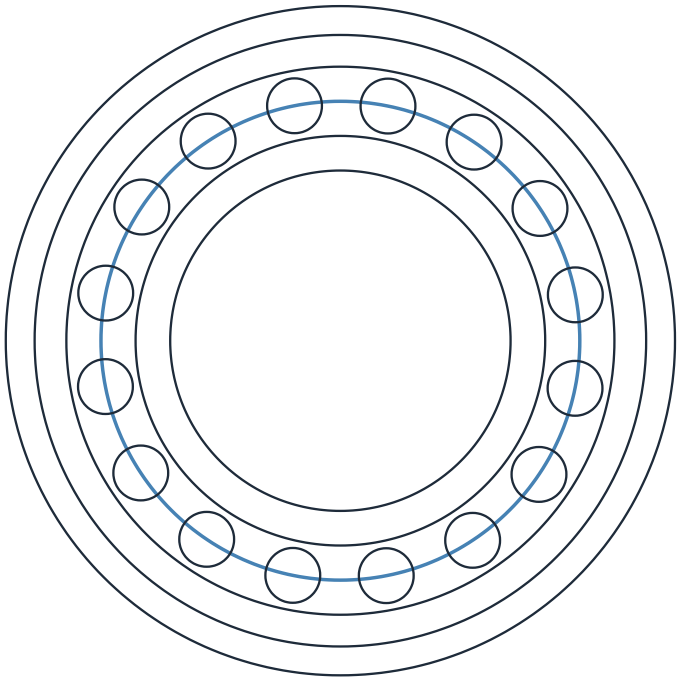


# TIMKEN

## Spherical Roller Bearing Catalog

### کاتالوگ رولبرینگ بشکه‌ای TIMKEN

استعلام قیمت و خرید بلبرینگ TIMKEN ←

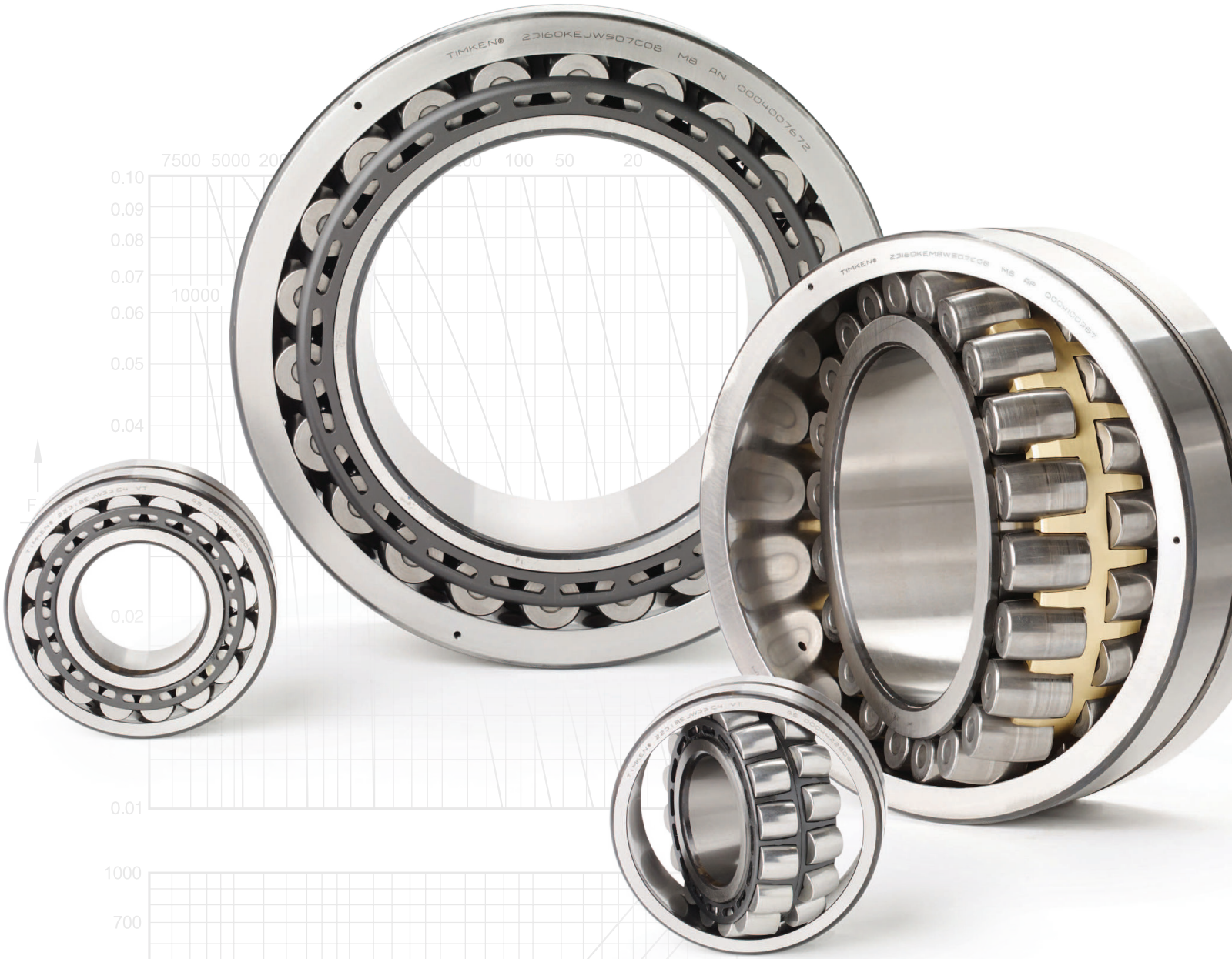
| BRAND<br>برند | ORIGIN<br>کشور سازنده | PRODUCTS<br>محصولات | PAGES<br>تعداد صفحات | LANGUAGE<br>زبان |
|---|---|---|---|---|
| TIMKEN | USA | Spherical roller bearings | 156 | English |

moharekcharkhesh.com
MoharekCharkhesh@proton.me

تأمین‌کننده تخصصی بلبرینگ و رولبرینگ
تهران، خیابان امیرکبیر، کوچه ناظم‌الاطبا شمالی، پاساژ تهران، طبقه سوم، پلاک ۱۴۲

021 3399 8121
021 3399 8100
0912 464 6470

TIMKEN



# TIMKEN® SPHERICAL ROLLER BEARING CATALOG

## ABOUT THE TIMKEN COMPANY

As a global leader in bearings and power transmission systems, Timken focuses on precise solution design, materials and craftsmanship to deliver reliable and efficient performance that improves productivity and uptime. Timken offers a full range of bearings, gear drives, automated lubrication systems, belts, chains, couplings and linear motion products along with rebuild and repair services. Timken applies its proven expertise in metallurgy, tribology and mechanical power transmission to create innovative approaches to customers' complex needs. Global availability of products and engineering talent, combined with exceptional service delivery across markets, makes Timken a preferred choice worldwide.

To view more Timken catalogs, go to **www.timken.com/catalogs** for interactive versions, or to download our catalog app to your smart phone or mobile device.



## SPHERICAL ROLLER BEARING CATALOG INDEX


INTRODUCTION . . . . . 2
HOW TO USE THIS CATALOG . . . . . 3
SHELF LIFE/STORAGE . . . . . 3
WARNINGS . . . . . 4

**ENGINEERING** . . . . . 5
Bearing Types and Cages . . . . . 6
Metric System Tolerances . . . . . 8
Mounting, Fitting, Setting and Installation . . . . . 11
Shaft and Housing Fits . . . . . 20
Operating Temperatures . . . . . 36
Heat Generation and Dissipation . . . . . 39
Torque . . . . . 40
Lubrication . . . . . 41

**SPHERICAL ROLLER BEARINGS** . . . . . 53
Nomenclature . . . . . 54
Modification Codes . . . . . 55
Spherical Roller Bearings . . . . . 56

**SPHERICAL ROLLER BEARING METRIC AND INCH ACCESSORIES** . . . . . 85
Nomenclature . . . . . 86
Accessories Prefixes and Suffixes . . . . . 87
Inch Sine Bar Gages . . . . . 88

METRIC ACCESSORIES
Metric Accessories Index . . . . . 89
Metric H Adapter Sleeves . . . . . 95
Metric HE Adapter Sleeves for Inch Shaft . . . . . 99
Metric HA Adapter Sleeves for Inch Shaft . . . . . 101
Metric OH Hydraulic Adapter Sleeves . . . . . 103
Metric AH Withdrawal Sleeves . . . . . 107
Metric AOH Hydraulic Withdrawal Sleeves . . . . . 112
Metric HMV Hydraulic Nuts . . . . . 117
Metric Locknuts . . . . . 121
Metric Lockwashers . . . . . 127
Metric Lockplates . . . . . 129

INCH ACCESSORIES
Inch Accessories – Pull-Type Sleeves . . . . . 131
Inch Accessories – Push-Type Sleeves . . . . . 140
Inch Accessories – Locknuts and Lockwashers . . . . . 144
Inch Accessories – Locknuts and Lockplates . . . . . 148
Inch HMVC Hydraulic Nuts . . . . . 152

# *TIMKEN® SPHERICAL ROLLER BEARINGS*

## HIGHER EFFICIENCY. BETTER PERFORMANCE. MORE PROFITABILITY.

From misalignment and contamination to extreme temperatures and high radial loads, Timken® spherical roller bearings can handle it all.

Our high-performance spherical roller bearings are engineered to excel in some of the toughest environments on earth. They can increase productivity and uptime in your equipment due to optimized internal geometry and higher capacity, resulting in longer bearing life. They also run cooler, resulting in extended lubrication life and reduced lubricant usage.

## ENGINEERED TO GIVE YOU MORE OF WHAT YOU NEED

We embarked on our spherical revolution for a single purpose: to make our spherical roller bearings better. Through continuous innovation, we applied more than 70 years of spherical roller bearing design, manufacturing and application knowledge to develop an enhanced bearing design that gives you more uptime, longer life and a lower cost of ownership.

With Timken spherical roller bearings, you gain:

- **Minimized wear.** Improved profiles reduce internal stresses and optimize load distribution.
- **Higher loads.** Improved internal geometry allows you to do more and operate with higher loads. They also result in 4% to 8% higher load ratings – or 14% to 29% longer predicted bearing life.
- **Improved lube film.** Enhanced surface finishes help improve lubrication film to avoid metal-to-metal contact, reduce friction and improve bearing life.
- **Tougher protection[1].** Hardened steel cages deliver greater fatigue strength, increased wear resistance and tougher protection against shock and acceleration.
- **Lower operating temperatures[1].** Rollers are guided by cage pockets – not a center guide ring – which eliminates a friction point, resulting in 4% to 10% less rotational torque and can lead to operating temperatures 5˚ C cooler, on average, than the competition.
- **Optimized efficiency.** Eliminating the center guide ring also reduces running torque up to 4%. Without a guide ring, less friction is created resulting in less energy needed to move the bearing and keep it moving.
- **Better contaminant purging for enhanced uptime.** Unique slots in the cage face improve oil flow and purge more contaminants from the bearing to help extend bearing life and equipment uptime.

[1]Only Timken offers these features as standard on its entire spherical roller bearing line.





# *HOW TO USE THIS CATALOG*

We designed this catalog to help you find the Timken bearings best suited to your equipment needs and specifications. Timken offers an extensive range of bearings and accessories in both imperial and metric sizes. For your convenience, size ranges are indicated in millimeters and inches. Contact your Timken engineer to learn more about our complete line for the special needs of your application.

This publication contains dimensions, tolerances and load ratings, as well as engineering sections describing mounting and fitting practices for shafts and housings, internal clearances, materials and other bearing features.

It provides valuable assistance in the initial consideration of the type and characteristics of the bearings that may best suit your particular needs.

ISO, as used in this publication, refers to the International Organization for Standardization and JIS refers to the Japanese Industrial Standards.

**Updates are made periodically to this catalog. Visit www.timken.com/catalogs for the most recent version of the Spherical Roller Bearing Catalog.**

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

To help you get the most value from our products, Timken provides guidelines for the shelf life of grease-lubricated ball and roller bearings, components and assemblies. Shelf life information is based on Timken and industry test data and experience.

## SHELF LIFE

Shelf life should be distinguished from lubricated bearing/component design life as follows:

Shelf life of the grease-lubricated bearing/component represents the period of time prior to use or installation.

The shelf life is a portion of the anticipated aggregate design life. It is impossible to accurately predict design life due to variations in lubricant bleed rates, oil migration, operating conditions, installation conditions, temperature, humidity and extended storage.

**TIMKEN IS NOT RESPONSIBLE FOR THE SHELF LIFE OF ANY BEARING/COMPONENT LUBRICATED BY ANOTHER PARTY.**

### European REACH compliance

Timken lubricants, greases and similar products sold in standalone containers or delivery systems are subject to the European REACH (Registration, Evaluation, Authorization and Restriction of CHemicals) directive. For import into the European Union, Timken can sell and provide only those lubricants and greases that are registered with ECHA (European CHemical Agency). For further information, please contact your Timken engineer.

## STORAGE

Timken suggests the following storage guidelines for our finished products (bearings, components and assemblies, referred to as "products"):

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

Due to the fact that Timken is not familiar with your particular storage conditions, we strongly suggest following these guidelines. However, you may be required by circumstances or applicable government requirements to adhere to stricter storage requirements.

Be careful in selecting lubrication, however, since different lubricants are often incompatible.

When you receive a bearing shipment, do not remove products from their packaging until they are ready for mounting so they do not become corroded or contaminated.

Store bearings and bearing housings in an appropriate atmosphere so they remain protected for the intended period.

## ⚠ WARNING

***Failure to observe the following warnings could create a risk of death or serious injury.***

Proper maintenance and handling practices are critical. Always follow installation instructions and maintain proper lubrication.

Never spin a bearing with compressed air. The components may be forcefully expelled.

Overheated bearings can ignite explosive atmospheres. Special care must be taken to properly select, install, maintain and lubricate mounted bearings that are used in or near atmospheres that may contain explosive levels of combustible gases or accumulations of dust such as grain, coal, or other combustible materials. Consult your equipment designer or supplier for installation and maintenance instructions.

If hammer and bar are used for installation or removal of a part, use a mild steel bar (e.g., 1010 or 1020 grade). Mild steel bars are less likely to cause release of high speed fragments from the hammer or bar or the part being installed or removed.

Ungrounded bearings can create static electricity that can ignite in an explosive atmosphere such as combustible gases or accumulations of dust such as grain, coal, or other combustible materials. Proper dissipation of such potential static electricity discharge must be assured to prevent any such explosion.

Below -40˚ C (-40˚ F), polymer housings may break. Select stainless or steel housings that operate to lower temperatures.

Tensile stresses can be very high in tightly fitted bearing components. Attempting to remove such components by cutting the inner ring may result in a sudden shattering of the component, causing fragments of metal to be forcefully expelled.

Always use properly guarded presses or bearing pullers to remove bearings from shafts, and always use suitable personal protective equipment, including safety glasses.

**For additional Timken product warnings, visit www.timken.com/warnings.**

## CAUTION

***Failure to observe the following cautions could result in property damage.***

The products cataloged are application specific. Any use in applications other than those intended could lead to equipment failure or to reduced equipment life.

Use of improper bearing fits may cause damage to equipment.

Do not use damaged mounted bearings.

Do not use damaged bearings. The use of a damaged bearing can result in equipment damage.

### *NOTE*

*Do not use excessive force when mounting or dismounting the unit.*

*Follow all tolerance, fit, and torque recommendations.*

*Always follow the Original Equipment Manufacturer's installation and maintenance guidelines.*

*Ensure proper alignment.*

*Never weld mounted units.*

*Do not heat components with an open flame.*

*Do not operate at bearing temperatures above 121° C (250° F).*

## DISCLAIMER

*This catalog is provided solely to give you analysis tools and data to assist you in your product selection. Product performance is affected by many factors beyond the control of Timken. Therefore, you must validate the suitability and feasibility of all product selections.*

*Timken products are sold subject to Timken terms and conditions of sale, which include our limited warranty and remedy. You can find these at https://www.timken.com/legal-notices/termsandconditionsofsale/.*

*Please consult with your Timken engineer for more information and assistance. Every reasonable effort has been made to ensure the accuracy of the information in this writing, but no liability is accepted for errors, omissions or for any other reason.*



# ENGINEERING

The following topics are covered within this engineering section:

- Spherical roller bearing design types.
- Cage design types.
- Fitting practice and mounting recommendations.
- Lubrication recommendations.

This engineering section is not intended to be comprehensive, but does serve as a useful guide in spherical roller bearing selection.

To view the complete engineering catalog, please visit www.timken.com. To order the catalog, please contact your Timken sales engineer and request a copy of the Timken Engineering Manual, order number 10424.

**ENGINEERING** . . . . . 5
Bearing Types and Cages . . . . . 6
Metric System Tolerances . . . . . 8
Mounting, Fitting, Setting and Installation . . . . . 11
Shaft and Housing Fits . . . . . 20
Operating Temperatures . . . . . 36
Heat Generation and Dissipation . . . . . 39
Torque . . . . . 40
Lubrication . . . . . 41



*To view more Timken catalogs, go to www.timken.com/catalogs for interactive versions, or to download a catalog app for your smart phone or mobile device scan the QR code or go to timkencatalogs.squawqr.com.*

# *RADIAL SPHERICAL ROLLER BEARING TYPES AND CAGES*

The principle styles of radial spherical roller bearings that Timken offers are:

- ≤600 mm outer diameter: EJ, EM and EMB
- >600 mm outer diameter: YMB, YMD and YP

Above suffixes correspond to different types of designs depending on a bearing size and geometry. Main differences are the cage type used in the assembly. Spherical roller bearings with an EJ cage suffix are fitted with a hardened stamped-steel cage. YM/EM/YMB and YMD suffixes are used with brass cage designs. YP is a pin-type cage specific for large diameter bearings.

The high performance Timken® EJ, EM and EMB bearings offer higher load ratings, increased thermal speed ratings and reduced operating temperatures compared to the previous offering.

In addition to these improvements, cage designs vary between the different styles as noted below. See the cage section for more details.

| Style | Cage Design |
|---|---|
| EJ | Land-riding steel cage; one per row |
| EM/YM | Roller-riding one-piece brass cage |
| EMB/YMB | Land-riding one-piece brass cage |
| YMD | Land-riding two-piece brass cage |
| YP | Steel pin-type cage |

Most Timken spherical roller bearings are available with a cylindrical bore as well as a tapered bore. Tapered bore bearing part numbers are designated with a K suffix.

A taper of 1:12 is standard except for 240, 241 and 242 series, which have a taper of 1:30.




**Fig. 1. Radial spherical roller bearings.**

## OPTIONAL FEATURES AVAILABLE WITH TIMKEN SPHERICAL ROLLER BEARINGS

### W33 lubrication groove and oil holes

A lubrication groove and three oil holes are provided in the bearing outer ring as standard. This is designated by the W33 suffix. It eliminates the expense of machining a channel in the housing bore for introducing lubricant to the bearing. This design feature allows the lubricant to flow between the roller paths, through a single lubrication fitting. The lubricant moves laterally outward from the center of the bearing, reaching all contact surfaces and flushing the bearing. To order, add the suffix W33 to the bearing number (e.g. 22216EW33).

### Bearings for vibratory applications

Timken offers specific spherical roller bearing designs for vibratory applications. They are designated by the W800 modification code and made to a C4 clearance. Specify W800 when ordering. This design provides:

- A lubrication groove on the outer ring with three lubrication holes to facilitate bearing lubrication.
- Reduced bore and outside diameter tolerances.
- Radial internal clearance is made in upper two-thirds of C4 clearance range.

These bearings are available with either a cylindrical or tapered bore. Other optional features are available. See page 55, table 27 or consult with your Timken sales engineer.

## CAGES

Cages (also referred to as rolling element retainers) serve several purposes in the proper operation of a rolling element bearing. Cages separate the rolling elements and prevent rolling element on rolling element contact and wear. Cages align the rolling elements on the inner ring to prevent rolling element sliding, skidding, and skewing to facilitate true rolling motion. For handling purposes, cages retain the rolling elements on the inner ring assembly to allow for bearing installation. In some instances, cages also improve flow of the lubricant to the bearing inner ring raceways.

The following sections discuss the common types of cages used for spherical roller bearings. The basic design geometry, material, and manufacture are discussed for each cage type.

## STAMPED-STEEL CAGES

Timken® EJ bearings incorporate a unique stamped-steel cage design as shown in fig. 1.

The EJ design includes two independent cages (fig. 2), one for each row of rollers, which are assembled into an individual bearing. This feature allows each path of cage and rollers to operate independently, and prevents the cage from bending.

This cage is guided on the inner ring and runs above pitch. Each cage is surface hardened (nitrided) to provide improved wear resistance as well as additional strength to allow the bearing to operate in even the most severe environment. Face slots have been designed for improved lubrication flow. This can result in a lower operating temperature and longer bearing life.

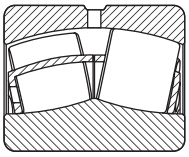


**Fig. 2. EJ bearings.**



**Fig. 3. EJ steel cage.**



**Fig. 5. EM/YM**
**One-piece, machined-brass, roller-riding, finger-type cage.**



**Fig. 6. EMB/YMB**
**One-piece, machined-brass, land-riding, finger-type cage.**



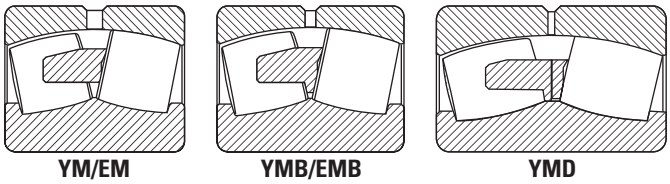
**Fig. 7. YMD**
**Split, machined-brass, land-riding, finger-type cage.**

## MACHINED-BRASS CAGE

EM, EMB, YM, YMB and YMD bearing cages are precision-machined from brass as shown in figs. 4-7. Their rugged construction provides an advantage in more severe applications. The open-end, finger-type design permits lubricant to reach all surfaces easily, ensuring ample lubrication and a cooler running bearing.

EM, EMB, YM and YMB are all one-piece designs that are differentiated by their means of guidance within the bearing. With EM and YM designs, the cage mass is low and the rollers are used for guidance, while EMB and YMB cage designs typically have more mass and guide on the inner ring.

YMD cages are similar to YMB, except they have a two-piece design. Two independent cages, one for each row of rollers, are assembled into an individual bearing. This allows each row of rollers to rotate independently when required by the application, and minimizes bending of the cage fingers.



**YM/EM** **YMB/EMB** **YMD**

**Fig. 4. Machined cages.**

## PIN-TYPE CAGES

Large diameter spherical roller bearings can be supplied with these cages. Pin-type cages, one for each row of rollers, consist of two rings and a series of pins running through the center of the rolling element. The design of pin-type cages permits an increased roller complement, giving the bearing enhanced load-carrying ability. Consult your Timken sales engineer for suggestions on the application of this cage.

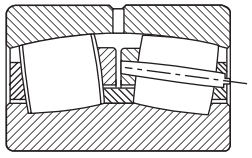


**Fig. 8. Pin-type cage.**

# *METRIC SYSTEM TOLERANCES*
## SPHERICAL ROLLER BEARINGS

Spherical roller bearings are manufactured to a number of specifications, with each having classes that define tolerances on dimensions such as bore, O.D., width and runout. Metric bearings have been manufactured to corresponding standard negative tolerances.

Table 1 summarizes the different specifications and classes for spherical roller bearings. For the purposes of this catalog, ISO specifications are shown for spherical roller bearings.

Boundary dimension tolerances for spherical roller bearing usage are listed in the following tables. These tolerances are provided for use in selecting bearings for general applications, in conjunction with the bearing mounting and fitting practices offered in later sections.

**TABLE 1. BEARING SPECIFICATIONS AND CLASSES**

| System | Specification | Bearing Type | Standard Bearing Class | | Precision Bearing Class | | | |
|---|---|---|---|---|---|---|---|---|
| Metric | ISO/DIN | All Bearing Types | P0 | P6 | P5 | P4 | P2 | --- |
| Imperial | ABMA | Spherical | RBEC 1 | RBEC 3 | RBEC 5 | RBEC 7 | RBEC 9 | --- |

Standard Timken radial spherical roller bearings maintain normal tolerances according to ISO 492. Tables 2 and 3 list the critical tolerances for these bearing types. For applications where running tolerance is critical, P6 or P5 tolerances are recommended.

The term deviation is defined as the difference between a single ring dimension and the nominal dimension. For metric tolerances, the nominal dimension is at a +0 mm (0 inch) tolerance. The deviation is the tolerance range for the listed parameter. Variation is defined as the difference between the largest and smallest measurements of a given parameter for an individual ring.

**TABLE 2. SPHERICAL ROLLER BEARING TOLERANCES – INNER RING (METRIC)[1]**

| Bearing Bore | | Bore Deviation[2] $\Delta_{dmp}$ | | | Width Variation $V_{BS}$ | | | Radial Runout $K_{ia}$ | | | Face Runout with Bore $S_d$ | Axial Runout $S_{ia}$ | Width Deviation Inner & Outer Rings[2] $\Delta_{Bs}$ and $\Delta_{Cs}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Over | Incl. | P0 | P6 | P5 | P0 | P6 | P5 | P0 | P6 | P5 | P5 | P5 | P0, P6 | P5 |
| **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. |
| **2.5000** | **10.000** | **-0.008** | **-0.007** | **-0.005** | **0.015** | **0.015** | **0.005** | **0.010** | **0.006** | **0.004** | **0.007** | **0.007** | **-0.120** | **-0.040** |
| 0.0984 | 0.3937 | -0.0003 | -0.0003 | -0.0002 | 0.0006 | 0.0006 | 0.0002 | 0.0004 | 0.0002 | 0.0002 | 0.0003 | 0.0003 | -0.0047 | -0.0157 |
| **10.000** | **18.000** | **-0.008** | **-0.007** | **-0.005** | **0.020** | **0.020** | **0.005** | **0.010** | **0.007** | **0.004** | **0.007** | **0.007** | **-0.120** | **-0.080** |
| 0.3937 | 0.7087 | -0.0003 | -0.0003 | -0.0002 | 0.0008 | 0.0008 | 0.0002 | 0.0004 | 0.0003 | 0.0002 | 0.0003 | 0.0003 | -0.0047 | -0.0031 |
| **18.000** | **30.000** | **-0.010** | **-0.008** | **-0.006** | **0.020** | **0.020** | **0.005** | **0.013** | **0.008** | **0.004** | **0.008** | **0.008** | **-0.120** | **-0.120** |
| 0.7087 | 1.1811 | -0.0004 | -0.0003 | -0.0002 | 0.0008 | 0.0008 | 0.0002 | 0.0005 | 0.0003 | 0.0002 | 0.0003 | 0.0003 | -0.0047 | -0.0047 |
| **30.000** | **50.000** | **-0.012** | **-0.010** | **-0.008** | **0.020** | **0.020** | **0.005** | **0.015** | **0.010** | **0.005** | **0.008** | **0.008** | **-0.120** | **-0.120** |
| 1.1811 | 1.9685 | -0.0005 | -0.0004 | -0.0003 | 0.0008 | 0.0008 | 0.0002 | 0.0006 | 0.0004 | 0.0002 | 0.0003 | 0.0003 | -0.0047 | -0.0047 |
| **50.000** | **80.000** | **-0.015** | **-0.012** | **-0.009** | **0.025** | **0.025** | **0.006** | **0.020** | **0.010** | **0.005** | **0.008** | **0.008** | **-0.150** | **-0.150** |
| 1.9685 | 3.1496 | -0.0006 | -0.0005 | -0.0004 | 0.0010 | 0.0010 | 0.0002 | 0.0008 | 0.0004 | 0.0002 | 0.0003 | 0.0003 | -0.0059 | -0.0059 |
| **80.000** | **120.000** | **-0.020** | **-0.015** | **-0.010** | **0.025** | **0.025** | **0.007** | **0.025** | **0.013** | **0.006** | **0.009** | **0.009** | **-0.200** | **-0.200** |
| 3.1496 | 4.7244 | -0.0008 | -0.0006 | -0.0004 | 0.0010 | 0.0010 | 0.0003 | 0.0010 | 0.0005 | 0.0002 | 0.0004 | 0.0004 | -0.0079 | -0.0079 |
| **120.000** | **150.000** | **-0.025** | **-0.018** | **-0.013** | **0.030** | **0.030** | **0.008** | **0.030** | **0.018** | **0.008** | **0.010** | **0.010** | **-0.250** | **-0.250** |
| 4.7244 | 5.9055 | -0.0010 | -0.0007 | -0.0005 | 0.0012 | 0.0012 | 0.0003 | 0.0012 | 0.0007 | 0.0003 | 0.0004 | 0.0004 | -0.0098 | -0.0098 |
| **150.000** | **180.000** | **-0.025** | **-0.018** | **-0.013** | **0.030** | **0.030** | **0.008** | **0.030** | **0.018** | **0.008** | **0.010** | **0.010** | **-0.250** | **-0.250** |
| 5.9055 | 7.0866 | -0.0010 | -0.0007 | -0.0005 | 0.0012 | 0.0012 | 0.0003 | 0.0012 | 0.0007 | 0.0003 | 0.0004 | 0.0004 | -0.0098 | -0.0098 |
| **180.000** | **250.000** | **-0.030** | **-0.022** | **-0.015** | **0.030** | **0.030** | **0.010** | **0.040** | **0.020** | **0.010** | **0.011** | **0.013** | **-0.300** | **-0.300** |
| 7.0866 | 9.8425 | -0.0012 | -0.0009 | -0.0006 | 0.0012 | 0.0012 | 0.0004 | 0.0016 | 0.0008 | 0.0004 | 0.0004 | 0.0005 | -0.0018 | -0.0018 |
| **250.000** | **315.000** | **-0.035** | **-0.025** | **-0.018** | **0.035** | **0.035** | **0.013** | **0.050** | **0.025** | **0.013** | **0.013** | **0.015** | **-0.350** | **-0.350** |
| 9.8425 | 12.4016 | -0.0014 | -0.0010 | -0.0007 | 0.0014 | 0.0014 | 0.0005 | 0.0020 | 0.0010 | 0.0005 | 0.0005 | 0.0006 | -0.0138 | -0.0138 |
| **315.000** | **400.000** | **-0.040** | **-0.030** | **-0.023** | **0.040** | **0.040** | **0.015** | **0.060** | **0.030** | **0.015** | **0.015** | **0.020** | **-0.400** | **-0.400** |
| 12.4016 | 15.7480 | -0.0016 | -0.0012 | -0.0009 | 0.0016 | 0.0016 | 0.0006 | 0.0024 | 0.0012 | 0.0006 | 0.0006 | 0.0008 | -0.0157 | -0.0157 |
| **400.000** | **500.000** | **-0.045** | **-0.035** | – | **0.050** | **0.045** | – | **0.065** | **0.035** | – | – | – | **-0.450** | – |
| 15.7480 | 19.6850 | -0.0018 | -0.0014 | – | 0.0020 | 0.0018 | – | 0.0026 | 0.0014 | – | – | – | -0.0177 | – |
| **500.000** | **630.000** | **-0.050** | **-0.040** | – | **0.060** | **0.050** | – | **0.070** | **0.040** | – | – | – | **-0.500** | – |
| 19.6850 | 24.8031 | -0.0020 | -0.0016 | – | 0.0024 | 0.0020 | – | 0.0028 | 0.0016 | – | – | – | -0.0197 | – |
| **630.000** | **800.000** | **-0.075** | – | – | **0.070** | – | – | **0.080** | – | – | – | – | **-0.750** | – |
| 24.8031 | 31.4961 | -0.0030 | – | – | 0.0028 | – | – | 0.0031 | – | – | – | – | -0.0295 | – |

[1]Symbol definitions are found on pages 32-33 of the Timken Engineering Manual (order number 10424).
[2]Tolerance range is from +0 to value listed.

## TABLE 3. SPHERICAL ROLLER BEARING TOLERANCES – OUTER RING (METRIC)[1]

| Bearing O.D. | | Outside Deviation[2] $\Delta_{Dmp}$ | | | Width Variation $V_{CS}$ | | Radial Runout $K_{ea}$ | | | Axial Runout $S_{ea}$ | Outside Diameter Runout With Face $S_D$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Over | Incl. | P0 | P6 | P5 | P0 | P6 | P0 | P6 | P5 | P5 | P5 |
| **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. |
| **0.000** 0.0000 | **18.000** 0.7087 | **-0.008** -0.0003 | **-0.007** -0.0003 | **-0.005** -0.0002 | **0.015** 0.0006 | **0.005** 0.0002 | **0.015** 0.0006 | **0.008** 0.0003 | **0.005** 0.0002 | **0.008** 0.0003 | **0.008** 0.0003 |
| **18.000** 0.7087 | **30.000** 1.1811 | **-0.009** -0.0004 | **-0.008** -0.0003 | **-0.006** -0.00024 | **0.020** 0.0008 | **0.005** 0.0002 | **0.015** 0.0006 | **0.009** 0.0004 | **0.006** 0.00024 | **0.008** 0.0003 | **0.008** 0.0003 |
| **30.000** 1.1811 | **50.000** 1.9685 | **-0.011** -0.0004 | **-0.009** -0.0004 | **-0.007** -0.0003 | **0.020** 0.0008 | **0.005** 0.0002 | **0.020** 0.0008 | **0.010** 0.0004 | **0.007** 0.0003 | **0.008** 0.0003 | **0.008** 0.0003 |
| **50.000** 1.9685 | **80.000** 3.1496 | **-0.013** -0.0005 | **-0.011** -0.0004 | **-0.009** -0.0004 | **0.025** 0.0010 | **0.006** 0.00024 | **0.025** 0.0010 | **0.013** 0.0005 | **0.008** 0.0003 | **0.010** 0.0004 | **0.008** 0.0003 |
| **80.000** 3.1496 | **120.000** 4.7244 | **-0.015** -0.0006 | **-0.013** -0.0005 | **-0.010** -0.0004 | **0.025** 0.0010 | **0.008** 0.0003 | **0.035** 0.0014 | **0.018** 0.0007 | **0.010** 0.0004 | **0.011** 0.0004 | **0.009** 0.0004 |
| **120.000** 4.7244 | **150.000** 5.9055 | **-0.018** -0.0007 | **-0.015** -0.0006 | **-0.011** -0.0004 | **0.030** 0.0012 | **0.008** 0.0003 | **0.040** 0.0016 | **0.020** 0.0008 | **0.011** 0.0004 | **0.013** 0.0005 | **0.010** 0.0004 |
| **150.000** 5.9055 | **180.000** 7.0866 | **-0.025** -0.0010 | **-0.018** -0.0007 | **-0.013** -0.0005 | **0.030** 0.0012 | **0.008** 0.0003 | **0.045** 0.0018 | **0.023** 0.0009 | **0.013** 0.0005 | **0.014** 0.0006 | **0.010** 0.0004 |
| **180.000** 7.0866 | **250.000** 9.8425 | **-0.030** -0.0012 | **-0.020** -0.0008 | **-0.015** -0.0006 | **0.030** 0.0012 | **0.010** 0.0004 | **0.050** 0.0020 | **0.025** 0.0010 | **0.015** 0.0006 | **0.015** 0.0006 | **0.011** 0.0004 |
| **250.000** 9.8425 | **315.000** 12.4016 | **-0.035** -0.0014 | **-0.025** -0.0010 | **-0.018** -0.0007 | **0.035** 0.0014 | **0.011** 0.0004 | **0.060** 0.0024 | **0.030** 0.0012 | **0.018** 0.0007 | **0.018** 0.0007 | **0.013** 0.0005 |
| **315.000** 12.4016 | **400.000** 15.7480 | **-0.040** -0.0016 | **-0.028** -0.0011 | **-0.020** -0.0008 | **0.040** 0.0016 | **0.013** 0.0005 | **0.070** 0.0028 | **0.035** 0.0014 | **0.020** 0.0008 | **0.020** 0.0008 | **0.013** 0.0005 |
| **400.000** 15.7480 | **500.000** 19.6850 | **-0.045** -0.0018 | **-0.033** -0.0013 | **-0.023** -0.0009 | **0.045** 0.0018 | **0.015** 0.0006 | **0.080** 0.0031 | **0.040** 0.0016 | **0.023** 0.0009 | **0.023** 0.0009 | **0.015** 0.0006 |
| **500.000** 19.6850 | **630.000** 24.8031 | **-0.050** -0.0020 | **-0.038** -0.0015 | **-0.028** -0.0011 | **0.050** 0.0020 | **0.018** 0.0007 | **0.100** 0.0039 | **0.050** 0.0020 | **0.025** 0.0010 | **0.025** 0.0010 | **0.018** 0.0007 |
| **630.000** 24.8031 | **800.000** 31.4961 | **-0.075** -0.0030 | **-0.045** -0.0018 | **-0.035** -0.0014 | – – | **0.020** 0.0008 | **0.120** 0.0047 | **0.060** 0.0024 | **0.030** 0.0012 | **0.030** 0.0012 | **0.020** 0.0008 |
| **800.000** 31.4961 | **1000.000** 39.3701 | **-0.100** -0.0040 | **-0.060** -0.0024 | – – | – – | – – | **0.140** 0.0055 | **0.075** 0.0030 | – – | – – | – – |
| **1000.000** 39.3701 | **1250.000** 49.2126 | **-0.125** -0.0050 | – – | – – | – – | – – | **0.160** 0.0063 | – – | – – | – – | – – |

[1]Symbol definitions are found on pages 32-33 of the Timken Engineering Manual (order number 10424).
[2]Tolerance range is from +0 to value listed.

# *SPHERICAL ROLLER BEARING MOUNTING, FITTING, SETTING AND INSTALLATION*

## MOUNTING

Spherical roller bearings can be mounted individually, but most often are mounted in combination with another spherical roller bearing, cylindrical roller bearing, or Timken® ADAPT™ bearing.

With spherical roller bearings, typically one bearing is fixed axially and the other is mounted with loose fits and axial space. This allows movement or float for environmental conditions such as uneven thermal growth between shaft and housing.

Fig. 9 shows a typical gearbox application using two spherical roller bearings where one bearing is free to float and the other bearing is fixed axially.

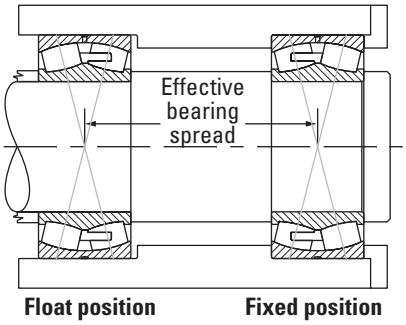



**Fig. 9. Spherical roller bearing direct mounting.**

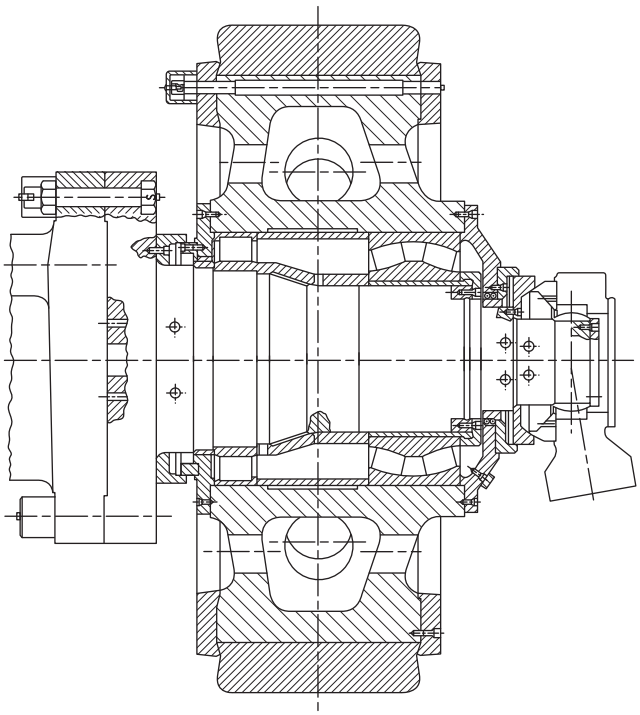


**Fig. 10. Pulverizer wheel assembly.**

Fig. 10 shows a pulverizer wheel assembly where a double-row spherical roller bearing is mounted in combination with a cylindrical roller bearing. In this application, the cylindrical roller bearing allows the shaft to float relative to the housing.

## FITTING PRACTICE

Tables 6-12 on pages 20-35 list the recommended fitting practice for spherical roller bearings. The tables assume:

- The bearing is of normal precision.
- The housing is thick and made from steel or cast iron.
- The shaft is solid and made from steel.
- The bearing seats are ground or accurately turned to less than approximately 1.6 Ra finish.

The suggested fit symbols are in accordance with ISO 286. For help with recommended fitting practice, contact your Timken sales engineer.

As a general guideline, rotating inner rings should be applied with an interference fit. Loose fits may permit the inner rings to creep or turn, and wear the shaft and the backing shoulder. This wear may result in excessive bearing looseness and possible bearing and shaft damage. Additionally, abrasive metal particles resulting from creep or turning may enter into the bearing and cause damage and vibration.

Stationary inner-ring fitting practice depends on the loading of the application. The load conditions and bearing envelope dimensions should be used to select the suggested shaft fit from the tables.

Similarly, rotating outer-ring applications should use an interference fit between the outer ring and housing.

Stationary outer rings are generally mounted with loose fits to permit assembly and disassembly. The loose fit also permits axial movement when a spherical bearing is mounted in the float position.

Thin-walled housings, light-alloy housings, or hollow shafts must use press fits tighter than those required for thick-walled housings, steel, or cast iron housings or solid shafts. Tighter fits also are required when mounting the bearing on relatively rough, or unground surfaces.

**⚠ WARNING**

***Failure to observe the following warnings could create a risk of death or serious injury.***

Proper maintenance and handling practices are critical. Always follow installation instructions and maintain proper lubrication.

Never spin a bearing with compressed air. The rollers may be forcefully expelled.

## TAPERED BORE DESIGNS

Typically, tapered bore bearings are selected to simplify shaft mounting and dismounting. Since the spherical roller bearing is not separable, mounting can be simplified by use of an adapter sleeve with a cylindrical bore and tapered O.D. A tapered bore roller bearing also can be mounted directly onto a tapered shaft.

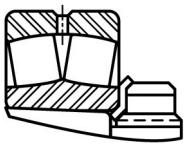


**Fig. 11. Mounting with tapered shaft**

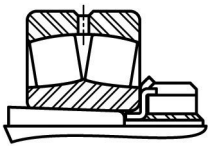


**Fig. 12. Mounting with adapter sleeve**

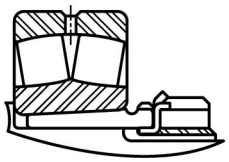


**Fig. 13. Mounting with withdrawal sleeve**

Bearings with a tapered bore typically require a tighter fit on the shaft than bearings with a cylindrical bore. A locknut is typically used to drive the inner ring up a tapered shaft sleeve. The locknut position is then secured by use of a lockwasher or lockplate. Timken offers a wide range of accessories to ease the assembly of spherical roller bearings with a tapered bore (see page 15). For approximating the clearance loss for axial drive-up, an 85 percent radial loss approximation can be used. That is, the radial clearance loss per axial drive-up can roughly be approximated as 71 µm/mm for a 1:12 tapered bore and 28 µm/mm for a 1:30 tapered bore. Table 5 on page 14 provides a direct relation between suggested RIC (radial internal clearance) reduction due to installation and the corresponding axial displacement of the inner ring.

# SETTING

To achieve appropriate operation clearance, attention must be paid to the effects that fitting practice and thermal gradients have within the bearing.

## FITTING PRACTICE

- An interference fit between the inner ring and a solid steel shaft will reduce the radial clearance within the bearing by approximately 80 percent of the fit.
- Interference fits between the outer ring and steel or cast iron housing will reduce radial clearance by approximately 60 percent.
- Spherical roller bearings with a tapered bore require a slightly greater interference fit on the shaft than a cylindrical bore bearing.

NOTE

*It is critical to select the RIC that allows for this reduction.*

## THERMAL GRADIENTS

- Thermal gradients within the bearing are primarily a function of the bearing rotational speed. As speed increases, thermal gradients increase, thermal growth occurs and the radial clearance is reduced.
- As a rule of thumb, radial clearance should be increased for speeds in excess of 70 percent of the thermal reference speed.

For help selecting the correct radial internal clearance for your application, consult with your Timken sales engineer.

Radial internal clearance tolerances are listed in tables 4 and 5 for spherical roller bearings.

Spherical roller bearings are ordered with a specified standard or non-standard radial internal clearance value. The standard radial internal clearances are designated as C2, C0 (normal), C3, C4 or C5 and are in accordance with ISO 5753. C2 represents the minimum clearance and C5 represents the maximum clearance. Non-standardized values also are available by special request.

The clearance required for a given application depends on the desired operating precision, the rotational speed of the bearing, and the fitting practice used. Most applications use a normal or C3 clearance. Typically, larger clearance reduces the operating load zone of the bearing, increases the maximum roller load, and reduces the bearing's expected life. However, a spherical roller bearing that has been put into a preload condition can experience premature bearing damage caused by excessive heat generation and/or material fatigue. As a general guideline, spherical roller bearings should not operate in a preloaded condition without special lubrication systems.

## TABLE 4. RADIAL INTERNAL CLEARANCE LIMITS – SPHERICAL ROLLER BEARINGS – CYLINDRICAL BORE

| Bore (Nominal) | | Radial Internal Clearance Prior To Mounting | | | | | | Suggested Reduction of RIC Due to Installation | | Suggested RIC After Installation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Normal CO | | C4 | | | | | |
| | | | Min. | Max. | Min. | Max. | | | | |
| | | C2 | | C3 | | C5 | | | | |
| Over | Incl. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min |
| **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. |
| **20** 0.9449 | **30** 1.1811 | **0.015** 0.0006 | **0.025** 0.0010 | **0.040** 0.0016 | **0.055** 0.0022 | **0.075** 0.0030 | **0.095** 0.0037 | **0.015** 0.0006 | **0.020** 0.0008 | **0.015** 0.0006 |
| **30** 1.1811 | **40** 1.5748 | **0.015** 0.0006 | **0.030** 0.0012 | **0.045** 0.0018 | **0.060** 0.0024 | **0.080** 0.0031 | **0.100** 0.0039 | **0.020** 0.0008 | **0.025** 0.0010 | **0.015** 0.0006 |
| **40** 1.5748 | **50** 1.9685 | **0.020** 0.0008 | **0.035** 0.0014 | **0.055** 0.0022 | **0.075** 0.0030 | **0.100** 0.0039 | **0.125** 0.0049 | **0.025** 0.0010 | **0.030** 0.0012 | **0.020** 0.0008 |
| **50** 1.9685 | **65** 2.5591 | **0.020** 0.0008 | **0.040** 0.0016 | **0.065** 0.0026 | **0.090** 0.0035 | **0.120** 0.0047 | **0.150** 0.0059 | **0.030** 0.0012 | **0.038** 0.0015 | **0.025** 0.0010 |
| **65** 2.5591 | **80** 3.1496 | **0.030** 0.0012 | **0.050** 0.0020 | **0.080** 0.0031 | **0.110** 0.0043 | **0.145** 0.0057 | **0.180** 0.0071 | **0.038** 0.0015 | **0.051** 0.0020 | **0.025** 0.0010 |
| **80** 3.1496 | **100** 3.9370 | **0.035** 0.0014 | **0.060** 0.0024 | **0.100** 0.0039 | **0.135** 0.0053 | **0.180** 0.0071 | **0.225** 0.0089 | **0.046** 0.0018 | **0.064** 0.0025 | **0.036** 0.0014 |
| **100** 3.9370 | **120** 4.7244 | **0.040** 0.0016 | **0.075** 0.0030 | **0.120** 0.0047 | **0.160** 0.0063 | **0.210** 0.0083 | **0.260** 0.0102 | **0.051** 0.0020 | **0.071** 0.0028 | **0.051** 0.0020 |
| **120** 4.7244 | **140** 5.5118 | **0.050** 0.0020 | **0.095** 0.0037 | **0.145** 0.0057 | **0.190** 0.0075 | **0.240** 0.0094 | **0.300** 0.0118 | **0.064** 0.0025 | **0.089** 0.0035 | **0.056** 0.0022 |
| **140** 5.5118 | **160** 6.2992 | **0.060** 0.0024 | **0.110** 0.0043 | **0.170** 0.0067 | **0.220** 0.0087 | **0.280** 0.0110 | **0.350** 0.0138 | **0.076** 0.0030 | **0.102** 0.0040 | **0.056** 0.0022 |
| **160** 6.2992 | **180** 7.0866 | **0.065** 0.0026 | **0.120** 0.0047 | **0.180** 0.0071 | **0.240** 0.0094 | **0.310** 0.0122 | **0.390** 0.0154 | **0.076** 0.0030 | **0.114** 0.0045 | **0.061** 0.0024 |
| **180** 7.0866 | **200** 7.8740 | **0.070** 0.0028 | **0.130** 0.0051 | **0.200** 0.0079 | **0.260** 0.0102 | **0.340** 0.0134 | **0.430** 0.0169 | **0.089** 0.0035 | **0.127** 0.0050 | **0.071** 0.0028 |
| **200** 7.8740 | **225** 8.8582 | **0.080** 0.0031 | **0.140** 0.0055 | **0.220** 0.0087 | **0.290** 0.0114 | **0.380** 0.0150 | **0.470** 0.0185 | **0.102** 0.0040 | **0.140** 0.0055 | **0.076** 0.0030 |
| **225** 8.8582 | **250** 9.8425 | **0.090** 0.0035 | **0.150** 0.0059 | **0.240** 0.0094 | **0.320** 0.0126 | **0.420** 0.0165 | **0.520** 0.0205 | **0.114** 0.0045 | **0.152** 0.0060 | **0.089** 0.0035 |
| **250** 9.8425 | **280** 11.0236 | **0.100** 0.0039 | **0.170** 0.0067 | **0.260** 0.0102 | **0.350** 0.0138 | **0.460** 0.0181 | **0.570** 0.0224 | **0.114** 0.0045 | **0.165** 0.0065 | **0.102** 0.0040 |
| **280** 11.0236 | **315** 12.4016 | **0.110** 0.0043 | **0.190** 0.0075 | **0.280** 0.0110 | **0.370** 0.0146 | **0.500** 0.0197 | **0.630** 0.0248 | **0.127** 0.0050 | **0.178** 0.0070 | **0.102** 0.0040 |
| **315** 12.4016 | **355** 13.9764 | **0.120** 0.0047 | **0.200** 0.0079 | **0.310** 0.0122 | **0.410** 0.0161 | **0.550** 0.0217 | **0.690** 0.0272 | **0.140** 0.0055 | **0.190** 0.0075 | **0.114** 0.0045 |
| **355** 13.9764 | **400** 15.7480 | **0.130** 0.0051 | **0.220** 0.0087 | **0.340** 0.0134 | **0.450** 0.0177 | **0.600** 0.0236 | **0.750** 0.0295 | **0.152** 0.0060 | **0.203** 0.0080 | **0.127** 0.0050 |
| **400** 15.7480 | **450** 17.7165 | **0.140** 0.0055 | **0.240** 0.0094 | **0.370** 0.0146 | **0.500** 0.0197 | **0.660** 0.026 | **0.820** 0.0323 | **0.165** 0.0065 | **0.216** 0.0085 | **0.152** 0.0060 |
| **450** 17.7165 | **500** 19.6850 | **0.140** 0.0055 | **0.260** 0.0102 | **0.410** 0.0161 | **0.550** 0.0217 | **0.720** 0.0283 | **0.900** 0.0354 | **0.178** 0.0070 | **0.229** 0.0090 | **0.165** 0.0065 |
| **500** 19.6850 | **560** 22.0472 | **0.150** 0.0059 | **0.280** 0.0110 | **0.440** 0.0173 | **0.600** 0.0236 | **0.780** 0.0307 | **1.000** 0.0394 | **0.203** 0.0080 | **0.254** 0.0100 | **0.178** 0.0070 |
| **560** 22.0472 | **630** 24.8031 | **0.170** 0.0067 | **0.310** 0.0122 | **0.480** 0.0189 | **0.650** 0.0256 | **0.850** 0.0335 | **1.100** 0.0433 | **0.229** 0.0090 | **0.279** 0.0110 | **0.203** 0.0080 |
| **630** 24.8031 | **710** 27.9528 | **0.190** 0.0075 | **0.350** 0.0138 | **0.530** 0.0209 | **0.700** 0.0276 | **0.920** 0.0362 | **1.190** 0.0469 | **0.254** 0.0100 | **0.305** 0.0120 | **0.203** 0.080 |
| **710** 27.9528 | **800** 31.4961 | **0.210** 0.0083 | **0.390** 0.0154 | **0.580** 0.0228 | **0.770** 0.0303 | **1.010** 0.0398 | **1.300** 0.0512 | **0279** 0.0110 | **0.356** 0.0140 | **0.229** 0.0900 |
| **800** 31.4961 | **900** 35.4331 | **0.230** 0.0091 | **0.430** 0.0169 | **0.650** 0.0256 | **0.860** 0.0339 | **1.120** 0.0441 | **1.440** 0.0567 | **0305** 0.0120 | **0.381** 0.0150 | **0.252** 0.0100 |
| **900** 35.4331 | **1000** 39.3701 | **0.260** 0.0102 | **0.480** 0.0189 | **0.710** 0.0280 | **0.930** 0.0366 | **1.220** 0.0480 | **1.570** 0.0618 | **0356** 0.0140 | **0.432** 0.0170 | **0.279** 0.0110 |
| **1000** 39.3701 | **1120** 44.0950 | **0.290** 0.0114 | **0.530** 0.0209 | **0.780** 0.0307 | **1.020** 0.0402 | **1.330** 0.0524 | **1.720** 0.0677 | **0.400** 0.0160 | **0.480** 0.0190 | **0.280** 0.0110 |
| **1120** 44.0950 | **1250** 49.2130 | **0.320** 0.0126 | **0.580** 0.0228 | **0.860** 0.0339 | **1.120** 0.0441 | **1.460** 0.0575 | **1.870** 0.0736 | **0.430** 0.0170 | **0.500** 0.0200 | **0.330** 0.0130 |

## TABLE 5. RADIAL INTERNAL CLEARANCE LIMITS – SPHERICAL ROLLER BEARINGS – TAPERED BORE

| Bore (Nominal) | | Radial Internal Clearance Prior To Mounting | | | | | | Suggested Reduction of RIC Due to Installation | | Axial Displacement of Inner Ring for RIC Reduction – Tapered Shaft[1][2] | | | | Minimum Permissible RIC After Installation[1] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C2 | | Normal CO | | C4 | | | | 1:12 Taper | | 1:30 Taper | | | | |
| | | | | Min. | Max. | Min. | Max. | | | | | | | | | |
| Over | Incl. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | CO | C3 | C4 |
| **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. |
| **20** | **30** | **0.020** | **0.030** | **0.040** | **0.055** | **0.075** | **0.095** | **0.015** | **0.020** | **0.230** | **0.300** | – | – | **0.015** | **0.025** | **0.040** |
| 0.9449 | 1.1811 | 0.0008 | 0.0012 | 0.0016 | 0.0022 | 0.0030 | 0.0037 | 0.0006 | 0.0008 | 0.0091 | 0.0118 | – | – | 0.0006 | 0.0010 | 0.0016 |
| **30** | **40** | **0.025** | **0.035** | **0.050** | **0.065** | **0.085** | **0.105** | **0.020** | **0.025** | **0.300** | **0.380** | – | – | **0.015** | **0.025** | **0.040** |
| 1.1811 | 1.5748 | 0.0010 | 0.0014 | 0.0020 | 0.0026 | 0.0033 | 0.0041 | 0.0008 | 0.0010 | 0.0118 | 0.0150 | – | – | 0.0006 | 0.0010 | 0.0016 |
| **40** | **50** | **0.030** | **0.045** | **0.060** | **0.080** | **0.100** | **0.130** | **0.025** | **0.030** | **0.380** | **0.460** | – | – | **0.02** | **0.030** | **0.050** |
| 1.5748 | 1.9685 | 0.0012 | 0.0018 | 0.0024 | 0.0031 | 0.0039 | 0.0051 | 0.0010 | 0.0012 | 0.0150 | 0.0181 | – | – | 0.0008 | 0.0012 | 0.0020 |
| **50** | **65** | **0.040** | **0.055** | **0.075** | **0.095** | **0.120** | **0.160** | **0.030** | **0.038** | **0.460** | **0.560** | – | – | **0.025** | **0.040** | **0.060** |
| 1.9685 | 2.5591 | 0.0016 | 0.0022 | 0.0030 | 0.0037 | 0.0047 | 0.0063 | 0.0012 | 0.0015 | 0.0181 | 0.0220 | – | – | 0.0010 | 0.0015 | 0.0025 |
| **65** | **80** | **0.050** | **0.070** | **0.0950** | **0.120** | **0.150** | **0.200** | **0.038** | **0.051** | **0.560** | **0.760** | – | – | **0.025** | **0.045** | **0.075** |
| 2.5591 | 3.1496 | 0.0020 | 0.0028 | 0.0037 | 0.0047 | 0.0059 | 0.0079 | 0.0015 | 0.0020 | 0.0220 | 0.0299 | – | – | 0.0010 | 0.0017 | 0.0030 |
| **80** | **100** | **0.055** | **0.080** | **0.110** | **0.140** | **0.180** | **0.230** | **0.046** | **0.064** | **0.680** | **0.970** | – | – | **0.036** | **0.050** | **0.075** |
| 3.1496 | 3.9370 | 0.0022 | 0.0030 | 0.0043 | 0.0055 | 0.0071 | 0.0091 | 0.0018 | 0.0025 | 0.0268 | 0.0382 | – | – | 0.0014 | 0.0020 | 0.0030 |
| **100** | **120** | **0.065** | **0.100** | **0.135** | **0.170** | **0.220** | **0.280** | **0.051** | **0.071** | **0.760** | **1.070** | **1.900** | **2.540** | **0.051** | **0.060** | **0.100** |
| 3.9370 | 4.7244 | 0.0026 | 0.0039 | 0.0053 | 0.0067 | 0.0087 | 0.0110 | 0.0020 | 0.0028 | 0.0299 | 0.0421 | 0.0748 | 0.1000 | 0.0020 | 0.0025 | 0.0040 |
| **120** | **140** | **0.080** | **0.120** | **0.160** | **0.200** | **0.260** | **0.330** | **0.064** | **0.089** | **0.890** | **1.270** | **2.290** | **3.050** | **0.056** | **0.075** | **0.115** |
| 4.7244 | 5.5118 | 0.0031 | 0.0047 | 0.0063 | 0.0079 | 0.0102 | 0.0130 | 0.0025 | 0.0035 | 0.0350 | 0.0500 | 0.0902 | 0.1201 | 0.0022 | 0.0030 | 0.0045 |
| **140** | **160** | **0.090** | **0.130** | **0.180** | **0.230** | **0.300** | **0.380** | **0.076** | **0.102** | **1.140** | **1.520** | **2.670** | **3.430** | **0.056** | **0.075** | **0.125** |
| 5.5118 | 6.2992 | 0.0035 | 0.0051 | 0.0071 | 0.0091 | 0.0118 | 0.0150 | 0.0030 | 0.0040 | 0.0449 | 0.0598 | 0.1051 | 0.1350 | 0.0022 | 0.0030 | 0.0050 |
| **160** | **180** | **0.100** | **0.140** | **0.200** | **0.260** | **0.340** | **0.430** | **0.076** | **0.114** | **1.140** | **1.650** | **2.670** | **4.060** | **0.061** | **0.090** | **0.150** |
| 6.2992 | 7.0866 | 0.0039 | 0.0055 | 0.0079 | 0.0102 | 0.0134 | 0.0169 | 0.0030 | 0.0045 | 0.0449 | 0.0650 | 0.1051 | 0.1598 | 0.0024 | 0.0035 | 0.0060 |
| **180** | **200** | **0.110** | **0.160** | **0.220** | **0.290** | **0.370** | **0.470** | **0.089** | **0.127** | **1.400** | **1.900** | **3.050** | **4.450** | **0.071** | **0.100** | **0.165** |
| 7.0866 | 7.8740 | 0.0043 | 0.0063 | 0.0087 | 0.0114 | 0.0146 | 0.0185 | 0.0035 | 0.0050 | 0.0551 | 0.0748 | 0.1201 | 0.1752 | 0.0028 | 0.0040 | 0.0065 |
| **200** | **225** | **0.120** | **0.180** | **0.250** | **0.320** | **0.410** | **0.520** | **0.102** | **0.140** | **1.520** | **2.030** | **3.560** | **4.830** | **0.076** | **0.115** | **0.180** |
| 7.8740 | 8.8582 | 0.0047 | 0.0071 | 0.0098 | 0.0126 | 0.0161 | 0.0205 | 0.0040 | 0.0055 | 0.0598 | 0.0799 | 0.1402 | 0.1902 | 0.0030 | 0.0045 | 0.0070 |
| **225** | **250** | **0.140** | **0.200** | **0.270** | **0.350** | **0.450** | **0.570** | **0.114** | **0.152** | **1.780** | **2.290** | **4.060** | **5.330** | **0.089** | **0.115** | **0.200** |
| 8.8582 | 9.8425 | 0.0055 | 0.0079 | 0.0106 | 0.0138 | 0.0177 | 0.0224 | 0.0045 | 0.0060 | 0.0701 | 0.0902 | 0.1598 | 0.2098 | 0.0035 | 0.0045 | 0.0080 |
| **250** | **280** | **0.150** | **0.220** | **0.300** | **0.390** | **0.490** | **0.620** | **0.114** | **0.165** | **1.780** | **2.540** | **4.060** | **5.840** | **0.102** | **0.140** | **0.230** |
| 9.8425 | 11.0236 | 0.0059 | 0.0087 | 0.0118 | 0.0154 | 0.0193 | 0.0244 | 0.0045 | 0.0065 | 0.0701 | 0.1000 | 0.1598 | 0.2299 | 0.0040 | 0.0055 | 0.0090 |
| **280** | **315** | **0.170** | **0.240** | **0.330** | **0.430** | **0.540** | **0.680** | **0.127** | **0.178** | **1.900** | **2.670** | **4.450** | **6.220** | **0.102** | **0.150** | **0.250** |
| 11.0236 | 12.4016 | 0.0067 | 0.0094 | 0.0130 | 0.0169 | 0.0213 | 0.0268 | 0.0050 | 0.0070 | 0.0748 | 0.1051 | 0.1752 | 0.2449 | 0.0040 | 0.0060 | 0.0100 |
| **315** | **355** | **0.190** | **0.270** | **0.360** | **0.470** | **0.590** | **0.740** | **0.140** | **0.190** | **2.030** | **2.790** | **4.830** | **6.600** | **0.114** | **0.165** | **0.280** |
| 12.4016 | 13.9764 | 0.0075 | 0.0106 | 0.0142 | 0.0185 | 0.0232 | 0.0291 | 0.0055 | 0.0075 | 0.0799 | 0.1098 | 0.1902 | 0.2598 | 0.0045 | 0.0065 | 0.0110 |
| **355** | **400** | **0.210** | **0.300** | **0.400** | **0.520** | **0.650** | **0.820** | **0.152** | **0.203** | **2.290** | **3.050** | **5.330** | **7.110** | **0.127** | **0.190** | **0.330** |
| 13.9764 | 15.7480 | 0.0083 | 0.0118 | 0.0157 | 0.0205 | 0.0256 | 0.0323 | 0.0060 | 0.0080 | 0.0902 | 0.1201 | 0.2098 | 0.2799 | 0.0050 | 0.0075 | 0.0130 |
| **400** | **450** | **0.230** | **0.330** | **0.440** | **0.570** | **0.720** | **0.910** | **0.165** | **0.216** | **2.540** | **3.300** | **5.840** | **7.620** | **0.152** | **0.230** | **0.360** |
| 15.7480 | 17.7165 | 0.0091 | 0.0130 | 0.0173 | 0.0224 | 0.0283 | 0.0358 | 0.0065 | 0.0085 | 0.1000 | 0.1299 | 0.2299 | 0.3000 | 0.0060 | 0.0090 | 0.0140 |
| **450** | **500** | **0.260** | **0.370** | **0.490** | **0.630** | **0.790** | **1.000** | **0.178** | **0.229** | **2.670** | **3.430** | **6.220** | **8.000** | **0.165** | **0.270** | **0.410** |
| 17.7165 | 19.6850 | 0.0102 | 0.0146 | 0.0193 | 0.0248 | 0.0311 | 0.0394 | 0.0070 | 0.0090 | 0.1051 | 0.1350 | 0.2449 | 0.3150 | 0.0065 | 0.0105 | 0.0160 |
| **500** | **560** | **0.290** | **0.410** | **0.540** | **0.680** | **0.870** | **1.100** | **0.203** | **0.254** | **3.050** | **3.810** | **7.110** | **8.890** | **0.178** | **0.290** | **0.440** |
| 19.6850 | 22.0472 | 0.0114 | 0.0161 | 0.0213 | 0.0268 | 0.0343 | 0.0433 | 0.0080 | 0.0100 | 0.1201 | 0.1500 | 0.2799 | 0.3500 | 0.0070 | 0.0115 | 0.0175 |
| **560** | **630** | **0.320** | **0.460** | **0.600** | **0.760** | **0.980** | **1.230** | **0.229** | **0.279** | **3.430** | **4.190** | **8.000** | **9.780** | **0.203** | **0.320** | **0.510** |
| 22.0472 | 24.8031 | 0.0126 | 0.0181 | 0.0236 | 0.0299 | 0.0386 | 0.0484 | 0.0090 | 0.0110 | 0.1350 | 0.1650 | 0.3150 | 0.3850 | 0.0080 | 0.0125 | 0.0200 |
| **630** | **710** | **0.350** | **0.510** | **0.670** | **0.850** | **1.090** | **1.360** | **0.254** | **0.305** | **3.810** | **4.570** | **8.890** | **10.670** | **0.203** | **0.370** | **0.550** |
| 24.8031 | 27.9528 | 0.0138 | 0.0201 | 0.0264 | 0.0335 | 0.0429 | 0.0535 | 0.0100 | 0.0120 | 0.1500 | 0.1799 | 0.3500 | 0.4201 | 0.0080 | 0.0145 | 0.0215 |
| **710** | **800** | **0.390** | **0.570** | **0.750** | **0.960** | **1.220** | **1.500** | **0.279** | **0.356** | **4.190** | **5.330** | **9.780** | **12.450** | **0.229** | **0.390** | **0.610** |
| 27.9528 | 31.4961 | 0.0154 | 0.0224 | 0.0295 | 0.0378 | 0.0480 | 0.0591 | 0.0110 | 0.0140 | 0.1650 | 0.2098 | 0.3850 | 0.4902 | 0.0090 | 0.0155 | 0.0240 |
| **800** | **900** | **0.440** | **0.640** | **0.840** | **1.070** | **1.370** | **1.690** | **0.305** | **0.381** | **4.570** | **5.720** | **10.670** | **13.330** | **0.252** | **0.460** | **0.690** |
| 31.4961 | 35.4331 | 0.0173 | 0.0252 | 0.0331 | 0.0421 | 0.0539 | 0.0665 | 0.0120 | 0.0150 | 0.1799 | 0.2252 | 0.4201 | 0.5248 | 0.0100 | 0.0180 | 0.0270 |
| **900** | **1000** | **0.490** | **0.710** | **0.930** | **1.190** | **1.520** | **1.860** | **0.356** | **0.432** | **5.330** | **6.480** | **12.450** | **15.110** | **0.279** | **0.490** | **0.750** |
| 35.4331 | 39.3701 | 0.0193 | 0.0280 | 0.0366 | 0.0469 | 0.0598 | 0.0732 | 0.0140 | 0.0170 | 0.2100 | 0.2551 | 0.4902 | 0.5949 | 0.0110 | 0.0195 | 0.0300 |
| **1000** | **1120** | **0.530** | **0.770** | **1.030** | **1.300** | **1.670** | **2.050** | **0.400** | **0.480** | **6.100** | **7.240** | **14.220** | **16.890** | **0.280** | **0.550** | **0.810** |
| 39.3701 | 44.0950 | 0.0209 | 0.0303 | 0.0406 | 0.0512 | 0.0657 | 0.0807 | 0.0160 | 0.0190 | 0.2400 | 0.2850 | 0.5600 | 0.6650 | 0.0110 | 0.0215 | 0.0320 |
| **1120** | **1250** | **0.570** | **0.830** | **1.120** | **1.420** | **1.830** | **2.250** | **0.430** | **0.500** | **6.480** | **7.620** | **15.110** | **17.780** | **0.330** | **0.610** | **0.910** |
| 44.0950 | 49.2130 | 0.0224 | 0.0327 | 0.0441 | 0.0559 | 0.0720 | 0.0886 | 0.0170 | 0.0200 | 0.2550 | 0.3000 | 0.5950 | 0.7000 | 0.0130 | 0.0240 | 0.0360 |

Note: Axial displacement values apply to solid steel shafts or hollow shafts with bore diameter less than half the shaft diameter. For shaft materials other than steel, or for thin-walled shafts, please consult your Timken sales engineer.

[1]This displacement is valid for assembly of tapered bore bearings and is measured starting from a line-to-line fit of the bearing bore to the tapered shaft.

[2]1:12 Taper used for 213, 222, 223, 230, 231, 232, 233, 238, 239 series. 1:30 Taper used for 240, 241, 242 series. For sleeve mounting, multiply axial displacement values by 1.1 for 1:12 Taper or by 1.05 for 1:30 Taper. For questions on tapered shaft data, consult your Timken sales engineer.

## EXAMPLE #1 –
## Calculating RIC Reduction Using a Spherical Roller Bearing with Tapered Bore

### Step 1:
Place bearing in upright position and center the inner ring and rollers. Apply pressure to the inner ring and oscillate several times to properly seat the rollers.

### Step 2:
Use a feeler gauge to measure the unmounted radial internal clearance (RIC) for both bearing rows.

- RIC must be checked at the unloaded roller.
- Feeler gauge must cover the length of the roller.
- Unmounted RIC is the thickest gauge that will slide through the gap between the roller and outer ring.
- Unmounted RIC is then the average reading for the two rows.



**Fig. 14. Measure RIC before installation.**

**Example: 22328KEJW33C3 140 mm bore (5.5118 in.)**
RIC measurement is 0.178 mm (0.0070 in.)

### Step 3:
Use table 5 (page 14) to confirm that the measured unmounted RIC value is within specification.

**Example: 22328KEJW33C3 140 mm bore (5.5118 in.)**
RIC range is 0.160 mm – 0.200 mm (0.0063 in. – 0.0079 in.), the example's measured RIC is 0.178 mm (0.007 in.) so it is within specified range.

### Step 4:
Use table 5 (page 14) to determine the Suggested Reduction of RIC Due to Installation.

**Example: 22328KEJW33C3 140 mm bore (5.5118 in.)**
Suggested Reduction of RIC Due to installation is 0.064 mm – 0.089 mm (0.0025 in. – 0.0035 in.).

### Step 5:
Determine the maximum and minimum RIC after mounting.

MAX RIC = actual unmounted RIC – minimum suggested reduction in RIC

MIN RIC = actual unmounted RIC – maximum suggested reduction in RIC

**Example: 22328KEJW33C3 140 mm bore (5.5118 in.)**

Max Mounted RIC: 0.178 mm – 0.064 mm = 0.114 mm (0.0070 in. – 0.0025 in. = 0.0045 in.)

Min Mounted RIC: 0.178 mm – 0.089 mm = 0.089 mm (0.0070 in. – 0.0035 in. = 0.0035 in.)

### Step 6:
Use table 5 (page 14) to determine Axial Displacement of Inner Ring for RIC Reduction.

**Example: 22328KEJW33C3 140 mm bore (5.5118 in.)**

22328KEJW33C3 is a 223 series which has a 1:12 tapered bore.

Axial Displacement of Inner Ring for RIC Reduction is 0.890 mm – 1.270 mm (0.035 in. – 0.050 in.).

### Step 7:
Place bearing on tapered shaft (or tapered sleeve) until line-to-line contact exists with the bearing bore.

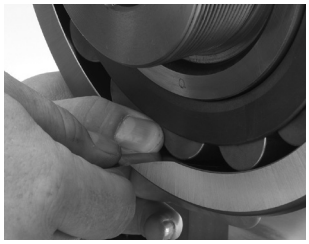


**Fig. 15. During mounting, the RIC should be checked at the unloaded roller.**

### Step 8:
Use a locknut (or hydraulic nut) to apply installation force and move the bearing up the shaft or tapered sleeve until the mounted RIC reaches the desired range established in Step 5. During mounting, RIC should be measured at unloaded roller.

**Example: 22328KEJW33C3 140 mm bore (5.5118 in.)**
Mounted RIC range is 0.089 mm – 0.114 mm (0.0035 in. – 0.0045 in.).

### Step 9:
Use table 5 (page 14) to evaluate mounted RIC against Minimum Permissible RIC After Installation.

**Example: 22328KEJW33C3 140 mm bore (5.5118 in.)**
The minimum permissible RIC after mounting would be 0.075 mm (0.0030 in.).

### Step 7 (Alternative Procedure):
Use a locknut (or hydraulic nut) to apply installation force and move the bearing up the shaft or tapered sleeve until the axial displacement of the inner ring reaches the desired range. During mounting, the axial displacement of the inner ring should be measured.

**Example: 22328KEJW33C3 140 mm bore (5.5118 in.)**
Axial Displacement of Inner Ring for RIC Reduction is 0.890 mm – 1.270 mm (0.035 in. – 0.050 in.).

## EXAMPLE #2 –
## Calculating RIC Reduction Using a Spherical Roller Bearing with Cylindrical Bore

### Step 1:
Gather general information required for fitting practice review.

- Bearing Bore and OD Dimensions/Tolerances
- Bearing operating conditions (Load/Speed)

Calculate bearing loading to bearing rating ratio by dividing the expected radial load by the basic dynamic radial load rating (BDLR) of the bearing.

**Example: 22230EMW33**

- Bore: 149.975 mm -150.00 mm (5.9045 in. – 5.9055 in.)
- OD: 269.965 mm – 270.00 mm (10.6285 in. – 10.6299 in.)
- BDLR: 1000 KN (225,000 lbf)
- Speed: 1,200 RPM; rotating shaft
- Radial Loading: 90 KN (20,250 lbf)
- Lubrication: grease
- Load/Bearing Rating Ratio:
  90 KN/1000 KN (20,250 lbf/225,000 lbf) = 0.09
  P= 0.09

### Step 2:
Determine which shaft and housing fits should be used.

- Using table 6 (page 20) determine the suggested fits for the inner ring on the shaft.
- Using table 7 (page 21) determine the suggested fits for the outer ring in the housing.

**Example: 22230EMW33**

Inner Ring/Shaft: 150 mm (5.9055 in.)

- Rotating inner ring
- *Normal/light loads applied*
- *ISO fit – p6 suggested*

Outer Ring: 270 mm OD (10.6299 in.)

- Solid, one piece housing
- Normal/light loads applied
- ISO fit – H8 suggested

### Step 3:
Determine the shaft OD and housing bore dimensions/tolerances.

- Using tables 9 and 10 (pages 22-27) determine the suggested shaft diameter dimensions
- Using table 11 and 12 (pages 28-35) determine the suggested housing bore dimension

**Example: 22230EMW33**

Shaft dimensions: p6 fit selected

Shaft tolerance: +0.043 mm/+0.068 mm
(+0.0017 in./+0.0027 in.)

Shaft diameter: 150.043 mm – 150.068 mm
(5.9072 in. – 5.9082 in.)

Housing Dimensions: H8 fit selected

Housing tolerance: +0.000 mm/+0.081 mm
(+0.0000 in./+0.0032 in.)

Housing diameter: 270.000 mm – 270.081 mm
(10.6299 in. – 10.6331 in.)

### Step 4:
Calculate the resultant fits on the shaft and in the housing.

- Calculate the maximum and minimum interference fit on the shaft.
- Calculate the maximum and minimum interference fit in the housing.
- Note: Negative resultant fits are tight fit interference.
- Note: Positive resultant fits are loose fit interferences.

**Example: 22230EMW33**

Shaft Fit:

Max interference = min bore – max shaft OD 149.975 mm – 150.068 mm = -0.093 mm (tight fit) **OR**
5.9045 in. – 5.9082 in. = -0.0037 in. (tight fit)

Min interference = max bore – min shaft OD 150.000 mm – 150.043 mm = -0.043 mm (tight fit) **OR**
5.9055 in. – 5.9072 in. = -0.0017 in. (tight fit)

Housing Fit:

Max interference = min housing bore – max bearing OD
270.000 mm – 270.000 mm = 0.000 mm (loose) **OR**
10.6299 in. – 10.6299 in. = 0.0000 in. (loose)

Min interference = max housing bore – min bearing OD
270.081 mm – 269.965 mm = +0.116 mm (loose) **OR**
10.6331 in. – 10.6285 in. = +0.0046 in. (loose)

## Step 5:

Calculate the RIC reduction due to fits.

- RIC reduction due to tight fit on the shaft = approx. 80% of the fit
- RIC reduction due to tight fit on the housing = approx. 60% of the fit

**Example: 22230EMW33**

RIC reduction due to tight fit on shaft:

Max RIC reduction: 0.80 x 0.093 mm = 0.074 mm (0.80 x 0.0037 in. = 0.0030 in.)

Min RIC reduction: 0.080 x 0.043 mm = 0.034 mm (0.80 x 0.0017 in. = 0.0014 in.)

RIC reduction is due to loose fit in the housing.
No reduction in RIC is due to loose fit.

## Step 6:

Use table 4 (page 13) to determine the unmounted RIC.

**Example: 22230EMW33**

RIC designation is C0 (normal)
Unmounted RIC: 0.110 mm – 0.170 mm (0.0043 in. – 0.0067 in.)

## Step 7:

Calculate the mounted RIC.

- Calculate the max mounted RIC Max unmounted RIC – min RIC fit reduction
- Calculate the min mounted RIC Min unmounted RIC – max RIC fit reduction

**Example: 22230EMW33**

Max mounted RIC: 0.170 mm – 0.034 mm = 0.136 mm (0.0067 in. – 0.0014 in. = 0.0053 in.)

Min mounted: RIC 0.110 mm – 0.074 mm = 0.036 mm (0.0043 in. – 0.0030 in. = 0.0013 in.)

## Step 8:

Use table 4 (page 13) to evaluate the mounted RIC.

**Example: 22230EMW33 (which has a C0 RIC)**

Min permissible RIC is 0.056 mm (0.0022 in.)

Since min mounted RIC is below min permissible level, C0 fit selection needs to be reevaluated.

## Step 9:

Review fitting repeating steps 6-8 using C3 clearance levels.

**Example: 22230EMW33C3**

Unmounted RIC: 0.170 mm – 0.220 mm (0.0067 in. – 0.0087 in.)

Mounted RIC: 0.096 mm – 0.186 mm (0.0037 in. – 0.0073 in.)

Mounted RIC is greater than min permissible, so C3 fit appears to be acceptable.

## Step 10:

Confirm RIC designation selection against operating speeds.

As a general rule of thumb, the RIC level is increased for bearings operating at speeds that exceed 70% of thermal speed rating (page 8).

**Example: 22230EMW33C3**

From page 64, thermal reference speed: 2,000 rpm

2,000 rpm x 0.7 = 1,400 rpm

Current operating speed of application is 1,200 rpm.

Current C3 clearance designation appears to be acceptable.

# INSTALLATION

When using a tight fit inner ring, the method of assembly will depend on whether the bearing has a cylindrical or tapered bore.

## CLEANLINESS

- Choose a clean environment, free from dust and moisture.
- The installer should make every effort to ensure cleanliness by use of protective screens and clean cloths.

## PLAN THE WORK

- Know your plans in advance and have the necessary tools at hand. This reduces the amount of time for the job and decreases the chance for dirt to get into the bearing.

## INSPECTION AND PREPARATION

- All component parts of the machine should be on hand and thoroughly cleaned before proceeding.
- Housings should be cleaned, including blowing out the oil holes.
- Do not use air hose on bearings.
- If blind holes are used, insert a magnetic rod to remove metal chips that might be lodged there during fabrication.
- Shaft shoulders and spacer rings contacting the bearing should be square with the shaft axis.
- The shaft fillet must be small enough to clear the radius of the bearing.
- On original installations, all component parts should be checked against the detail specification prints for dimensional accuracy. Shaft and housing should be carefully checked for size and form (roundness, etc.).

## SHAFT AND HOUSING FINISH

- Shaft surfaces on which the bearing will be mounted must be clean and free from nicks and burrs.
- For applications with stationary housing and rotating shaft, it is suggested that the bearing seat on the shaft be ground to 1.6 µm (65 µin.) Ra maximum.
- If it is impractical to use a ground finish, a machined finish of 3.2 µm (125 µin.) Ra is acceptable in many cases, but the amount of interference fit should be slightly increased.
- Housing bores should be finished to 3.2 µm (125 µin) Ra maximum.

**Note:** *Do not remove the bearing from its wrapping until you are ready to mount it.*




**Fig. 16. Induction heater.**

## INSTALLING CYLINDRICAL BORE BEARINGS

### Heat expansion method

- Most applications require a tight interference fit on the shaft.
- Mounting is simplified by heating the bearing to expand it sufficiently to slide easily onto the shaft.
- Two methods of heating are commonly used:
  - Induction heating.
  - Tank of heated oil.
- Induction heating:
  - The induction heating process can be used for mounting bearings.
  - Care must be taken to prevent bearing temperature from exceeding 121° C (250° F).
  - Trial runs with the unit and bearing are usually necessary to obtain proper timing.
  - Thermal crayons melted at predetermined temperatures can be used to check the bearing temperature.
  - While the bearing is hot, it should be positioned squarely against the shoulder.
  - Lockwashers and locknuts or clamping plates are then installed to hold the bearing against the shoulder of the shaft.
  - As the bearing cools, the locknut or clamping plate should be tightened.
  - In cases of outer ring rotation, where the outer ring is a tight fit in the housing, the housing member can be expanded by heating.
  - Fig. 16 shows a Timken induction heater.
- Oil bath:
  - This is accomplished by heating the bearing in a tank of oil that has a high flash point.
  - The oil temperature should not be allowed to exceed 121° C (250° F). The bearing should be heated for 20 or 30 minutes, or until it is expanded sufficiently to slide onto the shaft easily.
  - The bearing should not be in direct contact with the heat source.
  - The usual arrangement is to have a screen several inches from the bottom of the tank. Small support blocks separate the bearing from the screen.
  - It is important to keep the bearing away from any localized high-heat source that may raise its temperature excessively, resulting in ring hardness reduction.
  - Flame-type burners are commonly used. An automatic device for temperature control is desirable.
  - If safety regulations prevent the use of an open heated oil bath, a mixture of 15 percent soluble-oil water may be used. This mixture may be heated to a maximum of 121° C (250° F) without being flammable.

## Arbor press method

- An alternate method of mounting, generally used only on smaller size bearings, is to press the bearing onto the shaft or into the housing. This can be done by using an arbor press and a mounting tube as shown in fig. 17.
- The tube should be made from soft steel with an inside diameter slightly larger than the shaft.
- The O.D. of the tube should not exceed the shaft backing diameter.
- The tube should be faced square at both ends. It should be thoroughly clean inside and out, and long enough to clear the end of the shaft after the bearing is mounted.
- If the outer ring is being pressed into the housing, the O.D. of the mounting tube should be slightly smaller than the housing bore. The I.D. should not be less than the suggested housing backing diameter in the table of dimensions.
- Coat the shaft with a light machine oil to reduce the force needed for a press fit.
- Carefully place the bearing on the shaft, making sure it is square with the shaft axis.
- Apply steady pressure from the arbor ram to drive the bearing firmly against the shoulder.

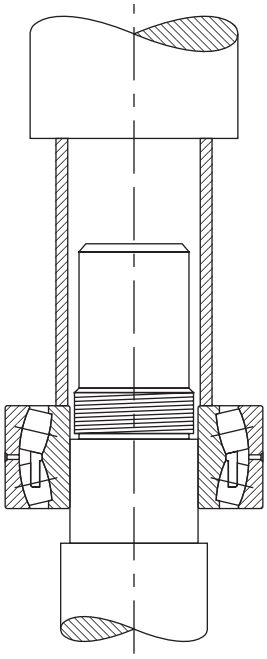


**Fig. 17. Arbor press method.**

NOTE

*Never attempt a press fit on a shaft by applying pressure to the outer ring or a press fit in a housing by applying pressure to the inner ring.*

NOTE

*Never use steam or hot water when cleaning the bearings because these methods can create rust or corrosion.*

NOTE

*Never expose any surface of a bearing to the flame of a torch.*

NOTE

*Do not heat bearing beyond 121° C (250° F).*

## Mounting tapered bore spherical roller bearings

- Use a feeler gage with the thinnest blade of 0.038 mm (0.0015 inch).
- Place the bearing in an upright position with the inner and outer ring faces parallel.
- Place thumbs on the inner ring bore and oscillate the inner ring the distance of two or three roller spacings.
- Position the individual roller assemblies so that a roller is at the top of the inner ring on both sides of the bearing.
- With the roller in the correct position, insert a thin blade of the feeler gage between the roller and the outer ring.
- Move the feeler gage carefully along the top roller between the roller and outer ring raceway. Repeat this procedure using thicker feeler gage blades until one is found that will not go through.
- The blade thickness that preceded the “no-go” blade is a measure of RIC before installation.
- Start the mounting procedure by lubricating the tapered shaft with a light coat of machine oil.
- Slide the bearing onto the shaft as far as it will go by hand.
- As the locknut is tightened, the interference fit builds up, resulting in expansion of the inner ring.
- Periodically measure to keep track of the reduction in RIC.
- Continue the procedure until the proper amount of reduction is obtained. Do not exceed suggested amount of reduction.
- As a final check, make sure the remaining RIC equals or exceeds the minimum mounted clearance shown in table 5.
- During mounting, the RIC should be checked at the unloaded roller. If this is at the bottom, make sure that the roller is raised to seat firmly at the inboard position of the inner ring.
- When the suggested amount of RIC reduction has been accomplished, the bearing is properly fitted.
- Complete the procedure by peening the lockwasher tang into the locknut slot or securing the lockplate.



**Fig. 18. Measure RIC before installation.**

# *SHAFT AND HOUSING FITS*

## SPHERICAL ROLLER BEARING SHAFT AND HOUSING FITS

This chart is a guideline for specifying shaft and housing fits related to particular operating conditions. Please contact your Timken sales engineer for more information.

**TABLE 6. RADIAL SPHERICAL ROLLER BEARING SHAFT FITS**

| | Conditions | Examples | Shaft Diameter | | Tolerance Symbol[1] | Remarks |
|---|---|---|---|---|---|---|
| | | | **mm**<br>in. | | | |
| Stationary inner ring load | The inner ring to be easily displaced on the shaft | Two-bearing shaft mechanism | See table 8 for shaft size. | | s4 | See table 8 for shaft size. |
| | The inner ring not to be easily displaced on the shaft | Wheel on non-rotating shaft | All diameters | | g6 | |
| | | Tension pulleys and rope sheaves | | | h6 | |
| Rotating inner ring load or indeterminate load direction | Light and variable loads<br>P ≤ 0.07C | Electrical apparatus, machine tools, pumps, ventilators, industrial trucks | over | incl. | k6 | In very accurate applications, k5 and m5 are used instead of k6 and m6 respectively. |
| | | | **18**<br>0.7087 | **100**<br>3.9370 | | |
| | | | **100**<br>3.9370 | **200**<br>7.8740 | m6 | |
| | Normal and heavy loads<br>P > 0.07C<br>≤ 0.25C | Applications in general, electrical motors, turbines, pumps, combustion engines, gear transmissions, woodworking machines | **18**<br>0.7087 | **65**<br>2.5590 | m5 | |
| | | | **65**<br>2.5590 | **100**<br>3.9370 | m6 | |
| | | | **100**<br>3.9370 | **140**<br>5.5118 | n6 | |
| | | | **140**<br>5.5118 | **280**<br>11.0236 | p6 | |
| | | | **280**<br>11.0236 | **500**<br>19.6850 | r6 | |
| | | | **500**<br>19.6850 | **and up** | r7 | |
| | Very heavy loads and shock loads<br>P > 0.25C | Journal boxes for locomotives and other heavy rail vehicles, traction motors | **18**<br>0.7087 | **65**<br>2.5590 | m6 | Bearings with greater clearance than normal must be used. |
| | | | **65**<br>2.5590 | **100**<br>3.9370 | n6 | |
| | | | **100**<br>3.9370 | **140**<br>5.5118 | p6 | |
| | | | **140**<br>5.5118 | **200**<br>7.8740 | r6 | |
| | | | **200**<br>7.8740 | **500**<br>19.6850 | r7 | |
| **BEARINGS WITH TAPERED BORE AND ADAPTER SLEEVE** | | | | | | |
| | All loads | Applications in general | All diameters | | | See tables for Reduction of RIC on pages 9-10. |

[1]For solid steel shaft. See tables on pages 22-27 for tolerance value.

**TABLE 7. SPHERICAL ROLLER BEARING HOUSING FITS**

| Conditions | | | Examples | Tolerance Symbol[1] | Remarks |
|---|---|---|---|---|---|
| One-piece bearing housing | Rotating outer ring load | Variable load direction | Two-bearing eccentric shaft mechanism | P6 | The outer ring is not displaceable axially. |
| | | Heavy loads on bearings in thin-walled housings | Supporting wheels in cranes, wheel hubs, crank bearings | P7 | |
| | | Normal and heavy loads | Wheel hubs, crank bearings | N7 | |
| | | Light and variable loads | Conveyor rollers, rope sheaves, tension pulleys | M7 | |
| | Indeterminate load direction | Heavy shock loads | Electrical traction motors | | |
| | | Heavy and normal loads, axial displacement of the outer ring not required | Electrical motors, pumps, crankshaft main bearings | K7 | The outer ring is, as a rule, not displaceable axially. |
| | | Normal and light loads, axial displacement of the outer ring is desirable | Electrical motors, pumps, crankshaft main bearings | J7 | The outer ring is, as a rule, displaceable axially. |
| Split or one-piece bearing housing | Stationary outer ring load | Shock loads, temporarily complete unloading | Journal boxes for rail vehicles | | |
| | | All loads | Bearing applications in general, journal boxes for rail vehicles | H7 | The outer ring is easily displaced axially. |
| | | Normal and light loads, loads under simple operating conditions | Line shaftings | H8 | |
| | | Heat supplied through the shaft | Dryer cylinders | G7 | |
| One-piece bearing housing | Applications requiring particular accuracy | Very accurate running and small deflections under variable loads | For main spindles in machine tools: O.D. less than 125 mm; O.D. 125 to 250 mm; O.D. over 250 mm | M6<br>N6<br>P6 | The outer ring is not displaceable axially. |
| | | Very accurate running under light loads and indeterminate load direction | Held bearings in high-speed centrifugal force compressors | K6 | The outer ring is, as a rule, not displaceable axially. |
| | | Very accurate running, axial displacement of outer ring desirable | Floating bearings in high-speed centrifugal force compressors | J6 | The outer ring is easily displaced axially. |

[1]Cast iron or steel housing. For tolerance values see tables on pages 28-35. For housings of light metal, tolerances generally are selected that give a slightly tighter fit than those given in the table.

## s4 Fits

A centrifugal force load produces a rotating outer ring load and a stationary inner ring load, even though the inner ring rotates. This makes it desirable to fit the outer ring tight in the housing (using a P6 fit as shown in table 12), and the inner ring loose on the shaft using an s4 fit as listed in table 8. The standard W33 bearing with oil grooves and oil holes can be used.

The s4 fit designation as referenced on this page is a special fit tolerance developed by The Timken Company for centrifugal force load applications. It DOES NOT conform to ISO standards similarly published as s4 preferred shaft fits.

**TABLE 8. s4 FITS**

| See Dimensional Tables for Nominal Bore. | | | | | |
|---|---|---|---|---|---|
| Bore | | Variance From Nominal Bore | | | |
| | | | Shaft Diameter | | Fit |
| Over | Incl. | Tolerance[1] | Max. | Min. | |
| **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. |
| **50.000**<br>1.9685 | **80.000**<br>3.1496 | **-0.015**<br>-0.0006 | **-0.025**<br>-0.0010 | **-0.036**<br>-0.0014 | **0.010L**<br>**0.036L**<br>0.0004L<br>0.0014L |
| **80.000**<br>3.4196 | **120.000**<br>4.7244 | **-0.020**<br>-0.0008 | **-0.033**<br>-0.0013 | **-0.043**<br>-0.0017 | **0.013L**<br>**0.043L**<br>0.0005L<br>0.0017L |
| **120.000**<br>4.7244 | **180.000**<br>7.0866 | **-0.025**<br>-0.0010 | **-0.041**<br>-0.0016 | **-0.053**<br>-0.0021 | **0.015L**<br>**0.053L**<br>0.0006L<br>0.0021L |
| **180.000**<br>7.0866 | **250.000**<br>9.8425 | **-0.030**<br>-0.0012 | **-0.048**<br>-0.0019 | **-0.064**<br>-0.0025 | **0.018L**<br>**0.064L**<br>0.0007L<br>0.0025L |

[1]Tolerance range is from +0 to value listed.

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

# SPHERICAL ROLLER BEARING SHAFT TOLERANCES

## TABLE 9. SPHERICAL ROLLER BEARINGS – SHAFT TOLERANCES

| Bearing Bore | | | g6 | | | h6 | | | h5 | | | j5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal (Max.) | | Tolerance[1] | Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit |
| Over | Incl. | | Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. |
| **3.000** 0.1181 | **6.000** 0.2362 | **-0.008** -0.003 | **-0.004** -0.0002 | **-0.012** -0.0005 | **0.012L** **0.004T** 0.0005L 0.0001T | **0.000** 0.0000 | **-0.008** -0.003 | **0.008L** **0.008T** 0.0003L 0.0003T | **0.000** 0.0000 | **-0.005** -0.0002 | **0.005L** **0.008T** 0.0002L 0.0003T | **+0.003** +0.0001 | **-0.002** -0.0001 | **0.002L** **0.011T** 0.0001L 0.0004T |
| **6.000** 0.2362 | **10.000** 0.3937 | **-0.008** -0.003 | **-0.005** -0.0002 | **-0.014** -0.0006 | **0.014L** **0.003T** 0.0006L 0.0001T | **0.000** 0.0000 | **-0.009** -0.0004 | **0.009L** **0.008T** 0.0004L 0.0003T | **0.000** 0.0000 | **-0.006** -0.0002 | **0.006L** **0.008T** 0.0002L 0.0003T | **+0.004** +0.0002 | **-0.002** -0.0001 | **0.002L** **0.012T** 0.0001L -0.0005T |
| **10.000** 0.3937 | **18.000** 0.7087 | **-0.008** -0.003 | **-0.006** -0.0002 | **-0.017** -0.0007 | **0.017L** **0.002T** 0.0007L -0.0001T | **0.000** 0.0000 | **-0.011** -0.0004 | **0.011L** **0.008T** 0.0004L 0.0003T | **0.000** 0.0000 | **-0.008** -0.0003 | **0.008L** **0.008T** 0.0003L 0.0003T | **+0.005** +0.0002 | **-0.003** -0.0001 | **0.003L** **0.013T** 0.0001L 0.0005T |
| **18.000** 0.7087 | **30.000** 1.1811 | **-0.010** -0.0004 | **-0.007** -0.0003 | **-0.020** -0.0008 | **0.020L** **0.003T** 0.0008L 0.0001T | **0.000** 0.0000 | **-0.013** -0.0005 | **0.013L** **0.010T** 0.0005L 0.0004T | – | – | – | **+0.005** +0.0002 | **-0.004** -0.0002 | **0.004L** **0.015T** 0.0002L 0.0006T |
| **30.000** 1.1811 | **50.000** 1.9685 | **-0.012** -0.0005 | **-0.009** -0.0004 | **-0.025** -0.0010 | **0.025L** **0.003T** 0.0010L 0.0001T | **0.000** 0.0000 | **-0.016** -0.0006 | **0.016L** **0.012T** 0.0006L 0.0005T | – | – | – | **+0.006** +0.0002 | **-0.005** -0.0002 | **0.005L** **0.018T** 0.0002L 0.0007T |
| **50.000** 1.9685 | **80.000** 3.1496 | **-0.015** -0.0006 | **-0.010** -0.0004 | **-0.029** -0.0011 | **0.029L** **0.005T** 0.0011L 0.0002T | **0.000** 0.0000 | **-0.019** -0.0007 | **0.019L** **0.015T** 0.0007L 0.0006T | – | – | – | **+0.006** +0.0002 | **-0.007** -0.0003 | **0.007L** **0.021T** 0.0003L 0.0008T |
| **80.000** 3.1496 | **120.000** 4.7244 | **-0.020** -0.0008 | **-0.012** -0.0005 | **-0.034** -0.0013 | **0.034L** **0.008T** 0.0013L 0.0003T | **0.000** 0.0000 | **-0.022** -0.0009 | **0.022L** **0.020T** 0.0009L 0.0008T | – | – | – | **+0.006** +0.0002 | **-0.009** -0.0004 | **0.009L** **0.026T** 0.0004L 0.0010T |
| **120.000** 4.7244 | **180.000** 7.0866 | **-0.025** -0.0010 | **-0.014** -0.0006 | **-0.039** -0.0015 | **0.039L** **0.011T** 0.0015L 0.0004T | **0.000** 0.0000 | **-0.025** -0.0010 | **0.025L** **0.025T** 0.0010L 0.0010T | – | – | – | **+0.007** +0.0003 | **-0.011** -0.0004 | **0.011L** **0.032T** 0.0004L 0.0013T |
| **180.000** 7.0866 | **200.000** 7.8740 | **-0.030** -0.0012 | **-0.015** -0.0006 | **-0.044** -0.0017 | **0.044T** **0.015T** 0.0017L 0.0006T | **0.000** 0.0000 | **-0.029** -0.0011 | **0.029L** **0.030T** 0.0011L 0.0012T | – | – | – | **+0.007** +0.0003 | **-0.013** -0.0005 | **0.013L** **0.037T** 0.0005L 0.0015T |
| **200.000** 7.8740 | **225.000** 8.8583 | **-0.030** -0.0012 | **-0.015** -0.0006 | **-0.044** -0.0017 | **0.044T** **0.015T** 0.0017L 0.0006T | **0.000** 0.0000 | **-0.029** -0.0011 | **0.029L** **0.030T** 0.0011L 0.0012T | – | – | – | **+0.007** +0.0003 | **-0.013** -0.0005 | **0.013L** **0.037T** 0.0005L 0.0015T |
| **225.000** 8.8583 | **250.000** 9.8425 | **-0.030** -0.0012 | **-0.015** -0.0006 | **-0.044** -0.0017 | **0.044T** **0.015T** 0.0017L 0.0006T | **0.000** 0.0000 | **-0.029** -0.0011 | **0.029L** **0.030T** 0.0011L 0.0012T | – | – | – | **+0.007** +0.0003 | **-0.013** -0.0005 | **0.013L** **0.037T** 0.0005L 0.0015T |
| **250.000** 9.8425 | **280.000** 11.0236 | **-0.035** -0.0014 | **-0.017** -0.0007 | **-0.049** -0.0019 | **0.049L** **0.018T** 0.0019L 0.0007T | **0.000** 0.0000 | **-0.032** -0.0013 | **0.032L** **0.035T** 0.0013L 0.0014T | – | – | – | **+0.007** +0.0003 | **-0.016** -0.0006 | **0.016L** **0.042T** 0.0006L 0.0017T |

NOTE: Tolerance and shaft diameters are shown in the table as variances from nominal bearing bore.
[1]Tolerance range is from +0 to value listed.

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

| j6 | | | k5 | | | k6 | | | m5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit |
| Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. |
| | | **0.002L** | | | **0.001T** | | | | | | **0.004T** |
| **+0.006** | **-0.002** | **0.014T** | **+0.006** | **+0.001** | **0.014T** | – | – | – | **+0.009** | **+0.004** | **0.017T** |
| +0.0002 | -0.0001 | 0.0001L | +0.0002 | +0.0000 | 0.0000T | | | | +0.0004 | +0.0002 | 0.0002T |
| | | 0.0005T | | | 0.0005T | | | | | | 0.0007T |
| | | **0.002L** | | | **0.001T** | | | | | | **0.006T** |
| **+0.007** | **-0.002** | **0.015T** | **+0.007** | **+0.001** | **0.015T** | – | – | – | **+0.012** | **+0.006** | **0.020T** |
| +0.0003 | -0.0001 | 0.0001L | +0.0003 | +0.0000 | 0.0000T | | | | +0.0005 | +0.0002 | 0.0002T |
| | | 0.0006T | | | 0.0006T | | | | | | 0.0008T |
| | | **0.003L** | | | **0.001T** | | | | | | **0.007T** |
| **+0.008** | **-0.003** | **0.016T** | **+0.009** | **+0.001** | **0.017T** | – | – | – | **+0.015** | **+0.007** | **0.023T** |
| +0.0003 | -0.0001 | 0.0001L | +0.0004 | +0.0000 | 0.0000T | | | | +0.0006 | +0.0003 | 0.0003T |
| | | 0.0006T | | | 0.0007T | | | | | | 0.0009T |
| | | **0.004L** | | | **0.002T** | | | | | | **0.008T** |
| **+0.009** | **-0.004** | **0.019T** | **+0.011** | **+0.002** | **0.021T** | – | – | – | **+0.017** | **+0.008** | **0.027T** |
| +0.0004 | -0.0002 | 0.0002L | +0.0004 | +0.0001 | 0.0001T | | | | +0.0007 | +0.0003 | 0.0003T |
| | | 0.0008T | | | 0.0008T | | | | | | 0.0011T |
| | | **0.005L** | | | **0.002T** | | | **0.002T** | | | **0.009T** |
| **+0.011** | **-0.005** | **0.023T** | **+0.013** | **+0.002** | **0.025T** | **+0.018** | **+0.002** | **0.030T** | **+0.020** | **+0.009** | **0.032T** |
| +0.0004 | -0.0002 | 0.0002L | +0.0005 | +0.0001 | 0.0001T | +0.0007 | +0.0001 | 0.0001T | +0.0008 | +0.0004 | 0.0004T |
| | | 0.00085T | | | 0.0010T | | | 0.0012T | | | 0.00125T |
| | | **0.007L** | | | **0.002T** | | | **0.002T** | | | **0.011T** |
| **+0.012** | **-0.007** | **0.027T** | **+0.015** | **+0.002** | **0.030T** | **+0.021** | **+0.002** | **0.036T** | **+0.024** | **+0.011** | **0.039T** |
| +0.0005 | -0.0003 | 0.0003L | +0.0006 | +0.0001 | 0.0001T | +0.0008 | +0.0001 | 0.0001T | +0.0009 | +0.0004 | 0.0004T |
| | | 0.0011T | | | 0.0012T | | | 0.0014T | | | 0.0015T |
| | | **0.009L** | | | **0.003T** | | | **0.003T** | | | **0.013T** |
| **+0.013** | **-0.009** | **0.033T** | **+0.018** | **+0.003** | **0.038T** | **+0.025** | **+0.003** | **0.045T** | **+0.028** | **+0.013** | **0.048T** |
| +0.0005 | -0.0004 | 0.0004L | +0.0007 | +0.0001 | 0.0001T | +0.0010 | +0.0001 | 0.0001T | +0.0011 | +0.0005 | 0.0005T |
| | | 0.0013T | | | 0.0015T | | | 0.0018T | | | 0.0019T |
| | | **0.011L** | | | **0.003T** | | | **0.003T** | | | **0.015T** |
| **+0.014** | **-0.011** | **0.039T** | **+0.021** | **+0.003** | **0.046T** | **+0.028** | **+0.003** | **0.053T** | **+0.033** | **+0.015** | **0.058T** |
| +0.0006 | -0.0004 | 0.0004L | +0.0008 | +0.0001 | 0.0001T | +0.0011 | +0.0001 | 0.0001T | +0.0013 | +0.0006 | 0.0006T |
| | | 0.0016T | | | 0.0018T | | | 0.0021T | | | 0.0023T |
| | | **0.013L** | | | **0.004T** | | | | | | **0.017T** |
| **+0.016** | **-0.013** | **0.046T** | **+0.024** | **+0.004** | **0.054T** | – | – | – | **+0.037** | **+0.017** | **0.067T** |
| +0.0006 | -0.0005 | 0.0005L | +0.0009 | +0.0002 | 0.0002T | | | | +0.0015 | +0.0007 | 0.0007T |
| | | 0.0018T | | | 0.0021T | | | | | | 0.0027T |
| | | **0.013L** | | | **0.004T** | | | | | | **0.017T** |
| **+0.016** | **-0.013** | **0.046T** | **+0.024** | **+0.004** | **0.054T** | – | – | – | **+0.037** | **+0.017** | **0.067T** |
| +0.0006 | -0.0005 | 0.0005L | +0.0009 | +0.0002 | 0.0002T | | | | +0.0015 | +0.0007 | 0.0007T |
| | | 0.0018T | | | 0.0021T | | | | | | 0.0027T |
| | | **0.013L** | | | **0.004T** | | | | | | **0.017T** |
| **+0.016** | **-0.013** | **0.046T** | **+0.024** | **+0.004** | **0.054T** | – | – | – | **+0.037** | **+0.017** | **0.067T** |
| +0.0006 | -0.0005 | 0.0005L | +0.0009 | +0.0002 | 0.0002T | | | | +0.0015 | +0.0007 | 0.0007T |
| | | 0.0018T | | | 0.0021T | | | | | | 0.0027T |
| | | **0.016L** | | | **0.004T** | | | | | | **0.020T** |
| **+0.016** | **-0.016** | **0.051T** | **+0.027** | **+0.004** | **0.062T** | – | – | – | **+0.043** | **+0.020** | **0.078T** |
| +0.0006 | -0.0006 | 0.0006L | +0.0011 | +0.0002 | 0.0002T | | | | +0.0017 | +0.0008 | 0.0008T |
| | | 0.0020T | | | 0.0025T | | | | | | 0.0031T |

*Continued on next page.*

## SHAFT AND HOUSING FITS

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

*Continued from previous page.*

| Bearing Bore | | | g6 | | | h6 | | | h5 | | | j5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal (Max.) | | Tolerance[1] | Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit |
| Over | Incl. | | Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. |
| | | | | | **0.049L** | | | **0.032L** | | | | | | **0.016L** |
| **280.000** | **315.000** | **-0.035** | **-0.017** | **-0.049** | **0.018T** | **0.000** | **-0.032** | **0.035T** | – | – | – | **+0.007** | **-0.016** | **0.042T** |
| 11.0236 | 12.4016 | -0.0014 | -0.0007 | -0.0019 | 0.0019L | 0.0000 | -0.0013 | 0.0013L | | | | +0.0003 | -0.0006 | 0.0006L |
| | | | | | 0.0007T | | | 0.0014T | | | | | | 0.0017T |
| | | | | | **0.054L** | | | **0.036L** | | | | | | **0.018L** |
| **315.000** | **355.000** | **-0.040** | **-0.018** | **-0.054** | **0.022T** | **0.000** | **-0.036** | **0.040T** | – | – | – | **+0.007** | **-0.018** | **0.047T** |
| 12.4016 | 13.9764 | -0.0016 | -0.0007 | -0.0021 | 0.0021L | 0.0000 | -0.0014 | 0.0014L | | | | +0.0003 | -0.0007 | 0.0007L |
| | | | | | 0.0009T | | | 0.0016T | | | | | | 0.0019T |
| | | | | | **0.054L** | | | **0.036L** | | | | | | **0.018L** |
| **355.000** | **400.000** | **-0.040** | **-0.018** | **-0.054** | **0.022T** | **0.000** | **-0.036** | **0.040T** | – | – | – | **+0.007** | **-0.018** | **0.047T** |
| 13.9764 | 15.7480 | -0.0016 | -0.0007 | -0.0021 | 0.0021L | 0.0000 | -0.0014 | 0.0014L | | | | +0.0003 | -0.0007 | 0.0007L |
| | | | | | 0.0009T | | | 0.0016T | | | | | | 0.0019T |
| | | | | | **0.060L** | | | **0.040L** | | | | | | **0.020L** |
| **400.000** | **450.000** | **-0.045** | **-0.020** | **-0.060** | **0.025T** | **0.000** | **-0.040** | **0.045T** | – | – | – | **+0.007** | **-0.020** | **0.052T** |
| 15.7480 | 17.7165 | -0.0018 | -0.0008 | -0.0024 | 0.0024L | 0.0000 | -0.0016 | 0.0016L | | | | +0.0003 | -0.0008 | 0.0008L |
| | | | | | 0.0010T | | | 0.0018T | | | | | | 0.0021T |
| | | | | | **0.060L** | | | **0.040L** | | | | | | **0.020L** |
| **450.000** | **500.000** | **-0.045** | **-0.020** | **-0.060** | **0.025T** | **0.000** | **-0.040** | **0.045T** | – | – | – | **+0.007** | **-0.020** | **0.052T** |
| 17.7165 | 19.6850 | -0.0018 | -0.0008 | -0.0024 | 0.0024L | 0.0000 | -0.0016 | 0.0016L | | | | +0.0003 | -0.0008 | 0.0008L |
| | | | | | 0.0010T | | | 0.0018T | | | | | | 0.0020T |
| | | | | | **0.066L** | | | **0.044L** | | | | | | **0.022L** |
| **500.000** | **560.000** | **-0.050** | **-0.022** | **-0.066** | **0.028T** | **0.000** | **-0.044** | **0.050T** | – | – | – | **+0.008** | **-0.022** | **0.058T** |
| 19.6850 | 22.0472 | -0.0020 | -0.0009 | -0.0026 | 0.0026L | 0.0000 | -0.0017 | 0.0017L | | | | 0.0003 | -0.0009 | 0.0009L |
| | | | | | 0.0011T | | | 0.0020T | | | | | | 0.0023T |
| | | | | | **0.066L** | | | **0.044L** | | | | | | **0.022L** |
| **560.000** | **630.000** | **-0.050** | **-0.022** | **-0.066** | **0.028T** | **0.000** | **-0.044** | **0.050T** | – | – | – | **+0.008** | **-0.022** | **0.058T** |
| 22.0472 | 24.8032 | -0.0020 | -0.0009 | -0.0026 | 0.0026L | 0.0000 | -0.0017 | 0.0017L | | | | +0.0003 | -0.0009 | 0.0009L |
| | | | | | 0.0011T | | | 0.0020T | | | | | | 0.0023T |
| | | | | | **0.074L** | | | **0.050L** | | | | | | **0.025L** |
| **630.000** | **710.000** | **-0.075** | **-0.024** | **-0.074** | **0.051T** | **0.000** | **-0.050** | **0.075T** | – | – | – | **+0.010** | **-0.025** | **0.085T** |
| 24.8032 | 27.9528 | -0.0030 | -0.0009 | -0.0029 | 0.0029L | 0.0000 | -0.0020 | 0.0020L | | | | +0.0004 | -0.0010 | 0.0010L |
| | | | | | 0.0021T | | | 0.0030T | | | | | | 0.0035T |
| | | | | | **0.074L** | | | **0.050L** | | | | | | **0.025L** |
| **710.000** | **800.000** | **-0.075** | **-0.024** | **-0.074** | **0.051T** | **0.000** | **-0.050** | **0.075T** | – | – | – | **+0.010** | **-0.025** | **0.085T** |
| 27.9528 | 31.4961 | -0.0030 | -0.0009 | -0.0029 | 0.0029L | 0.0000 | -0.0020 | 0.0020L | | | | +0.0004 | -0.0010 | 0.0010L |
| | | | | | 0.0021T | | | 0.0030T | | | | | | 0.0035T |
| | | | | | **0.082L** | | | **0.056L** | | | | | | **0.028L** |
| **800.000** | **900.000** | **-0.100** | **-0.026** | **-0.082** | **0.074T** | **0.000** | **-0.056** | **0.100T** | – | – | – | **+0.012** | **-0.028** | **0.112T** |
| 31.4961 | 35.4331 | -0.0039 | -0.0010 | 0.0032 | 0.0032L | 0.0000 | -0.0022 | 0.0022L | | | | +0.0005 | -0.0011 | 0.0011L |
| | | | | | 0.0029T | | | 0.0039T | | | | | | 0.0044T |
| | | | | | **0.082L** | | | **0.056L** | | | | | | **0.028L** |
| **900.000** | **1000.000** | **-0.100** | **-0.026** | **-0.082** | **0.074T** | **0.000** | **-0.056** | **0.100T** | – | – | – | **+0.012** | **-0.028** | **0.112T** |
| 35.4331 | 39.3701 | -0.0039 | -0.0010 | 0.0032 | 0.0032L | 0.0000 | -0.0022 | 0.0022L | | | | +0.0005 | -0.0011 | 0.0011L |
| | | | | | 0.0029T | | | 0.0039T | | | | | | 0.0044T |
| | | | | | **0.094L** | | | **0.066L** | | | | | | **0.033L** |
| **1000.000** | **1120.000** | **-0.125** | **-0.028** | **-0.094** | **0.097T** | **0.000** | **-0.066** | **0.125T** | – | – | – | **+0.013** | **-0.033** | **0.138T** |
| 39.3701 | 44.0945 | -0.0049 | -0.0011 | -0.0037 | 0.0037L | 0.0000 | -0.0026 | 0.0022L | | | | +0.0005 | -0.0013 | 0.0013L |
| | | | | | 0.0038T | | | 0.0039T | | | | | | 0.0054T |
| | | | | | **0.094L** | | | **0.066L** | | | | | | **0.033L** |
| **1120.000** | **1250.000** | **-0.125** | **-0.028** | **-0.094** | **0.097T** | **0.000** | **-0.066** | **0.125T** | – | – | – | **+0.013** | **-0.033** | **0.138T** |
| 44.0945 | 49.2126 | -0.0049 | -0.0011 | -0.0037 | 0.0037L | 0.0000 | -0.0026 | 0.0022L | | | | +0.0005 | -0.0013 | 0.0013L |
| | | | | | 0.0038T | | | 0.0039T | | | | | | 0.0054T |

NOTE: Tolerance and shaft diameters are shown in the table as variances from nominal bearing bore.

[1]Tolerance range is from +0 to value listed.

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

| j6 | | | k5 | | | k6 | | | m5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit |
| Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. | **mm**<br>in. |
| | | **0.016L** | | | **0.004T** | | | | | | **0.020T** |
| **+0.016** | **-0.016** | **0.051T** | **+0.027** | **+0.004** | **0.062T** | – | – | – | **+0.043** | **+0.020** | **0.078T** |
| +0.0006 | -0.0006 | 0.0006L | +0.0011 | +0.0002 | 0.0002T | | | | +0.0017 | +0.0008 | 0.0008T |
| | | 0.0020T | | | 0.0025T | | | | | | 0.0031T |
| | | **0.018L** | | | **0.004T** | | | | | | **0.021T** |
| **+0.018** | **-0.018** | **0.058T** | **+0.029** | **+0.046** | **0.069T** | – | – | – | **+0.046** | **+0.021** | **0.086T** |
| +0.0007 | -0.0007 | 0.0007L | +0.0011 | +0.0002 | 0.0002T | | | | +0.0018 | +0.0008 | 0.0008T |
| | | 0.0023T | | | 0.0027T | | | | | | 0.0034T |
| | | **0.018L** | | | **0.004T** | | | | | | **0.021T** |
| **+0.018** | **-0.018** | **0.058T** | **+0.029** | **+0.004** | **0.069T** | – | – | – | **+0.046** | **+0.021** | **0.086T** |
| +0.0007 | -0.0007 | 0.0007L | +0.0011 | +0.0002 | 0.0002T | | | | +0.0018 | +0.0008 | 0.0008T |
| | | 0.0023T | | | 0.0027T | | | | | | 0.0034T |
| | | **0.020L** | | | **0.005T** | | | | | | **0.023T** |
| **+0.020** | **-0.020** | **0.065T** | **+0.032** | **+0.005** | **0.077T** | – | – | – | **+0.050** | **+0.023** | **0.095T** |
| +0.0008 | -0.0008 | 0.0008L | +0.0013 | +0.0002 | 0.0002T | | | | +0.0020 | +0.0009 | 0.0009T |
| | | 0.0026T | | | 0.0031T | | | | | | 0.0037T |
| | | **0.020L** | | | **0.005T** | | | | | | **0.023T** |
| **+0.020** | **-0.020** | **0.065T** | **+0.032** | **+0.005** | **0.077T** | – | – | – | **+0.050** | **+0.023** | **0.095T** |
| +0.0008 | -0.0008 | 0.0008L | +0.0013 | +0.0002 | 0.0002T | | | | +0.0020 | +0.0009 | 0.0009T |
| | | 0.0026T | | | 0.0031T | | | | | | 0.0037T |
| | | **0.022L** | | | **0.00T** | | | | | | **0.026T** |
| **+0.022** | **-0.022** | **0.072T** | **+0.030** | **0.000** | **0.080T** | – | – | – | **+0.056** | **+0.026** | **0.106T** |
| +0.0009 | -0.0009 | 0.0009L | +0.0012 | 0.0000 | 0.0000T | | | | +0.0022 | +0.0010 | 0.0010T |
| | | 0.0029T | | | 0.0032T | | | | | | 0.0042T |
| | | **0.022L** | | | **0.00T** | | | | | | **0.026T** |
| **+0.022** | **-0.022** | **0.072T** | **+0.030** | **0.000** | **0.080T** | – | – | – | **+0.056** | **+0.026** | **0.106T** |
| +0.0009 | -0.0009 | 0.0009L | +0.0012 | 0.0000 | 0.0000T | | | | +0.0022 | +0.0010 | 0.0010T |
| | | 0.0029T | | | 0.0032T | | | | | | 0.0042T |
| | | **0.025L** | | | **0.000T** | | | | | | **0.030T** |
| **+0.025** | **-0.025** | **0.100T** | **+0.035** | **0.000** | **0.110T** | – | – | – | **+0.065** | **+0.030** | **0.140T** |
| +0.0010 | -0.0010 | 0.0010L | +0.0014 | 0.0000 | 0.0000T | | | | +0.0026 | +0.0012 | 0.0012T |
| | | 0.0040T | | | 0.0044T | | | | | | 0.0056T |
| | | **0.025L** | | | **0.000T** | | | | | | **0.030T** |
| **+0.025** | **-0.025** | **0.100T** | **+0.035** | **0.000** | **0.110T** | – | – | – | **+0.065** | **+0.030** | **0.140T** |
| +0.0010 | -0.0010 | 0.0010L | +0.0014 | 0.0000 | 0.0000T | | | | +0.0026 | +0.0012 | 0.0012T |
| | | 0.0040T | | | 0.0044T | | | | | | 0.0056T |
| | | **0.028L** | | | **0.000T** | | | | | | **0.034T** |
| **+0.025** | **-0.025** | **0.128T** | **+0.040** | **0.000** | **0.140T** | – | – | – | **+0.074** | **+0.0030** | **0.174T** |
| +0.0010 | -0.0010 | 0.0011L | +0.0016 | 0.0000 | 0.0000T | | | | +0.0029 | +0.0012 | 0.0012T |
| | | 0.0050L | | | 0.0055T | | | | | | 0.0056T |
| | | **0.028L** | | | **0.000T** | | | | | | **0.034T** |
| **+0.028** | **-0.028** | **0.128T** | **+0.040** | **0.000** | **0.140T** | – | – | – | **+0.074** | **+0.034** | **0.174T** |
| +0.0011 | -0.0011 | 0.0011L | +0.0016 | 0.0000 | 0.0000T | | | | +0.0029 | +0.0013 | 0.0013T |
| | | 0.0050T | | | 0.0055T | | | | | | 0.0068T |
| | | **0.033L** | | | **0.000T** | | | | | | **0.040T** |
| **+0.028** | **-0.028** | **0.158T** | **+0.046** | **0.000** | **0.171T** | – | – | – | **+0.086** | **+0.040** | **0.211T** |
| +0.0011 | -0.0011 | 0.0013L | +0.0018 | 0.0000 | 0.0000T | | | | +0.0034 | +0.0016 | 0.0016T |
| | | 0.0062T | | | 0.0067T | | | | | | 0.0083T |
| | | **0.033L** | | | **0.000T** | | | | | | **0.040T** |
| **+0.033** | **-0.033** | **0.158T** | **+0.046** | **0.000** | **0.171T** | – | – | – | **+0.086** | **+0.040** | **0.211T** |
| +0.0013 | -0.0013 | 0.0013L | +0.0018 | 0.0000 | 0.0000T | | | | +0.0034 | +0.0016 | 0.0016T |
| | | 0.0062T | | | 0.0067T | | | | | | 0.0083T |

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

## TABLE 10. SPHERICAL ROLLER BEARINGS – SHAFT TOLERANCES

| Bearing Bore | | | m6 | | | n6 | | | p6 | | | r6 | | | r7 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal (Max.) | | Tolerance[1] | Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit |
| Over | Incl. | | Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. |
| **3.000** 0.1181 | **6.000** 0.2362 | **-0.008** -0.0003 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| **6.000** 0.2362 | **10.000** 0.3937 | **-0.008** -0.0003 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| **10.000** 0.3937 | **18.000** 0.7087 | **-0.008** -0.0003 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| **18.000** 0.7087 | **30.000** 1.1811 | **-0.010** -0.0004 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| **30.000** 1.1811 | **50.000** 1.9685 | **-0.014** -0.0006 | **+0.025** +0.0010 | **+0.009** +0.0004 | **0.009T** **0.037T** 0.0004T 0.0145T | – | – | – | – | – | – | – | – | – | – | – | – |
| **50.000** 1.9685 | **80.000** 3.1496 | **-0.015** -0.0006 | **+0.030** +0.0012 | **+0.011** +0.0004 | **0.011T** **0.045T** 0.0004T 0.0018T | **+0.039** +0.0015 | **+0.020** +0.0008 | **0.020T** **0.054T** 0.0008T 0.0021T | – | – | – | – | – | – | – | – | – |
| **80.000** 3.1496 | **120.000** 4.7244 | **-0.020** -0.0008 | **+0.035** +0.0014 | **+0.013** +0.0005 | **0.013T** **0.055T** 0.0005T 0.0022T | **+0.045** +0.0018 | **+0.023** +0.0009 | **0.023T** **0.065T** 0.0009T 0.0026T | **+0.059** +0.0023 | **+0.037** +0.0015 | **0.037T** **0.079T** 0.0015T 0.0031T | – | – | – | – | – | – |
| **120.000** 4.7244 | **180.000** 7.0866 | **-0.025** -0.0010 | **+0.040** +0.0016 | **+0.015** +0.0006 | **0.015T** **0.065T** 0.0006T 0.0026T | **+0.052** +0.0020 | **+0.027** +0.0011 | **0.027T** **0.077T** 0.0011T 0.0030T | **+0.068** +0.0027 | **+0.043** +0.0017 | **0.043T** **0.093T** 0.0017T 0.0037T | **+0.090** +0.0035 | **+0.065** +0.0026 | **0.065T** **0.115T** 0.0026T 0.0045T | – | – | – |
| **180.000** 7.0866 | **200.000** 7.8740 | **-0.030** -0.0012 | **+0.046** +0.0018 | **+0.017** +0.0007 | **0.017T** **0.076T** 0.0007T 0.0030T | **+0.060** +0.0024 | **+0.031** +0.0012 | **0.031L** **0.090T** 0.0012L 0.0036T | **+0.079** +0.0031 | **+0.050** +0.0020 | **0.050T** **0.109T** 0.0020T 0.0043T | **+0.106** +0.0042 | **+0.077** +0.0030 | **0.077T** **0.136T** 0.0030T 0.0054T | – | – | – |
| **200.000** 7.8740 | **225.000** 8.8583 | **-0.030** -0.0012 | **+0.046** +0.0018 | **+0.017** +0.0007 | **0.017T** **0.076T** 0.0007T 0.0030T | **+0.060** +0.0024 | **+0.031** +0.0012 | **0.031L** **0.090T** 0.0012L 0.0036T | **+0.079** +0.0031 | **+0.050** +0.0020 | **0.050T** **0.109T** 0.0020T 0.0043T | **+0.109** +0.0043 | **+0.080** +0.0031 | **0.080T** **0.139T** 0.0031T 0.0055T | **+0.126** +0.0050 | **+0.080** +0.0031 | **0.080T** **0.156T** 0.0031T 0.0062T |
| **225.000** 8.8583 | **250.000** 9.8425 | **-0.030** -0.0012 | **+0.046** +0.0018 | **+0.017** +0.0007 | **0.017T** **0.076T** 0.0007T 0.0030T | **+0.060** +0.0024 | **+0.031** +0.0012 | **0.031L** **0.090T** 0.0012L 0.0036T | **+0.079** +0.0031 | **+0.050** +0.0020 | **0.050T** **0.109T** 0.0020T 0.0043T | **+0.113** +0.0044 | **+0.084** +0.0033 | **0.084T** **0.143T** 0.0033T 0.0056T | **+0.130** +0.0051 | **+0.084** +0.0033 | **0.084T** **0.160T** 0.0033T 0.0063T |
| **250.000** 9.8425 | **280.000** 11.0236 | **-0.035** -0.0014 | **+0.052** +0.0020 | **+0.020** +0.0008 | **0.020T** **0.087T** 0.0008T 0.0034T | **+0.066** +0.0026 | **+0.034** +0.0013 | **0.034T** **0.101T** 0.0013T 0.0040T | **+0.088** +0.0035 | **+0.056** +0.0022 | **0.056T** **0.123T** 0.0022T 0.0049T | **+0.126** +0.0050 | **+0.094** +0.0037 | **0.094T** **0.161T** 0.0037T 0.0064T | **+0.146** +0.0057 | **+0.094** +0.0037 | **0.094T** **0.181T** 0.0037T 0.0071T |
| **280.000** 11.0236 | **315.000** 12.4016 | **-0.035** -0.0014 | **+0.052** +0.0020 | **+0.020** +0.0008 | **0.020T** **0.087T** 0.0008T 0.0034T | **+0.066** +0.0026 | **+0.034** +0.0013 | **0.034T** **0.101T** 0.0013T 0.0040T | **+0.088** +0.0035 | **+0.056** +0.0022 | **0.056T** **0.123T** 0.0022T 0.0049T | **+0.130** +0.0051 | **+0.098** +0.0039 | **0.098T** **0.165T** 0.0039T 0.0065T | **+0.150** +0.0059 | **+0.098** +0.0039 | **0.098T** **0.185T** 0.0039T 0.0073T |

NOTE: Tolerance and shaft diameters are shown in the table as variances from nominal bearing bore.

[1]Tolerance range is from +0 to value listed.

*Continued on next page.*

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

*Continued from previous page.*

| Bearing Bore | | | m6 | | | n6 | | | p6 | | | r6 | | | r7 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal (Max.) | | Tolerance[1] | Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit | Shaft Diameter | | Fit |
| Over | Incl. | | Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. |
| | | | | | **0.021T** | | | **0.037T** | | | **0.062T** | | | **0.108T** | | | **0.108T** |
| **315.000** | **355.000** | **-0.040** | **+0.057** | **+0.021** | **0.097T** | **+0.073** | **+0.037** | **0.113T** | **+0.098** | **+0.062** | **0.138T** | **+0.144** | **+0.108** | **0.184T** | **+0.165** | **+0.108** | **0.205T** |
| 12.4016 | 13.9764 | -0.0016 | +0.0022 | +0.0008 | 0.0008T | +0.0029 | +0.0015 | 0.0015T | +0.0039 | +0.0024 | 0.0024T | +0.0057 | +0.0043 | 0.0043T | +0.0065 | +0.0043 | 0.0043T |
| | | | | | 0.0038T | | | 0.0045T | | | 0.0055T | | | 0.0073T | | | 0.0081T |
| | | | | | | | | **0.037T** | | | **0.062T** | | | **0.114T** | | | **0.114T** |
| **355.000** | **400.000** | **-0.040** | – | – | – | **+0.073** | **+0.037** | **0.113T** | **+0.098** | **+0.062** | **0.138T** | **+0.150** | **+0.114** | **0.190T** | **+0.171** | **+0.114** | **0.211T** |
| 13.9764 | 15.7480 | -0.0016 | | | | +0.0029 | +0.0015 | 0.0015T | +0.0039 | +0.0024 | 0.0024T | +0.0059 | +0.0045 | 0.0045T | +0.0067 | +0.0045 | 0.0045T |
| | | | | | | | | 0.0045T | | | 0.0055T | | | 0.0075T | | | 0.0083T |
| | | | | | | | | **0.040T** | | | **0.068T** | | | **0.126T** | | | **0.126T** |
| **400.000** | **450.000** | **-0.045** | – | – | – | **+0.080** | **+0.040** | **0.125T** | **+0.108** | **+0.068** | **0.153T** | **+0.166** | **+0.126** | **0.211T** | **+0.189** | **+0.126** | **0.234T** |
| 15.7480 | 17.7165 | -0.0018 | | | | +0.0031 | +0.0016 | 0.0016T | +0.0043 | +0.0027 | 0.0027T | +0.0065 | +0.0050 | 0.0050T | +0.0074 | +0.0050 | 0.0050T |
| | | | | | | | | 0.0049T | | | 0.0061T | | | 0.0083T | | | 0.0092T |
| | | | | | | | | **0.040T** | | | **0.068T** | | | **0.132T** | | | **0.132T** |
| **450.000** | **500.000** | **-0.045** | – | – | – | **+0.080** | **+0.040** | **0.125T** | **+0.108** | **+0.068** | **0.153T** | **+0.172** | **+0.132** | **0.217T** | **+0.195** | **+0.132** | **0.240T** |
| 17.7165 | 19.6850 | -0.0018 | | | | +0.0031 | +0.0016 | 0.0016T | +0.0043 | +0.0027 | 0.0027T | +0.0068 | +0.0052 | 0.0052T | +0.0077 | +0.0052 | 0.0052T |
| | | | | | | | | 0.0049T | | | 0.0061T | | | 0.0086T | | | 0.0095T |
| | | | | | | | | | | | **0.078T** | | | **0.150T** | | | **0.150T** |
| **500.000** | **560.000** | **-0.050** | – | – | – | – | – | – | **+0.122** | **+0.078** | **0.172T** | **+0.194** | **+0.150** | **0.244T** | **+0.220** | **+0.150** | **0.270T** |
| 19.6850 | 22.0472 | -0.0020 | | | | | | | +0.0048 | +0.0031 | 0.0031T | +0.0076 | +0.0059 | 0.0059T | +0.0087 | +0.0059 | 0.0059T |
| | | | | | | | | | | | 0.0068T | | | 0.0096T | | | 0.0107T |
| | | | | | | | | | | | **0.078T** | | | **0.155T** | | | **0.155T** |
| **560.000** | **630.000** | **-0.050** | – | – | – | – | – | – | **+0.122** | **+0.078** | **0.172T** | **+0.199** | **+0.155** | **0.249T** | **+0.225** | **+0.155** | **0.275T** |
| 22.0472 | 24.8032 | -0.0020 | | | | | | | +0.0048 | +0.0031 | 0.0031T | +0.0078 | +0.0061 | 0.0061T | +0.0089 | +0.0061 | 0.0061T |
| | | | | | | | | | | | 0.0068T | | | 0.0098T | | | 0.0109T |
| | | | | | | | | | | | **0.088T** | | | **0.175T** | | | **0.175T** |
| **630.000** | **710.000** | **-0.075** | – | – | – | – | – | – | **+0.138** | **+0.088** | **0.213T** | **+0.225** | **+0.175** | **0.300T** | **+0.255** | **+0.175** | **0.330T** |
| 24.8032 | 27.9528 | -0.0030 | | | | | | | +0.0054 | +0.0035 | 0.0035T | +0.0089 | +0.0069 | 0.0069T | +0.0100 | +0.0069 | 0.0069T |
| | | | | | | | | | | | 0.0084T | | | 0.0119T | | | 0.0130T |
| | | | | | | | | | | | **0.088T** | | | **0.185T** | | | **0.185T** |
| **710.000** | **800.000** | **-0.075** | – | – | – | – | – | – | **+0.138** | **+0.088** | **0.213T** | **+0.235** | **+0.185** | **0.310T** | **+0.265** | **+0.185** | **0.340T** |
| 27.9528 | 31.4961 | -0.0030 | | | | | | | +0.0054 | +0.0035 | 0.0035T | +0.0093 | +0.0073 | 0.0073T | +0.0104 | +0.0073 | 0.0073T |
| | | | | | | | | | | | 0.0084T | | | 0.0123T | | | 0.0134T |
| | | | | | | | | | | | **0.100T** | | | **0.210T** | | | **0.210T** |
| **800.000** | **900.000** | **-0.100** | – | – | – | – | – | – | **+0.156** | **+0.100** | **0.256T** | **+0.266** | **+0.210** | **0.366T** | **+0.300** | **+0.210** | **0.400T** |
| 31.4961 | 35.4331 | -0.0039 | | | | | | | +0.0061 | +0.0039 | 0.0039T | +0.0105 | +0.0083 | 0.0083T | +0.0118 | +0.0083 | 0.0083T |
| | | | | | | | | | | | 0.0100T | | | 0.0144T | | | 0.0157T |
| | | | | | | | | | | | **0.100T** | | | **0.220T** | | | **0.220T** |
| **900.000** | **1000.000** | **-0.100** | – | – | – | – | – | – | **+0.156** | **+0.100** | **0.256T** | **+0.276** | **+0.220** | **0.366T** | **+0.0310** | **+0.220** | **0.410T** |
| 35.4331 | 39.3701 | -0.0039 | | | | | | | +0.0061 | +0.0039 | 0.0039T | +0.0109 | +0.0087 | 0.0087T | +0.0122 | +0.0087 | 0.0087T |
| | | | | | | | | | | | 0.0100T | | | 0.0148T | | | 0.0161T |
| | | | | | | | | | | | **0.120T** | | | **0.250T** | | | **0.250T** |
| **1000.000** | **1120.000** | **-0.125** | – | – | – | – | – | – | **+0.186** | **+0.120** | **0.311T** | **+0.316** | **+0.250** | **0.441T** | **+0.355** | **+0.250** | **0.480T** |
| 39.3701 | 44.0945 | -0.0049 | | | | | | | +0.0073 | +0.0047 | 0.0047T | +0.0124 | +0.0098 | 0.0098T | +0.0140 | +0.0098 | 0.0098T |
| | | | | | | | | | | | 0.0122T | | | 0.0173T | | | 0.0189T |
| | | | | | | | | | | | **0.120T** | | | **0.260T** | | | **0.260T** |
| **1120.000** | **1250.000** | **-0.125** | – | – | – | – | – | – | **+0.186** | **+0.120** | **0.311T** | **+0.326** | **+0.260** | **0.451T** | **+0.365** | **+0.260** | **0.490T** |
| 44.0945 | 49.2126 | -0.0049 | | | | | | | +0.0073 | +0.0047 | 0.0047T | +0.0128 | +0.0102 | 0.0102T | +0.0144 | +0.0102 | 0.0102T |
| | | | | | | | | | | | 0.0122T | | | 0.0177T | | | 0.0193T |

NOTE: Tolerance and shaft diameters are shown in the table as variances from nominal bearing bore.

[1]Tolerance range is from +0 to value listed.

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

# SPHERICAL ROLLER BEARING HOUSING TOLERANCES

## TABLE 11. SPHERICAL ROLLER BEARINGS – HOUSING TOLERANCES

| Bearing O.D. | | | F7 | | | G7 | | | H6 | | | H7 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal (Max.) | | Tolerance[1] | Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit |
| Over | Incl. | | Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** |
| in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. |
| | | | | | **0.016L** | | | **0.006L** | | | **0.000L** | | | **0.000L** |
| **10.000** | **18.000** | **-0.008** | **+0.034** | **+0.016** | **0.042L** | **+0.024** | **+0.002** | **0.032L** | **+0.011** | **0.000** | **0.019L** | **+0.018** | **0.000** | **0.026L** |
| 0.3937 | 0.7087 | -0.0003 | +0.0013 | +0.0006 | 0.0006L | +0.0009 | +0.0002 | 0.0002L | +0.0004 | 0.0000 | 0.0000L | +0.0007 | 0.0000 | 0.0000L |
| | | | | | 0.0016L | | | 0.0012L | | | 0.0007L | | | 0.0010L |
| | | | | | **0.020L** | | | **0.007L** | | | **0.000L** | | | **0.000L** |
| **18.000** | **30.000** | **-0.009** | **+0.041** | **+0.020** | **0.050L** | **+0.028** | **+0.007** | **0.037L** | **+0.013** | **0.000** | **0.022L** | **+0.021** | **0.000** | **0.030L** |
| 0.7087 | 1.1811 | -0.0035 | +0.0016 | +0.0008 | 0.0008L | +0.0011 | +0.0003 | 0.0003L | +0.0005 | 0.0000 | 0.0000L | +0.0008 | 0.0000 | 0.0000L |
| | | | | | 0.00195L | | | 0.00145L | | | 0.00085L | | | 0.00125L |
| | | | | | **0.025L** | | | **0.009L** | | | **0.000L** | | | **0.000L** |
| **30.000** | **50.000** | **-0.011** | **+0.050** | **+0.025** | **0.061L** | **+0.034** | **+0.009** | **0.045L** | **+0.016** | **0.000** | **0.027L** | **+0.025** | **0.000** | **0.036L** |
| 1.1811 | 1.9685 | -0.00045 | +0.0020 | +0.0010 | 0.0010L | +0.0013 | +0.0004 | 0.0004L | +0.0006 | 0.0000 | 0.0000L | +0.0010 | 0.0000 | 0.0000L |
| | | | | | 0.00245L | | | 0.00175L | | | 0.00105L | | | 0.00145L |
| | | | | | **0.030L** | | | **0.010L** | | | **0.000L** | | | **0.000L** |
| **50.000** | **80.000** | **-0.013** | **+0.060** | **+0.030** | **0.073L** | **+0.040** | **+0.010** | **0.053L** | **+0.019** | **0.000** | **0.032L** | **+0.030** | **0.000** | **0.059L** |
| 1.9685 | 3.1496 | -0.0005 | +0.0024 | +0.0012 | 0.0012L | +0.0016 | +0.0004 | 0.0004L | +0.0007 | 0.0000 | 0.0000L | +0.0012 | 0.0000 | 0.0000L |
| | | | | | 0.0029L | | | 0.0021L | | | 0.0012L | | | 0.0017L |
| | | | | | **0.036L** | | | **0.012L** | | | **0.000L** | | | **0.000L** |
| **80.000** | **120.000** | **-0.015** | **+0.071** | **+0.036** | **0.086L** | **+0.047** | **+0.012** | **0.062L** | **+0.022** | **0.000** | **0.037L** | **+0.035** | **0.000** | **0.050L** |
| 3.1496 | 4.7244 | -0.0006 | +0.0028 | +0.0014 | 0.0014L | +0.0019 | +0.0005 | 0.0005L | +0.0009 | 0.0000 | 0.0000L | +0.0014 | 0.0000 | 0.0000L |
| | | | | | 0.0034L | | | 0.0025L | | | 0.0015L | | | 0.0020L |
| | | | | | **0.043L** | | | **0.014L** | | | **0.000L** | | | **0.000L** |
| **120.000** | **150.000** | **-0.018** | **+0.083** | **+0.043** | **0.101L** | **+0.054** | **+0.014** | **0.072L** | **+0.025** | **0.000** | **0.043L** | **+0.040** | **0.000** | **0.058L** |
| 4.7244 | 5.9055 | -0.0007 | +0.0033 | +0.0017 | 0.0017L | +0.0021 | +0.0006 | 0.0006L | +0.0010 | 0.0000 | 0.0000L | +0.0016 | 0.0000 | 0.0000L |
| | | | | | 0.0040L | | | 0.0028L | | | 0.0017L | | | 0.0023L |
| | | | | | **0.043L** | | | **0.014L** | | | **0.000L** | | | **0.000L** |
| **150.000** | **180.000** | **-0.025** | **+0.083** | **+0.043** | **0.108L** | **+0.054** | **+0.014** | **0.079L** | **+0.025** | **0.000** | **0.050L** | **+0.040** | **0.000** | **0.065L** |
| 5.9055 | 7.0866 | -0.0010 | +0.0033 | +0.0017 | 0.0017L | +0.0021 | +0.0006 | 0.0006L | +0.0010 | 0.0000 | 0.0000L | +0.0016 | 0.0000 | 0.0000L |
| | | | | | 0.0043L | | | 0.0031L | | | 0.0020L | | | 0.0026L |
| | | | | | **0.050L** | | | **0.015L** | | | **0.000L** | | | **0.000L** |
| **180.000** | **250.000** | **-0.030** | **+0.096** | **+0.050** | **0.126L** | **+0.061** | **+0.015** | **0.091L** | **+0.029** | **0.000** | **0.059L** | **+0.046** | **0.000** | **0.076L** |
| 7.0866 | 9.8425 | -0.0012 | +0.0038 | +0.0020 | 0.0020L | +0.0024 | +0.0006 | 0.0006L | +0.0011 | 0.0000 | 0.0000L | +0.0018 | 0.0000 | 0.0000L |
| | | | | | 0.0050L | | | 0.0036L | | | 0.0023L | | | 0.0030L |
| | | | | | **0.056L** | | | **0.017L** | | | **0.000L** | | | **0.000L** |
| **250.000** | **315.000** | **-0.035** | **+0.108** | **+0.056** | **0.143L** | **+0.069** | **+0.17** | **0.104L** | **+0.032** | **0.000** | **0.067L** | **+0.052** | **0.000** | **0.087L** |
| 9.8425 | 12.4016 | -0.0014 | +0.0043 | +0.0022 | 0.0022L | +0.0027 | +0.0007 | 0.0007L | +0.0013 | 0.0000 | 0.0000L | +0.0020 | 0.0000 | 0.0000L |
| | | | | | 0.0057L | | | 0.0041L | | | 0.0027L | | | 0.0034L |
| | | | | | **0.063L** | | | **0.018L** | | | **0.000L** | | | **0.000L** |
| **315.000** | **400.000** | **-0.040** | **+0.119** | **+0.062** | **0.159L** | **+0.075** | **+0.018** | **0.115L** | **+0.089** | **0.000** | **0.129L** | **+0.057** | **0.000** | **0.097L** |
| 12.4016 | 15.7480 | -0.0016 | +0.0047 | +0.0024 | 0.0024L | +0.0030 | +0.0007 | 0.0007L | +0.0014 | 0.0000 | 0.0000L | +0.0022 | 0.0000 | 0.0000L |
| | | | | | 0.0063L | | | 0.0046L | | | 0.0030L | | | 0.0038L |
| | | | | | **0.068L** | | | **0.020L** | | | **0.000L** | | | **0.000L** |
| **400.000** | **500.000** | **-0.045** | **+0.131** | **+0.068** | **0.176L** | **+0.083** | **+0.020** | **0.128L** | **+0.097** | **0.000** | **0.142L** | **+0.063** | **0.000** | **0.108L** |
| 15.7480 | 19.6850 | -0.0018 | +0.0052 | +0.0027 | 0.0027L | +0.0033 | +0.0008 | 0.0008L | +0.0016 | 0.0000 | 0.0000L | +0.0025 | 0.0000 | 0.0000L |
| | | | | | 0.0070L | | | 0.0051L | | | 0.0034L | | | 0.0043L |
| | | | | | **0.076L** | | | **0.022L** | | | **0.000L** | | | **0.000L** |
| **500.000** | **630.000** | **-0.050** | **+0.146** | **+0.076** | **0.196L** | **+0.092** | **+0.022** | **0.142L** | **+0.110** | **0.000** | **0.160L** | **+0.070** | **0.000** | **0.120L** |
| 19.6850 | 24.8032 | -0.0020 | +0.0057 | +0.0030 | 0.0030L | +0.0036 | +0.0009 | 0.0009L | +0.0017 | 0.0000 | 0.0000L | +0.0028 | 0.0000 | 0.0000L |
| | | | | | 0.0077L | | | 0.0056L | | | 0.0037L | | | 0.0048L |

NOTE: Tolerance and shaft diameters are shown in the table as variances from nominal bearing O.D.

[1]Tolerance range is from +0 to value listed.

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

| H8 | | | J6 | | | J7 | | | K6 | | | K7 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit |
| Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** |
| in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. |
| | | **0.000L** | | | **0.005T** | | | **0.008T** | | | **0.009T** | | | **0.012T** |
| **+0.027** | **0.000** | **0.035L** | **+0.006** | **-0.005** | **0.014L** | **+0.10** | **-0.008** | **0.018L** | **+0.002** | **-0.009** | **0.010L** | **+0.006** | **-0.012** | **0.014L** |
| +0.0011 | 0.0000 | 0.0000L | +0.0002 | -0.0002 | 0.0002T | +0.004 | -0.0003 | 0.0003T | +0.0001 | -0.0004 | 0.0004T | +0.0002 | -0.0005 | 0.0005T |
| | | 0.0014L | | | 0.0005L | | | 0.0007L | | | 0.0004L | | | 0.0005L |
| | | **0.000L** | | | **0.005T** | | | **0.009T** | | | **0.011T** | | | **0.015T** |
| **+0.033** | **0.000** | **0.030L** | **+0.008** | **-0.005** | **0.017L** | **+0.012** | **-0.009** | **0.021L** | **+0.002** | **-0.011** | **0.011L** | **+0.006** | **-0.015** | **0.015L** |
| +0.0013 | 0.0000 | 0.0000L | +0.0003 | -0.0002 | 0.0002T | +0.0005 | -0.0004 | 0.0004T | +0.0001 | -0.0004 | 0.0004T | +0.0002 | -0.0006 | 0.0006T |
| | | 0.00165L | | | 0.00065L | | | 0.00085L | | | 0.00045L | | | 0.00055L |
| | | **0.000L** | | | **0.006T** | | | **0.011T** | | | **0.013T** | | | **0.018T** |
| **+0.039** | **0.000** | **0.050L** | **+0.010** | **-0.006** | **0.021L** | **+0.014** | **-0.011** | **0.025L** | **+0.003** | **-0.014** | **0.014L** | **+0.007** | **-0.018** | **0.018L** |
| +0.0015 | 0.0000 | 0.0000L | +0.0002 | -0.0002 | 0.0002T | +0.0006 | -0.0004 | 0.0004T | +0.0001 | -0.0005 | 0.0005T | +0.0003 | -0.0007 | 0.0007T |
| | | 0.00195L | | | 0.00085L | | | 0.00105L | | | 0.00055L | | | 0.00065L |
| | | **0.000L** | | | **0.006T** | | | **0.012T** | | | **0.015T** | | | **0.021T** |
| **+0.046** | **0.000** | **0.059L** | **+0.013** | **-0.006** | **0.026L** | **+0.018** | **-0.012** | **0.031L** | **+0.004** | **-0.015** | **0.017L** | **+0.009** | **-0.021** | **0.022L** |
| +0.0018 | 0.0000 | 0.0000L | +0.0005 | -0.0002 | 0.0002T | +0.0007 | -0.0005 | 0.0005T | +0.0002 | -0.0006 | 0.0006T | +0.0004 | -0.0008 | 0.0008T |
| | | 0.0023L | | | 0.0010L | | | 0.0012L | | | 0.0007L | | | 0.0009L |
| **+0.054** | **0.000** | **0.000L** | | | **0.006T** | | | **0.013T** | | | **0.018T** | | | **0.025T** |
| **+0.054** | **0.000** | **0.069L** | **+0.016** | **-0.006** | **0.031L** | **+0.022** | **-0.013** | **0.037L** | **+0.004** | **-0.018** | **0.019L** | **+0.010** | **-0.025** | **0.025L** |
| +0.0021 | 0.0000 | 0.0000L | +0.0006 | -0.0002 | 0.0002T | +0.0009 | -0.0005 | 0.0005T | +0.0002 | -0.0007 | 0.0007T | +0.0004 | -0.0010 | 0.0010T |
| | | 0.0027L | | | 0.0012L | | | 0.0015L | | | 0.0008L | | | 0.0010L |
| | | **0.000L** | | | **0.007T** | | | **0.014T** | | | **0.021T** | | | **0.028T** |
| **+0.063** | **0.000** | **0.081L** | **+0.018** | **-0.007** | **0.036L** | **+0.026** | **-0.014** | **0.044L** | **+0.004** | **-0.021** | **0.022L** | **+0.012** | **-0.028** | **0.030L** |
| +0.0025 | 0.0000 | 0.0000L | +0.0007 | -0.0003 | 0.0003T | +0.0010 | -0.0006 | 0.0006T | +0.0002 | -0.0008 | 0.0008T | +0.0005 | -0.0011 | 0.0011T |
| | | 0.0032L | | | 0.0014L | | | 0.0017L | | | 0.0009L | | | 0.0012L |
| | | **0.000L** | | | **0.007T** | | | **0.014T** | | | **0.021T** | | | **0.028T** |
| **+0.063** | **0.000** | **0.088L** | **+0.018** | **-0.007** | **0.043L** | **+0.026** | **-0.014** | **0.051L** | **+0.004** | **-0.021** | **0.029L** | **+0.012** | **-0.033** | **0.037L** |
| +0.0025 | 0.0000 | 0.0000L | +0.0007 | -0.0003 | 0.0003T | +0.0010 | -0.0006 | 0.0006T | +0.0002 | -0.0008 | 0.008T | +0.0005 | -0.028 | 0.0011T |
| | | 0.0035L | | | 0.0017L | | | 0.0020L | | | 0.0012L | | | 0.0015L |
| | | **0.000L** | | | **0.007T** | | | **0.016T** | | | **0.024T** | | | **0.033T** |
| **+0.072** | **0.000** | **0.102L** | **+0.022** | **-0.007** | **0.052L** | **+0.030** | **-0.016** | **0.060L** | **+0.005** | **-0.024** | **0.035L** | **+0.013** | **-0.0011** | **0.043L** |
| +0.0028 | 0.0000 | 0.0000L | +0.0007 | -0.0003 | 0.0003T | +0.0012 | -0.0006 | 0.0006T | +0.0002 | -0.0009 | 0.0009T | +0.0005 | -0.0013 | 0.0013T |
| | | 0.0040L | | | 0.0021L | | | 0.0024L | | | 0.0014L | | | 0.0017L |
| | | **0.000L** | | | **0.007T** | | | **0.016T** | | | **0.027T** | | | **0.036T** |
| **+0.081** | **0.000** | **0.116L** | **+0.025** | **-0.007** | **0.060L** | **+0.036** | **-0.016** | **0.071L** | **+0.005** | **-0.027** | **0.040L** | **+0.016** | **-0.036** | **0.051L** |
| +0.0032 | 0.0000 | 0.0000L | +0.0010 | -0.0003 | 0.0003T | +0.0014 | -0.0006 | 0.0006T | +0.0002 | -0.0011 | 0.0011T | +0.0006 | -0.0014 | 0.0014T |
| | | 0.0046L | | | 0.0024L | | | 0.0028L | | | 0.0016L | | | 0.0020L |
| | | **0.000L** | | | **0.007T** | | | **0.018T** | | | **0.029T** | | | **0.040T** |
| **+0.036** | **0.000** | **0.076L** | **+0.029** | **-0.007** | **0.069L** | **+0.039** | **-0.018** | **0.079L** | **+0.007** | **-0.029** | **0.047L** | **+0.017** | **-0.040** | **0.057L** |
| +0.035 | 0.0000 | 0.0000L | +0.0011 | -0.0003 | 0.0003T | +0.0015 | -0.0007 | 0.0007T | +0.0003 | -0.0011 | 0.0011T | +0.0007 | -0.0016 | 0.0016T |
| | | 0.0051L | | | 0.0027L | | | 0.0031L | | | 0.0019L | | | 0.0023L |
| | | **0.000L** | | | **0.007T** | | | **0.020T** | | | **0.032T** | | | **0.045T** |
| **+0.040** | **0.000** | **0.085** | **+0.033** | **-0.007** | **0.078L** | **+0.043** | **-0.020** | **0.088L** | **+0.008** | **-0.032** | **0.053L** | **+0.018** | **-0.045** | **0.063L** |
| +0.0038 | 0.0000 | 0.0000L | +0.0013 | -0.0003 | 0.0003T | +0.0017 | -0.0008 | 0.0008T | +0.0003 | -0.0013 | 0.0013T | +0.0007 | -0.0018 | 0.0018T |
| | | 0.0056L | | | 0.0031L | | | 0.0035L | | | 0.0021L | | | 0.0025L |
| | | **0.000L** | | | **0.022T** | | | **0.022T** | | | **0.044T** | | | **0.070T** |
| **+0.044** | **0.000** | **0.094L** | **+0.037** | **-0.007** | **0.098L** | **+0.048** | **-0.022** | **0.098L** | **0.000** | **-0.044** | **0.050L** | **0.000** | **-0.070** | **0.050L** |
| +0.0043 | 0.0000 | 0.0000L | +0.0015 | -0.0003 | 0.0003T | +0.0019 | -0.0009 | 0.0009T | 0.0000 | -0.0017 | 0.0017T | 0.0000 | -0.0028 | 0.0028T |
| | | 0.0063L | | | 0.0035L | | | 0.0039L | | | 0.0020L | | | 0.0020L |

*Continued on next page.*

## SHAFT AND HOUSING FITS

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

*Continued from previous page.*

| Bearing O.D. | | | F7 | | | G7 | | | H6 | | | H7 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal (Max.) | | Tolerance[1] | Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit |
| Over | Incl. | | Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** |
| in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. |
| | | | | | **0.080L** | | | **0.024L** | | | **0.000L** | | | **0.000L** |
| **630.000** | **800.000** | **-0.075** | **+0.160** | **+0.080** | **0.235L** | **+0.104** | **+0.024** | **0.179L** | **+0.125** | **0.000** | **0.200L** | **+0.080** | **0.000** | **0.155L** |
| 24.8032 | 31.4961 | -0.0030 | +0.0063 | +0.0031 | 0.0031L | +0.0041 | +0.0009 | 0.0009L | +0.0020 | 0.0000 | 0.0000L | +0.0031 | 0.0000 | 0.0000L |
| | | | | | 0.0093L | | | 0.0071L | | | 0.0030L | | | 0.0061L |
| | | | | | **0.086L** | | | **0.026L** | | | **0.000L** | | | **0.000L** |
| **800.000** | **1000.000** | **-0.100** | **+0.179** | **+0.086** | **0.276L** | **+0.116** | **+0.026** | **0.216L** | **+0.140** | **0.000** | **0.240L** | **+0.090** | **0.000** | **0.190L** |
| 31.4961 | 39.3701 | -0.0039 | +0.0063 | +0.0034 | 0.0034L | +0.0046 | +0.0010 | 0.0010L | +0.0022 | 0.0000 | 0.0000L | +0.0035 | 0.0000 | 0.0000L |
| | | | | | 0.0108L | | | 0.0085L | | | 0.0061L | | | 0.0074L |
| | | | | | **0.098L** | | | **0.028L** | | | **0.000L** | | | **0.000L** |
| **1000.000** | **1250.000** | **-0.125** | **+0.203** | **+0.098** | **0.328L** | **+0.133** | **+0.028** | **0.258L** | **+0.165** | **0.000** | **0.290L** | **+0.105** | **0.000** | **0.230L** |
| 39.3701 | 49.2126 | -0.0049 | +0.0080 | +0.0039 | 0.0039L | +0.0052 | +0.0011 | 0.0011L | +0.0026 | 0.0000 | 0.0000L | +0.0041 | 0.0000 | 0.0000L |
| | | | | | 0.0129L | | | 0.0101L | | | 0.0075L | | | 0.0090L |
| | | | | | **0.110L** | | | **0.030L** | | | **0.000L** | | | **0.000L** |
| **1250.000** | **1600.000** | **-0.160** | **+0.155** | **+0.030** | **0.395L** | **+0.155** | **+0.030** | **0.315L** | **+0.195** | **0.000** | **0.355L** | **+0.125** | **0.000** | **0.355L** |
| 49.2126 | 62.9921 | -0.0063 | +0.0093 | +0.0043 | 0.0043L | +0.0061 | +0.0012 | 0.0012L | +0.0031 | 0.0000 | 0.0000L | +0.0049 | 0.0000 | 0.0000L |
| | | | | | 0.0156L | | | 0.0124L | | | 0.0094L | | | 0.0112L |
| | | | | | **0.120L** | | | **0.032L** | | | **0.000L** | | | **0.000L** |
| **1600.000** | **2000.000** | **-0.200** | **+0.270** | **+0.120** | **0.470L** | **+0.182** | **+0.032** | **0.382L** | **+0.230** | **0.000** | **0.430L** | **+0.150** | **0.000** | **0.350L** |
| 62.9921 | 78.7402 | -0.0079 | +0.0106 | +0.0047 | 0.0047L | +0.0072 | +0.0013 | 0.0013L | +0.0036 | 0.0000 | 0.0000L | +0.0059 | 0.0000 | 0.0000L |
| | | | | | 0.0185L | | | 0.0151L | | | 0.0115L | | | 0.0138L |
| | | | | | **0.130L** | | | **0.034L** | | | **0.000L** | | | **0.000L** |
| **2000.000** | **2500.000** | **-0.250** | **+0.305** | **+0.0130** | **0.555L** | **+0.209** | **+0.034** | **0.459L** | **+0.280** | **0.000** | **0.530L** | **+0.175** | **0.000** | **0.425L** |
| 78.7402 | 98.4252 | -0.0098 | 0.0120 | +0.0051 | 0.0051L | +0.0082 | +0.0013 | 0.0013L | +0.043 | 0.0000 | 0.0000L | +0.0069 | 0.0000 | 0.0000L |
| | | | | | 0.0218L | | | 0.0180L | | | 0.0141L | | | 0.0167L |

NOTE: Tolerance and shaft diameters are shown in the table as variances from nominal bearing O.D.

[1]Tolerance range is from +0 to value listed.

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

| H8 | | | J6 | | | J7 | | | K6 | | | K7 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit |
| Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** |
| in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. |
| | | **0.000L** | | | **0.010T** | | | **0.024T** | | | **0.050T** | | | **0.080T** |
| **+0.050** | **0.000** | **0.125L** | **+0.040** | **-0.010** | **0.115L** | **+0.056** | **-0.024** | **0.131L** | **0.000** | **-0.050** | **0.075L** | **0.000** | **-0.080** | **0.075L** |
| +0.0049 | 0.0000 | 0.0000L | +0.0016 | -0.0004 | 0.0004T | +0.0022 | -0.0009 | 0.0009T | 0.0000 | -0.0020 | 0.0020T | 0.0000 | -0.0031 | 0.0031T |
| | | 0.0079L | | | 0.0046L | | | 0.0052L | | | 0.0030L | | | 0.0030L |
| | | **0.000L** | | | **0.010T** | | | **0.026T** | | | **0.056T** | | | **0.090T** |
| **+0.056** | **0.000** | **0.156L** | **+0.046** | **-0.010** | **0.146L** | **+0.064** | **-0.026** | **0.164L** | **0.000** | **-0.056** | **0.100L** | **0.000** | **-0.090** | **0.100L** |
| +0.0055 | 0.0000 | 0.0000L | +0.0018 | -0.0004 | 0.0004T | +0.0025 | -0.0010 | 0.0010T | 0.0000 | -0.0022 | 0.0022T | 0.0000 | -0.0035 | 0.0035T |
| | | 0.0094L | | | 0.0057L | | | 0.0064L | | | 0.0039L | | | 0.0039L |
| | | **0.000L** | | | **0.010T** | | | **0.028T** | | | **0.066T** | | | **0.105T** |
| **+0.066** | **0.000** | **0.191L** | **+0.056** | **-0.010** | **0.181L** | **+0.077** | **-0.028** | **0.202L** | **0.000** | **-0.066** | **0.125L** | **0.000** | **-0.105** | **0.125L** |
| +0.0065 | 0.0000 | 0.0000L | +0.0022 | -0.0004 | 0.0004T | +0.0030 | -0.0011 | 0.0011T | 0.0000 | -0.0026 | 0.0026T | 0.0000 | -0.0041 | 0.0041T |
| | | 0.0114L | | | 0.0071L | | | 0.0079L | | | 0.0049L | | | 0.0049L |
| | | **0.000L** | | | **0.010T** | | | **0.030T** | | | **0.078T** | | | **0.125T** |
| **+0.078** | **0.000** | **0.238L** | **+0.068** | **-0.010** | **0.228L** | **+0.095** | **-0.030** | **0.255L** | **0.000** | **-0.078** | **0.160L** | **0.000** | **-0.125** | **0.160L** |
| +0.0077 | 0.0000 | 0.0000L | +0.0027 | -0.0004 | 0.0004T | +0.0037 | -0.0012 | 0.0012T | 0.0000 | -0.0031 | 0.0031T | 0.0000 | -0.0049 | 0.0049T |
| | | 0.0104L | | | 0.0090L | | | 0.0100L | | | 0.0063L | | | 0.0063L |
| | | **0.000L** | | | **0.110T** | | | **0.032T** | | | **0.092T** | | | **0.150T** |
| **+0.092** | **0.000** | **0.292L** | **+0.082** | **-0.010** | **0.282L** | **+0.118** | **-0.032** | **0.318L** | **0.000** | **-0.092** | **0.200L** | **0.000** | **-0.150** | **0.200L** |
| +0.0091 | 0.0000 | 0.0000L | +0.0032 | -0.0004 | 0.0004T | +0.0046 | -0.0013 | 0.0013T | 0.0000 | -0.0036 | 0.0036T | 0.0000 | -0.0059 | 0.0059T |
| | | 0.0170L | | | 0.0111L | | | 0.0125L | | | 0.0079L | | | 0.0079L |
| | | **0.000L** | | | **0.010T** | | | **0.034T** | | | **0.110T** | | | **0.175T** |
| **+0.110** | **0.000** | **0.360L** | **+0.100** | **-0.010** | **0.350L** | **+0.141** | **-0.034** | **0.391L** | **0.000** | **-0.110** | **0.250L** | **0.000** | **-0.175** | **0.250L** |
| +0.0110 | 0.0000 | 0.0000L | +0.0039 | -0.0004 | 0.0004T | +0.0056 | -0.0013 | 0.0013T | 0.0000 | -0.0043 | 0.0043T | 0.0000 | -0.0069 | 0.0069T |
| | | 0.0208L | | | 0.0137L | | | 0.0154L | | | 0.0098L | | | 0.0098L |

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

## TABLE 12. SPHERICAL ROLLER BEARINGS – HOUSING TOLERANCES

| Bearing O.D. | | | M6 | | | M7 | | | N6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal (Max.) | | Tolerance[1] | Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit |
| Over | Incl. | | Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** |
| in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. |
| | | | | | **0.015T** | | | **0.018T** | | | **0.020T** |
| **10.000** | **18.000** | **-0.008** | **-0.004** | **-0.015** | **0.004L** | **0.000** | **-0.018** | **0.008L** | **-0.009** | **-0.020** | **0.001T** |
| 0.3937 | 0.7087 | -0.0003 | -0.0002 | -0.0006 | 0.0006T | 0.0000 | -0.0007 | 0.0007T | -0.0004 | -0.0008 | 0.0008T |
| | | | | | 0.0001L | | | 0.0003L | | | 0.0001T |
| | | | | | **0.017T** | | | **0.021T** | | | **0.024T** |
| **18.000** | **30.000** | **-0.009** | **-0.004** | **-0.017** | **0.005L** | **0.000** | **-0.021** | **0.009L** | **-0.007** | **-0.028** | **0.002T** |
| 0.7087 | 1.1811 | -0.0035 | -0.0002 | -0.0007 | 0.0007T | 0.0000 | -0.0008 | 0.0008T | -0.0004 | -0.0009 | 0.0009T |
| | | | | | 0.00015L | | | 0.0035L | | | 0.00005T |
| | | | | | **0.020T** | | | **0.025T** | | | **0.028T** |
| **30.000** | **50.000** | **-0.011** | **-0.004** | **-0.020** | **0.007L** | **0.000** | **-0.025** | **0.011L** | **-0.012** | **-0.028** | **0.001T** |
| 1.1811 | 1.9685 | -0.0045 | -0.0002 | -0.0008 | 0.0008T | 0.0000 | -0.0010 | 0.0010T | -0.0005 | -0.0011 | 0.0011T |
| | | | | | 0.00025L | | | 0.00045L | | | 0.00005T |
| | | | | | **0.024T** | | | **0.030T** | | | **0.033T** |
| **50.000** | **80.000** | **-0.013** | **-0.005** | **-0.024** | **0.008L** | **0.000** | **-0.030** | **0.013L** | **-0.014** | **-0.033** | **0.001T** |
| 1.9685 | 3.1496 | -0.0005 | -0.0002 | -0.0009 | 0.0009T | 0.0000 | -0.0012 | 0.0012T | -0.0006 | -0.0013 | 0.0013T |
| | | | | | 0.0003L | | | 0.0005L | | | 0.0001T |
| | | | | | **0.028T** | | | **0.035T** | | | **0.038T** |
| **80.000** | **120.000** | **-0.015** | **-0.006** | **-0.028** | **0.009L** | **0.000** | **-0.035** | **0.015L** | **-0.016** | **-0.038** | **0.001T** |
| 3.1496 | 4.7244 | -0.0006 | -0.0002 | -0.0011 | 0.0011T | 0.0000 | -0.0014 | 0.0014T | -0.0006 | -0.0015 | 0.0015T |
| | | | | | 0.0004L | | | 0.0006L | | | 0.0000T |
| | | | | | **0.033T** | | | **0.040T** | | | **0.045T** |
| **120.000** | **150.000** | **-0.018** | **-0.008** | **-0.033** | **0.010L** | **0.000** | **-0.040** | **0.018L** | **-0.020** | **-0.045** | **0.002T** |
| 4.7244 | 5.9055 | -0.0007 | -0.0003 | -0.0013 | 0.0013T | 0.0000 | -0.0016 | 0.0016T | -0.0008 | -0.0018 | 0.0018T |
| | | | | | 0.0004L | | | 0.0007L | | | 0.0001T |
| | | | | | **0.033T** | | | **0.040T** | | | **0.045T** |
| **150.000** | **180.000** | **-0.025** | **-0.008** | **-0.033** | **0.017L** | **0.000** | **-0.040** | **0.025L** | **-0.020** | **-0.045** | **0.005T** |
| 5.9055 | 7.0866 | -0.0010 | -0.0003 | -0.0013 | 0.0013T | 0.0000 | -0.0016 | 0.0016T | -0.0008 | -0.0018 | 0.0018T |
| | | | | | 0.0007L | | | 0.0010L | | | 0.0002T |
| | | | | | **0.037T** | | | **0.046T** | | | **0.051T** |
| **180.000** | **250.000** | **-0.030** | **-0.008** | **-0.037** | **0.022L** | **0.000** | **-0.046** | **0.030L** | **-0.022** | **-0.051** | **0.008T** |
| 7.0866 | 9.8425 | -0.0012 | -0.0003 | -0.0015 | 0.0015T | 0.0000 | -0.0018 | 0.0018T | -0.0009 | -0.0020 | 0.0020T |
| | | | | | 0.0009L | | | 0.0012L | | | 0.0003T |
| | | | | | **0.041T** | | | **0.052T** | | | **0.057T** |
| **250.000** | **315.000** | **-0.035** | **-0.009** | **-0.041** | **0.026L** | **0.000** | **-0.052** | **0.035L** | **-0.025** | **-0.057** | **0.010T** |
| 9.8425 | 12.4016 | -0.0014 | -0.0004 | -0.0016 | 0.0016T | 0.0000 | -0.0020 | 0.0020T | -0.0010 | -0.0022 | 0.0022T |
| | | | | | 0.0010L | | | 030014L | | | 0.0004T |
| | | | | | **0.046T** | | | **0.057T** | | | **0.062T** |
| **315.000** | **400.000** | **-0.040** | **-0.010** | **-0.046** | **0.030L** | **0.000** | **-0.057** | **0.040L** | **-0.026** | **-0.062** | **0.014T** |
| 12.4016 | 15.7480 | -0.0016 | -0.0004 | -0.0018 | 0.0018T | 0.0000 | -0.0022 | 0.0022T | -0.0006 | -0.0029 | 0.0024T |
| | | | | | 0.0012L | | | 0.0016L | | | 0.0006T |
| | | | | | **0.050T** | | | **0.063T** | | | **0.067T** |
| **400.000** | **500.000** | **-0.045** | **-0.010** | **-0.050** | **0.035L** | **0.000** | **-0.063** | **0.045L** | **-0.027** | **-0.067** | **0.018T** |
| 15.7480 | 19.6850 | -0.0018 | -0.0004 | -0.0020 | 0.0020T | 0.0000 | -0.0025 | 0.0025T | -0.0011 | -0.0026 | 0.0026T |
| | | | | | 0.0014L | | | 0.0018L | | | 0.0007T |
| | | | | | **0.070T** | | | **0.096T** | | | **0.088T** |
| **500.000** | **630.000** | **-0.050** | **-0.026** | **-0.070** | **0.024L** | **-0.026** | **-0.096** | **0.024L** | **-0.044** | **-0.088** | **0.006T** |
| 19.6850 | 24.8032 | -0.0020 | -0.0010 | -0.0028 | 0.0028T | -0.0010 | -0.0038 | 0.0038T | -0.0017 | -0.0035 | 0.0035T |
| | | | | | 0.0010L | | | 0.0010L | | | 0.0003T |

NOTE: Tolerance and shaft diameters are shown in the table as variances from nominal bearing O.D.

[1]Tolerance range is from +0 to value listed.

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

| N7 | | | P6 | | | P7 | | |
|---|---|---|---|---|---|---|---|---|
| Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit |
| Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** |
| in. | in. | in. | in. | in. | in. | in. | in. | in. |
| | | **0.023T** | | | **0.026T** | | | **0.029T** |
| **-0.005** | **-0.023** | **0.003L** | **-0.015** | **-0.026** | **0.007T** | **-0.011** | **-0.029** | **0.003T** |
| -0.0002 | -0.0009 | 0.0009T | -0.0006 | -0.0010 | 0.0010T | -0.0004 | -0.0011 | 0.0011T |
| | | 0.0001L | | | 0.0003T | | | 0.0001T |
| | | **0.028T** | | | **0.031T** | | | **0.035T** |
| **-0.007** | **-0.028** | **0.002L** | **-0.018** | **-0.031** | **0.009T** | **-0.014** | **-0.035** | **0.005T** |
| -0.0003 | -0.0011 | 0.0011T | -0.0007 | -0.0012 | 0.0012T | -0.0006 | -0.0014 | 0.0014T |
| | | 0.00005L | | | 0.00035T | | | 0.0025T |
| | | **0.033T** | | | **0.037T** | | | **0.042T** |
| **-0.008** | **-0.033** | **0.003L** | **-0.021** | **-0.037** | **0.010T** | **-0.017** | **-0.042** | **0.006T** |
| -0.0003 | -0.0013 | 0.0013T | -0.0008 | -0.0015 | 0.0015T | -0.0007 | -0.0017 | 0.0017T |
| | | 0.00015L | | | 0.00035T | | | 0.0025T |
| | | **0.039T** | | | **0.045T** | | | **0.051T** |
| **-0.009** | **-0.039** | **0.004L** | **-0.026** | **-0.045** | **0.013T** | **-0.021** | **-0.051** | **0.008T** |
| -0.0004 | -0.0015 | 0.0015T | -0.0010 | -0.0018 | 0.0018T | -0.0008 | -0.0020 | 0.0020T |
| | | 0.0001L | | | 0.0005T | | | 0.0003T |
| | | **0.045T** | | | **0.052T** | | | **0.059T** |
| **-0.010** | **-0.045** | **0.005L** | **-0.030** | **-0.052** | **0.015T** | **-0.024** | **-0.059** | **0.009T** |
| -0.0004 | -0.0018 | 0.0018T | -0.0012 | -0.0020 | 0.0020T | -0.0009 | -0.0023 | 0.0023T |
| | | 0.0002L | | | 0.0006T | | | 0.0003T |
| | | **0.061T** | | | **0.061T** | | | **0.068T** |
| **-0.012** | **-0.052** | **0.018L** | **-0.036** | **-0.061** | **0.018T** | **-0.028** | **-0.068** | **0.010T** |
| -0.0005 | -0.0020 | 0.0020T | -0.0014 | -0.0024 | 0.0024T | -0.0011 | -0.0027 | 0.0027T |
| | | 0.0002L | | | 0.0007T | | | 0.0004T |
| | | **0.052T** | | | **0.061T** | | | **0.068T** |
| **-0.012** | **-0.052** | **0.013L** | **-0.036** | **-0.061** | **0.011T** | **-0.028** | **-0.068** | **0.003T** |
| -0.0005 | -0.0020 | 0.0020T | -0.0014 | -0.0024 | 0.0024T | -0.0011 | -0.0027 | 0.0027T |
| | | 0.0005L | | | 0.0004T | | | 0.0001T |
| | | **0.060T** | | | **0.070T** | | | **0.079T** |
| **-0.014** | **-0.060** | **0.016L** | **-0.041** | **-0.070** | **0.011T** | **-0.033** | **-0.079** | **0.003T** |
| -0.0006 | -0.0024 | 0.0024T | -0.0016 | -0.0028 | 0.0028T | -0.0013 | -0.0031 | 0.0031T |
| | | 0.0006L | | | 0.0004T | | | 0.0001T |
| | | **0.066T** | | | **0.079T** | | | **0.088T** |
| **-0.014** | **-0.066** | **0.021L** | **-0.047** | **-0.079** | **0.012T** | **-0.036** | **-0.088** | **0.001T** |
| -0.0006 | -0.0026 | 0.0025T | -0.0019 | -0.0031 | 0.0031T | -0.0014 | -0.0035 | 0.0035T |
| | | 0.0008L | | | 0.0005T | | | 0.0000T |
| | | **0.073T** | | | **0.087T** | | | **0.098T** |
| **-0.016** | **-0.073** | **0.024L** | **-0.051** | **-0.087** | **0.011T** | **-0.041** | **-0.098** | **0.001T** |
| -0.0006 | -0.0029 | 0.0029T | -0.0020 | -0.0034 | 0.0034T | -0.0016 | -0.0039 | 0.0039T |
| | | 0.0010L | | | 0.0004T | | | 0.0000T |
| | | **0.080T** | | | **0.095T** | | | **0.108T** |
| **-0.017** | **-0.080** | **0.028L** | **-0.055** | **-0.095** | **0.010T** | **-0.045** | **-0.108** | **0.000T** |
| -0.0007 | -0.0031 | 0.0031T | -0.0022 | -0.0037 | 0.0037T | -0.0018 | -0.0043 | 0.0043T |
| | | 0.0011L | | | 0.0004T | | | 0.0000T |
| | | **0.114T** | | | **0.122T** | | | **0.148T** |
| **-0.044** | **-0.114** | **0.006L** | **-0.078** | **-0.122** | **0.028T** | **-0.078** | **-0.148** | **0.028T** |
| -0.0017 | -0.0045 | 0.0045T | -0.0031 | -0.0048 | 0.0048T | -0.0031 | -0.0058 | 0.0058T |
| | | 0.0003L | | | 0.0011T | | | 0.0011T |

*Continued on next page.*

## SHAFT AND HOUSING FITS

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

*Continued from previous page.*

| Bearing O.D. | | | M6 | | | M7 | | | N6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal (Max.) | | Tolerance[1] | Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit |
| Over | Incl. | | Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. |
| | | | | | **0.080T** | | | **0.110T** | | | **0.100T** |
| **630.000** | **800.000** | **-0.075** | **-0.030** | **-0.080** | **0.045L** | **-0.030** | **-0.110** | **0.045L** | **-0.050** | **-0.100** | **0.025T** |
| 24.8032 | 31.4961 | -0.0030 | -0.0012 | -0.0031 | 0.0031T | -0.0012 | -0.0043 | 0.0043T | -0.0020 | -0.0039 | 0.0039T |
| | | | | | 0.0018L | | | 0.0018L | | | 0.0010T |
| | | | | | **0.090T** | | | **0.124T** | | | **0.112T** |
| **800.000** | **1000.000** | **-0.100** | **-0.034** | **-0.090** | **0.066L** | **-0.034** | **-0.124** | **0.066L** | **-0.056** | **-0.112** | **0.044T** |
| 31.4961 | 39.3701 | -0.0039 | -0.0013 | -0.0035 | 0.0035T | -0.0013 | -0.0049 | 0.0049T | -0.0022 | -0.0044 | 0.0044T |
| | | | | | 0.0026L | | | 0.0026L | | | 0.0017T |
| | | | | | **0.106T** | | | **0.145T** | | | **0.132T** |
| **1000.000** | **1250.000** | **-0.125** | **-0.040** | **-0.106** | **0.085L** | **-0.040** | **-0.145** | **0.085L** | **-0.066** | **-0.132** | **0.059T** |
| 39.3701 | 49.2126 | -0.0049 | -0.0016 | -0.0042 | 0.0042T | -0.0016 | -0.0057 | 0.0057T | -0.0026 | -0.0052 | 0.0052T |
| | | | | | 0.0033L | | | 0.0033L | | | 0.0023T |
| | | | | | **0.126T** | | | **0.173T** | | | **0.156T** |
| **1250.000** | **1600.000** | **-0.160** | **-0.048** | **-0.126** | **0.112L** | **-0.048** | **-0.173** | **0.112L** | **-0.078** | **-0.156** | **0.082T** |
| 49.2126 | 62.9921 | -0.0063 | -0.0019 | -0.0050 | 0.0050T | -0.0019 | -0.0068 | 0.0068T | -0.0031 | -0.0061 | 0.0061T |
| | | | | | 0.0044L | | | 0.0044L | | | 0.0032T |
| | | | | | **0.150T** | | | **0.208T** | | | **0.184T** |
| **1600.000** | **2000.000** | **-0.200** | **-0.058** | **-0.150** | **0.142L** | **-0.058** | **-0.208** | **0.142L** | **-0.092** | **-0.184** | **0.108T** |
| 62.9921 | 78.7402 | -0.0079 | -0.0023 | -0.0059 | 0.0059T | -0.0023 | -0.0082 | 0.0082T | -0.0036 | -0.0072 | 0.0072T |
| | | | | | 0.0056L | | | 0.0056L | | | 0.0043T |
| | | | | | **0.178T** | | | **0.243** | | | **0.285T** |
| **2000.000** | **2500.000** | **-0.250** | **-0.068** | **-0.178** | **0.182L** | **-0.068** | **-0.243** | **0.182L** | **-0.110** | **-0.220** | **0.140T** |
| 78.7402 | 98.4252 | -0.0098 | -0.0027 | -0.0070 | 0.0070T | -0.0027 | -0.0096 | 0.0096T | -0.0043 | -0.0087 | 0.112T |
| | | | | | 0.0071L | | | 0.0071L | | | 0.055T |

NOTE: Tolerance and shaft diameters are shown in the table as variances from nominal bearing O.D.
[1]Tolerance range is from +0 to value listed.

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions found in table 6 on page 20.

| N7 | | | P6 | | | P7 | | |
|---|---|---|---|---|---|---|---|---|
| Housing Bore | | Fit | Housing Bore | | Fit | Housing Bore | | Fit |
| Max. | Min. | | Max. | Min. | | Max. | Min. | |
| **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** |
| in. | in. | in. | in. | in. | in. | in. | in. | in. |
| | | **0.130T** | | | **0.138T** | | | **0.168T** |
| **-0.050** | **-0.130** | **0.025L** | **-0.088** | **-0.138** | **0.013T** | **-0.088** | **-0.168** | **0.013T** |
| -0.0020 | -0.0051 | 00051T | -0.0035 | -0.0054 | 0.0054T | -0.0035 | -0.0066 | 0.0066T |
| | | 0.0010L | | | 0.0005T | | | 0.0005T |
| | | **0.146T** | | | **0.156T** | | | **0.190T** |
| **-0.056** | **-0.146** | **0.044L** | **-0.100** | **-0.156** | **0.000T** | **-0.100** | **-0.190** | **0.000T** |
| -0.0022 | -0.0057 | 0.0057T | -0.0039 | -0.0061 | 0.0061T | -0.0039 | -0.0075 | 0.0075T |
| | | 0.0017L | | | 0.0000T | | | 0.0000T |
| | | **0.171T** | | | **0.186T** | | | **0.225T** |
| **-0.066** | **-0.171** | **0.059L** | **-0.120** | **-0.186** | **0.005L** | **-0.120** | **-0.225** | **0.005T** |
| -0.0026 | -0.0067 | 0.0067T | -0.0047 | -0.0073 | 0.0073T | -0.0047 | -0.0089 | 0.0089T |
| | | 0.0023L | | | 0.0002L | | | 0.0002T |
| | | **0.203T** | | | **0.218T** | | | **0.265T** |
| **-0.078** | **-0.203** | **0.082L** | **-0.140** | **-0.218** | **0.020L** | **-0.140** | **-0.265** | **0.020L** |
| -0.0031 | -0.0080 | 0.0080T | -0.0055 | -0.0086 | 0.0086T | -0.0055 | -0.0104 | 0.0104T |
| | | 0.0023L | | | 0.0008L | | | 0.0008L |
| | | **0.242T** | | | **0.262T** | | | **0.320T** |
| **-0.092** | **-0.242** | **0.108L** | **-0.170** | **-0.262** | **0.030L** | **-0.170** | **-0.320** | **0.030L** |
| -0.0036 | -0.0095 | 0.0095T | -0.0067 | -0.0103 | 0.0103T | -0.0067 | -0.0126 | 0.0126T |
| | | 0.0043L | | | 0.0012L | | | 0.0012L |
| | | **0.285T** | | | **0.305T** | | | **0.370T** |
| **-0.110** | **-0.285** | **0.140L** | **-0.195** | **-0.305** | **0.055L** | **-0.195** | **-0.370** | **0.055L** |
| -0.0043 | -0.0112 | 0.0112T | -0.0077 | -0.0120 | 0.0120T | -0.0077 | -0.0146 | 0.0146T |
| | | 0.0055L | | | 0.0021L | | | 0.0021L |

# *OPERATING TEMPERATURES*

Bearings operate in a wide range of applications and environments. In most cases, bearing operating temperature is not an issue. Some applications, however, operate at extreme speeds or in extreme temperature environments. In these cases, care must be taken not to exceed the temperature limits of the bearing. Minimum temperature limits are primarily based on lubricant capability. Maximum temperature limits are most often based on material and/or lubricant constraints, but also may be based on accuracy requirements of the equipment that the bearings are built into. These constraints/limitations are discussed below.

## BEARING MATERIAL LIMITATIONS

Standard bearing steels with a standard heat treatment cannot maintain a minimum hardness of 58 HRC much above 120° C (250° F).

Dimensional stability of Timken bearings is managed through the proper selection of an appropriate heat-treat process. Standard spherical roller bearings are dimensionally stabilized up to 200° C (392° F). Upon request, these bearings can be ordered to higher levels of stability as listed below. These designations are in agreement with DIN Standard 623.

**TABLE 13.**

| Stability Designation | Maximum Operating Temperature | |
|---|---|---|
| | °C | °F |
| S0 | 150 | 302 |
| S1 | 200 | 392 |
| S2 | 250 | 482 |
| S3 | 300 | 572 |
| S4 | 350 | 662 |

With dimensionally stabilized product, there still may be some changes in dimensions during service as a result of microstructural transformations. These transformations include the continued tempering of martensite and decomposition of retained austenite. The magnitude of change depends on the operating temperature, the time at temperature and the composition and heat-treatment of the steel.

Temperatures exceeding the limits shown in table 13 require special high-temperature steel. Consult your Timken sales engineer for availability of specific part numbers for non-standard heat stability or high-temperature steel grades.

Suggested materials for use in balls, rings and rollers at various operating temperatures are listed in table 14. Also listed are chemical composition recommendations, hardness recommendations and dimensional stability information.

Operating temperature affects lubricant film thickness and setting, both of which directly influence bearing life. Extremely high temperatures can result in a reduced film thickness that can lead to asperity contact between contacting surfaces.

Operating temperature also can affect performance of cages, seals and shields, which in turn can affect bearing performance. Materials for these components and their operating temperature ranges are shown in table 15.

## LUBRICATION LIMITATIONS

Starting torque in grease-lubricated applications typically increases significantly at cold temperatures. Starting torque is not primarily a function of the consistency or channel properties of the grease. Most often, it is a function of the rheological properties of the grease.

The high-temperature limit for greases is generally a function of the thermal and oxidation stability of the base oil in the grease and the effectiveness of the oxidation inhibitors.

See the Lubrication section on page 41 for more information on lubrication limitations.

## EQUIPMENT REQUIREMENTS

The equipment designer must evaluate the effects of temperature on the performance of the equipment being designed. Precision machine tool spindles, for example, can be very sensitive to thermal expansions. For some spindles, it is important that the temperature rise over ambient be held to 20° C to 35° C (36° F to 45° F).

Most industrial equipment can operate at considerably higher temperatures. Thermal ratings on gear drives, for example, are based on 93° C (200° F). Equipment such as gas turbines operates continuously at temperatures above 100° C (212° F). Running at high temperatures for extended periods of time, however, may affect shaft and housing fits, if the shaft and housing are not machined and heat-treated properly.

Although bearings can operate satisfactorily up to 120° C (250° F), an upper temperature limit of 80° C to 95° C (176° F to 203° F) is more practical. Higher operating temperatures increase the risk of damage from transient temperature spikes. Prototype testing of the application can help define the operating temperature range and should be conducted, if possible. It is the responsibility of the equipment designer to weigh all relevant factors and make the final determination of satisfactory operating temperature.

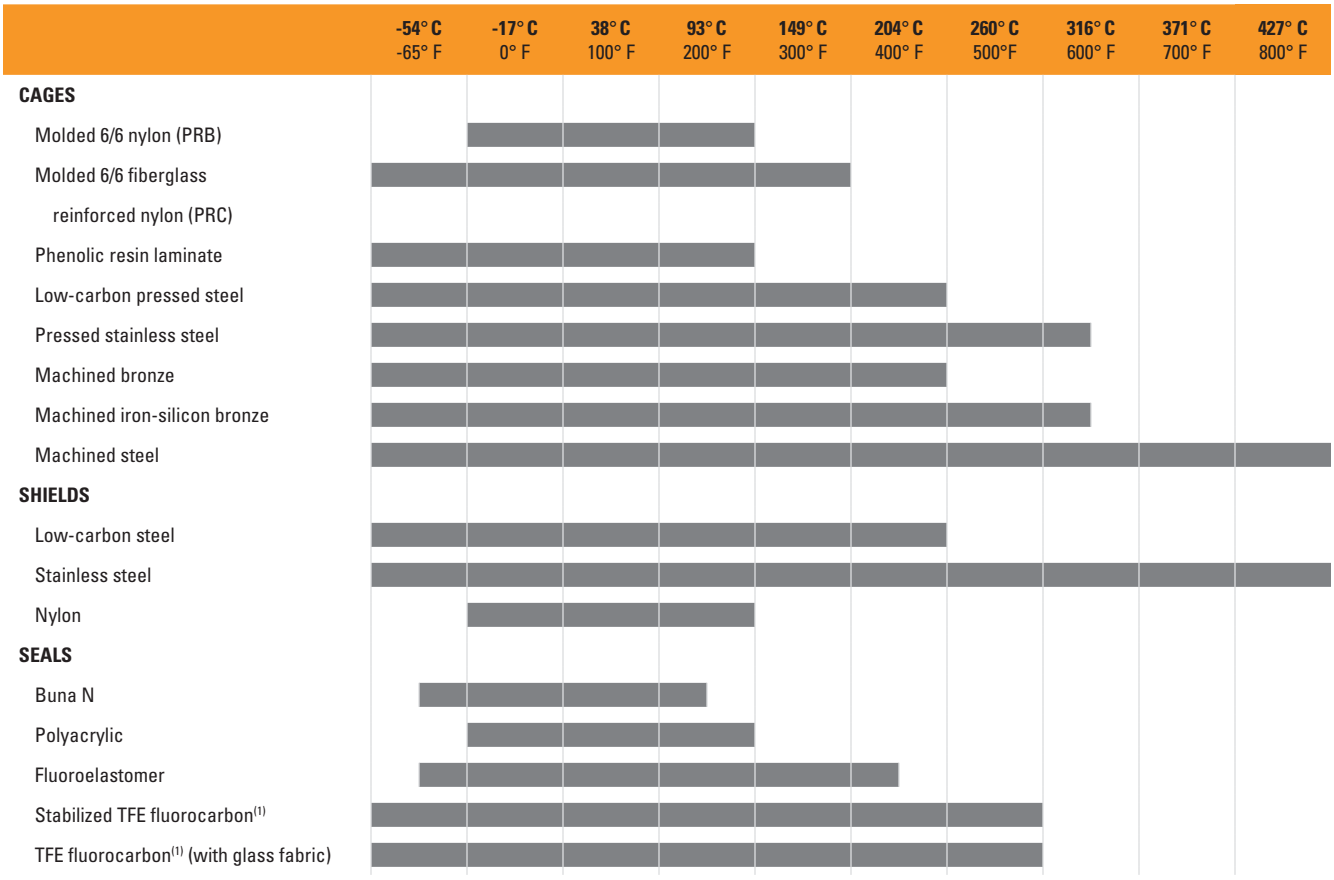
Tables 14 and 15 provide standard operating temperatures for common bearing component materials. They should be used for reference purposes only. Other bearing component materials are available on request. Contact your Timken sales engineer for more information.

**TABLE 14. OPERATING TEMPERATURES FOR BEARING COMPONENT MATERIALS**

| Material | Approximate Chemical Analysis % | Temp. °F | Hardness HRC | -73° C -100° F | -54° C -65° F | -40° C -40° F | -17° C 0° F | 121° C 250° F | 204° C 400° F | 316° C 600° F |
|---|---|---|---|---|---|---|---|---|---|---|
| Low-alloy carbon-chromium bearing steels. 52100 and others per ASTM A295 | 1C<br>0.5–1.5Cr<br>0.35Mn | 70 | 60 | STANDARD DIMENSIONAL STABILIZATION <0.0001 in./in dimensional change in 2500 hours at 100° C (212°F). Good oxidation resistance. | | | | | | |
| Low-alloy carbon-chromium bearing steels. 52100 and others per ASTM A295 | 1C<br>0.5–1.5Cr<br>0.35Mn | 70<br>350<br>450 | 58<br>56<br>54 | Heat stabilized per FS136, <0.0001in./in dimensional change in 2500 hours at 149° C (300° F). When given a stabilizing heat treatment, A295 steel is suitable for many applications in the 177°-232° C (350-450° F) range; however, it is not as dimensionally stable as it is at temperatures below 177° C (350° F). If utmost stability is required, use materials in the 316° C (600° F) group below. | | | | | | |
| Deep-hardening steels for heavy sections per ASTM A485 | 1C<br>1–1.8Cr<br>1–1.5Mn .06Si | 70<br>450<br>600 | 58<br>55<br>52 | As heat-treated and tempered, it is stabilized, <0.0001 in./in dimensional change in 2500 hours at 149° C (300° F). | | | | | | |
| Carburizing steels per ASTM A534<br>a) low alloy 4118, 8X19, 5019, 8620 (Ni-Moly grades)<br>b) high nickel 3310 | Ni-Moly: 0.2C, 0.4-2.0Mn, 0.3-0.8Cr, 0-2.0Ni, 0-0.3Mo<br>.0.1C, 1.5Cr, 0.4Mn, 3.5Ni | 70 | 58 | | | Nickel-Moly grades of steel frequently used to achieve extra ductility in inner rings for locking device bearings. 3311 and others used for extra-thick-section rings. | | | | |
| Corrosion-resistant 440C stainless steel per ASTM A756 | 1C 18Cr | 70 | 58 | | Excellent corrosion resistance. | | | | | |
| Corrosion-resistant 440C stainless steel per ASTM A756 | 1C 18Cr | 70<br>450<br>600 | 58<br>55<br>52 | As heat stabilized for maximum hardness at high temperatures (FS238). Good oxidation resistance at higher temperatures. Note load capacity drops off more rapidly at higher temperatures than M50 shown below, which should be considered if loads are high, <0.0001 in./in dimensional change in 1200 hours. | | | | | | |
| M-50 medium high speed | 4Cr 4Mo<br>1V 0.8C | 70<br>450<br>600 | 60<br>59<br>57 | Suggested where stable high hardness at elevated temperature is required, <0.0001 in./in dimensional change in 1200 hours at 316° C (600° F). | | | | | | |

Note: Dimensional stability data shown above is the permanent metallurgical growth and/or shrinkage only. Thermal expansion effects are not included. For operating temperatures above 427° C (800° F), consult your Timken engineer.

## TABLE 15. OPERATING TEMPERATURES FOR CAGES, SHIELDS AND SEALS




(1)Limited life above these temperatures.

# HEAT GENERATION AND DISSIPATION

Bearing operating temperature is dependent upon a number of factors, including heat generation of all contributing heat sources, heat flow rate between sources and the ability of the system to dissipate the heat. Heat sources include such things as bearings, seals, gears, clutches and oil supply. Heat dissipation is affected by many factors, including shaft and housing materials and designs, lubricant circulation and external environmental conditions. These and other factors are discussed in the following sections.

## HEAT GENERATION

Under normal operating conditions, most of the torque and heat generated by the bearing is caused by the elastohydrodynamic losses at the roller/ring contacts.

Heat generation is the product of bearing torque and speed. The following equation is used to calculate the heat generated.

$$Q_{gen} = k_4 n M$$

If the bearing is a spherical roller bearing, the torque calculations are given in the subsequent sections.

## HEAT DISSIPATION

The problem of determining the heat flow from a bearing in a specific application is rather complex. In general, it can be said that factors affecting the rate of heat dissipation include the following:

1. Temperature gradient from the bearing to the housing. This is affected by size configuration of the house and any external cooling such as fans, water cooling or fan action of the rotating components.
2. Temperature gradient from the bearing to the shaft. Any other heat sources, such as gears and additional bearings and their proximity to the bearing considered, will influence the temperature of the shaft.
3. The heat carried away by a circulating oil system.

To what extent nos. 1 and 2 can be controlled will depend on the application. The heat-dissipation modes include conduction through the system, convection along the inside and outside surfaces of the system, as well as radiation exchange to and from neighboring structures. In many applications, overall heat dissipation can be divided into two categories – heat removed by circulating oil and heat removed through the structure.

### Heat dissipation by circulating oil

The amount of heat removed by the lubricant can be controlled more easily. In a splash lubrication system, cooling coils may be used to control the bulk oil temperature.

The amount of heat carried away in a circulating oil system by the lubricant can be approximated from the following equations.

$$Q_{oil} = k_6 C_p \rho f (\theta_o - \theta_i)$$

Where:

$k_6 = 1.67 \times 10^{-5}$ for $Q_{oil}$ in W

$= 1.67 \times 10^{-2}$ for $Q_{oil}$ in Btu/min

If the circulating lubricant is petroleum oil, the heat removed is further approximated by the following:

$$Q_{oil} = k_5 f (\theta_o - \theta_i)$$

The following factors apply to the heat generation and dissipation equations listed on this page.

Where:

$k_5 = 28$ for $Q_{oil}$ in W when f in L/min and $\theta$ in °C

$= 0.42$ for $Q_{oil}$ in Btu/min when f in U.S. pt/min and $\theta$ in °F

# *TORQUE*

## RUNNING TORQUE-M

The rotational resistance of a rolling bearing is dependent on load, speed, lubrication conditions and bearing internal characteristics.

The following formulas yield approximations to values of bearing running torque. The formulas apply to bearings lubricated by oil. For bearings lubricated by grease or oil mist, torque is usually lower, although for grease lubrication this depends on amount and consistency of the grease. The formulas also assume the bearing running torque has stabilized after an initial period referred to as "running-in."

## SPHERICAL ROLLER BEARINGS

The torque equations for spherical roller bearings are given as follows, where the coefficients are based on series and found in the following table:

$$M = \begin{Bmatrix} f_1 F_{\beta} dm + 10^{-7} f_0 (v \times n)^{2/3} dm^3 & \text{if} \quad (v \times n) \geq 2000 \\ f_1 F_{\beta} dm + 160 \times 10^{-7} f_0 dm^3 & \text{if} \quad (v \times n) < 2000 \end{Bmatrix}$$

Again, note that the viscosity is in units of centistokes. The load term ($F_{\beta}$) is dependent on bearing type as follows:

Radial spherical roller: $F_{\beta} = \max \begin{pmatrix} 0.8F_a \cot \alpha \\ \text{or} \\ F_r \end{pmatrix}$

**TABLE 16. COEFFICIENTS FOR THE TORQUE EQUATION**

| Bearing Type | Dimension Series | $f_0$ | $f_1$ |
|---|---|---|---|
| Spherical roller bearings | 30 | 4.5 | 0.00017 |
| | 39 | 4.5 | 0.00017 |
| | 40 | 6.5 | 0.00027 |
| | 31 | 5.5 | 0.00027 |
| | 41 | 7 | 0.00049 |
| | 22 | 4 | 0.00019 |
| | 32 | 6 | 0.00036 |
| | 23 | 4.5 | 0.00030 |

# LUBRICATION

To help maintain a bearing's antifriction characteristics, lubrication is needed to:

- Minimize rolling resistance caused by deformation of the rolling elements and raceway under load by separating the mating surfaces.
- Minimize sliding friction occurring between rolling elements, raceways and cage.
- Transfer heat (with oil lubrication).
- Protect from corrosion and, with grease lubrication, from contaminant ingress.

The wide range of bearing types and operating conditions precludes any simple, all-inclusive statement or guideline allowing the selection of the proper lubricant. At the design level, the first consideration is whether oil or grease is best for the particular operation. The advantages of oil and grease are outlined in the table below. When heat must be carried away from the bearing, oil must be used. It is almost always preferred for very high-speed applications.

**TABLE 17. ADVANTAGES OF OIL AND GREASE**

| Oil | Grease |
|---|---|
| Carries heat away from the bearings | Simplifies seal design and acts as a sealant |
| Carries away moisture and particulate matter | Permits prelubrication of sealed or shielded bearings |
| Easily controlled lubrication | Generally requires less frequent lubrication |

## European REACH compliance

Timken-branded lubricants, greases and similar products sold in stand-alone containers or delivery systems are subject to the European REACH (**R**egistration, **E**valuation, **A**uthorization and Restriction of **CH**emicals) directive. For import into the European Union, Timken can sell and provide only those lubricants and greases that are registered with ECHA (European CHemical Agency). For further information, please contact your Timken sales engineer.

# OIL LUBRICATION

Oils used for bearing lubrication should be high-quality mineral oils or synthetic oils with similar properties. Selection of the proper type of oils depends on bearing speed, load, operating temperature and lubrication method. Some features and advantages of oil lubrication, in addition to the above are:

- Oil is a better lubricant for high speeds or high temperatures. It can be cooled to help reduce bearing temperature.
- It is easier to handle and control the amount of lubricant reaching the bearing. It is harder to retain in the bearing. Lubricant losses may be higher than with grease.
- Oil can be introduced to the bearing in many ways, such as drip-feed, wick-feed, pressurized circulating systems, oil bath or air-oil mist. Each is suited for certain types of applications.
- Oil is easier to keep clean for recirculating systems.

Oil may be introduced to the bearing housing in many ways. The most common systems are:

- **Oil bath.** The housing is designed to provide a sump through which the rolling elements of the bearing will pass. Generally, the oil level should be no higher than the center point of the lowest rolling element. If speed is high, lower oil levels should be used to reduce churning. Gages or controlled elevation drains are used to achieve and maintain the proper oil level.
- **Circulating system.** This system has the advantages of:
  - An adequate supply of oil for both cooling and lubrication.
  - Metered control of the quantity of oil delivered to each bearing.
  - Removal of contaminants and moisture from the bearing by flushing action.
  - Suitability for multiple bearing installations.
  - Large reservoir, which reduces deterioration. Increased lubricant life provides economical efficiency.
  - Incorporation of oil-filtering devices.
  - Positive control to deliver the lubricant where needed.
  - A typical circulating oil system consists of an oil reservoir, pump, piping and filter. A heat exchange may be required.
- **Oil-mist lubrication.** Oil-mist lubrication systems are used in high-speed, continuous-operation applications. This system permits close control of the amount of lubricant reaching the bearings. The oil may be metered, atomized by compressed air and mixed with air, or it may be picked up from a reservoir using a venturi effect. In either case, the air is filtered and supplied under sufficient pressure to assure adequate lubrication of the bearings. Control of this type of lubrication system is accomplished by monitoring the operating temperatures of the bearings being lubricated. The continuous passage of the pressurized air and oil through the labyrinth seals used in the system prevents the entrance of contaminants from the atmosphere to the system.

The successful operation of this type of system is based upon the following factors:

- Proper location of the lubricant entry ports in relation to the bearings being lubricated.
- Avoidance of excessive pressure drops across void spaces within the system.
- Proper air pressure and oil quantity ratio to suit the particular application.
- Adequate exhaust of the air-oil mist after lubrication has been accomplished.

To ensure "wetting" of the bearings, and to prevent possible damage to the rolling elements and rings, it is imperative that the oil-mist system be turned on for several minutes before the equipment is started. The importance of "wetting" the bearing before starting cannot be overstated, and it also has particular significance for equipment that has been idled for extended periods of time.

Lubricating oils are commercially available in many forms for automotive, industrial, aircraft and other uses. Oils are classified as either petroleum types (refined from crude oil) or synthetic types (produced by chemical synthesis).

## PETROLEUM OILS

Petroleum oils are made from a petroleum hydrocarbon derived from crude oil, with additives to improve certain properties. Petroleum oils are used for nearly all oil-lubricated applications of bearings.

## SYNTHETIC OILS

Synthetic oils cover a broad range of categories and include polyalphaolefins, silicones, polyglycols and various esters. In general, synthetic oils are less prone to oxidation and can operate at extreme hot or cold temperatures. Physical properties, such as pressure-viscosity coefficients, tend to vary between oil types; use caution when making oil selections.

The polyalphaolefins (PAO) have a hydrocarbon chemistry that parallels petroleum oil both in chemical structures and pressure-viscosity coefficients. Therefore, PAO oil is mostly used in the oil-lubricated applications of bearings when severe temperature environments (hot and cold) are encountered or when extended lubricant life is required.

The silicone, ester and polyglycol oils have an oxygen-based chemistry that is structurally quite different from petroleum oils and PAO oils. This difference has a profound effect on its physical properties where pressure-viscosity coefficients can be lower compared to mineral and PAO oils. This means that these types of synthetic oils may actually generate a smaller elastohydrodynamic (EHD) film thickness than a mineral or PAO oil of equal viscosity at operating temperature. Reductions in bearing fatigue life and increases in bearing wear could result from this reduction of lubricant film thickness.

## VISCOSITY

The selection of oil viscosity for any bearing application requires consideration of several factors: load, speed, bearing setting, type of oil and environmental factors. Since oil viscosity varies inversely with temperature, a viscosity value must always be stated with the temperature at which it was determined. High-viscosity oil is used for low-speed or high-ambient-temperature applications. Low-viscosity oil is used for high-speed or low-ambient-temperature applications.

There are several classifications of oils based on viscosity grades. The most familiar are the Society of Automotive Engineers (SAE) classifications for automotive engine and gear oils. The American Society for Testing and Materials (ASTM) and the International Organization for Standardization (ISO) have adopted standard viscosity grades for industrial fluids. Fig. 19 shows the viscosity comparisons of ISO/ASTM with SAE classification systems at 40° C (104° F).

**VISCOSITY CLASSIFICATION COMPARISON**

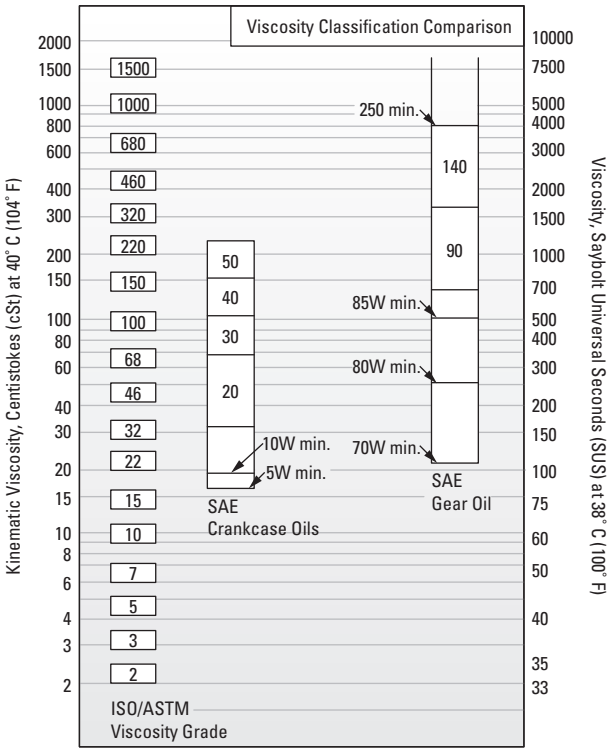



**Fig. 19. Comparison between ISO/ASTM grades (ISO 3448/ASTM D2442) and SAE grades (SAE J 300-80 for crankcase oils, SAE J 306-81 for axle and manual transmission oils).**

The ASTM/ISO viscosity grade system for industrial oils is depicted below.

**ISO VISCOSITY SYSTEM**

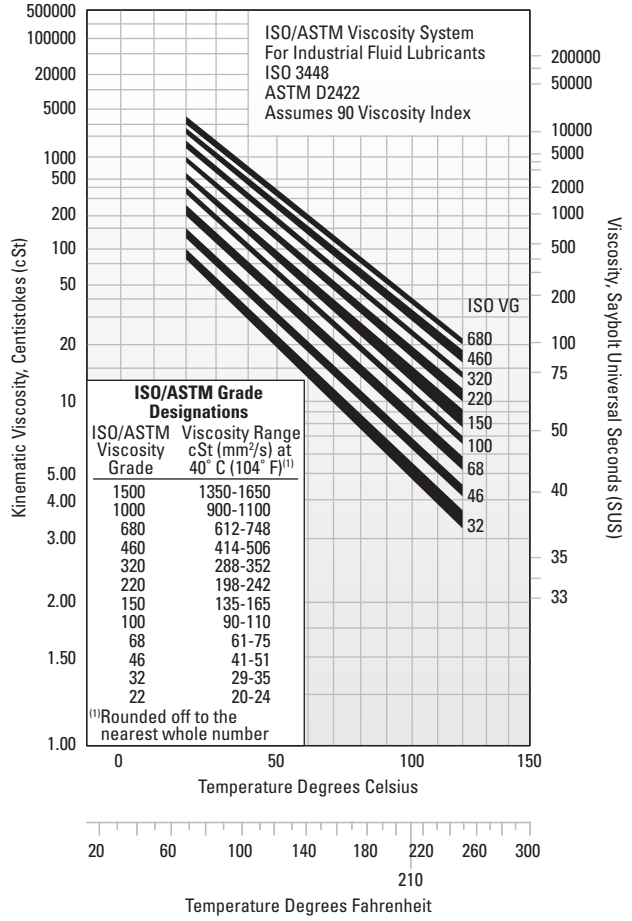



**Fig. 20. Viscosity grade system for industrial oils.**

## TYPICAL BEARING LUBRICATION OILS

In this section, the properties and characteristics of lubricants for typical roller bearing applications are listed. These general characteristics are derived from successful performance in applications across all industries.

### General-purpose rust and oxidation lubricating oil

General-purpose rust and oxidation (R&O) inhibited oils are the most common type of industrial lubricant. They are used to lubricate Timken® bearings in all types of industrial applications where conditions requiring special considerations do not exist.

**TABLE 18. SUGGESTED GENERAL PURPOSE R&O LUBRICATING OIL PROPERTIES**

| | Properties |
|---|---|
| Base stock | Solvent-refined, high viscosity-index petroleum oil |
| Additives | Corrosion and oxidation inhibitors |
| Viscosity index | 80 min. |
| Pour point | -10° C max. (14° F) |
| Viscosity grades | ISO/ASTM 32 through 220 |

Some low-speed and/or high-ambient-temperature applications require the higher viscosity grades. High-speed and/or low-temperature applications require the lower viscosity grades.

### Industrial extreme-pressure (EP) gear oil

Extreme-pressure gear oils are used to lubricate Timken bearings in most types of heavily loaded industrial equipment. They should be capable of withstanding abnormal shock loads that are common in heavy-duty equipment.

**TABLE 19. SUGGESTED INDUSTRIAL EP GEAR OIL PROPERTIES**

| | Properties |
|---|---|
| Base stock | Solvent-refined, high viscosity-index petroleum oil |
| Additives | Corrosion and oxidation inhibitors<br>Extreme-pressure (EP) additive(1) - 15.8 kg (35 lb.) min. |
| Viscosity index | 80 min. |
| Pour point | -10° C max. (14° F) |
| Viscosity grades | ISO/ASTM 100, 150, 220, 320, 460 |

(1)ASTM D 2782

Industrial EP gear oils should be composed of a highly refined petroleum oil-based stock plus appropriate inhibitors and additives. They should not contain materials that are corrosive or abrasive to bearings. The inhibitors should provide long-term protection from oxidation and protect the bearing from corrosion in the presence of moisture. The oils should resist foaming in service and have good water-separation properties. An EP additive protects against scoring under boundary-lubrication conditions. The viscosity grades suggested represent a wide range. High-temperature and/or slow-speed applications generally require the higher viscosity grades. Low temperatures and/or high speeds require the use of lower viscosity grades.

# GREASE LUBRICATION

Grease lubrication is generally applicable to low-to-moderate speed applications that have operating temperatures within the limits of the grease. There is no universal antifriction bearing grease. Each grease has limiting properties and characteristics.

Greases consist of a base oil, a thickening agent and additives. Conventionally, bearing greases have consisted of petroleum base oils thickened to the desired consistency by some form of metallic soap. More recently synthetic base oils have been used with organic and inorganic thickeners. Table 20 summarizes the composition of typical lubricating greases.

**TABLE 20. COMPOSITION OF GREASES**

| Base Oil | + | Thickening Agents | + | Additives | = | Lubricating Grease |
|---|---|---|---|---|---|---|
| Mineral oil<br>Synthetic hydrocarbon<br>Esters<br>Perflironiated oil<br>Silicone | | Soaps and complex soaps lithium, aluminum, barium, calcium<br>Non-Soap (inorganic) microgel (clay), carbon black, silica-gel, PTFE<br>Non-Soap (organic) Urea compounds | | Rust inhibitors<br>Dyes<br>Tactifiers<br>Metal deactivates<br>Oxidation inhibitors<br>Anti-wear EP | | |

Calcium- and aluminum-based greases have excellent water resistance and are used in industrial applications where water ingress is an issue. Lithium-based greases are multi-purpose and are used in industrial applications and wheel bearings.

Synthetic base oils such as esters, organic esters and silicones used with conventional thickeners and additives typically have higher maximum operating temperatures than petroleum-based greases. Synthetic greases can be designed to operate in temperatures from -73° C (-100° F) to 288° C (550° F).

Below are the general characteristics of common thickeners used with petroleum base oils.

**TABLE 21. GENERAL CHARACTERISTICS OF THICKENERS USED WITH PETROLEUM-BASED OILS**

| Thickener | Typical Dropping Point | | Maximum Temperature | | Typical Water Resistance |
|---|---|---|---|---|---|
| | °C | °F | °C | °F | |
| Lithium soap | **193** | 380 | **121** | 250 | Good |
| Lithium complex | **260+** | 500+ | **149** | 300 | Good |
| Aluminum complex | **249** | 480 | **149** | 300 | Excellent |
| Calcium sulfonate | **299** | 570 | **177** | 350 | Excellent |
| Polyurea | **260** | 500 | **149** | 300 | Good |

Use of the thickeners in table 21 with synthetic hydrocarbon or ester base oils increases the maximum operating temperature by approximately 10° C (50° F).

Using polyurea as a thickener for lubricating fluids is one of the most significant lubrication developments in more than 30 years. Polyurea grease performance is outstanding in a wide range of bearing applications and, in a relatively short time, it has gained acceptance as a factory-packed lubricant for ball bearings.

## LOW TEMPERATURES

Starting torque in a grease-lubricated bearing at low temperatures can be critical. Some greases may function adequately as long as the bearing is operating, but resistance to initial movement may be excessive. In certain smaller machines, starting may be impossible when very cold. Under such operating circumstances, greases containing low-temperature characteristic oils are generally required.

If the operating temperature range is wide, synthetic greases offer advantages. Synthetic greases are available to provide very low starting and running torque at temperatures as low as -73° C (-100° F). In certain instances, these greases perform better in this respect than oil.

An important point concerning lubricating greases is that the starting torque is not necessarily a function of the consistency or the channel properties of the grease. Starting torque is more a function of the individual rheological properties of a particular grease and is best evaluated by application experience.

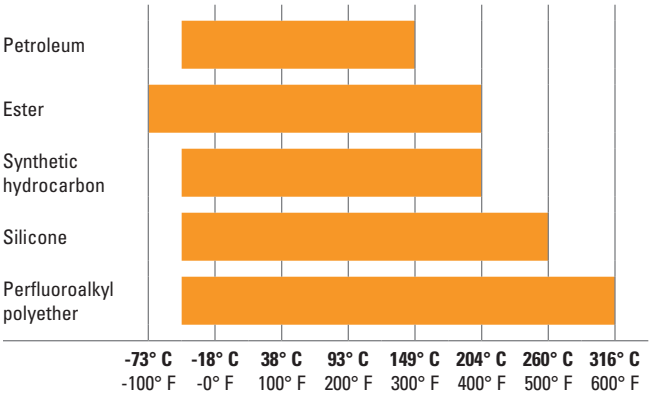
## HIGH TEMPERATURES

The high temperature limit for lubricating greases is generally a function of the thermal and oxidation stability of the fluid and the effectiveness of the oxidation inhibitors. Grease temperature ranges are defined by both the dropping point of the grease thickener and composition of the base oil. Table 22 shows the temperature ranges of various base oils used in grease formulations.

A rule of thumb, developed from years of testing grease-lubricated bearings, indicates that grease life is halved for every 10° C (50° F) increase in temperature. For example, if a particular grease provides 2000 hours of life at 90° C (194° F), by raising the temperature to 100° C (212° F), reduction in life to approximately 1000 hours would result. On the other hand, 4000 hours could be expected by lowering the temperature to 80° C (176° F).

Thermal stability, oxidation resistance and temperature limitations must be considered when selecting greases for high-temperature applications. In non-relubricatable applications, highly refined mineral oils or chemically stable synthetic fluids are required as the oil component of greases for operation at temperatures above 121° C (250° F).

**TABLE 22. TEMPERATURE RANGES FOR BASE OILS USED IN LUBRICATING GREASES**




## CONTAMINATION

### Abrasive Particles

When roller bearings operate in a clean environment, the primary cause of damage is the eventual fatigue of the surfaces where rolling contact occurs. However, when particle contamination enters the bearing system, it is likely to cause damage such as bruising, which can shorten bearing life.

When dirt from the environment or metallic wear debris from some component in the application are allowed to contaminate the lubricant, wear can become the predominant cause of bearing damage. If bearing wear becomes significant, changes will occur to critical bearing dimensions that could adversely affect machine operation.

Bearings operating in a contaminated lubricant exhibit a higher initial rate of wear than those running in an uncontaminated lubricant. With no further contaminant ingress, this wear rate quickly diminishes. The contamination particles are reduced in size as they pass through the bearing contact area during normal operation.

### Water

Water and moisture can be particularly conducive to bearing damage. Lubricating greases may provide a measure of protection from this contamination. Certain greases, such as calcium and aluminum-complex, are highly water-resistant.

Sodium-soap greases are water-soluble and should not be used in applications involving water.

Either dissolved or suspended water in lubricating oils can exert a detrimental influence on bearing fatigue life. Water can cause bearing etching that also can reduce bearing fatigue life. The exact mechanism by which water lowers fatigue life is not fully understood. It has been suggested that water enters micro-cracks in the bearing rings that are caused by repeated stress cycles. This leads to corrosion and hydrogen embrittlement in the micro-cracks, reducing the time required for these cracks to propagate to an unacceptable-sized spall.

Water-based fluids, such as water glycol and invert emulsions, also have shown a reduction in bearing fatigue life. Although water from these sources is not the same as contamination, the results support the previous discussion concerning water-contaminated lubricants.

## GREASE SELECTION

The successful use of bearing grease depends on the physical and chemical properties of the lubricant as well as application and environmental conditions. Because the choice of grease for a particular bearing under certain service conditions is often difficult to make, you should consult with your lubricant supplier or equipment maker for specific questions about lubrication requirements for your application. You also can contact your Timken sales engineer for general lubrication guidelines for any application.

Grease must be carefully selected with regard to its consistency at operating temperature. It should not exhibit thickening, separation of oil, acid formation or hardening to any marked degree. It should be smooth, non-fibrous and entirely free from chemically active ingredients. Its dropping point should be considerably higher than the operating temperature.

Timken® application-specific lubricants were developed by leveraging our knowledge of tribology and antifriction bearings, and how these two elements affect overall system performance. Timken lubricants help bearings and related components operate effectively in demanding industrial operations. High-temperature, anti-wear and water-resistant additives offer superior protection in challenging environments. Table 23 provides an overview of the Timken greases available for general applications. Contact your Timken sales engineer for a more detailed publication on Timken lubrication solutions.

**TABLE 23. GREASE LUBRICATION SELECTION GUIDE**

| ENVIRONMENT | | APPLICATION |
|---|---|---|
| High Wear • Moderate Loads<br>Moderate Speeds<br>Moderate Temperatures | Timken Premium<br>All-Purpose Industrial LC-2 Grease | Agriculture • Bushings/Ball Joints<br>Truck and Auto Wheel Bearings<br>Heavy Duty Industrial |
| Extreme Heat • Heavy Loads<br>High Sliding Wear<br>Dirty Environments<br>Slow Speeds • Shock Loading | Timken Construction and<br>Off-Highway Grease | Agriculture/Mining • Cement Plants<br>Construction/Off Road • Rock Quarry<br>Earth Moving Equipment<br>Fleet Equipment • Heavy Industry<br>Pivot Pins/Splined Shafts |
| Wet and Corrosive Conditions<br>Quiet Environments • Light Loads<br>Moderate to High Speeds<br>Moderate Temperatures | Timken Ball Bearing<br>Pillow Block Grease | Lightly Loaded Pillow Blocks<br>Idler Pulleys • Oven Conveyors<br>Electric Motors • Fans • Pumps |
| Corrosive Media • Extreme Heat<br>Heavy Loads • Wet Conditions<br>Slow to Moderate Speeds | Timken Mill Grease | Aluminum Mills • Paper Mills<br>Steel Mills • Offshore Rigs<br>Power Generation |
| Incidental Food Contact<br>Hot and Cold Temperatures<br>Moderate to High Speeds<br>Medium Loads | Timken<br>Food Safe Grease | Food and Beverage Industries<br>Pharmaceuticals<br>*only for ball bearing applications* |
| Extreme Low and High Temperatures<br>Severe Loads<br>Corrosive Media<br>Slow to Moderate Speeds | Timken<br>Synthetic Industrial LC-1.5 Grease | Wind Energy Main Bearing<br>Pulp and Paper Machines<br>General Heavy Industry<br>Marine Applications<br>Centralized Grease Systems |
| Moderate Speeds<br>Light to Moderate Loads<br>Moderate Temperatures<br>Moderate Water | Timken<br>Multi-Use Lithium EP1 and EP2 Grease | General Industrial Applications<br>Pins and Bushings • Track Rollers<br>Water Pumps<br>Plain and Antifriction Bearings |
| Extreme Load • High Wear<br>Moderate Speed<br>High Temperatures • Shock Loading | Timken High-Performance Roller<br>Housed Unit Grease | Metals • Mining • Aggregate<br>Power Generation<br>Material Handling<br>Heavy Industry |

This selection guide is not intended to replace the specifications by the equipment builder, who is responsible for its performance.

Many bearing applications require lubricants with special properties or lubricants formulated specifically for certain environments, such as:

- Friction oxidation (fretting corrosion).
- Chemical and solvent resistance.
- Food handling.

For assistance with these or other areas requiring special lubricants, consult your Timken sales engineer.

## GREASE USE GUIDELINES

It is important to use the proper amount of grease in the application. In typical industrial applications, the bearing cavity should be kept approximately one-third to one-half full. Less grease may result in the bearing being starved for lubrication. More grease may result in churning. Both conditions may result in excessive heat generation. As the grease temperature rises, viscosity decreases and the grease becomes thinner. This can reduce the lubricating effect and increase leakage of the grease from the bearing. It also may cause the grease components to separate, leading to a general breakdown of the lubricant properties. As the grease breaks down, bearing torque increases. In the case of excess grease resulting in churning, torque may also increase due to the resistance caused by the grease.

For best results, there should be ample space in the housing to allow room for excess grease to be thrown from the bearing. However, it is equally important that the grease be retained all around the bearing. If a large void exists between the bearings, grease closures should be used to prevent the grease from leaving the bearing area.

Only in low-speed applications may the housing be entirely filled with grease. This method of lubrication is a safeguard against the entry of foreign matter, where sealing provisions are inadequate for exclusion of contaminants or moisture.

During periods of non-operation, it is often wise to completely fill the housings with grease to protect the bearing surfaces. Prior to restarting operation, remove the excess grease and restore the proper level.

Applications utilizing grease lubrication should have a grease fitting and a vent at opposite ends of the housing near the top. A drain plug should be located near the bottom of the housing to allow the old grease to purge from the bearing.

Bearings should be relubricated at regular intervals to help prevent damage. Relubrication intervals are difficult to determine. If plant practice or experience with other applications is not available, consult your lubricant supplier.

Timken offers a range of lubricants to help bearings and related components operate effectively in demanding industrial operations. High-temperature, anti-wear and water-resistant additives offer greater protection in challenging environments. Timken also offers a line of single- and multi-point lubricators to simplify grease delivery.



**Fig. 21. Grease can easily be packed by hand.**



**Fig. 22. Mechanical grease packer.**

### Grease application methods

Grease, in general, is easier to use than oil in industrial bearing lubrication applications. Most bearings that are initially packed with grease require periodic relubrication to operate efficiently.

Grease should be packed into the bearing so that it gets between the rolling elements – the rollers or balls. For tapered roller bearings, forcing grease through the bearing from the large end to the small end will ensure proper distribution.

Grease can be easily packed into small- and medium-size bearings by hand (fig. 21). In shops where bearings are frequently regreased, a mechanical grease packer that forces grease through the bearing under pressure may be appropriate (fig. 22). Regardless of the method, after packing the internal areas of the bearing, a small amount of grease also should be smeared on the outside of the rollers or balls.

The two primary considerations that determine the relubrication cycle are operating temperature and sealing efficiency. High-operating-temperature applications generally require more frequent regreasing. The less efficient the seals, the greater the grease loss and the more frequently grease must be added.

Grease should be added any time the amount in the bearing falls below the desired amount. The grease should be replaced when its lubrication properties have been reduced through contamination, high temperature, water, oxidation or any other factors. For additional information on appropriate regreasing cycles, consult with the equipment manufacturer or your Timken sales engineer.

## CONSISTENCY

Greases may vary in consistency from semi-fluids that are hardly thicker than a viscous oil to solid grades almost as hard as a soft wood.

Consistency is measured by a penetrometer in which a standard weighted cone is dropped into the grease. The distance the cone penetrates (measured in tenths of a millimeter in a specific time) is the penetration number.

The National Lubricating Grease Institute (NLGI) classification of grease consistency is shown below:

**TABLE 24. NLGI CLASSIFICATIONS**

| NLGI Grease Grades | Penetration Number |
|---|---|
| 0 | 355-385 |
| 1 | 310-340 |
| 2 | 265-295 |
| 3 | 220-250 |
| 4 | 175-205 |
| 5 | 130-160 |
| 6 | 85-115 |

Grease consistency is not fixed; it normally becomes softer when sheared or “worked.” In the laboratory, this “working” is accomplished by forcing a perforated plate up and down through a closed container of grease. This “working” does not compare with the violent shearing action that takes place in a bearing and does not necessarily correlate with actual performance.

## TABLE 25. GREASE COMPATIBILITY CHART

■ = Best Choice
■ = Compatible
■ = Borderline
■ = Incompatible

| | Aluminum Complex | Barium Complex | Calcium Stearate | Calcium 12 Hydroxy | Calcium Complex | Calcium Sulfonate | Clay Non-Soap | Lithium Stearate | Lithium 12 Hydroxy | Lithium Complex | Polyurea Conventional | Polyurea Shear Stable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum Complex | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Timken Food Safe Grease | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Barium Complex | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Calcium Stearate | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Calcium 12 Hydroxy | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Calcium Complex | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Calcium Sulfonate | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Timken Construction and Off-Highway Grease | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Timken Mill Grease | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Clay Non-Soap | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Lithium Stearate | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Lithium 12 Hydroxy | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Timken Multi-Use | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Lithium Complex | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Timken All -Purpose Timken Synthetic | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| High Performance Roller Housed Unit Grease | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Timken Premium All Purpose Industrial LC-2 Grease | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Polyurea Conventional | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Polyurea Shear Stable | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Timken Pillow Block | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

## GREASE LUBRICATIONS FOR BEARING/HOUSING ASSEMBLIES

Polyurea and lithium-based greases are normally preferred for general-purpose bearing lubrication and are advantageous in high moisture applications. Both greases have good water-resistant characteristics. For temperature ranges of standard greases, see table 22.

The grease must be carefully selected with regard to its consistency at operating temperature. It should not exhibit thickening, separation of oil, acid formation or hardening to any marked degree. It should be smooth, non-fibrous and entirely free from chemically active ingredients. Its melting point should be considerably higher than the operating temperature. In cases of extreme load or very low operating speeds, extreme pressure additives (EP) that retard adhesive wear should be considered.

Frictional torque is influenced by the quantity and the quality of lubricant present. Excessive quantities of grease cause churning. The adverse effects of churn are accelerated with increases in operating speed. The churn results in excessive temperatures, separation of the grease components, and breakdown in lubrication values. In normal-speed applications, the housings should be kept approximately one-third to one-half full. Only in low-speed applications may the housing be entirely filled with grease. This method of lubrication is a safeguard against the entry of foreign matter, where sealing provisions are inadequate for exclusion of contaminants or moisture.

During periods of non-operation, it is often wise to completely fill the housings with grease to protect the bearing surfaces. Prior to subsequent operation, the excess grease should be removed and the proper level restored. Applications utilizing grease lubrication should have a grease fitting and a vent at opposite ends of the housing near the top. A drain plug should be located near the bottom of the housing to allow purging of the old grease from the bearing. Relubricate at regular intervals to prevent damage to the bearing. Relubrication intervals are difficult to determine. If plant practice or experience with other applications is not available, consult your lubricant supplier.

NOTE

*Mixing greases can result in improper bearing lubrication. Always follow the specific lubrication instructions of your equipment supplier.*

## MULTI-PURPOSE INDUSTRIAL GREASE

These are typical of greases that can be used to lubricate many Timken bearing applications in all types of standard equipment.

Special consideration should be given to applications where speed, load, temperature or environmental conditions are extreme.

**TABLE 26. SUGGESTED LITHIUM SOAP, LITHIUM COMPLEX AND CALCIUM SULFONATE GREASE PROPERTIES**

| Thickener type | Lithium Complex, or equivalent |
|---|---|
| Consistency | NLGI No.1 or No. 2 |
| Additives | Anti-wear, corrosion and oxidation inhibitors |
| Base oil | Mineral oil or synthetic |
| Viscosity at 40° C | ISO VG 150-220 |
| Viscosity index | 80 min. |
| Pour point | -18° C max. |

Lithium greases, lithium complex greases, or calcium sulfonate thickened grease are suitable for most centralized, single-point, or manually lubricated product. They should be a smooth, homogeneous and uniform, premium-quality product composed of mineral or synthetic oil, a thickener and appropriate inhibitors. They should not contain materials that are corrosive or abrasive to roller bearings. The grease should have excellent mechanical and chemical stability. The grease should contain inhibitors to provide long-term protection against oxidation in high-performance applications and protect the bearings from corrosion in the presence of moisture. The suggested base oil viscosity covers a fairly wide range. Lower viscosity products should be used in high-speed and/or lightly loaded applications to minimize heat generation and torque. Higher viscosity products should be used in moderate- to low-speed applications and under heavy loads to maximize lubricant film thickness. Speed ratings are listed for each size/class part number in the SPHERICAL ROLLER BEARING section (pages 56-83) of the catalog. When application speeds exceed 70 percent of grease speed rating, consider increasing RIC by one ISO clearance range (CNormal to C3). Never mix greases (type or manufacturer). Incompatibility can inhibit proper lubrication. Table 25 is provided as a reference for typical grease thickener compatibilities. Consult your lubricant supplier for further information for your specific requirement. For general industrial applications, consider a grease that is NLGI No. 1 or No. 2, with a ISO 150 to 220 viscosity grade.

## APPLICATION CONSIDERATIONS

For higher-speed applications (operating at 75 percent of the grease speed rating or more), a grease with a lighter base oil viscosity (ISO 100-150) can be considered. Conversely, for lower-speed applications, a grease with a heavier base oil viscosity (ISO 320-460) can be considered. For lower-speed applications operating at colder start-up temperatures (>-18° C [0° F]), consider a softer grease (NLGI grade 1) with an approved EP additive. The lighter grade will allow more grease flow into the bearing contact area and the EP additive will reduce wear during start-up. An ISO 460 base oil viscosity also can be considered.

When lower-speed applications operate at higher temperatures (>149° C [300° F]), consult a local Timken sales engineer.

## GREASE FILL

For normal industrial applications, fill the bearing void to 100 percent full and the housing void to 40-60 percent full. For high-speed applications, fill the bearing void to 100 percent full and the housing void to 30-40 percent full. The free volume of the bearing can be estimated by first calculating the "solid ring" volume of the bearing. Then, weigh the bearing and divide the weight by the density of steel. This "actual" volume can then be subtracted from the "solid ring" volume. The resultant value is an estimate of the free volume of the bearing available for grease fill. When the grease volume is determined for the application, multiplying this value by the density of the grease will yield the approximate weight of the grease fill. After weighing the grease required, apply approximately 75 percent of the amount into the cage and roller assembly. The remaining amount of grease should then be applied to both inner and outer rings in equal amounts. The preservatives applied to bearing components are compatible with nearly all industrial greases and should not be wiped or cleaned prior to packing the bearing. If in doubt, contact a local Timken sales engineer.

## THERMAL REFERENCE SPEED

Thermal Reference Speed is the bearing thermal equilibrium speed, under certain referenced conditions.

This criteria is based on industry standard reference conditions outlined in ISO 15312: 2003. Thermal equilibrium balances the heat generated by the bearing, with heat conduction through the housing and shaft. This standard applies to both bath oil lubricated and 30% grease fill packed bearings. It excludes any heat removed by a circulating lubricant. This standard also excludes the heat generated by seals.

ISO 15312 Thermal Reference Speed calculations are based on the following assumptions.

- The bearing ambient temperature is 20° C.
- The tolerable bearing/housing interface temperature is 70° C.
- Oil and grease lubricants are considered.
  - For radial bearings: ISO VG 32 oil.
  - For thrust bearings: ISO VG 68 oil.
  - For radial & thrust bearings: ISO VG 150 grease.
- The Radial and thrust loads assume a normal clearance ($C_0$).
  - For radial bearings, the applied load is 5% of the Static Load Rating ($C_{0r}$).
  - For thrust bearings, the applied load is 2% of the Static Load Rating ($C_{0a}$).

The Thermal Reference Speed values assume the bearing has been sufficiently broken in. During the break in process, temperatures may exceed the tolerable limit, experience a stabilized maximum temperature and then decrease. Break in commonly takes between 10 to 36 hours. Any questions about temperatures experienced during the break in process should be directed to your Timken sales engineer.

Certain bearing materials, lubricants, and methods of applying the lubricant, permit bearing temperatures in excess of 70° C. Contact your Timken sales engineer if application conditions dictate operating temperatures greater than 70° C are required, or if your application requires speeds above the Timken Catalogued values. Note: the Thermal Reference Speed does not consider cage behavior, as does the Limiting Speed.

## LIMITING SPEED

Limiting Speed is the speed at which predicted cage life equals the bearing Catalogued fatigue life, under certain reference conditions.

The Limiting Speed is based on cage behavior. The Limiting Speed calculation studies cage stability and material wear through a theoretical speed dependent power law correlation.

Limiting Speed calculations are dependent on the following assumptions.

- The bearing is operating under typical sump or circulating oil conditions.
- After a critical amount of cage wear, the bearing is operating outside a tolerable factor of safety.
- The wear rate differs by bearing geometry and kinematics, cage geometry and dynamics, as well as the raceway and cage material interactions.

The Catalogued Limiting Speed values have been substantiated through testing. Contact your Timken sales engineer if your application requires faster speeds. Elevated speeds require further consideration, such as lubricant selection and method of application, cage design, and bearing sealing.

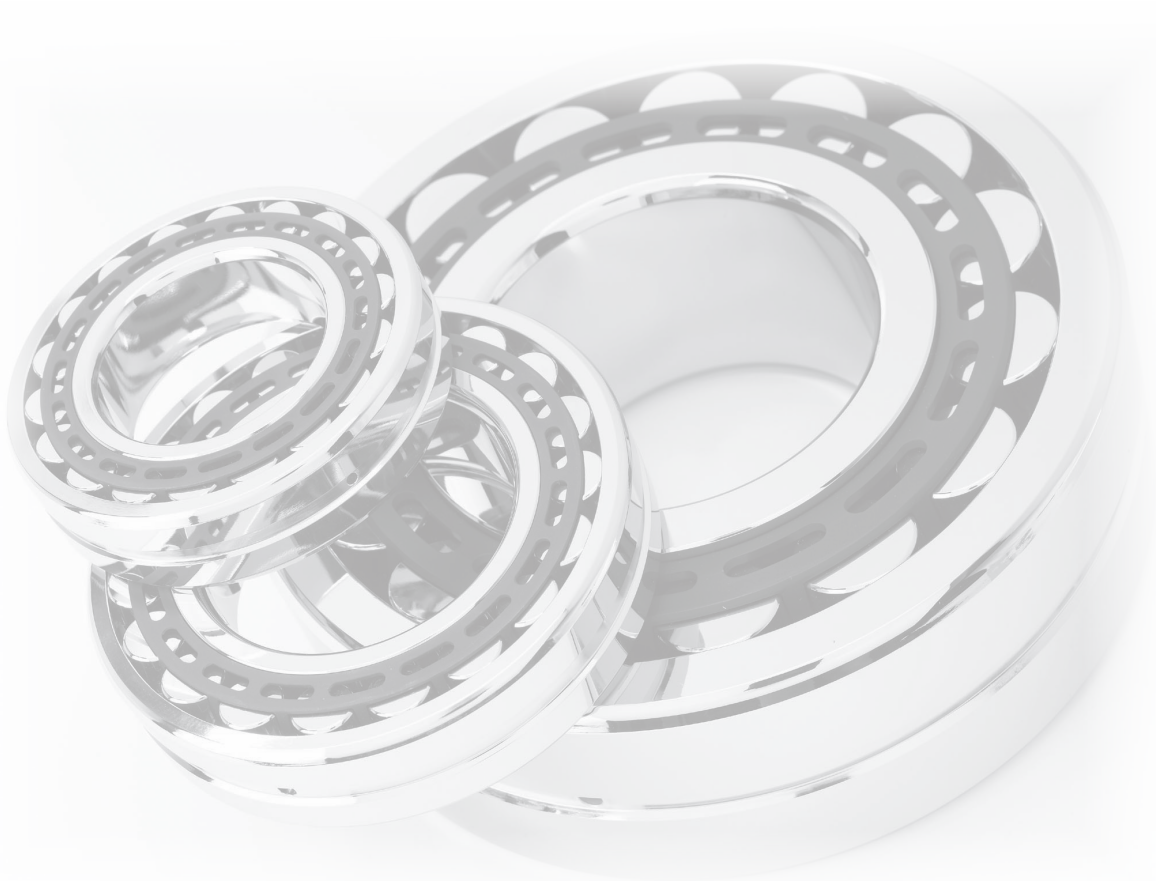
Note: the Limiting Speed does not consider thermal equilibrium, as does the Thermal Reference Speed.



## *SPHERICAL ROLLER BEARINGS*

Timken® spherical roller bearings feature all of the characteristics that have made Timken renowned superior design, reliable performance and comprehensive technical support. Spherical roller bearings are designed to manage high radial loads and perform consistently, even when misalignment, marginal lubrication, contamination, extreme speeds and critical application stresses are present.

Nomenclature . . . . . 54
Modification Codes . . . . . 55
Spherical Roller Bearings . . . . . 56



# *NOMENCLATURE*

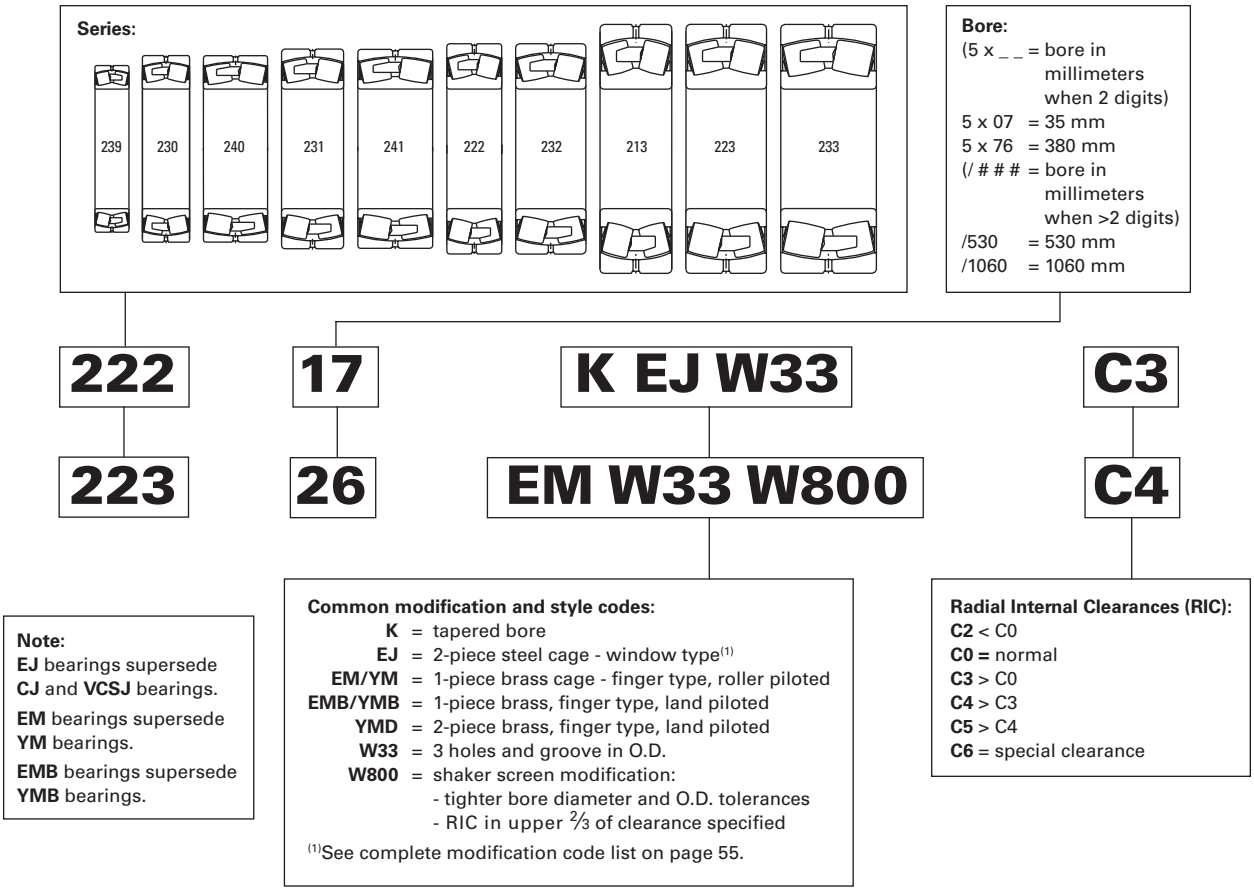



**Fig. 23. Timken spherical roller bearing nomenclature.**

## TABLE 27. TIMKEN SPHERICAL ROLLER BEARING MODIFICATION CODES

| TIMKEN[1] | SKF[2] | FAG[3] | NSK | Timken General Definition |
|---|---|---|---|---|
| EJ | E, EJA, C, CC, CCJA, EC, ECC | E1 | EA, C, CD | Stamped nitrided steel cage – high performance |
| EM | CA, ECA, CAMA | M | CA | One-piece, roller-riding, machined-brass cage – high performance |
| EMB | CA, ECA, CAMA | MB | CA | One-piece, inner-ring-piloted, machined-brass cage – high performance |
| YMB | CA, ECA, CAMA | MB | CA | One-piece, inner-ring-piloted, machined-brass cage |
| YMD | | | | Two-piece, inner-ring-piloted, machined-brass cage |
| C2 | C2 | C2 | C2 | Bearing radial internal clearance (RIC) smaller than normal |
| C3 | C3 | C3 | C3 | Bearing radial internal clearance (RIC) greater than normal |
| C4 | C4 | C4 | C4 | Bearing radial internal clearance (RIC) greater than C3 |
| C5 | C5 | C5 | C5 | Bearing radial internal clearance (RIC) greater than C4 |
| C6 | C6 | C6 | CGxx, SLxx | Specific RIC designed to bearing size |
| S1(4) | S1 | S1 | S11 | Bearing rings dimensionally stabilized for use at operating temperatures up to 200° C (392° F) |
| S2 | S2 | S2 | | Bearing rings dimensionally stabilized for use at operating temperatures up to 250° C (482° F) |
| S3 | S3 | S3 | | Bearing rings dimensionally stabilized for use at operating temperatures up to 300° C (572° F) |
| S4 | S4 | S4 | | Bearing rings dimensionally stabilized for use at operating temperatures up to 350° C (662° F) |
| C02 | C02 | T52BE | P5B, P53 | Inner ring with P5 running accuracy, high point of eccentricity marked (SKF does not mark) |
| C04 | C04 | T52BN | P5C, P52 | Outer ring with P5 running accuracy, high point of eccentricity marked (SKF does not mark) |
| C08 | C08 | T52BW | P55 | P5 running accuracy (C02 + C04) |
| C08C3 | C083 | C3, T52BW | P55, C3 | P5 running accuracy (C02 + C04), C3 RIC |
| C08C4 | C084 | C4, T52BW | P55, C4 | P5 running accuracy (C02 + C04), C4 RIC |
| K | K | K | K | Tapered bore (1:12 on diameter 13, 22, 23, 30, 31, 32, 33, 38, 39 series) |
| K | K30 | K30 | K30 | Tapered bore (1:30 on diameter 40, 41, 42 series) |
| W4 | W4 | J26A | | Inner ring or sleeve marked to show high point of eccentricity |
| W6R | | | | Engineered surface thin-film coating ES302 on roller contact surfaces |
| W20 | W20 | SY | E3 | Outer ring with lubrication holes |
| W22 | W22 | T50H | S (a, b) | Special reduced O.D. tolerance on outer rings |
| W25 | W73 | | | Outer ring counter-drilled lubrication holes |
| W31 | W31 | | U22 | Bearing inspected to certain quality control requirements |
| W33 | W33 | S | E4 | Standard lubrication holes and groove in outer ring |
| W40 | ECD- | W209 | g | Bearing made of carburizing-grade steel |
| W40I | HA3, ECB- | W209B | g3 | Inner ring only made of carburizing-grade steel |
| W40R | | | g1 | Roller only made of carburizing-grade steel |
| W40E | | | g2 | Outer ring only made of carburizing-grade steel |
| W45A | VE 553 | | | Tapped lifting holes in face of outer ring to facilitate lifting and handling |
| W47 | VA414 (incl W800 & W47) | T41B (incl W22 & W47) | | Inner ring with oversize bore |
| W84 | W77 | H44SA, H40 | E42 | Outer ring with standard lubrication holes plugged |
| W841 | W | H40 | | Outer ring with no lubrication hole |
| W88 | | | | Special reduced bore tolerance on inner ring |
| W89 | | | | Inner ring with lubrication holes and lubrication groove |
| W94 | W26 | H40AB | E5 | Inner ring lubrication holes |
| W507 | W507 | J26A | E4U22, E4P53 | W31 + W33 + W45A |
| W509 | W509 (W26 + W31 + W33) | S.H40A | E7U22 | W31 + W33 + W94 + W45A (where feasible) |
| W525 | W525 (W31 + W77) | S.H44S | | W31 + W33 + W84 + W45A (where feasible) |
| W534 | | | | W507 + C08 |
| W800 | VA405 | T41A | U15, VS | Shaker screen modification (W22 + W88 + radial internal clearance in upper 2⁄3 of range specified) |
| W906A | C083HA3 | T52BW.W209B | | C08 + W31 +W33 + W40I + W40R – Modification mainly used in paper industry |

[1]Timken offers differentiated solutions for many applications. This is only a partial list of common modification codes.
[2]E suffix for SKF Explorer available in some sizes.
[3]E1 suffix for FAG X-life available in some sizes.
[4]Standard for all Timken spherical roller bearings.
Every reasonable effort has been made to ensure the accuracy of the information contained in this writing, but no liability is accepted for errors, omissions or for any other reason.

# SPHERICAL ROLLER BEARINGS

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | Dynamic $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | Dynamic $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | Static In All Cases $Y_0$ | | Thermal Reference Speed[4] Oil | Thermal Reference Speed[4] Grease | Limiting Speed[5] | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 22205 | **25** 0.9843 | **52** 2.0472 | **18** 0.7087 | **50.6** 11400 | **43.1** 9690 | EJ | **1** 0.04 | **30** 1.2 | **47** 1.9 | 0.34 | 2.00 | 2.98 | 1.96 | 0.033 | 11500 | 9200 | 17220 | **0.2** 0.4 |
| 21305 | **25** 0.9843 | **62** 2.4409 | **17** 0.6693 | **55.5** 12500 | **44.3** 9970 | EJ | **1** 0.04 | **35** 1.4 | **55** 2.1 | 0.27 | 2.48 | 3.70 | 2.43 | 0.037 | 10100 | 8100 | 13720 | **0.3** 0.6 |
| 22206 | **30** 1.1811 | **62** 2.4409 | **20** 0.7874 | **67.4** 15200 | **60.8** 13700 | EJ | **1** 0.04 | **38** 1.5 | **56** 2.2 | 0.31 | 2.15 | 3.20 | 2.10 | 0.037 | 9700 | 7800 | 13360 | **0.3** 0.6 |
| 22206 | **30** 1.1811 | **62** 2.4409 | **20** 0.7874 | **64.3** 14400 | **56.8** 12800 | EM | **1** 0.04 | **38** 1.5 | **56** 2.2 | 0.31 | 2.15 | 3.20 | 2.10 | 0.036 | 9900 | 7900 | 14030 | **0.3** 0.6 |
| 21306 | **30** 1.1811 | **72** 2.8346 | **19** 0.7480 | **70.3** 15800 | **56.5** 12700 | EJ | **1** 0.04 | **41** 1.6 | **64** 2.5 | 0.26 | 2.60 | 3.87 | 2.54 | 0.041 | 8900 | 7200 | 11590 | **0.4** 0.9 |
| 22207 | **35** 1.3780 | **72** 2.8346 | **23** 0.9055 | **90.5** 20300 | **88** 19700 | EJ | **1** 0.04 | **45** 1.8 | **65** 2.6 | 0.31 | 2.21 | 3.29 | 2.16 | 0.041 | 8600 | 6900 | 11900 | **0.4** 1.0 |
| 22207 | **35** 1.3780 | **72** 2.8346 | **23** 0.9055 | **86.5** 19400 | **82** 18500 | EM | **1** 0.04 | **45** 1.8 | **65** 2.6 | 0.31 | 2.21 | 3.29 | 2.16 | 0.041 | 8700 | 7000 | 13290 | **0.4** 1.0 |
| 21307 | **35** 1.3780 | **80** 3.1496 | **21** 0.8268 | **90.2** 20300 | **77.8** 17500 | EJ | **1.5** 0.06 | **47** 1.9 | **71** 2.8 | 0.26 | 2.56 | 3.81 | 2.50 | 0.044 | 7900 | 6400 | 10580 | **0.5** 1.1 |
| 22208 | **40** 1.5748 | **80** 3.1496 | **23** 0.9055 | **104** 23400 | **99.7** 22400 | EJ | **1** 0.04 | **50** 2.0 | **73** 2.9 | 0.27 | 2.47 | 3.67 | 2.41 | 0.044 | 7500 | 6000 | 10980 | **0.5** 1.2 |
| 22208 | **40** 1.5748 | **80** 3.1496 | **23** 0.9055 | **99.6** 22400 | **93.4** 21000 | EM | **1** 0.04 | **50** 2.0 | **73** 2.9 | 0.27 | 2.47 | 3.67 | 2.41 | 0.044 | 7600 | 6100 | 9990 | **0.5** 1.2 |
| 21308 | **40** 1.5748 | **90** 3.5433 | **23** 0.9055 | **113** 25400 | **102** 22900 | EJ | **1.5** 0.06 | **54** 2.1 | **80** 3.2 | 0.26 | 2.64 | 3.93 | 2.58 | 0.048 | 7100 | 5800 | 9240 | **0.7** 1.5 |
| 22308 | **40** 1.5748 | **90** 3.5433 | **33** 1.2992 | **155** 34900 | **147** 33100 | EJ | **1.5** 0.06 | **53** 2.1 | **81** 3.2 | 0.36 | 1.87 | 2.79 | 1.83 | 0.046 | 6700 | 5600 | 7560 | **1.0** 2.2 |
| 22308 | **40** 1.5748 | **90** 3.5433 | **33** 1.2992 | **147** 33100 | **137** 30800 | EM | **1.5** 0.06 | **53** 2.1 | **81** 3.2 | 0.36 | 1.87 | 2.79 | 1.83 | 0.045 | 6700 | 5600 | 8040 | **1.1** 2.3 |
| 22209 | **45** 1.7717 | **85** 3.3465 | **23** 0.9055 | **109** 24500 | **108** 24200 | EJ | **1** 0.04 | **55** 2.2 | **77** 3.0 | 0.26 | 2.64 | 3.93 | 2.58 | 0.046 | 6800 | 5500 | 10400 | **0.6** 1.3 |
| 22209 | **45** 1.7717 | **85** 3.3465 | **23** 0.9055 | **104** 23500 | **101** 22800 | EM | **1** 0.04 | **55** 2.2 | **77** 3.0 | 0.26 | 2.64 | 3.93 | 2.58 | 0.046 | 6900 | 5600 | 9400 | **0.6** 1.3 |
| 21309 | **45** 1.7717 | **100** 3.9370 | **25** 0.9843 | **138** 31000 | **125** 28200 | EJ | **1.5** 0.06 | **60** 2.4 | **90** 3.5 | 0.25 | 2.75 | 4.09 | 2.69 | 0.052 | 6500 | 5300 | 8510 | **1.0** 2.2 |
| 22309 | **45** 1.7717 | **100** 3.9370 | **36** 1.4173 | **190** 42700 | **182** 40800 | EJ | **1.5** 0.06 | **58** 2.3 | **90** 3.5 | 0.36 | 1.90 | 2.83 | 1.86 | 0.049 | 6100 | 5100 | 7090 | **1.3** 3.0 |
| 22309 | **45** 1.7717 | **100** 3.9370 | **36** 1.4173 | **180** 40500 | **169** 37900 | EM | **1.5** 0.06 | **58** 2.3 | **90** 3.5 | 0.36 | 1.90 | 2.83 | 1.86 | 0.048 | 6100 | 5100 | 7020 | **1.4** 3.1 |

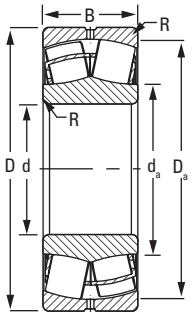
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

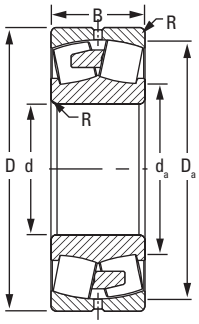
[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

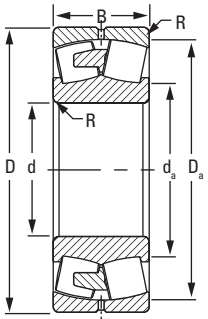
[5]See limiting speed on page 51.




**EJ**




**EM/YM**




**EMB/YMB**

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Backing Diameter | | | Dynamic | | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Shaft $d_a$ | Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 22210 | **50** | **90** | **23** | **117** | **118** | EJ | **1** | **59** | **82** | 0.24 | 2.84 | 4.23 | 2.78 | 0.049 | 6200 | 5000 | 9450 | **0.6** |
| | 1.9685 | 3.5433 | 0.9055 | 26300 | 26600 | | 0.04 | 2.3 | 3.2 | | | | | | | | | 1.3 |
| 22210 | **50** | **90** | **23** | **112** | **112** | EM | **1** | **59** | **82** | 0.24 | 2.84 | 4.23 | 2.78 | 0.048 | 6300 | 5100 | 9110 | **0.6** |
| | 1.9685 | 3.5433 | 0.9055 | 25200 | 25100 | | 0.04 | 2.3 | 3.2 | | | | | | | | | 1.3 |
| 21310 | **50** | **110** | **27** | **163** | **151** | EJ | **2** | **67** | **99** | 0.24 | 2.83 | 4.21 | 2.76 | 0.055 | 5900 | 4900 | 7710 | **1.2** |
| | 1.9685 | 4.3307 | 1.0630 | 36700 | 33800 | | 0.08 | 2.6 | 3.9 | | | | | | | | | 2.6 |
| 22310 | **50** | **110** | **40** | **238** | **241** | EJ | **2** | **65** | **98** | 0.36 | 1.89 | 2.81 | 1.85 | 0.055 | 5500 | 4600 | 6430 | **1.9** |
| | 1.9685 | 4.3307 | 1.5748 | 53500 | 54200 | | 0.08 | 2.6 | 3.9 | | | | | | | | | 4.2 |
| 22310 | **50** | **110** | **40** | **227** | **225** | EM | **2** | **65** | **98** | 0.36 | 1.89 | 2.81 | 1.85 | 0.052 | 5600 | 4700 | 6630 | **1.9** |
| | 1.9685 | 4.3307 | 1.5748 | 51000 | 50600 | | 0.08 | 2.6 | 3.9 | | | | | | | | | 4.2 |
| 22211 | **55** | **100** | **25** | **140** | **142** | EJ | **1.5** | **66** | **91** | 0.23 | 2.95 | 4.40 | 2.89 | 0.052 | 5800 | 4700 | 8980 | **0.8** |
| | 2.1654 | 3.9370 | 0.9843 | 31400 | 31900 | | 0.06 | 2.6 | 3.6 | | | | | | | | | 1.8 |
| 22211 | **55** | **100** | **25** | **134** | **134** | EM | **1.5** | **66** | **91** | 0.23 | 2.95 | 4.40 | 2.89 | 0.052 | 5900 | 4700 | 8910 | **0.9** |
| | 2.1654 | 3.9370 | 0.9843 | 30100 | 30100 | | 0.06 | 2.6 | 3.6 | | | | | | | | | 1.9 |
| 21311 | **55** | **120** | **29** | **188** | **176** | EJ | **2** | **73** | **108** | 0.24 | 2.81 | 4.18 | 2.75 | 0.051 | 5500 | 4500 | 6930 | **1.6** |
| | 2.1654 | 4.7244 | 1.1417 | 42400 | 39500 | | 0.08 | 2.9 | 4.2 | | | | | | | | | 3.5 |
| 22311 | **55** | **120** | **43** | **266** | **265** | EJ | **2** | **69** | **106** | 0.36 | 1.89 | 2.81 | 1.84 | 0.050 | 5100 | 4300 | 5890 | **2.4** |
| | 2.1654 | 4.7244 | 1.6929 | 59800 | 59500 | | 0.08 | 2.7 | 4.2 | | | | | | | | | 5.3 |
| 22311 | **55** | **120** | **43** | **266** | **265** | EM | **2** | **69** | **106** | 0.36 | 1.89 | 2.81 | 1.84 | 0.050 | 5200 | 4400 | 6110 | **2.4** |
| | 2.1654 | 4.7244 | 1.6929 | 59800 | 59500 | | 0.08 | 2.7 | 4.2 | | | | | | | | | 5.3 |
| 22212 | **60** | **110** | **28** | **169** | **174** | EJ | **1.5** | **72** | **100** | 0.24 | 2.84 | 4.23 | 2.78 | 0.055 | 5500 | 4400 | 7960 | **1.1** |
| | 2.3622 | 4.3307 | 1.1024 | 38100 | 39000 | | 0.06 | 2.8 | 4.0 | | | | | | | | | 2.5 |
| 22212 | **60** | **110** | **28** | **163** | **164** | EM | **1.5** | **72** | **100** | 0.24 | 2.84 | 4.23 | 2.78 | 0.055 | 5600 | 4500 | 9000 | **1.2** |
| | 2.3622 | 4.3307 | 1.1024 | 36600 | 36900 | | 0.06 | 2.8 | 4.0 | | | | | | | | | 2.6 |
| 21312 | **60** | **130** | **31** | **225** | **219** | EJ | **2** | **80** | **116** | 0.23 | 2.91 | 4.33 | 2.84 | 0.054 | 5100 | 4200 | 6660 | **2.0** |
| | 2.3622 | 5.1181 | 1.2205 | 50500 | 49200 | | 0.08 | 3.2 | 4.6 | | | | | | | | | 4.4 |
| 22312 | **60** | **130** | **46** | **306** | **307** | EJ | **2** | **77** | **117** | 0.34 | 1.98 | 2.94 | 1.93 | 0.053 | 4700 | 4000 | 5360 | **3.0** |
| | 2.3622 | 5.1181 | 1.8110 | 68800 | 69000 | | 0.08 | 3.0 | 4.6 | | | | | | | | | 6.6 |
| 22312 | **60** | **130** | **46** | **306** | **307** | EM | **2** | **77** | **117** | 0.34 | 1.98 | 2.94 | 1.93 | 0.053 | 4900 | 4100 | 5540 | **3.0** |
| | 2.3622 | 5.1181 | 1.8110 | 68800 | 69000 | | 0.08 | 3.0 | 4.6 | | | | | | | | | 6.6 |
| 22213 | **65** | **120** | **31** | **206** | **216** | EJ | **1.5** | **78** | **109** | 0.24 | 2.79 | 4.15 | 2.73 | 0.051 | 5100 | 4200 | 7320 | **1.5** |
| | 2.5591 | 4.7244 | 1.2205 | 46400 | 48600 | | 0.06 | 3.1 | 4.3 | | | | | | | | | 3.3 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

*Continued on next page.*

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARINGS – *continued*

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

*Continued from previous page.*

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Fillet[1] (Max.) R | Backing Diameter | | Dynamic | | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | | Shaft $d_a$ | Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 22213 | **65** 2.5591 | **120** 4.7244 | **31** 1.2205 | **198** 44600 | **204** 45900 | EM | **1.5** 0.06 | **78** 3.1 | **109** 4.3 | 0.24 | 2.79 | 4.15 | 2.73 | 0.051 | 5200 | 4200 | 7520 | **1.6** 3.4 |
| 21313 | **65** 2.5591 | **140** 5.5118 | **33** 1.2992 | **259** 58200 | **254** 57100 | EJ | **2** 0.08 | **86** 3.4 | **126** 5.0 | 0.23 | 2.94 | 4.37 | 2.87 | 0.057 | 4800 | 3900 | 6110 | **2.4** 5.3 |
| 22313 | **65** 2.5591 | **140** 5.5118 | **48** 1.8898 | **344** 77400 | **346** 77800 | EJ | **2** 0.08 | **84** 3.3 | **127** 5.0 | 0.33 | 2.05 | 3.05 | 2.00 | 0.056 | 4400 | 3800 | 4960 | **3.6** 7.9 |
| 22313 | **65** 2.5591 | **140** 5.5118 | **48** 1.8898 | **344** 77400 | **346** 77800 | EM | **2** 0.08 | **84** 3.3 | **127** 5.0 | 0.33 | 2.05 | 3.05 | 2.00 | 0.056 | 4600 | 3900 | 5110 | **3.6** 7.9 |
| 22214 | **70** 2.7559 | **125** 4.9213 | **31** 1.2205 | **213** 47800 | **231** 52000 | EJ | **1.5** 0.06 | **84** 3.3 | **114** 4.5 | 0.23 | 2.90 | 4.32 | 2.84 | 0.055 | 4800 | 3900 | 7040 | **1.6** 3.5 |
| 22214 | **70** 2.7559 | **125** 4.9213 | **31** 1.2205 | **205** 46000 | **219** 49200 | EM | **1.5** 0.06 | **84** 3.3 | **114** 4.5 | 0.23 | 2.90 | 4.32 | 2.84 | 0.055 | 4900 | 4000 | 7110 | **1.6** 3.5 |
| 21314 | **70** 2.7559 | **150** 5.9055 | **35** 1.3780 | **292** 65600 | **289** 65000 | EJ | **2** 0.08 | **93** 3.7 | **135** 5.3 | 0.23 | 2.97 | 4.42 | 2.90 | 0.059 | 4500 | 3700 | 5660 | **3.0** 6.6 |
| 22314 | **70** 2.7559 | **150** 5.9055 | **51** 2.0079 | **395** 88800 | **414** 93100 | EJ | **2** 0.08 | **91** 3.6 | **135** 5.3 | 0.33 | 2.07 | 3.08 | 2.02 | 0.059 | 4200 | 3600 | 4690 | **4.4** 9.7 |
| 22314 | **70** 2.7559 | **150** 5.9055 | **51** 2.0079 | **395** 88800 | **414** 93100 | EM | **2** 0.08 | **91** 3.6 | **135** 5.3 | 0.33 | 2.07 | 3.08 | 2.02 | 0.059 | 4200 | 3600 | 5020 | **4.4** 9.7 |
| 22215 | **75** 2.9528 | **130** 5.1181 | **31** 1.2205 | **222** 49900 | **240** 54100 | EJ | **1.5** 0.06 | **88** 3.5 | **120** 4.7 | 0.22 | 3.14 | 4.67 | 3.07 | 0.055 | 4600 | 3700 | 6640 | **1.7** 3.7 |
| 21315 | **75** 2.9528 | **160** 6.2992 | **37** 1.4567 | **322** 72400 | **321** 72200 | EJ | **2** 0.08 | **99** 3.9 | **144** 5.7 | 0.23 | 2.98 | 4.43 | 2.91 | 0.062 | 4300 | 3600 | 5280 | **3.5** 7.7 |
| 22315 | **75** 2.9528 | **160** 6.2992 | **55** 2.1654 | **450** 101000 | **478** 107000 | EJ | **2** 0.08 | **97** 3.8 | **144** 5.7 | 0.33 | 2.04 | 3.04 | 2.00 | 0.061 | 4000 | 3400 | 4330 | **5.2** 11.9 |
| 22315 | **75** 2.9528 | **160** 6.2992 | **55** 2.1654 | **450** 101000 | **478** 107000 | EM | **2** 0.08 | **97** 3.8 | **144** 5.7 | 0.33 | 2.04 | 3.04 | 2.00 | 0.061 | 4000 | 3400 | 4750 | **5.4** 11.9 |
| 22216 | **80** 3.1496 | **140** 5.5118 | **33** 1.2992 | **254** 57200 | **278** 62500 | EJ | **2** 0.08 | **95** 3.7 | **129** 5.1 | 0.22 | 3.14 | 4.67 | 3.07 | 0.057 | 4300 | 3500 | 6190 | **2.0** 4.5 |
| 22216 | **80** 3.1496 | **140** 5.5118 | **33** 1.2992 | **245** 55100 | **263** 59200 | EM | **2** 0.08 | **95** 3.7 | **129** 5.1 | 0.22 | 3.14 | 4.67 | 3.07 | 0.057 | 4400 | 3600 | 6650 | **2.1** 4.7 |
| 21316 | **80** 3.1496 | **170** 6.6929 | **39** 1.5354 | **363** 81700 | **363** 81700 | EJ | **2** 0.08 | **105** 4.1 | **153** 6.0 | 0.22 | 3.01 | 4.47 | 2.94 | 0.065 | 4100 | 3400 | 5050 | **4.2** 9.2 |
| 22316 | **80** 3.1496 | **170** 6.6929 | **58** 2.2835 | **499** 112000 | **534** 120000 | EJ | **2** 0.08 | **103** 4.1 | **153** 6.0 | 0.33 | 2.06 | 3.06 | 2.01 | 0.064 | 3700 | 3200 | 4160 | **6.4** 14.1 |
| 22316 | **80** 3.1496 | **170** 6.6929 | **58** 2.2835 | **499** 112000 | **534** 120000 | EM | **2** 0.08 | **103** 4.1 | **153** 6.0 | 0.33 | 2.06 | 3.06 | 2.01 | 0.064 | 3800 | 3300 | 4590 | **6.4** 14.1 |

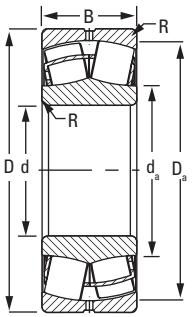
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

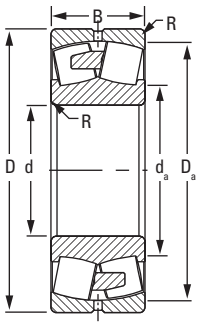
[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

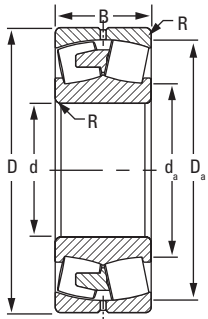
[5]See limiting speed on page 51.




**EJ**




**EM/YM**




**EMB/YMB**

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Dynamic | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 22217 | **85** 3.3465 | **150** 5.9055 | **36** 1.4173 | **297** 66900 | **320** 71900 | EJ | **2** 0.08 | **101** 4.0 | **139** 5.5 | 0.22 | 3.07 | 4.57 | 3.00 | 0.060 | 4200 | 3400 | 5840 | **2.6** 5.6 |
| 22217 | **85** 3.3465 | **150** 5.9055 | **36** 1.4173 | **286** 64200 | **302** 67900 | EM | **2** 0.08 | **101** 4.0 | **139** 5.5 | 0.22 | 3.07 | 4.57 | 3.00 | 0.059 | 4200 | 3500 | 5960 | **2.7** 6.0 |
| 21317 | **85** 3.3465 | **180** 7.0866 | **41** 1.6142 | **403** 90600 | **407** 91500 | EJ | **2.5** 0.1 | **112** 4.4 | **162** 6.4 | 0.22 | 3.04 | 4.53 | 2.97 | 0.067 | 3900 | 3200 | 4730 | **4.9** 10.8 |
| 22317 | **85** 3.3465 | **180** 7.0866 | **60** 2.3622 | **543** 122000 | **584** 131000 | EJ | **2.5** 0.1 | **110** 4.3 | **162** 6.4 | 0.32 | 2.11 | 3.14 | 2.06 | 0.066 | 3500 | 3000 | 3860 | **7.5** 16.5 |
| 22317 | **85** 3.3465 | **180** 7.0866 | **60** 2.3622 | **543** 122000 | **584** 131000 | EM | **2.5** 0.1 | **110** 4.3 | **162** 6.4 | 0.32 | 2.11 | 3.14 | 2.06 | 0.066 | 3500 | 3000 | 4320 | **7.5** 16.5 |
| 22218 | **90** 3.5433 | **160** 6.2992 | **40** 1.5748 | **355** 79700 | **388** 87200 | EJ | **2** 0.08 | **105** 4.2 | **146** 5.8 | 0.23 | 2.90 | 4.31 | 2.83 | 0.064 | 4300 | 3500 | 5520 | **3.5** 7.7 |
| 22218 | **90** 3.5433 | **160** 6.2992 | **40** 1.5748 | **355** 79700 | **388** 87200 | EM | **2** 0.08 | **105** 4.2 | **146** 5.8 | 0.23 | 2.90 | 4.31 | 2.83 | 0.064 | 4300 | 3500 | 5790 | **3.5** 7.7 |
| 23218 | **90** 3.5433 | **160** 6.2992 | **52.4** 2.0630 | **436** 98000 | **521** 117000 | EJ | **2** 0.08 | **107** 4.2 | **147** 5.8 | 0.30 | 2.28 | 3.40 | 2.23 | 0.065 | 3000 | 2600 | 4160 | **4.5** 9.9 |
| 23218 | **90** 3.5433 | **160** 6.2992 | **52.4** 2.0630 | **436** 98000 | **521** 117000 | EM | **2** 0.08 | **107** 4.2 | **147** 5.8 | 0.30 | 2.28 | 3.40 | 2.23 | 0.065 | 3000 | 2600 | 3850 | **4.5** 9.9 |
| 21318 | **90** 3.5433 | **190** 7.4803 | **43** 1.6929 | **442** 99400 | **449** 101000 | EJ | **2.5** 0.1 | **118** 4.7 | **171** 6.7 | 0.22 | 3.05 | 4.55 | 2.99 | 0.069 | 3700 | 3100 | 4460 | **5.8** 12.8 |
| 22318 | **90** 3.5433 | **190** 7.4803 | **64** 2.5197 | **606** 136000 | **659** 148000 | EJ | **2.5** 0.1 | **116** 4.6 | **171** 6.7 | 0.32 | 2.09 | 3.11 | 2.04 | 0.069 | 3400 | 2900 | 3640 | **8.3** 19.4 |
| 22318 | **90** 3.5433 | **190** 7.4803 | **64** 2.5197 | **606** 136000 | **659** 148000 | EM | **2.5** 0.1 | **116** 4.6 | **171** 6.7 | 0.32 | 2.09 | 3.11 | 2.04 | 0.069 | 3400 | 2900 | 4190 | **8.8** 19.4 |
| 23318 | **90** 3.5433 | **190** 7.4803 | **73** 2.8740 | **623** 140000 | **672** 151000 | EM | **2.5** 0.1 | **110** 4.3 | **167** 6.6 | 0.40 | 1.70 | 2.52 | 1.66 | 0.067 | 2500 | 2100 | 2970 | **9.8** 21.6 |
| 21319 | **95** 3.7402 | **200** 7.8740 | **45** 1.7717 | **474** 107000 | **483** 109000 | EJ | **2.5** 0.1 | **125** 4.9 | **180** 7.1 | 0.22 | 3.02 | 4.50 | 2.96 | 0.072 | 3600 | 3000 | 4460 | **6.5** 14.4 |
| 22219 | **95** 3.7402 | **170** 6.6929 | **43** 1.6929 | **385** 86600 | **441** 99000 | EJ | **2** 0.08 | **114** 4.5 | **155** 6.1 | 0.23 | 2.88 | 4.29 | 2.82 | 0.067 | 3900 | 3200 | 5120 | **4.2** 9.2 |
| 22219 | **95** 3.7402 | **170** 6.6929 | **43** 1.6929 | **385** 86600 | **441** 99000 | EM | **2** 0.08 | **114** 4.5 | **155** 6.1 | 0.23 | 2.88 | 4.29 | 2.82 | 0.067 | 3900 | 3200 | 5550 | **4.2** 9.2 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

*Continued on next page.*

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARINGS – *continued*

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

*Continued from previous page.*

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Fillet[1] (Max.) R | Backing Diameter | | Dynamic | | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | | Shaft $d_a$ | Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 22319 | **95** 3.7402 | **200** 7.8740 | **67** 2.6378 | **694** 156000 | **774** 174000 | EJ | **2.5** 0.1 | **122** 4.8 | **180** 7.1 | 0.32 | 2.10 | 3.13 | 2.05 | 0.072 | 3000 | 2600 | 3470 | **10.2** 22.4 |
| 22319 | **95** 3.7402 | **200** 7.8740 | **67** 2.6378 | **663** 149000 | **725** 163000 | EM | **2.5** 0.1 | **122** 4.8 | **180** 7.1 | 0.32 | 2.10 | 3.13 | 2.05 | 0.071 | 3100 | 2600 | 4020 | **10.2** 22.4 |
| 24020 | **100** 3.9370 | **150** 5.9055 | **50** 1.9685 | **352** 79100 | **506** 114000 | EJ | **1.5** 0.06 | **111** 4.4 | **139** 5.5 | 0.29 | 2.32 | 3.45 | 2.26 | 0.065 | 3200 | 2700 | 4060 | **3.0** 6.6 |
| 21320 | **100** 3.9370 | **215** 8.4646 | **47** 1.8504 | **521** 119000 | **530** 121000 | EJ | **2.5** 0.1 | **133** 5.2 | **193** 7.6 | 0.22 | 3.13 | 4.66 | 3.06 | 0.075 | 3400 | 2800 | 4190 | **8.1** 17.7 |
| 23120 | **100** 3.9370 | **165** 6.4961 | **52** 2.0472 | **446** 100000 | **583** 131000 | EJ | **2** 0.08 | **114** 4.5 | **150** 6.0 | 0.28 | 2.35 | 3.50 | 2.30 | 0.067 | 3200 | 2700 | 4070 | **4.4** 9.7 |
| 23120 | **100** 3.9370 | **165** 6.4961 | **52** 2.0472 | **446** 100000 | **583** 131000 | EM | **2** 0.08 | **114** 4.5 | **150** 6.0 | 0.28 | 2.35 | 3.50 | 2.30 | 0.067 | 3200 | 2700 | 4060 | **4.4** 9.7 |
| 22220 | **100** 3.9370 | **180** 7.0866 | **46** 1.8110 | **435** 97700 | **502** 113000 | EJ | **2** 0.08 | **120** 4.7 | **163** 6.4 | 0.24 | 2.85 | 4.24 | 2.78 | 0.069 | 3800 | 3100 | 4990 | **5.0** 11.0 |
| 22220 | **100** 3.9370 | **180** 7.0866 | **46** 1.8110 | **435** 97700 | **502** 113000 | EM | **2** 0.08 | **120** 4.7 | **163** 6.4 | 0.24 | 2.85 | 4.24 | 2.78 | 0.069 | 3800 | 3100 | 5230 | **5.0** 11.0 |
| 23220 | **100** 3.9370 | **180** 7.0866 | **60.3** 2.3740 | **554** 124000 | **678** 152000 | EJ | **2** 0.08 | **119** 4.7 | **164** 6.5 | 0.30 | 2.22 | 3.30 | 2.17 | 0.070 | 2700 | 2300 | 3780 | **6.6** 14.5 |
| 23220 | **100** 3.9370 | **180** 7.0866 | **60.3** 2.374 | **554** 124000 | **678** 152000 | EM | **2** 0.08 | **119** 4.7 | **164** 6.5 | 0.30 | 2.22 | 3.30 | 2.17 | 0.070 | 2700 | 2300 | 3440 | **6.6** 14.5 |
| 22320 | **100** 3.9370 | **215** 8.4646 | **73** 2.8740 | **804** 181000 | **910** 205000 | EJ | **2.5** 0.1 | **131** 5.1 | **193** 7.6 | 0.33 | 2.06 | 3.07 | 2.02 | 0.075 | 2800 | 2400 | 3250 | **12.7** 28.2 |
| 22320 | **100** 3.9370 | **215** 8.4646 | **73** 2.8740 | **768** 173000 | **853** 192000 | EM | **2.5** 0.1 | **130** 5.1 | **193** 7.6 | 0.33 | 2.06 | 3.07 | 2.02 | 0.074 | 2900 | 2500 | 3810 | **12.8** 28.2 |
| 23022 | **110** 4.3307 | **170** 6.6929 | **45** 1.7717 | **391** 88000 | **534** 120000 | EJ | **2** 0.08 | **125** 4.9 | **158** 6.2 | 0.23 | 2.90 | 4.32 | 2.84 | 0.071 | 3600 | 2900 | 4300 | **3.6** 7.9 |
| 24022 | **110** 4.3307 | **170** 6.6929 | **60** 2.3622 | **493** 111000 | **706** 159000 | EJ | **2** 0.08 | **122** 4.8 | **157** 6.2 | 0.31 | 2.15 | 3.21 | 2.11 | 0.070 | 2900 | 2500 | 3660 | **4.9** 10.8 |
| 23122 | **110** 4.3307 | **180** 7.0866 | **56** 2.2047 | **518** 116000 | **686** 154000 | EJ | **2** 0.08 | **126** 5.0 | **166** 6.5 | 0.28 | 2.40 | 3.58 | 2.35 | 0.072 | 2900 | 2500 | 3730 | **5.6** 12.3 |
| 23122 | **110** 4.3307 | **180** 7.0866 | **56** 2.2047 | **518** 116000 | **686** 154000 | EM | **2** 0.08 | **126** 5.0 | **166** 6.5 | 0.28 | 2.40 | 3.58 | 2.35 | 0.072 | 2900 | 2500 | 3720 | **5.6** 12.3 |
| 24122 | **110** 4.3307 | **180** 7.0866 | **69** 2.7165 | **595** 134000 | **811** 182000 | EJ | **2** 0.08 | **124** 4.9 | **164** 6.5 | 0.34 | 1.96 | 2.92 | 1.92 | 0.071 | 2100 | 1800 | 3000 | **6.7** 14.7 |
| 22222 | **110** 4.3307 | **200** 7.8740 | **53** 2.0866 | **555** 125000 | **653** 147000 | EJ | **2** 0.08 | **133** 5.2 | **182** 7.2 | 0.25 | 2.73 | 4.06 | 2.67 | 0.074 | 3500 | 2900 | 4410 | **7.2** 15.8 |

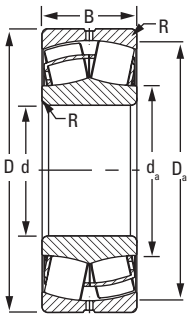
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

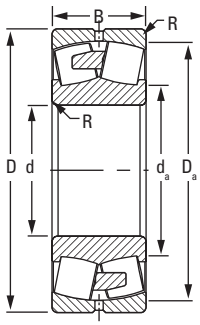
[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

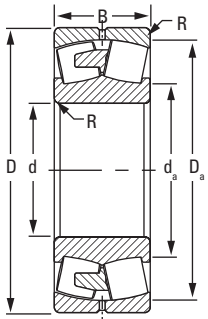
[5]See limiting speed on page 51.




**EJ**




**EM/YM**




**EMB/YMB**

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Dynamic | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ $X = 1$ $Y_1$ | $\frac{F_a}{F_r} > e$ $X = 0.67$ $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 22222 | **110** 4.3307 | **200** 7.8740 | **53** 2.0866 | **555** 125000 | **653** 147000 | EM | **2** 0.08 | **133** 5.2 | **182** 7.2 | 0.25 | 2.73 | 4.06 | 2.67 | 0.074 | 3500 | 2900 | 4800 | **7.2** 15.8 |
| 23222 | **110** 4.3307 | **200** 7.8740 | **69.8** 2.7480 | **710** 160000 | **887** 199000 | EJ | **2** 0.08 | **131** 5.2 | **182** 7.2 | 0.32 | 2.11 | 3.14 | 2.06 | 0.074 | 2300 | 2000 | 3390 | **9.6** 21.1 |
| 23222 | **110** 4.3307 | **200** 7.8740 | **69.8** 2.7480 | **710** 160000 | **887** 199000 | EM | **2** 0.08 | **131** 5.2 | **182** 7.2 | 0.32 | 2.11 | 3.14 | 2.06 | 0.074 | 2300 | 2000 | 3100 | **9.6** 21.1 |
| 22322 | **110** 4.3307 | **240** 9.4488 | **80** 3.1496 | **949** 213000 | **1050** 236000 | EJ | **2.5** 0.1 | **144** 5.7 | **215** 8.5 | 0.32 | 2.08 | 3.10 | 2.04 | 0.079 | 2500 | 2100 | 2890 | **17.8** 39.2 |
| 22322 | **110** 4.3307 | **240** 9.4488 | **80** 3.1496 | **949** 213000 | **1050** 236000 | EM | **2.5** 0.1 | **144** 5.7 | **215** 8.5 | 0.32 | 2.08 | 3.10 | 2.04 | 0.079 | 2500 | 2200 | 3540 | **17.8** 39.2 |
| 23322 | **110** 4.3307 | **240** 9.4488 | **92.1** 3.6260 | **979** 220000 | **1080** 243000 | EM | **2.5** 0.1 | **136** 5.4 | **209** 8.2 | 0.40 | 1.67 | 2.49 | 1.63 | 0.077 | 1800 | 1600 | 2490 | **20.4** 44.9 |
| 23024 | **120** 4.7244 | **180** 7.0866 | **46** 1.8110 | **408** 91700 | **574** 129000 | EJ | **2** 0.08 | **134** 5.3 | **167** 6.6 | 0.22 | 3.02 | 4.49 | 2.95 | 0.074 | 3300 | 2700 | 4260 | **4.0** 8.8 |
| 24024 | **120** 4.7244 | **180** 7.0866 | **60** 2.3622 | **523** 117000 | **762** 171000 | EJ | **2** 0.08 | **132** 5.2 | **167** 6.6 | 0.29 | 2.32 | 3.45 | 2.26 | 0.073 | 2700 | 2200 | 3410 | **5.2** 11.4 |
| 23124 | **120** 4.7244 | **200** 7.8740 | **62** 2.4409 | **621** 140000 | **816** 183000 | EJ | **2** 0.08 | **138** 5.4 | **182** 7.2 | 0.28 | 2.38 | 3.54 | 2.32 | 0.075 | 2600 | 2200 | 3460 | **7.9** 17.4 |
| 23124 | **120** 4.7244 | **200** 7.8740 | **62** 2.4409 | **621** 140000 | **816** 183000 | EM | **2** 0.08 | **138** 5.4 | **182** 7.2 | 0.28 | 2.38 | 3.54 | 2.32 | 0.075 | 2600 | 2200 | 3420 | **7.9** 17.4 |
| 24124 | **120** 4.7244 | **200** 7.8740 | **80** 3.1496 | **778** 175000 | **1080** 242000 | EJ | **2** 0.08 | **135** 5.3 | **182** 7.2 | 0.36 | 1.86 | 2.77 | 1.82 | 0.075 | 1700 | 1600 | 2660 | **10.0** 22.0 |
| 22224 | **120** 4.7244 | **215** 8.4646 | **58** 2.2835 | **647** 145000 | **772** 174000 | EJ | **2** 0.08 | **143** 5.6 | **196** 7.7 | 0.25 | 2.70 | 4.02 | 2.64 | 0.078 | 3200 | 2600 | 4060 | **9.0** 19.8 |
| 22224 | **120** 4.7244 | **215** 8.4646 | **58** 2.2835 | **647** 145000 | **772** 174000 | EM | **2** 0.08 | **143** 5.6 | **196** 7.7 | 0.25 | 2.70 | 4.02 | 2.64 | 0.078 | 3200 | 2600 | 4440 | **9.0** 19.8 |
| 23224 | **120** 4.7244 | **215** 8.4646 | **76** 2.9921 | **824** 185000 | **1040** 234000 | EJ | **2** 0.08 | **142** 5.6 | **197** 7.7 | 0.32 | 2.10 | 3.13 | 2.05 | 0.078 | 2100 | 1800 | 3100 | **11.8** 26.0 |
| 23224 | **120** 4.7244 | **215** 8.4646 | **76** 2.9921 | **824** 185000 | **1040** 234000 | EM | **2** 0.08 | **142** 5.6 | **197** 7.7 | 0.32 | 2.10 | 3.13 | 2.05 | 0.078 | 2100 | 1800 | 2910 | **11.8** 26.0 |
| 22324 | **120** 4.7244 | **260** 10.2362 | **86** 3.3858 | **1080** 244000 | **1210** 272000 | EJ | **2.5** 0.1 | **157** 6.2 | **234** 9.2 | 0.32 | 2.11 | 3.15 | 2.07 | 0.083 | 2200 | 1900 | 2680 | **21.4** 48.4 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

*Continued on next page.*

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARINGS – *continued*

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

*Continued from previous page.*

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Fillet[1] (Max.) R | Backing Diameter | | Dynamic | | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | | Shaft $d_a$ | Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 22324 | **120** 4.7244 | **260** 10.2362 | **86** 3.3858 | **1080** 244000 | **1210** 272000 | EM | **2.5** 0.1 | **157** 6.2 | **234** 9.2 | 0.32 | 2.11 | 3.15 | 2.07 | 0.083 | 2200 | 1900 | 3320 | **22.3** 49.1 |
| 23324 | **120** 4.7244 | **260** 10.2362 | **106** 4.1732 | **1230** 276000 | **1410** 318000 | EM | **2.5** 0.1 | **147** 5.8 | **226** 8.9 | 0.43 | 1.57 | 2.34 | 1.54 | 0.082 | 1500 | 1400 | 2310 | **27.8** 61.2 |
| 23926 | **130** 5.1181 | **180** 7.0866 | **37** 1.4567 | **302** 67900 | **453** 102000 | EM | **1** 0.04 | **142** 5.6 | **169** 6.7 | 0.18 | 3.83 | 5.70 | 3.75 | 0.076 | 300 | 2400 | 3460 | **2.8** 6.2 |
| 23026 | **130** 5.1181 | **200** 7.8740 | **52** 2.0472 | **518** 116000 | **723** 162000 | EJ | **2** 0.08 | **146** 5.8 | **185** 7.3 | 0.23 | 2.94 | 4.37 | 2.87 | 0.078 | 3100 | 2500 | 3890 | **5.9** 13.0 |
| 24026 | **130** 5.1181 | **200** 7.8740 | **69** 2.7165 | **664** 149000 | **966** 217000 | EJ | **2** 0.08 | **144** 5.7 | **185** 7.3 | 0.31 | 2.21 | 3.29 | 2.16 | 0.078 | 2400 | 2000 | 3040 | **7.8** 17.2 |
| 23126 | **130** 5.1181 | **210** 8.2677 | **64** 2.5197 | **679** 153000 | **937** 211000 | EJ | **2** 0.08 | **149** 5.9 | **193** 7.6 | 0.27 | 2.48 | 3.69 | 2.43 | 0.080 | 2400 | 2000 | 3240 | **8.6** 18.9 |
| 23126 | **130** 5.1181 | **210** 8.2677 | **64** 2.5197 | **679** 153000 | **937** 211000 | EM | **2** 0.08 | **149** 5.9 | **193** 7.6 | 0.27 | 2.48 | 3.69 | 2.43 | 0.080 | 2400 | 2000 | 3300 | **8.6** 18.9 |
| 24126 | **130** 5.1181 | **210** 8.2677 | **80** 3.1496 | **798** 179000 | **1130** 255000 | EJ | **2** 0.08 | **146** 5.7 | **192** 7.6 | 0.34 | 1.99 | 2.96 | 1.94 | 0.079 | 1600 | 1500 | 2490 | **10.5** 23.1 |
| 22226 | **130** 5.1181 | **230** 9.0551 | **64** 2.5197 | **757** 170000 | **945** 212000 | EJ | **2.5** 0.1 | **155** 6.1 | **210** 8.3 | 0.26 | 2.62 | 3.90 | 2.56 | 0.082 | 2900 | 2400 | 3750 | **11.3** 24.9 |
| 22226 | **130** 5.1181 | **230** 9.0551 | **64** 2.5197 | **757** 170000 | **945** 212000 | EM | **2.5** 0.1 | **155** 6.1 | **210** 8.3 | 0.26 | 2.62 | 3.90 | 2.56 | 0.082 | 2900 | 2400 | 4280 | **11.3** 24.9 |
| 23226 | **130** 5.1181 | **230** 9.0551 | **80** 3.1496 | **915** 206000 | **1170** 262000 | EJ | **2.5** 0.1 | **153** 6.0 | **211** 8.3 | 0.32 | 2.14 | 3.19 | 2.09 | 0.082 | 1900 | 1700 | 2910 | **14.0** 30.8 |
| 23226 | **130** 5.1181 | **230** 9.0551 | **80** 3.1496 | **915** 206000 | **1170** 262000 | EM | **2.5** 0.1 | **153** 6.0 | **211** 8.3 | 0.32 | 2.14 | 3.19 | 2.09 | 0.082 | 1900 | 1700 | 2740 | **14.0** 30.8 |
| 22326 | **130** 5.1181 | **280** 11.0236 | **93** 3.6614 | **1250** 281000 | **1410** 318000 | EJ | **3** 0.1 | **169** 6.7 | **252** 9.9 | 0.32 | 2.11 | 3.14 | 2.06 | 0.087 | 2000 | 1800 | 2520 | **26.7** 60.3 |
| 22326 | **130** 5.1181 | **280** 11.0236 | **93** 3.6614 | **1250** 281000 | **1410** 318000 | EM | **3** 0.1 | **169** 6.7 | **252** 9.9 | 0.32 | 2.11 | 3.14 | 2.06 | 0.087 | 2000 | 1800 | 3090 | **27.8** 61.2 |
| 23326 | **130** 5.1181 | **280** 11.0236 | **112** 4.4094 | **1340** 302000 | **1590** 359000 | EM | **3** 0.1 | **164** 6.5 | **245** 9.6 | 0.42 | 1.62 | 2.42 | 1.59 | 0.086 | 1400 | 1200 | 2130 | **33.8** 74.4 |
| 23928 | **140** 5.5118 | **190** 7.4803 | **37** 1.4567 | **314** 70500 | **477** 107000 | EM | **1.5** 0.06 | **152** 6.0 | **180** 7.1 | 0.16 | 4.10 | 6.10 | 4.01 | 0.079 | 2800 | 2200 | 3340 | **2.9** 6.4 |
| 23028 | **140** 5.5118 | **210** 8.2677 | **53** 2.0866 | **551** 124000 | **802** 180000 | EJ | **2** 0.08 | **158** 6.2 | **196** 7.7 | 0.22 | 3.10 | 4.61 | 3.03 | 0.082 | 2800 | 2300 | 3480 | **6.2** 13.6 |
| 24028 | **140** 5.5118 | **210** 8.2677 | **69** 2.7165 | **702** 158000 | **1060** 238000 | EJ | **2** 0.08 | **154** 6.1 | **195** 7.7 | 0.29 | 2.36 | 3.51 | 2.31 | 0.081 | 2100 | 1800 | 2980 | **8.2** 18.0 |

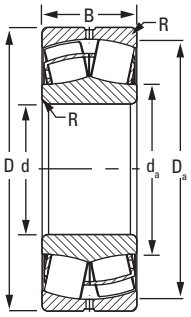
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

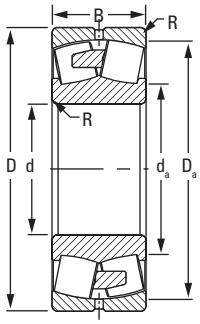
[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

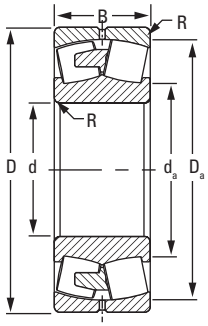
[5]See limiting speed on page 51.




**EJ**




**EM/YM**




**EMB/YMB**

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Dynamic | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 23128 | **140** 5.5118 | **225** 8.8583 | **68** 2.6772 | **766** 172000 | **1070** 240000 | EJ | **2** 0.08 | **160** 6.3 | **208** 8.2 | 0.27 | 2.50 | 3.72 | 2.45 | 0.083 | 2100 | 1800 | 2960 | **10.4** 22.9 |
| 23128 | **140** 5.5118 | **225** 8.8583 | **68** 2.6772 | **766** 172000 | **1070** 240000 | EM | **2** 0.08 | **160** 6.3 | **208** 8.2 | 0.27 | 2.50 | 3.72 | 2.45 | 0.083 | 2100 | 1800 | 3160 | **10.2** 22.3 |
| 24128 | **140** 5.5118 | **225** 8.8583 | **85** 3.3465 | **894** 201000 | **1290** 289000 | EJ | **2** 0.08 | **157** 6.2 | **206** 8.1 | 0.34 | 2.01 | 2.99 | 1.96 | 0.082 | 1500 | 1300 | 2290 | **12.7** 27.9 |
| 26228 | **140** 5.5118 | **240** 9.4488 | **80** 3.1496 | **863** 194000 | **1110** 249000 | EM | **2.5** 0.1 | **161** 6.3 | **218** 8.6 | 0.32 | 2.08 | 3.10 | 2.04 | 0.083 | 1500 | 1300 | 1840 | **14.7** 32.3 |
| 22228 | **140** 5.5118 | **250** 9.8425 | **68** 2.6772 | **863** 194000 | **1060** 237000 | EJ | **2.5** 0.1 | **167** 6.6 | **228** 9.0 | 0.25 | 2.67 | 3.98 | 2.61 | 0.086 | 2600 | 2200 | 3500 | **14.2** 31.2 |
| 22228 | **140** 5.5118 | **250** 9.8425 | **68** 2.6772 | **863** 194000 | **1060** 237000 | EM | **2.5** 0.1 | **167** 6.6 | **228** 9.0 | 0.25 | 2.67 | 3.98 | 2.61 | 0.086 | 2600 | 2200 | 3900 | **14.2** 31.2 |
| 23228 | **140** 5.5118 | **250** 9.8425 | **88** 3.4646 | **1090** 246000 | **1410** 317000 | EJ | **2.5** 0.1 | **165** 6.5 | **229** 9.0 | 0.32 | 2.11 | 3.13 | 2.06 | 0.086 | 1700 | 1500 | 2700 | **18.0** 39.6 |
| 23228 | **140** 5.5118 | **250** 9.8425 | **88** 3.4646 | **1090** 246000 | **1410** 317000 | EM | **2.5** 0.1 | **165** 6.5 | **229** 9.0 | 0.32 | 2.11 | 3.13 | 2.06 | 0.086 | 1700 | 1500 | 2610 | **18.5** 40.6 |
| 22328 | **140** 5.5118 | **300** 11.8110 | **102** 4.0157 | **1450** 326000 | **1670** 375000 | EJ | **3** 0.1 | **182** 7.1 | **270** 10.6 | 0.33 | 2.06 | 3.06 | 2.01 | 0.091 | 1800 | 1600 | 2360 | **33.6** 73.9 |
| 22328 | **140** 5.5118 | **300** 11.8110 | **102** 4.0157 | **1450** 326000 | **1670** 375000 | EM | **3** 0.1 | **182** 7.1 | **270** 10.6 | 0.33 | 2.06 | 3.06 | 2.01 | 0.091 | 1800 | 1600 | 2970 | **34.2** 75.3 |
| 23328 | **140** 5.5118 | **300** 11.8110 | **118** 4.6457 | **1570** 352000 | **1910** 429000 | EMB | **3** 0.1 | **175** 6.9 | **261** 10.3 | 0.41 | 1.65 | 2.45 | 1.61 | 0.091 | 1200 | 1100 | 1900 | **41.7** 91.7 |
| 23030 | **150** 5.9055 | **225** 8.8583 | **56** 2.2047 | **621** 140000 | **911** 205000 | EJ | **2** 0.08 | **169** 6.7 | **210** 8.3 | 0.21 | 3.14 | 4.68 | 3.07 | 0.086 | 2600 | 2100 | 3220 | **7.5** 16.6 |
| 23030 | **150** 5.9055 | **225** 8.8583 | **56** 2.2047 | **621** 140000 | **911** 205000 | EM | **2** 0.08 | **169** 6.7 | **210** 8.3 | 0.21 | 3.14 | 4.68 | 3.07 | 0.086 | 2600 | 2100 | 3190 | **7.7** 16.9 |
| 24030 | **150** 5.9055 | **225** 8.8583 | **75** 2.9528 | **808** 182000 | **1240** 278000 | EJ | **2** 0.08 | **165** 6.5 | **209** 8.2 | 0.29 | 2.32 | 3.46 | 2.27 | 0.085 | 2000 | 1700 | 2800 | **10.2** 22.3 |
| 23130 | **150** 5.9055 | **250** 9.8425 | **80** 3.1496 | **1000** 225000 | **1390** 312000 | EJ | **2** 0.08 | **173** 6.8 | **229** 9.0 | 0.29 | 2.32 | 3.45 | 2.26 | 0.088 | 1900 | 1600 | 2690 | **15.5** 34.2 |
| 23130 | **150** 5.9055 | **250** 9.8425 | **80** 3.1496 | **1000** 225000 | **1390** 312000 | EM | **2** 0.08 | **173** 6.8 | **229** 9.0 | 0.29 | 2.32 | 3.45 | 2.26 | 0.088 | 1900 | 1600 | 2920 | **15.5** 34.2 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

*Continued on next page.*

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARINGS – continued

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

*Continued from previous page.*

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Fillet[1] (Max.) R | Backing Diameter | | Dynamic | | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | | Shaft $d_a$ | Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 24130 | **150** 5.9055 | **250** 9.8425 | **100** 3.9370 | **1180** 264000 | **1680** 378000 | EJ | **2** 0.08 | **169** 6.7 | **227** 8.9 | 0.36 | 1.86 | 2.77 | 1.82 | 0.087 | 1300 | 1200 | 2070 | **19.4** 42.7 |
| 22230 | **150** 5.9055 | **270** 10.6299 | **73** 2.8740 | **1000** 225000 | **1230** 276000 | EJ | **2.5** 0.1 | **179** 7.0 | **246** 9.7 | 0.25 | 2.69 | 4.00 | 2.63 | 0.090 | 2400 | 2000 | 3250 | **17.5** 39.2 |
| 22230 | **150** 5.9055 | **270** 10.6299 | **73** 2.8740 | **1000** 225000 | **1230** 276000 | EM | **2.5** 0.1 | **179** 7.0 | **246** 9.7 | 0.25 | 2.69 | 4.00 | 2.63 | 0.090 | 2400 | 2000 | 3600 | **17.8** 39.2 |
| 23230 | **150** 5.9055 | **270** 10.6299 | **96** 3.7795 | **1270** 286000 | **1660** 372000 | EJ | **2.5** 0.1 | **178** 7.0 | **247** 9.7 | 0.32 | 2.08 | 3.10 | 2.04 | 0.090 | 1500 | 1400 | 2540 | **23.0** 52.4 |
| 23230 | **150** 5.9055 | **270** 10.6299 | **96** 3.7795 | **1270** 286000 | **1660** 372000 | EM | **2.5** 0.1 | **178** 7.0 | **247** 9.7 | 0.32 | 2.08 | 3.10 | 2.04 | 0.090 | 1500 | 1400 | 2440 | **23.8** 52.4 |
| 22330 | **150** 5.9055 | **320** 12.5984 | **108** 4.2520 | **1620** 365000 | **1890** 424000 | EJ | **3** 0.1 | **194** 7.6 | **288** 11.3 | 0.33 | 2.08 | 3.09 | 2.03 | 0.088 | 1600 | 1500 | 2200 | **40.6** 94.6 |
| 22330 | **150** 5.9055 | **320** 12.5984 | **108** 4.2520 | **1620** 365000 | **1890** 424000 | EMB | **3** 0.1 | **194** 7.6 | **288** 11.3 | 0.33 | 2.08 | 3.09 | 2.03 | 0.088 | 1600 | 1500 | 1950 | **43.0** 94.6 |
| 23330 | **150** 5.9055 | **320** 12.5984 | **128** 5.0394 | **1780** 400000 | **2130** 479000 | EMB | **3** 0.1 | **185** 7.3 | **280** 11.0 | 0.41 | 1.64 | 2.44 | 1.60 | 0.087 | 1100 | 1000 | 1630 | **50.4** 111.0 |
| 23932 | **160** 6.2992 | **220** 8.6614 | **45** 1.7717 | **421** 94700 | **654** 147000 | EM | **2** 0.08 | **175** 6.9 | **207** 8.2 | 0.18 | 3.78 | 5.63 | 3.70 | 0.086 | 2500 | 2100 | 2970 | **4.9** 10.8 |
| 23032 | **160** 6.2992 | **240** 9.4488 | **60** 2.3622 | **705** 159000 | **1040** 235000 | EJ | **2** 0.08 | **180** 7.1 | **224** 8.8 | 0.22 | 3.12 | 4.65 | 3.05 | 0.089 | 2400 | 2000 | 3080 | **9.3** 20.4 |
| 23032 | **160** 6.2992 | **240** 9.4488 | **60** 2.3622 | **705** 159000 | **1040** 235000 | EM | **2** 0.08 | **180** 7.1 | **224** 8.8 | 0.22 | 3.12 | 4.65 | 3.05 | 0.089 | 2400 | 2000 | 3080 | **9.3** 20.4 |
| 24032 | **160** 6.2992 | **240** 9.4488 | **80** 3.1496 | **914** 206000 | **1410** 317000 | EJ | **2** 0.08 | **176** 6.9 | **223** 8.8 | 0.29 | 2.32 | 3.45 | 2.27 | 0.089 | 1800 | 1500 | 2670 | **12.5** 27.5 |
| 23132 | **160** 6.2992 | **270** 10.6299 | **86** 3.3858 | **1160** 261000 | **1580** 354000 | EJ | **2** 0.08 | **185** 7.3 | **248** 9.8 | 0.29 | 2.33 | 3.46 | 2.27 | 0.092 | 1700 | 1500 | 2520 | **19.7** 43.3 |
| 23132 | **160** 6.2992 | **270** 10.6299 | **86** 3.3858 | **1160** 261000 | **1580** 354000 | EM | **2** 0.08 | **185** 7.3 | **248** 9.8 | 0.29 | 2.33 | 3.46 | 2.27 | 0.092 | 1700 | 1500 | 2710 | **20.2** 44.4 |
| 24132 | **160** 6.2992 | **270** 10.6299 | **109** 4.2913 | **1390** 313000 | **2000** 449000 | EJ | **2** 0.08 | **181** 7.1 | **245** 9.7 | 0.37 | 1.84 | 2.74 | 1.80 | 0.091 | 1100 | 1000 | 1920 | **25.1** 55.2 |
| 22232 | **160** 6.2992 | **290** 11.4173 | **80** 3.1496 | **1120** 253000 | **1370** 309000 | EJ | **2.5** 0.1 | **192** 7.5 | **264** 10.4 | 0.26 | 2.62 | 3.91 | 2.57 | 0.093 | 2200 | 1900 | 2980 | **21.9** 50.6 |
| 22232 | **160** 6.2992 | **290** 11.4173 | **80** 3.1496 | **1120** 253000 | **1370** 309000 | EM | **2.5** 0.1 | **192** 7.5 | **264** 10.4 | 0.26 | 2.62 | 3.91 | 2.57 | 0.093 | 2200 | 1900 | 3380 | **23.0** 50.6 |
| 23232 | **160** 6.2992 | **290** 11.4173 | **104** 4.0945 | **1470** 330000 | **1940** 435000 | EJ | **2.5** 0.1 | **190** 7.5 | **264** 10.4 | 0.33 | 2.06 | 3.06 | 2.01 | 0.094 | 1400 | 1200 | 2360 | **29.3** 64.3 |

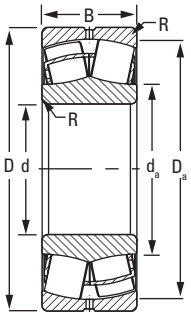
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

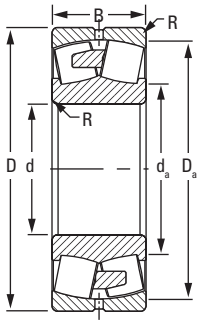
[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

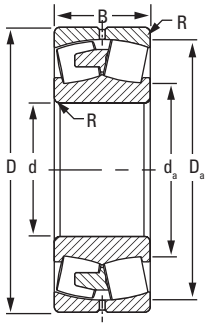
[5]See limiting speed on page 51.




**EJ**




**EM/YM**




**EMB/YMB**

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Dynamic | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 23232 | **160** 6.2992 | **290** 11.4173 | **104** 4.0945 | **1470** 330000 | **1940** 435000 | EM | **2.5** 0.1 | **190** 7.5 | **264** 10.4 | 0.33 | 2.06 | 3.06 | 2.01 | 0.094 | 1400 | 1200 | 2310 | **30.0** 66.0 |
| 22332 | **160** 6.2992 | **340** 13.3858 | **114** 4.4882 | **1800** 405000 | **2110** 475000 | EJ | **3** 0.1 | **207** 8.1 | **306** 12.0 | 0.32 | 2.09 | 3.11 | 2.04 | 0.092 | 1500 | 1300 | 2060 | **51.0** 112.2 |
| 22332 | **160** 6.2992 | **340** 13.3858 | **114** 4.4882 | **1800** 405000 | **2110** 475000 | EMB | **3** 0.1 | **207** 8.1 | **306** 12.0 | 0.32 | 2.09 | 3.11 | 2.04 | 0.092 | 1500 | 1300 | 1800 | **51.0** 112.2 |
| 23332 | **160** 6.2992 | **340** 13.3858 | **136** 5.3543 | **2000** 449000 | **2530** 568000 | EMB | **3** 0.1 | **202** 8.0 | **297** 11.7 | 0.42 | 1.62 | 2.41 | 1.58 | 0.091 | 990 | 900 | 1590 | **61.2** 134.7 |
| 23934 | **170** 6.6929 | **230** 9.0551 | **45** 1.7717 | **453** 102000 | **716** 161000 | EM | **2** 0.08 | **184** 7.2 | **217** 8.6 | 0.17 | 4.07 | 6.05 | 3.97 | 0.090 | 2300 | 1900 | 2990 | **5.2** 11.4 |
| 23034 | **170** 6.6929 | **260** 10.2362 | **67** 2.6378 | **858** 193000 | **1250** 282000 | EJ | **2** 0.08 | **192** 7.6 | **242** 9.5 | 0.22 | 3.02 | 4.49 | 2.95 | 0.093 | 2200 | 1800 | 2820 | **12.5** 27.5 |
| 23034 | **170** 6.6929 | **260** 10.2362 | **67** 2.6378 | **858** 193000 | **1250** 282000 | EM | **2** 0.08 | **192** 7.6 | **242** 9.5 | 0.22 | 3.02 | 4.49 | 2.95 | 0.093 | 2200 | 1800 | 2870 | **12.5** 27.5 |
| 24034 | **170** 6.6929 | **260** 10.2362 | **90** 3.5433 | **1030** 233000 | **1570** 354000 | EJ | **2** 0.08 | **189** 7.4 | **240** 9.5 | 0.30 | 2.22 | 3.30 | 2.17 | 0.092 | 1700 | 1500 | 2460 | **16.7** 37.8 |
| 23134 | **170** 6.6929 | **280** 11.0236 | **88** 3.4646 | **1220** 274000 | **1710** 384000 | EJ | **2** 0.08 | **195** 7.7 | **258** 10.1 | 0.28 | 2.39 | 3.55 | 2.33 | 0.095 | 1600 | 1400 | 2420 | **21.1** 46.5 |
| 23134 | **170** 6.6929 | **280** 11.0236 | **88** 3.4646 | **1220** 274000 | **1710** 384000 | EM | **2** 0.08 | **195** 7.7 | **258** 10.1 | 0.28 | 2.39 | 3.55 | 2.33 | 0.095 | 1600 | 1400 | 2620 | **21.7** 47.7 |
| 24134 | **170** 6.6929 | **280** 11.0236 | **109** 4.2913 | **1440** 324000 | **2110** 475000 | EJ | **2** 0.08 | **192** 7.5 | **255** 10.1 | 0.35 | 1.93 | 2.87 | 1.88 | 0.094 | 1000 | 960 | 1830 | **26.4** 57.8 |
| 22234 | **170** 6.6929 | **310** 12.2047 | **86** 3.3858 | **1290** 290000 | **1590** 359000 | EJ | **3** 0.1 | **204** 8.0 | **281** 11.1 | 0.26 | 2.61 | 3.89 | 2.55 | 0.090 | 2000 | 1700 | 2780 | **27.3** 62.7 |
| 22234 | **170** 6.6929 | **310** 12.2047 | **86** 3.3858 | **1290** 290000 | **1590** 359000 | EM | **3** 0.1 | **204** 8.0 | **281** 11.1 | 0.26 | 2.61 | 3.89 | 2.55 | 0.090 | 2000 | 1700 | 3180 | **28.5** 62.7 |
| 23234 | **170** 6.6929 | **310** 12.2047 | **110** 4.3307 | **1660** 373000 | **2200** 494000 | EJ | **3** 0.1 | **202** 8.0 | **281** 11.1 | 0.33 | 2.08 | 3.09 | 2.03 | 0.091 | 1200 | 1100 | 2220 | **35.8** 78.8 |
| 23234 | **170** 6.6929 | **310** 12.2047 | **110** 4.3307 | **1660** 373000 | **2200** 494000 | EM | **3** 0.1 | **202** 8.0 | **281** 11.1 | 0.33 | 2.08 | 3.09 | 2.03 | 0.091 | 1200 | 1100 | 2190 | **36.6** 80.5 |
| 22334 | **170** 6.6929 | **360** 14.1732 | **120** 4.7244 | **2000** 450000 | **2360** 530000 | EJ | **3** 0.1 | **219** 8.6 | **325** 12.8 | 0.32 | 2.11 | 3.15 | 2.07 | 0.096 | 1400 | 1200 | 1980 | **59.9** 131.8 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

*Continued on next page.*

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARINGS – *continued*

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

*Continued from previous page.*

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Fillet[1] (Max.) R | Backing Diameter | | Dynamic | | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | | Shaft $d_a$ | Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 22334 | **170** 6.6929 | **360** 14.1732 | **120** 4.7244 | **2000** 450000 | **2360** 530000 | EMB | **3** 0.1 | **219** 8.6 | **325** 12.8 | 0.32 | 2.11 | 3.15 | 2.07 | 0.096 | 1400 | 1200 | 1680 | **59.9** 131.8 |
| 23334 | **170** 6.6929 | **360** 14.1732 | **140** 5.5118 | **2170** 487000 | **2580** 581000 | EMB | **3** 0.1 | **208** 8.2 | **315** 12.4 | 0.40 | 1.67 | 2.49 | 1.63 | 0.094 | 950 | 860 | 1440 | **70.3** 154.7 |
| 23936 | **180** 7.0866 | **250** 9.8425 | **52** 2.0472 | **572** 129000 | **907** 204000 | EJ | **2** 0.08 | **197** 7.8 | **235** 9.3 | 0.18 | 3.77 | 5.62 | 3.69 | 0.094 | 2200 | 1800 | 2890 | **7.6** 16.7 |
| 23936 | **180** 7.0866 | **250** 9.8425 | **52** 2.0472 | **572** 129000 | **907** 204000 | EM | **2** 0.08 | **197** 7.8 | **235** 9.3 | 0.18 | 3.77 | 5.62 | 3.69 | 0.094 | 2200 | 1800 | 2840 | **7.6** 16.7 |
| 23036 | **180** 7.0866 | **280** 11.0236 | **74** 2.9134 | **1020** 229000 | **1480** 332000 | EJ | **2** 0.08 | **204** 8.0 | **260** 10.2 | 0.23 | 2.91 | 4.34 | 2.85 | 0.097 | 2000 | 1700 | 2620 | **16.8** 37.0 |
| 23036 | **180** 7.0866 | **280** 11.0236 | **74** 2.9134 | **1020** 229000 | **1480** 332000 | EM | **2** 0.08 | **204** 8.0 | **260** 10.2 | 0.23 | 2.91 | 4.34 | 2.85 | 0.097 | 2000 | 1700 | 2660 | **16.8** 37.0 |
| 24036 | **180** 7.0866 | **280** 11.0236 | **100** 3.9370 | **1320** 296000 | **2040** 460000 | EJ | **2** 0.08 | **200** 7.9 | **258** 10.2 | 0.32 | 2.13 | 3.17 | 2.08 | 0.097 | 1500 | 1300 | 2280 | **22.6** 49.7 |
| 23136 | **180** 7.0866 | **300** 11.8110 | **96** 3.7795 | **1410** 317000 | **2000** 449000 | EJ | **2.5** 0.1 | **208** 8.2 | **275** 10.8 | 0.29 | 2.32 | 3.45 | 2.27 | 0.099 | 1500 | 1300 | 2250 | **27.6** 60.7 |
| 23136 | **180** 7.0866 | **300** 11.8110 | **96** 3.7795 | **1410** 317000 | **2000** 449000 | EM | **2.5** 0.1 | **208** 8.2 | **275** 10.8 | 0.29 | 2.32 | 3.45 | 2.27 | 0.099 | 1500 | 1300 | 2470 | **27.6** 60.7 |
| 24136 | **180** 7.0866 | **300** 11.8110 | **118** 4.6457 | **1650** 370000 | **2450** 550000 | EJ | **2.5** 0.1 | **204** 8.1 | **273** 10.7 | 0.36 | 1.90 | 2.82 | 1.85 | 0.098 | 950 | 870 | 1700 | **33.4** 73.5 |
| 22236 | **180** 7.0866 | **320** 12.5984 | **86** 3.3858 | **1340** 301000 | **1700** 382000 | EJ | **3** 0.1 | **215** 8.5 | **292** 11.5 | 0.25 | 2.72 | 4.05 | 2.66 | 0.094 | 1900 | 1600 | 2690 | **29.1** 64.0 |
| 22236 | **180** 7.0866 | **320** 12.5984 | **86** 3.3858 | **1340** 301000 | **1700** 382000 | EM | **3** 0.1 | **215** 8.5 | **292** 11.5 | 0.25 | 2.72 | 4.05 | 2.66 | 0.093 | 1900 | 1600 | 3030 | **29.4** 64.7 |
| 23236 | **180** 7.0866 | **320** 12.5984 | **112** 4.4094 | **1720** 387000 | **2290** 515000 | EJ | **3** 0.1 | **211** 8.3 | **292** 11.5 | 0.32 | 2.11 | 3.15 | 2.07 | 0.093 | 1200 | 1100 | 2150 | **39.0** 85.0 |
| 23236 | **180** 7.0866 | **320** 12.5984 | **112** 4.4094 | **1720** 387000 | **2290** 515000 | EMB | **3** 0.1 | **211** 8.3 | **292** 11.5 | 0.32 | 2.11 | 3.15 | 2.07 | 0.093 | 1200 | 1100 | 1510 | **38.6** 84.9 |
| 22336 | **180** 7.0866 | **380** 14.9606 | **126** 4.9606 | **2190** 491000 | **2600** 584000 | EJ | **3** 0.1 | **232** 9.2 | **343** 13.5 | 0.32 | 2.13 | 3.17 | 2.08 | 0.099 | 1300 | 1200 | 1890 | **69.0** 153.0 |
| 22336 | **180** 7.0866 | **380** 14.9606 | **126** 4.9606 | **2190** 491000 | **2600** 584000 | EMB | **3** 0.1 | **232** 9.2 | **343** 13.5 | 0.32 | 2.13 | 3.17 | 2.08 | 0.099 | 1300 | 1200 | 1570 | **69.0** 153.0 |
| 23938 | **190** 7.4803 | **260** 10.2362 | **52** 2.0472 | **589** 133000 | **964** 217000 | EM | **2** 0.08 | **207** 8.2 | **245** 9.6 | 0.17 | 4.01 | 5.97 | 3.92 | 0.097 | 2000 | 1700 | 2710 | **8.0** 17.6 |
| 23038 | **190** 7.4803 | **290** 11.4173 | **75** 2.9528 | **1060** 239000 | **1580** 355000 | EJ | **2** 0.08 | **214** 8.4 | **270** 10.6 | 0.23 | 3.00 | 4.47 | 2.93 | 0.100 | 1900 | 1600 | 2470 | **17.8** 39.2 |

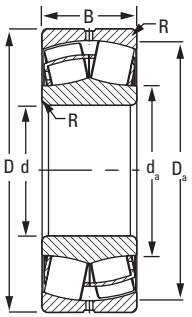
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

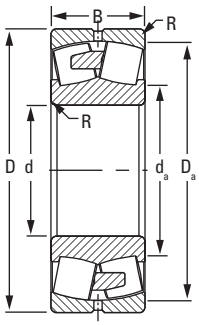
[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

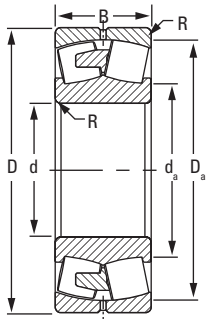
[5]See limiting speed on page 51.




**EJ**




**EM/YM**




**EMB/YMB**

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Dynamic | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ $X = 1$ $Y_1$ | $\frac{F_a}{F_r} > e$ $X = 0.67$ $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 23038 | **190** 7.4803 | **290** 11.4173 | **75** 2.9528 | **1060** 239000 | **1580** 355000 | EM | **2** 0.08 | **214** 8.4 | **270** 10.6 | 0.23 | 3.00 | 4.47 | 2.93 | 0.100 | 1900 | 1600 | 2570 | **17.8** 39.2 |
| 24038 | **190** 7.4803 | **290** 11.4173 | **100** 3.9370 | **1330** 300000 | **2100** 473000 | EJ | **2** 0.08 | **210** 8.3 | **268** 10.6 | 0.31 | 2.20 | 3.27 | 2.15 | 0.100 | 1400 | 1200 | 2180 | **24.0** 52.0 |
| 24038 | **190** 7.4803 | **290** 11.4173 | **100** 3.9370 | **1330** 300000 | **2100** 473000 | EM | **2** 0.08 | **210** 8.3 | **268** 10.6 | 0.31 | 2.20 | 3.27 | 2.15 | 0.100 | 1400 | 1200 | 2000 | **24.0** 52.0 |
| 23138 | **190** 7.4803 | **320** 12.5984 | **104** 4.0945 | **1630** 365000 | **2340** 525000 | EJ | **2.5** 0.1 | **221** 8.7 | **293** 11.5 | 0.30 | 2.26 | 3.36 | 2.21 | 0.095 | 1400 | 1200 | 2120 | **33.9** 74.6 |
| 23138 | **190** 7.4803 | **320** 12.5984 | **104** 4.0945 | **1630** 365000 | **2340** 525000 | EM | **2.5** 0.1 | **221** 8.7 | **293** 11.5 | 0.30 | 2.26 | 3.36 | 2.21 | 0.095 | 1400 | 1200 | 2340 | **34.7** 76.4 |
| 24138 | **190** 7.4803 | **320** 12.5984 | **128** 5.0394 | **1870** 421000 | **2760** 619000 | EJ | **2.5** 0.1 | **215** 8.5 | **290** 11.4 | 0.36 | 1.85 | 2.76 | 1.81 | 0.094 | 880 | 810 | 1570 | **42.0** 92.0 |
| 22238 | **190** 7.4803 | **340** 13.3858 | **92** 3.6220 | **1550** 348000 | **1960** 440000 | EJ | **3** 0.1 | **226** 8.9 | **310** 12.2 | 0.25 | 2.67 | 3.98 | 2.62 | 0.097 | 1800 | 1500 | 2540 | **35.0** 77.0 |
| 22238 | **190** 7.4803 | **340** 13.3858 | **92** 3.6220 | **1550** 348000 | **1960** 440000 | EMB | **3** 0.1 | **226** 8.9 | **310** 12.2 | 0.25 | 2.67 | 3.98 | 2.62 | 0.097 | 1800 | 1500 | 2130 | **36.0** 79.0 |
| 23238 | **190** 7.4803 | **340** 13.3858 | **120** 4.7244 | **1940** 436000 | **2610** 586000 | EJ | **3** 0.1 | **225** 8.9 | **311** 12.2 | 0.32 | 2.10 | 3.12 | 2.05 | 0.097 | 1100 | 980 | 2040 | **47.0** 104.0 |
| 23238 | **190** 7.4803 | **340** 13.3858 | **120** 4.7244 | **1940** 436000 | **2610** 586000 | EMB | **3** 0.1 | **225** 8.9 | **311** 12.2 | 0.32 | 2.10 | 3.12 | 2.05 | 0.097 | 1100 | 990 | 1430 | **47.1** 103.6 |
| 22338 | **190** 7.4803 | **400** 15.7480 | **132** 5.1969 | **2380** 534000 | **2830** 635000 | EJ | **4** 0.2 | **245** 9.6 | **361** 14.2 | 0.32 | 2.12 | 3.15 | 2.07 | 0.102 | 1200 | 1100 | 1800 | **80.0** 177.0 |
| 22338 | **190** 7.4803 | **400** 15.7480 | **132** 5.1969 | **2380** 534000 | **2830** 635000 | EMB | **4** 0.2 | **245** 9.6 | **361** 14.2 | 0.32 | 2.12 | 3.15 | 2.07 | 0.102 | 1200 | 1100 | 1610 | **80.9** 178.0 |
| 23940 | **200** 7.8740 | **280** 11.0236 | **60** 2.3622 | **712** 160000 | **1130** 254000 | EM | **2** 0.08 | **219** 8.6 | **263** 10.3 | 0.19 | 3.65 | 5.43 | 3.57 | 0.101 | 1900 | 1600 | 2500 | **11.0** 25.0 |
| 23040 | **200** 7.8740 | **310** 12.2047 | **82** 3.2283 | **1230** 276000 | **1760** 395000 | EJ | **2** 0.08 | **225** 8.9 | **289** 11.4 | 0.23 | 2.95 | 4.40 | 2.89 | 0.092 | 1800 | 1500 | 2380 | **22.1** 48.6 |
| 23040 | **200** 7.8740 | **310** 12.2047 | **82** 3.2283 | **1230** 276000 | **1760** 395000 | EM | **2** 0.08 | **225** 8.9 | **289** 11.4 | 0.23 | 2.95 | 4.40 | 2.89 | 0.092 | 1800 | 1500 | 2390 | **21.9** 48.1 |
| 24040 | **200** 7.8740 | **310** 12.2047 | **109** 4.2913 | **1560** 351000 | **2460** 552000 | EJ | **2** 0.08 | **223** 8.8 | **286** 11.2 | 0.31 | 2.16 | 3.22 | 2.12 | 0.096 | 1300 | 1100 | 2050 | **30.0** 67.0 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

*Continued on next page.*

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARINGS – *continued*

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

*Continued from previous page.*

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Fillet[1] (Max.) R | Backing Diameter | | Dynamic | | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | | Shaft $d_a$ | Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 24040 | **200** 7.8740 | **310** 12.2047 | **109** 4.2913 | **1560** 351000 | **2460** 552000 | EM | **2** 0.08 | **223** 8.8 | **286** 11.2 | 0.31 | 2.16 | 3.22 | 2.12 | 0.096 | 1300 | 1100 | 1890 | **30.0** 66.0 |
| 23140 | **200** 7.8740 | **340** 13.3858 | **112** 4.4094 | **1720** 386000 | **2400** 540000 | EJ | **2.5** 0.1 | **230** 9.0 | **308** 12.1 | 0.31 | 2.15 | 3.20 | 2.10 | 0.098 | 1300 | 1200 | 2010 | **40.8** 89.9 |
| 23140 | **200** 7.8740 | **340** 13.3858 | **112** 4.4094 | **1660** 373000 | **2290** 514000 | EMB | **2.5** 0.1 | **230** 9.0 | **308** 12.1 | 0.31 | 2.15 | 3.20 | 2.10 | 0.097 | 1400 | 1200 | 1890 | **40.7** 89.6 |
| 24140 | **200** 7.8740 | **340** 13.3858 | **140** 5.5118 | **2030** 456000 | **2930** 658000 | EJ | **2.5** 0.1 | **226** 8.9 | **308** 12.1 | 0.39 | 1.74 | 2.59 | 1.70 | 0.097 | 850 | 790 | 1440 | **51.7** 113.7 |
| 24140 | **200** 7.8740 | **340** 13.3858 | **140** 5.5118 | **2030** 456000 | **2930** 658000 | EMB | **2.5** 0.1 | **226** 8.9 | **308** 12.1 | 0.39 | 1.74 | 2.59 | 1.70 | 0.097 | 850 | 790 | 1360 | **52.1** 114.7 |
| 22240 | **200** 7.8740 | **360** 14.1732 | **98** 3.8583 | **1580** 356000 | **2010** 452000 | EJ | **3** 0.1 | **236** 9.3 | **323** 12.7 | 0.27 | 2.50 | 3.72 | 2.44 | 0.099 | 1700 | 1500 | 2480 | **41.7** 91.8 |
| 22240 | **200** 7.8740 | **360** 14.1732 | **98** 3.8583 | **1580** 356000 | **2010** 452000 | EMB | **3** 0.1 | **236** 9.3 | **323** 12.7 | 0.27 | 2.50 | 3.72 | 2.44 | 0.099 | 1700 | 1500 | 2330 | **42.6** 93.8 |
| 23240 | **200** 7.8740 | **360** 14.1732 | **128** 5.0394 | **2140** 480000 | **2890** 650000 | EMB | **3** 0.1 | **237** 9.3 | **329** 12.9 | 0.33 | 2.06 | 3.06 | 2.01 | 0.100 | 1000 | 920 | 1470 | **56.5** 124.3 |
| 26340 | **200** 7.8740 | **380** 14.9606 | **126** 4.9606 | **1900** 427000 | **2690** 605000 | EMB | **4** 0.2 | **240** 9.4 | **336.7** 13.3 | 0.33 | 2.02 | 3.01 | 1.98 | 0.101 | 820 | 740 | 1250 | **66.0** 145.2 |
| 23340 | **200** 7.8740 | **420** 16.5354 | **165** 6.4961 | **2940** 660000 | **3730** 838000 | EMB | **4** 0.2 | **246** 9.7 | **366** 14.4 | 0.41 | 1.66 | 2.47 | 1.62 | 0.104 | 720 | 670 | 1250 | **112.6** 247.7 |
| 22340 | **200** 7.8740 | **420** 16.5354 | **138** 5.4331 | **2470** 556000 | **2930** 658000 | EJ | **4** 0.2 | **246** 9.7 | **369** 14.5 | 0.33 | 2.02 | 3.01 | 1.98 | 0.103 | 1200 | 1000 | 1750 | **89.0** 195.8 |
| 22340 | **200** 7.8740 | **420** 16.5354 | **138** 5.4331 | **2470** 556000 | **2930** 658000 | EMB | **4** 0.2 | **247** 9.7 | **369** 14.5 | 0.33 | 2.02 | 3.01 | 1.98 | 0.103 | 1200 | 1000 | 1640 | **93.0** 204.5 |
| 23944 | **220** 8.6614 | **300** 11.8110 | **60** 2.3622 | **739** 166000 | **1210** 272000 | EM | **2** 0.08 | **239** 9.4 | **283** 11.2 | 0.17 | 3.94 | 5.87 | 3.85 | 0.106 | 1700 | 1400 | 2280 | **12.0** 26.4 |
| 23044 | **220** 8.6614 | **340** 13.3858 | **90** 3.5433 | **1340** 300000 | **1970** 443000 | EJ | **2.5** 0.1 | **247** 9.7 | **313** 12.3 | 0.24 | 2.77 | 4.13 | 2.71 | 0.101 | 1700 | 1400 | 2120 | **28.7** 63.1 |
| 23044 | **220** 8.6614 | **340** 13.3858 | **90** 3.5433 | **1340** 300000 | **1970** 443000 | EM | **2.5** 0.1 | **247** 9.7 | **313** 12.3 | 0.24 | 2.77 | 4.13 | 2.71 | 0.101 | 1700 | 1400 | 2260 | **28.8** 63.4 |
| 24044 | **220** 8.6614 | **340** 13.3858 | **118** 4.6457 | **1720** 388000 | **2720** 612000 | EJ | **2.5** 0.1 | **245** 9.6 | **313** 12.3 | 0.32 | 2.14 | 3.18 | 2.09 | 0.101 | 1200 | 1000 | 1830 | **39.0** 86.0 |
| 24044 | **220** 8.6614 | **340** 13.3858 | **118** 4.6457 | **1720** 388000 | **2720** 612000 | EMB | **2.5** 0.1 | **245** 9.6 | **313** 12.3 | 0.32 | 2.14 | 3.18 | 2.09 | 0.101 | 1200 | 1000 | 1710 | **39.3** 86.5 |
| 23144 | **220** 8.6614 | **370** 14.5669 | **120** 4.7244 | **1940** 436000 | **2740** 616000 | EJ | **3** 0.1 | **252** 9.9 | **336** 13.2 | 0.31 | 2.17 | 3.24 | 2.12 | 0.103 | 1200 | 1000 | 1810 | **52.8** 116.2 |

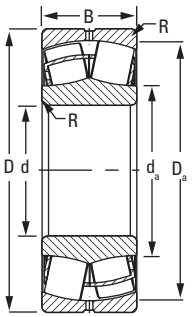
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

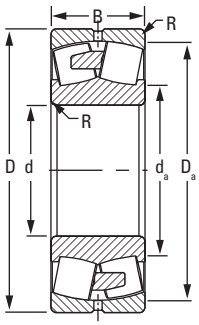
[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

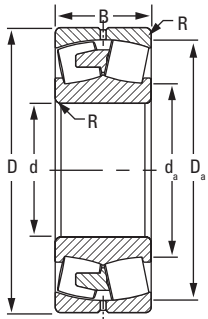
[5]See limiting speed on page 51.




**EJ**




**EM/YM**




**EMB/YMB**

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Backing Diameter | | | Dynamic | | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Shaft $d_a$ | Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 23144 | **220** 8.6614 | **370** 14.5669 | **120** 4.7244 | **1940** 436000 | **2740** 616000 | EMB | **3** 0.1 | **252** 9.9 | **336** 13.2 | 0.31 | 2.17 | 3.24 | 2.12 | 0.103 | 1200 | 1000 | 1760 | **52.8** 116.2 |
| 24144 | **220** 8.6614 | **370** 14.5669 | **150** 5.9055 | **2250** 505000 | **3220** 725000 | EJ | **3** 0.1 | **248** 9.8 | **337** 13.3 | 0.36 | 1.86 | 2.77 | 1.82 | 0.103 | 780 | 720 | 1310 | **65.0** 144.0 |
| 24144 | **220** 8.6614 | **370** 14.5669 | **150** 5.9055 | **2250** 505000 | **3220** 725000 | EMB | **3** 0.1 | **248** 9.8 | **337** 13.3 | 0.36 | 1.86 | 2.77 | 1.82 | 0.103 | 780 | 720 | 1170 | **65.0** 144.0 |
| 22244 | **220** 8.6614 | **400** 15.7480 | **108** 4.2520 | **1850** 415000 | **2310** 520000 | EJ | **3** 0.1 | **261** 10.3 | **359** 14.1 | 0.27 | 2.51 | 3.73 | 2.45 | 0.106 | 1500 | 1300 | 2220 | **59.4** 130.7 |
| 22244 | **220** 8.6614 | **400** 15.7480 | **108** 4.2520 | **1850** 415000 | **2310** 520000 | EMB | **3** 0.1 | **261** 10.3 | **359** 14.1 | 0.27 | 2.51 | 3.73 | 2.45 | 0.106 | 1500 | 1300 | 2010 | **59.4** 130.7 |
| 23244 | **220** 8.6614 | **400** 15.7480 | **144** 5.6693 | **2490** 559000 | **3350** 754000 | EJ | **3** 0.1 | **257** 10.1 | **359** 14.1 | 0.35 | 1.95 | 2.90 | 1.90 | 0.105 | 920 | 830 | 1730 | **79.0** 174.0 |
| 23244 | **220** 8.6614 | **400** 15.7480 | **144** 5.6693 | **2490** 559000 | **3350** 754000 | EMB | **3** 0.1 | **257** 10.1 | **359** 14.1 | 0.35 | 1.95 | 2.90 | 1.90 | 0.105 | 920 | 830 | 1330 | **79.4** 174.7 |
| 26344 | **220** 8.6614 | **420** 16.5354 | **138** 5.4331 | **2480** 558000 | **3260** 733000 | EMB | **4** 0.2 | **265** 10.42 | **372** 14.6 | 0.33 | 2.04 | 3.03 | 1.99 | 0.108 | 700 | 640 | 1110 | **88.2** 194.0 |
| 22344 | **220** 8.6614 | **460** 18.1102 | **145** 5.7087 | **2740** 615000 | **3240** 729000 | EJ | **4** 0.2 | **273** 10.7 | **404** 15.9 | 0.32 | 2.08 | 3.10 | 2.04 | 0.110 | 1100 | 940 | 1600 | **111.0** 244.2 |
| 22344 | **220** 8.6614 | **460** 18.1102 | **145** 5.7087 | **2740** 615000 | **3240** 729000 | EMB | **4** 0.2 | **273** 10.7 | **404** 15.9 | 0.32 | 2.08 | 3.10 | 2.04 | 0.110 | 1100 | 940 | 1610 | **118.5** 260.7 |
| 23948 | **240** 9.4488 | **320** 12.5984 | **60** 2.3622 | **785** 176000 | **1340** 300000 | EM | **2** 0.08 | **260** 10.2 | **304** 12.0 | 0.16 | 4.16 | 6.20 | 4.07 | 0.104 | 1600 | 1300 | 2280 | **12.9** 28.4 |
| 23048 | **240** 9.4488 | **360** 14.1732 | **92** 3.6220 | **1400** 315000 | **2140** 480000 | EJ | **2.5** 0.1 | **267** 10.5 | **334** 13.1 | 0.23 | 2.91 | 4.34 | 2.85 | 0.106 | 1500 | 1300 | 1980 | **33.0** 72.0 |
| 23048 | **240** 9.4488 | **360** 14.1732 | **92** 3.6220 | **1400** 315000 | **2140** 480000 | EM | **2.5** 0.1 | **267** 10.5 | **334** 13.1 | 0.23 | 2.91 | 4.34 | 2.85 | 0.106 | 1500 | 1300 | 2120 | **33.0** 72.0 |
| 24048 | **240** 9.4488 | **360** 14.1732 | **118** 4.6457 | **1790** 403000 | **2900** 652000 | EJ | **2.5** 0.1 | **265** 10.4 | **334** 13.1 | 0.29 | 2.31 | 3.44 | 2.26 | 0.106 | 1100 | 940 | 1720 | **42.0** 92.0 |
| 24048 | **240** 9.4488 | **360** 14.1732 | **118** 4.6457 | **1790** 403000 | **2900** 652000 | EMB | **2.5** 0.1 | **265** 10.4 | **334** 13.1 | 0.29 | 2.31 | 3.44 | 2.26 | 0.106 | 1100 | 940 | 1520 | **41.8** 92.0 |
| 23148 | **240** 9.4488 | **400** 15.7480 | **128** 5.0394 | **2280** 512000 | **3330** 748000 | EJ | **3** 0.1 | **276** 10.9 | **364** 14.3 | 0.30 | 2.28 | 3.40 | 2.23 | 0.111 | 1000 | 910 | 1680 | **64.9** 142.8 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

*Continued on next page.*

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARINGS – continued

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

*Continued from previous page.*

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | Dynamic $\frac{F_a}{F_r} \le e$ $X = 1$ $Y_1$ | Dynamic $\frac{F_a}{F_r} > e$ $X = 0.67$ $Y_2$ | Static In All Cases $Y_0$ | | Thermal Reference Speed[4] Oil | Thermal Reference Speed[4] Grease | Limiting Speed[5] | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 23148 | **240** 9.4488 | **400** 15.7480 | **128** 5.0394 | **2200** 495000 | **3180** 714000 | EMB | **3** 0.1 | **276** 10.9 | **364** 14.3 | 0.30 | 2.28 | 3.40 | 2.23 | 0.110 | 1100 | 930 | 1460 | **65.0** 142.0 |
| 24148 | **240** 9.4488 | **400** 15.7480 | **160** 6.2992 | **2690** 606000 | **4050** 912000 | EJ | **3** 0.1 | **270** 10.7 | **364** 14.3 | 0.37 | 1.80 | 2.68 | 1.76 | 0.109 | 650 | 610 | 1200 | **80.5** 177.1 |
| 24148 | **240** 9.4488 | **400** 15.7480 | **160** 6.2992 | **2690** 606000 | **4050** 912000 | EMB | **3** 0.1 | **270** 10.7 | **364** 14.3 | 0.37 | 1.80 | 2.68 | 1.76 | 0.109 | 650 | 610 | 1080 | **80.5** 177.1 |
| 22248 | **240** 9.4488 | **440** 17.3228 | **120** 4.7244 | **2330** 524000 | **2950** 663000 | EJ | **3** 0.1 | **283** 11.1 | **395** 15.6 | 0.27 | 2.46 | 3.67 | 2.41 | 0.112 | 1300 | 1100 | 2050 | **77.0** 169.5 |
| 22248 | **240** 9.4488 | **440** 17.3228 | **120** 4.7244 | **2330** 524000 | **2950** 663000 | EMB | **3** 0.1 | **284** 11.2 | **395** 15.6 | 0.27 | 2.46 | 3.67 | 2.41 | 0.112 | 1300 | 1100 | 1760 | **81.0** 178.2 |
| 23248 | **240** 9.4488 | **440** 17.3228 | **160** 6.2992 | **3050** 685000 | **4160** 935000 | EJ | **3** 0.1 | **280** 11.0 | **394** 15.5 | 0.35 | 1.92 | 2.86 | 1.88 | 0.112 | 790 | 720 | 1600 | **104.8** 230.4 |
| 23248 | **240** 9.4488 | **440** 17.3228 | **160** 6.2992 | **3050** 685000 | **4160** 935000 | EMB | **3** 0.1 | **281** 11.1 | **394** 15.5 | 0.35 | 1.92 | 2.86 | 1.88 | 0.112 | 790 | 720 | 1160 | **108.0** 237.5 |
| 26348 | **240** 9.4488 | **460** 18.1102 | **147** 5.7874 | **2910** 653000 | **3690** 829000 | EMB | **4** 0.2 | **286** 11.3 | **410** 16.1 | 0.32 | 2.08 | 3.10 | 2.04 | 0.113 | 690 | 580 | 970 | **113.0** 248.6 |
| 22348 | **240** 9.4488 | **500** 19.6850 | **155** 6.1024 | **3270** 734000 | **3960** 890000 | EMB | **4** 0.2 | **297** 11.7 | **439** 17.3 | 0.32 | 2.10 | 3.13 | 2.05 | 0.117 | 910 | 820 | 1480 | **149.2** 328.2 |
| 26250 | **250** 9.8425 | **410** 16.1417 | **128** 5.0394 | **2190** 492000 | **3150** 709000 | EM | **3** 0.1 | **284.5** 11.2 | **374** 14.7 | 0.30 | 2.28 | 3.39 | 2.23 | 0.111 | 680 | 620 | 1230 | **64.0** 140.8 |
| 23952 | **260** 10.2362 | **360** 14.1732 | **75** 2.9528 | **1120** 251000 | **1860** 419000 | EM | **2** 0.08 | **284** 11.2 | **339** 13.3 | 0.18 | 3.74 | 5.56 | 3.65 | 0.110 | 1400 | 1200 | 1990 | **22.8** 50.2 |
| 23052 | **260** 10.2362 | **400** 15.7480 | **104** 4.0945 | **1820** 409000 | **2740** 617000 | EJ | **3** 0.12 | **291** 11.5 | **369** 14.5 | 0.24 | 2.85 | 4.24 | 2.78 | 0.113 | 1300 | 1100 | 1830 | **47.5** 104.5 |
| 23052 | **260** 10.2362 | **400** 15.7480 | **104** 4.0945 | **1820** 409000 | **2740** 617000 | EMB | **3** 0.1 | **291** 11.5 | **369** 14.5 | 0.24 | 2.85 | 4.24 | 2.78 | 0.113 | 1300 | 1100 | 1620 | **47.6** 104.7 |
| 24052 | **260** 10.2362 | **400** 15.7480 | **140** 5.5118 | **2380** 535000 | **3840** 864000 | EJ | **3** 0.1 | **288** 11.3 | **369** 14.5 | 0.32 | 2.12 | 3.15 | 2.07 | 0.113 | 930 | 820 | 1580 | **63.9** 140.6 |
| 24052 | **260** 10.2362 | **400** 15.7480 | **140** 5.5118 | **2380** 535000 | **3840** 864000 | EMB | **3** 0.1 | **288** 11.3 | **369** 14.5 | 0.32 | 2.12 | 3.15 | 2.07 | 0.113 | 940 | 830 | 1360 | **63.9** 140.6 |
| 23152 | **260** 10.236 | **440** 17.3228 | **144** 5.6693 | **2680** 603000 | **3930** 885000 | EJ | **3** 0.1 | **301** 11.8 | **400** 15.7 | 0.30 | 2.23 | 3.31 | 2.18 | 0.116 | 930 | 830 | 1550 | **87.7** 193.0 |
| 23152 | **260** 10.2362 | **440** 17.3228 | **144** 5.6693 | **2680** 603000 | **3930** 885000 | EMB | **3** 0.1 | **302** 11.9 | **400** 15.7 | 0.30 | 2.23 | 3.31 | 2.18 | 0.116 | 930 | 830 | 1240 | **90.0** 199.0 |
| 24152 | **260** 10.2362 | **440** 17.3228 | **180** 7.0866 | **3160** 710000 | **4800** 1080000 | EJ | **3** 0.1 | **294** 11.6 | **398** 15.7 | 0.37 | 1.82 | 2.70 | 1.78 | 0.115 | 580 | 540 | 1090 | **112.0** 246.0 |

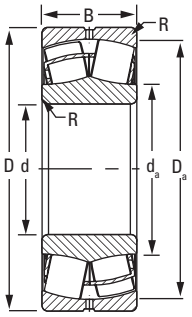
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

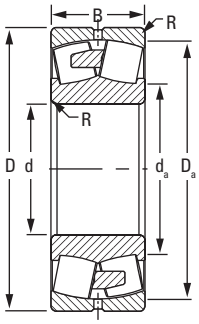
[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

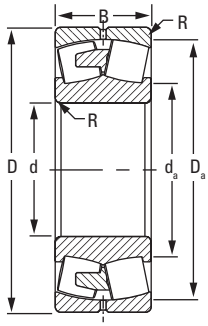
[5]See limiting speed on page 51.




**EJ**




**EM/YM**




**EMB/YMB**

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | Dynamic e | Dynamic $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | Dynamic $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | Static In All Cases $Y_0$ | | Thermal Reference Speed[4] Oil | Thermal Reference Speed[4] Grease | Limiting Speed[5] | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 24152 | **260** 10.2362 | **440** 17.3228 | **180** 7.0866 | **3160** 710000 | **4800** 1080000 | EMB | **3** 0.1 | **296** 11.7 | **398** 15.7 | 0.37 | 1.82 | 2.70 | 1.78 | 0.115 | 580 | 540 | 960 | **111.4** 245.1 |
| 22252 | **260** 10.2362 | **480** 18.8976 | **130** 5.1181 | **2740** 616000 | **3500** 787000 | EMB | **4** 0.2 | **309** 12.2 | **430** 16.9 | 0.27 | 2.46 | 3.66 | 2.41 | 0.118 | 1200 | 1000 | 1600 | **105.5** 232.1 |
| 23252 | **260** 10.2362 | **480** 18.8976 | **174** 6.8504 | **3510** 790000 | **4850** 1090000 | EJ | **4** 0.2 | **307** 12.1 | **430** 16.9 | 0.34 | 1.98 | 2.95 | 1.94 | 0.119 | 710 | 650 | 1470 | **135.8** 298.8 |
| 23252 | **260** 10.2362 | **480** 18.8976 | **174** 6.8504 | **3510** 790000 | **4850** 1090000 | EMB | **4** 0.2 | **308** 12.1 | **430** 16.9 | 0.34 | 1.98 | 2.95 | 1.94 | 0.119 | 710 | 650 | 1000 | **140.0** 308.0 |
| 22352 | **260** 10.2362 | **540** 21.2598 | **165** 6.4961 | **3730** 838000 | **4550** 1020000 | EMB | **5** 0.2 | **321** 12.6 | **475** 18.7 | 0.32 | 2.13 | 3.17 | 2.08 | 0.123 | 810 | 730 | 1340 | **184.5** 405.9 |
| 23352 | **260** 10.2362 | **540** 21.2598 | **206** 8.1102 | **4600** 1030000 | **5990** 1350000 | EM | **5** 0.2 | **318** 12.5 | **473** 18.6 | 0.39 | 1.71 | 2.54 | 1.67 | 0.123 | 490 | 460 | 1270 | **227.0** 499.4 |
| 23956 | **280** 11.0236 | **380** 14.9606 | **75** 2.9528 | **1170** 264000 | **1990** 446000 | EMB | **2** 0.08 | **304** 12.0 | **360** 14.2 | 0.17 | 3.95 | 5.88 | 3.86 | 0.115 | 1300 | 1100 | 1690 | **24.3** 53.5 |
| 23056 | **280** 11.0236 | **420** 16.5354 | **106** 4.1732 | **1820** 410000 | **2810** 631000 | EJ | **3** 0.1 | **309** 12.2 | **389** 15.3 | 0.23 | 2.92 | 4.35 | 2.86 | 0.118 | 1300 | 1100 | 1690 | **48.8** 107.3 |
| 23056 | **280** 11.0236 | **420** 16.5354 | **106** 4.1732 | **1820** 410000 | **2810** 631000 | EMB | **3** 0.1 | **312** 12.3 | **389** 15.3 | 0.23 | 2.92 | 4.35 | 2.86 | 0.118 | 1300 | 1100 | 1600 | **51.0** 112.2 |
| 24056 | **280** 11.0236 | **420** 16.5354 | **140** 5.5118 | **2420** 544000 | **4090** 921000 | EJ | **3** 0.1 | **307** 12.1 | **388** 15.3 | 0.30 | 2.25 | 3.35 | 2.20 | 0.117 | 860 | 760 | 1310 | **68.0** 149.0 |
| 24056 | **280** 11.0236 | **420** 16.5354 | **140** 5.5118 | **2420** 544000 | **4090** 921000 | EMB | **3** 0.1 | **310** 12.2 | **388** 15.3 | 0.30 | 2.25 | 3.35 | 2.20 | 0.117 | 860 | 760 | 1290 | **68.0** 149.6 |
| 23156 | **280** 11.0236 | **460** 18.1102 | **146** 5.7480 | **2780** 626000 | **4170** 937000 | EJ | **4** 0.2 | **318** 12.5 | **419** 16.5 | 0.30 | 2.26 | 3.36 | 2.21 | 0.121 | 870 | 770 | 1480 | **93.3** 205.2 |
| 23156 | **280** 11.0236 | **460** 18.1102 | **146** 5.7480 | **2780** 626000 | **4170** 937000 | EMB | **4** 0.2 | **320** 12.6 | **419** 16.5 | 0.30 | 2.26 | 3.36 | 2.21 | 0.121 | 870 | 770 | 1320 | **96.8** 213.0 |
| 24156 | **280** 11.0236 | **460** 18.1102 | **180** 7.0866 | **3210** 723000 | **5060** 1140000 | EJ | **4** 0.2 | **316** 12.5 | **419** 16.5 | 0.36 | 1.86 | 2.77 | 1.82 | 0.121 | 540 | 510 | 1010 | **118.0** 260.0 |
| 24156 | **280** 11.0236 | **460** 18.1102 | **180** 7.0866 | **3210** 723000 | **5060** 1140000 | EMB | **4** 0.2 | **319** 12.6 | **419** 16.5 | 0.36 | 1.86 | 2.77 | 1.82 | 0.121 | 540 | 510 | 910 | **118.0** 259.6 |
| 22256 | **280** 11.0236 | **500** 19.6850 | **130** 5.1181 | **2800** 630000 | **3750** 844000 | EMB | **4** 0.2 | **331** 13.0 | **449** 17.7 | 0.26 | 2.62 | 3.91 | 2.57 | 0.123 | 1100 | 940 | 1570 | **112.1** 246.6 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

*Continued on next page.*

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARINGS – *continued*

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

*Continued from previous page.*

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | Dynamic $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | Dynamic $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | Static In All Cases $Y_0$ | | Thermal Reference Speed[4] Oil | Thermal Reference Speed[4] Grease | Limiting Speed[5] | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 23256 | **280** 11.0236 | **500** 19.6850 | **176** 6.9291 | **3680** 828000 | **5250** 1180000 | EJ | **4** 0.2 | **327** 12.9 | **450** 17.7 | 0.33 | 2.07 | 3.08 | 2.02 | 0.123 | 650 | 590 | 1400 | **149.0** 328.0 |
| 23256 | **280** 11.0236 | **500** 19.6850 | **176** 6.9291 | **3680** 828000 | **5250** 1180000 | EMB | **4** 0.2 | **329** 13.0 | **450** 17.7 | 0.33 | 2.07 | 3.08 | 2.02 | 0.123 | 650 | 590 | 940 | **149.6** 329.1 |
| 22356 | **280** 11.0236 | **580** 22.8346 | **175** 6.8898 | **4280** 962000 | **5280** 1190000 | EMB | **5** 0.2 | **345** 13.6 | **511** 20.1 | 0.32 | 2.13 | 3.17 | 2.08 | 0.129 | 720 | 660 | 1210 | **226.3** 497.9 |
| 23356 | **280** 11.0236 | **580** 22.8346 | **224** 8.8189 | **5340** 1200000 | **7050** 1580000 | EMB | **5** 0.2 | **341** 13.4 | **508** 20.0 | 0.40 | 1.69 | 2.52 | 1.65 | 0.128 | 440 | 410 | 800 | **284.0** 624.8 |
| 23960 | **300** 11.8110 | **420** 16.5354 | **90** 3.5433 | **1570** 352000 | **2630** 592000 | EMB | **2.5** 0.1 | **328** 12.9 | **394** 15.5 | 0.19 | 3.59 | 5.34 | 3.51 | 0.121 | 1200 | 970 | 1530 | **38.4** 84.5 |
| 23060 | **300** 11.8110 | **460** 18.1102 | **118** 4.6457 | **2330** 525000 | **3570** 803000 | EJ | **3** 0.1 | **334** 13.1 | **425** 16.8 | 0.24 | 2.87 | 4.27 | 2.80 | 0.123 | 1100 | 940 | 1550 | **68.2** 150.0 |
| 23060 | **300** 11.8110 | **460** 18.1102 | **118** 4.6457 | **2330** 525000 | **3570** 803000 | EMB | **3** 0.1 | **336** 13.2 | **425** 16.8 | 0.24 | 2.87 | 4.27 | 2.80 | 0.123 | 1100 | 940 | 1410 | **71.2** 156.5 |
| 24060 | **300** 11.8110 | **460** 18.1102 | **160** 6.2992 | **3070** 689000 | **5190** 1170000 | EJ | **3** 0.1 | **331** 13.0 | **423** 16.7 | 0.32 | 2.11 | 3.13 | 2.06 | 0.123 | 750 | 670 | 1210 | **96.0** 211.0 |
| 24060 | **300** 11.8110 | **460** 18.1102 | **160** 6.2992 | **3070** 689000 | **5190** 1170000 | EMB | **3** 0.1 | **334** 13.1 | **423** 16.7 | 0.32 | 2.11 | 3.13 | 2.06 | 0.123 | 750 | 670 | 1210 | **97.4** 214.3 |
| 23160 | **300** 11.8110 | **500** 19.6850 | **160** 6.2992 | **3370** 757000 | **5120** 1150000 | EJ | **4** 0.2 | **343** 13.5 | **453** 17.8 | 0.30 | 2.25 | 3.35 | 2.20 | 0.127 | 760 | 680 | 1380 | **124.9** 274.8 |
| 23160 | **300** 11.8110 | **500** 19.6850 | **160** 6.2992 | **3370** 757000 | **5120** 1150000 | EMB | **4** 0.2 | **345** 13.6 | **453** 17.8 | 0.30 | 2.25 | 3.35 | 2.20 | 0.127 | 760 | 680 | 1180 | **128.7** 283.1 |
| 24160 | **300** 11.8110 | **500** 19.6850 | **200** 7.8740 | **4060** 913000 | **6270** 1410000 | EJ | **4** 0.2 | **336** 13.2 | **455** 17.9 | 0.37 | 1.82 | 2.71 | 1.78 | 0.125 | 470 | 440 | 930 | **158.0** 347,0 |
| 24160 | **300** 11.8110 | **500** 19.6850 | **200** 7.8740 | **4060** 913000 | **6270** 1410000 | EMB | **4** 0.2 | **338** 13.3 | **455** 17.9 | 0.37 | 1.82 | 2.71 | 1.78 | 0.125 | 470 | 440 | 810 | **157.1** 345.6 |
| 22260 | **300** 11.8110 | **540** 21.2598 | **140** 5.5118 | **3290** 740000 | **4400** 989000 | EMB | **4** 0.2 | **355** 14.0 | **484** 19.1 | 0.26 | 2.59 | 3.86 | 2.53 | 0.128 | 980 | 850 | 1410 | **142.0** 312.4 |
| 23260 | **300** 11.8110 | **540** 21.2598 | **192** 7.5591 | **4210** 946000 | **6170** 1390000 | EJ | **4** 0.2 | **351** 13.8 | **482** 19.0 | 0.34 | 2.00 | 2.98 | 1.96 | 0.130 | 580 | 530 | 1310 | **191.0** 420.0 |
| 23260 | **300** 11.8110 | **540** 21.2598 | **192** 7.5591 | **4210** 946000 | **6170** 1390000 | EMB | **4** 0.2 | **353** 13.9 | **482** 19.0 | 0.34 | 2.00 | 2.98 | 1.96 | 0.130 | 580 | 530 | 1020 | **194.5** 427.9 |
| 23964 | **320** 12.5984 | **440** 17.3228 | **90** 3.5433 | **1600** 359000 | **2780** 625000 | EMB | **2.5** 0.1 | **349** 13.8 | **414** 16.3 | 0.18 | 3.79 | 5.65 | 3.71 | 0.126 | 1100 | 900 | 1450 | **40.6** 89.3 |
| 23064 | **320** 12.5984 | **480** 18.8976 | **121** 4.7638 | **2410** 543000 | **3880** 873000 | EJ | **3** 0.1 | **355** 14.0 | **444** 17.5 | 0.23 | 2.93 | 4.36 | 2.86 | 0.128 | 1000 | 880 | 1470 | **74.2** 163.2 |

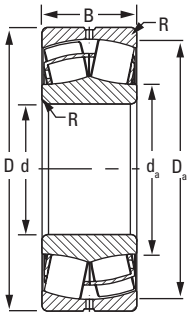
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

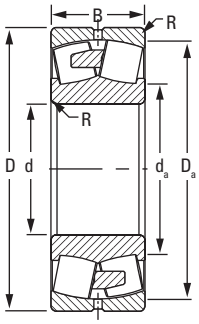
[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

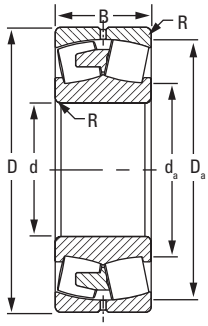
[5]See limiting speed on page 51.




**EJ**




**EM/YM**




**EMB/YMB**

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | Dynamic e | Dynamic $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | Dynamic $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | Static In All Cases $Y_0$ | | Thermal Reference Speed[4] Oil | Thermal Reference Speed[4] Grease | Limiting Speed[5] | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 23064 | **320** 12.5984 | **480** 18.8976 | **121** 4.7638 | **2410** 543000 | **3880** 873000 | EMB | **3** 0.1 | **357** 14.1 | **444** 17.5 | 0.23 | 2.93 | 4.36 | 2.86 | 0.128 | 1000 | 880 | 1370 | **77.4** 170.2 |
| 24064 | **320** 12.5984 | **480** 18.8976 | **160** 6.2992 | **3130** 703000 | **5380** 1210000 | EJ | **3** 0.1 | **351** 13.8 | **444** 17.5 | 0.30 | 2.24 | 3.34 | 2.19 | 0.128 | 710 | 630 | 1150 | **101.0** 222.0 |
| 24064 | **320** 12.5984 | **480** 18.8976 | **160** 6.2992 | **3130** 703000 | **5380** 1210000 | EMB | **3** 0.1 | **354** 13.9 | **444** 17.5 | 0.30 | 2.24 | 3.34 | 2.19 | 0.128 | 710 | 630 | 1130 | **102.0** 224.4 |
| 23164 | **320** 12.5984 | **540** 21.2598 | **176** 6.9291 | **3990** 898000 | **5950** 1340000 | EJ | **4** 0.2 | **364** 14.3 | **490** 19.3 | 0.31 | 2.14 | 3.19 | 2.10 | 0.131 | 690 | 620 | 1260 | **160.5** 353.0 |
| 23164 | **320** 12.5984 | **540** 21.2598 | **176** 6.9291 | **3990** 898000 | **5950** 1340000 | EMB | **4** 0.2 | **367** 14.4 | **490** 19.3 | 0.31 | 2.14 | 3.19 | 2.10 | 0.131 | 690 | 620 | 1100 | **167.1** 367.5 |
| 24164 | **320** 12.5984 | **540** 21.2598 | **218** 8.5827 | **4790** 1080000 | **7530** 1690000 | EJ | **4** 0.2 | **360** 14.2 | **489** 19.3 | 0.38 | 1.77 | 2.63 | 1.73 | 0.131 | 410 | 390 | 860 | **203.0** 448.0 |
| 24164 | **320** 12.5984 | **540** 21.2598 | **218** 8.5827 | **4790** 1080000 | **7530** 1690000 | EMB | **4** 0.2 | **362** 14.3 | **489** 19.3 | 0.38 | 1.77 | 2.63 | 1.73 | 0.131 | 410 | 390 | 720 | **204.6** 450.1 |
| 22264 | **320** 12.5984 | **580** 22.8346 | **150** 5.9055 | **3720** 835000 | **5000** 1120000 | EMB | **4** 0.2 | **380** 15.0 | **519** 20.4 | 0.26 | 2.58 | 3.84 | 2.52 | 0.134 | 900 | 780 | 1290 | **177.1** 389.6 |
| 23264 | **320** 12.5984 | **580** 22.8346 | **208** 8.1890 | **4770** 1070000 | **7090** 1590000 | EJ | **4** 0.2 | **377** 14.8 | **516** 20.3 | 0.34 | 1.98 | 2.94 | 1.93 | 0.135 | 530 | 490 | 1220 | **240.0** 528.0 |
| 23264 | **320** 12.5984 | **580** 22.8346 | **208** 8.1890 | **4770** 1070000 | **7090** 1590000 | EMB | **4** 0.2 | **379** 14.9 | **516** 20.3 | 0.34 | 1.98 | 2.94 | 1.93 | 0.135 | 530 | 490 | 940 | **245.1** 539.2 |
| 23968 | **340** 13.3858 | **460** 18.1102 | **90** 3.5433 | **1670** 376000 | **2990** 673000 | EMB | **2.5** 0.1 | **369** 14.5 | **435** 17.1 | 0.17 | 3.98 | 5.93 | 3.89 | 0.131 | 990 | 830 | 1390 | **43.0** 94.6 |
| 23068 | **340** 13.3858 | **520** 20.4724 | **133** 5.2362 | **2890** 650000 | **4630** 1040000 | EJ | **4** 0.2 | **381** 15.0 | **481** 18.9 | 0.23 | 2.96 | 4.40 | 2.89 | 0.135 | 930 | 800 | 1350 | **101.0** 223.0 |
| 23068 | **340** 13.3858 | **520** 20.4724 | **133** 5.2362 | **2890** 650000 | **4630** 1040000 | EMB | **4** 0.2 | **384** 15.1 | **481** 18.9 | 0.23 | 2.96 | 4.40 | 2.89 | 0.135 | 930 | 800 | 1150 | **102.7** 225.9 |
| 24068 | **340** 13.3858 | **520** 20.4724 | **180** 7.0866 | **3820** 859000 | **6540** 1470000 | EJ | **4** 0.2 | **375** 14.7 | **479** 18.9 | 0.32 | 2.14 | 3.18 | 2.09 | 0.134 | 640 | 570 | 1070 | **137.0** 302.0 |
| 24068 | **340** 13.3858 | **520** 20.4724 | **180** 7.0866 | **3820** 859000 | **6540** 1470000 | EMB | **4** 0.2 | **377** 14.9 | **479** 18.9 | 0.32 | 2.14 | 3.18 | 2.09 | 0.134 | 640 | 570 | 1030 | **139.0** 305.8 |
| 23168 | **340** 13.3858 | **580** 22.8346 | **190** 7.4803 | **4500** 1010000 | **6850** 1540000 | EJ | **4** 0.2 | **395** 15.5 | **526** 20.7 | 0.30 | 2.22 | 3.30 | 2.17 | 0.138 | 630 | 570 | 1170 | **206.0** 455.0 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

*Continued on next page.*

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARINGS – *continued*

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

*Continued from previous page.*

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | Dynamic $\frac{F_a}{F_r} \le e$ $X = 1$ $Y_1$ | Dynamic $\frac{F_a}{F_r} > e$ $X = 0.67$ $Y_2$ | Static In All Cases $Y_0$ | | Thermal Reference Speed[4] Oil | Thermal Reference Speed[4] Grease | Limiting Speed[5] | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 23168 | **340** 13.3858 | **580** 22.8346 | **190** 7.4803 | **4500** 1010000 | **6850** 1540000 | EMB | **4** 0.2 | **397** 15.6 | **526** 20.7 | 0.30 | 2.22 | 3.30 | 2.17 | 0.138 | 630 | 570 | 940 | **210.3** 462.7 |
| 24168 | **340** 13.3858 | **580** 22.8346 | **243** 9.5669 | **5680** 1280000 | **8900** 2000000 | EMB | **4** 0.2 | **385** 15.2 | **525** 20.7 | 0.39 | 1.75 | 2.61 | 1.71 | 0.137 | 370 | 350 | 660 | **266.0** 585.2 |
| 23268 | **340** 13.3858 | **620** 24.4094 | **224** 8.8189 | **5160** 1160000 | **8200** 1840000 | YMB | **5** 0.2 | **399** 15.7 | **554** 21.8 | 0.35 | 1.91 | 2.84 | 1.86 | 0.086 | 470 | 440 | 870 | **292.4** 643.4 |
| 23972 | **360** 14.1732 | **480** 18.8976 | **90** 3.5433 | **1710** 385000 | **3140** 707000 | EMB | **2.5** 0.1 | **389** 15.3 | **455** 17.9 | 0.16 | 4.12 | 6.13 | 4.03 | 0.135 | 920 | 780 | 1310 | **45.0** 99.0 |
| 23072 | **360** 14.1732 | **540** 21.2598 | **134** 5.2756 | **2840** 638000 | **4610** 1040000 | EJ | **4** 0.2 | **400** 15.7 | **499** 19.7 | 0.23 | 2.94 | 4.38 | 2.88 | 0.139 | 900 | 770 | 1290 | **107.0** 236.0 |
| 23072 | **360** 14.1732 | **540** 21.2598 | **134** 5.2756 | **2840** 638000 | **4610** 1040000 | EMB | **4** 0.2 | **403** 15.9 | **499** 19.7 | 0.23 | 2.94 | 4.38 | 2.88 | 0.139 | 900 | 770 | 1200 | **108.3** 238.3 |
| 24072 | **360** 14.1732 | **540** 21.2598 | **180** 7.0866 | **3920** 881000 | **6850** 1540000 | EJ | **4** 0.2 | **395** 15.6 | **500** 19.7 | 0.30 | 2.24 | 3.33 | 2.19 | 0.138 | 600 | 540 | 1030 | **144.0** 316.0 |
| 24072 | **360** 14.1732 | **540** 21.2598 | **180** 7.0866 | **3920** 881000 | **6850** 1540000 | EMB | **4** 0.2 | **398** 15.7 | **500** 19.7 | 0.30 | 2.24 | 3.33 | 2.19 | 0.138 | 600 | 540 | 960 | **145.4** 319.9 |
| 23172 | **360** 14.1732 | **600** 23.6220 | **192** 7.5591 | **4660** 1050000 | **7300** 1640000 | EJ | **4** 0.2 | **416** 16.4 | **546** 21.5 | 0.29 | 2.29 | 3.42 | 2.24 | 0.143 | 590 | 530 | 1120 | **218.0** 480.0 |
| 23172 | **360** 14.1732 | **600** 23.6220 | **192** 7.5591 | **4660** 1050000 | **7300** 1640000 | EMB | **4** 0.2 | **419** 16.5 | **546** 21.5 | 0.29 | 2.29 | 3.42 | 2.24 | 0.143 | 590 | 530 | 900 | **222.1** 488.6 |
| 24172 | **360** 14.1732 | **600** 23.6220 | **243** 9.5669 | **5900** 1330000 | **9550** 2150000 | EMB | **4** 0.2 | **406** 16.0 | **545** 21.4 | 0.38 | 1.79 | 2.67 | 1.75 | 0.142 | 340 | 320 | 630 | **279.5** 614.9 |
| 22272 | **360** 14.1732 | **650** 25.5906 | **170** 6.6929 | **4210** 946000 | **6280** 1410000 | YMB | **5** 0.2 | **427** 16.8 | **583** 23.0 | 0.25 | 2.66 | 3.95 | 2.60 | 0.089 | 770 | 680 | 1170 | **245.0** 539.0 |
| 23272 | **360** 14.1732 | **650** 25.5906 | **232** 9.1339 | **5530** 1240000 | **8790** 1980000 | YMB | **5** 0.2 | **420** 16.5 | **583** 23.0 | 0.35 | 1.95 | 2.91 | 1.91 | 0.089 | 450 | 410 | 990 | **338.6** 744.9 |
| 23976 | **380** 14.9606 | **520** 20.4724 | **106** 4.1732 | **2130** 479000 | **3940** 886000 | EMB | **3** 0.1 | **416** 16.4 | **488** 19.2 | 0.18 | 3.80 | 5.66 | 3.72 | 0.141 | 860 | 720 | 1180 | **67.1** 147.6 |
| 23076 | **380** 14.9606 | **560** 22.0472 | **135** 5.3150 | **3070** 690000 | **5110** 1150000 | EJ | **4** 0.2 | **420** 16.5 | **520** 20.5 | 0.22 | 3.08 | 4.58 | 3.01 | 0.142 | 830 | 710 | 1240 | **112.0** 248.0 |
| 23076 | **380** 14.9606 | **560** 22.0472 | **135** 5.3150 | **3070** 690000 | **5110** 1150000 | EMB | **4** 0.2 | **422** 16.6 | **520** 20.5 | 0.22 | 3.08 | 4.58 | 3.01 | 0.142 | 830 | 710 | 880 | **114.2** 251.2 |
| 24076 | **380** 14.9606 | **560** 22.0472 | **180** 7.0866 | **4030** 905000 | **7090** 1590000 | EMB | **4** 0.2 | **418** 16.4 | **520** 20.5 | 0.29 | 2.32 | 3.45 | 2.27 | 0.141 | 570 | 510 | 870 | **151.2** 332.6 |
| 23176 | **380** 14.9606 | **620** 24.4094 | **194** 7.6378 | **4490** 1010000 | **7580** 1700000 | YMB | **4** 0.2 | **431** 17.0 | **566** 22.3 | 0.30 | 2.28 | 3.39 | 2.23 | 0.090 | 560 | 510 | 1140 | **232.6** 511.7 |

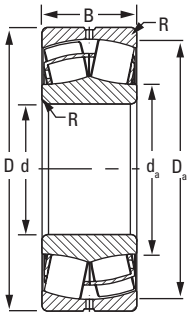
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

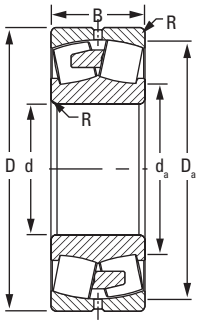
[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

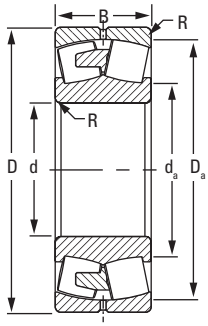
[5]See limiting speed on page 51.




**EJ**




**EM/YM**




**EMB/YMB**

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | Dynamic e | Dynamic $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | Dynamic $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | Static In All Cases $Y_0$ | | Thermal Reference Speed[4] Oil | Thermal Reference Speed[4] Grease | Limiting Speed[5] | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 24176 | **380** 14.9606 | **620** 24.4094 | **243** 9.5669 | **5580** 1250000 | **10100** 2260000 | YMB | **4** 0.2 | **427** 16.8 | **565** 22.3 | 0.36 | 1.87 | 2.79 | 1.83 | 0.090 | 320 | 300 | 630 | **291.0** 640.2 |
| 22276 | **380** 14.9606 | **680** 26.7716 | **175** 6.8898 | **4540** 1020000 | **6780** 1520000 | YMB | **5** 0.2 | **449** 17.7 | **611** 24.1 | 0.25 | 2.71 | 4.03 | 2.65 | 0.092 | 720 | 640 | 1110 | **274.0** 604.0 |
| 23276 | **380** 14.9606 | **680** 26.7716 | **240** 9.4488 | **5970** 1340000 | **9520** 2140000 | YMB | **5** 0.2 | **442** 17.4 | **611** 24.1 | 0.34 | 1.98 | 2.95 | 1.94 | 0.092 | 420 | 390 | 920 | **379.4** 834.7 |
| 23980 | **400** 15.7480 | **540** 21.2598 | **106** 4.1732 | **2180** 489000 | **4020** 903000 | EMB | **3** 0.1 | **436** 17.2 | **511** 20.1 | 0.17 | 3.99 | 5.94 | 3.90 | 0.146 | 810 | 690 | 1100 | **69.2** 152.2 |
| 23080 | **400** 15.7480 | **600** 23.6220 | **148** 5.8268 | **3630** 815000 | **5980** 1340000 | EJ | **4** 0.2 | **444** 17.5 | **555** 21.9 | 0.23 | 2.98 | 4.44 | 2.92 | 0.147 | 760 | 660 | 1160 | **146.0** 321.0 |
| 23080 | **400** 15.7480 | **600** 23.6220 | **148** 5.8268 | **3630** 815000 | **5980** 1340000 | EMB | **4** 0.2 | **447** 17.6 | **555** 21.9 | 0.23 | 2.98 | 4.44 | 2.92 | 0.147 | 760 | 660 | 1230 | **148.7** 327.1 |
| 24080 | **400** 15.7480 | **600** 23.6220 | **200** 7.8740 | **4790** 1080000 | **8480** 1910000 | EMB | **4** 0.2 | **442** 17.4 | **555** 21.9 | 0.30 | 2.24 | 3.33 | 2.19 | 0.147 | 510 | 460 | 1010 | **200.0** 440.0 |
| 23180 | **400** 15.7480 | **650** 25.5906 | **200** 7.8740 | **4770** 1070000 | **8110** 1820000 | YMB | **5** 0.2 | **454** 17.9 | **594** 23.4 | 0.29 | 2.32 | 3.46 | 2.27 | 0.092 | 530 | 480 | 1060 | **261.6** 575.5 |
| 24180 | **400** 15.7480 | **650** 25.5906 | **250** 9.8425 | **5810** 1310000 | **10400** 2330000 | YMB | **5** 0.2 | **449** 17.7 | **594** 23.4 | 0.35 | 1.91 | 2.84 | 1.87 | 0.092 | 310 | 290 | 570 | **322.3** 709.1 |
| 22280 | **400** 15.7480 | **720** 28.3465 | **185** 7.2835 | **5040** 1130000 | **7590** 1710000 | YMB | **5** 0.2 | **474** 18.7 | **646** 25.4 | 0.25 | 2.70 | 4.03 | 2.64 | 0.095 | 670 | 590 | 1040 | **326.0** 719.0 |
| 23280 | **400** 15.7480 | **720** 28.3465 | **256** 10.0787 | **6720** 1510000 | **10800** 2430000 | YMB | **5** 0.2 | **466** 18.4 | **646** 25.4 | 0.34 | 1.96 | 2.93 | 1.92 | 0.095 | 380 | 350 | 850 | **457.5** 1006.5 |
| 22380 | **400** 15.7480 | **820** 32.2835 | **243** 9.5669 | **7220** 1620000 | **10100** 2280000 | YMB | **6** 0.2 | **496** 19.5 | **729** 28.7 | 0.30 | 2.28 | 3.40 | 2.23 | 0.099 | 440 | 410 | 930 | **618.7** 1361.1 |
| 23984 | **420** 16.5354 | **560** 22.0472 | **106** 4.1732 | **2270** 511000 | **4240** 953000 | EMB | **3** 0.1 | **454** 17.9 | **531** 20.9 | 0.16 | 4.14 | 6.17 | 4.05 | 0.149 | 770 | 650 | 1090 | **71.9** 158.2 |
| 23084 | **420** 16.5354 | **620** 24.4094 | **150** 5.9055 | **3450** 774000 | **6360** 1430000 | YMB | **4** 0.2 | **467** 18.4 | **576** 22.7 | 0.22 | 3.05 | 4.54 | 2.98 | 0.094 | 720 | 620 | 1230 | **156.0** 343.2 |
| 24084 | **420** 16.5354 | **620** 24.4094 | **200** 7.8740 | **4390** 987000 | **8630** 1940000 | YMB | **4** 0.2 | **463** 18.2 | **575** 22.7 | 0.29 | 2.37 | 3.52 | 2.31 | 0.093 | 490 | 440 | 1010 | **206.7** 454.7 |
| 23184 | **420** 16.5354 | **700** 27.5591 | **224** 8.8189 | **5720** 1290000 | **9640** 2170000 | YMB | **5** 0.2 | **480** 18.9 | **636** 25.1 | 0.31 | 2.21 | 3.20 | 2.16 | 0.096 | 480 | 440 | 970 | **350.8** 771.8 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

*Continued on next page.*

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARINGS – *continued*

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

*Continued from previous page.*

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Fillet[1] (Max.) R | Backing Diameter | | Dynamic | | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | | Shaft $d_a$ | Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 24184 | **420** 16.5354 | **700** 27.5591 | **280** 11.0236 | **6990** 1570000 | **12400** 2780000 | YMB | **5** 0.2 | **474** 18.7 | **636** 25.1 | 0.37 | 1.81 | 2.70 | 1.77 | 0.096 | 270 | 260 | 510 | **432.6** 951.7 |
| 23284 | **420** 16.5354 | **760** 29.9213 | **272** 10.7087 | **7360** 1650000 | **11800** 2660000 | YMB | **6** 0.2 | **490** 19.3 | **681** 26.8 | 0.35 | 1.90 | 2.83 | 1.86 | 0.098 | 360 | 330 | 750 | **541.0** 1191.0 |
| 23988 | **440** 17.3228 | **600** 23.6220 | **118** 4.6457 | **2760** 619000 | **5040** 1130000 | EMB | **3** 0.1 | **479** 18.9 | **566** 22.3 | 0.17 | 3.93 | 5.85 | 3.84 | 0.154 | 710 | 600 | 1180 | **98.0** 215.6 |
| 23088 | **440** 17.3228 | **650** 25.5906 | **157** 6.1811 | **3750** 844000 | **6970** 1570000 | YMB | **5** 0.2 | **489** 19.3 | **603** 23.7 | 0.22 | 3.04 | 4.53 | 2.97 | 0.096 | 680 | 590 | 1160 | **180.0** 396.0 |
| 24088 | **440** 17.3228 | **650** 25.5906 | **212** 8.3465 | **4910** 1100000 | **9770** 2200000 | YMB | **5** 0.2 | **485** 19.1 | **603** 23.7 | 0.29 | 2.31 | 3.44 | 2.26 | 0.096 | 450 | 410 | 950 | **241.8** 532.0 |
| 23188 | **440** 17.3228 | **720** 28.3465 | **226** 8.8976 | **5970** 1340000 | **10300** 2310000 | YMB | **5** 0.2 | **500** 19.7 | **657** 25.9 | 0.30 | 2.26 | 3.37 | 2.21 | 0.098 | 450 | 410 | 940 | **367.8** 809.2 |
| 24188 | **440** 17.3228 | **720** 28.3465 | **280** 11.0236 | **7120** 1600000 | **12900** 2900000 | YMB | **5** 0.2 | **495** 19.5 | **656** 25.8 | 0.36 | 1.88 | 2.79 | 1.84 | 0.098 | 260 | 250 | 500 | **449.1** 988.0 |
| 23288 | **440** 17.3228 | **790** 31.1024 | **280** 11.0236 | **8090** 1820000 | **13200** 2970000 | YMB | **6** 0.2 | **512** 20.1 | **710** 28.0 | 0.35 | 1.95 | 2.91 | 1.91 | 0.101 | 320 | 300 | 760 | **602.0** 1324.4 |
| 23992 | **460** 18.1102 | **620** 24.4094 | **118** 4.6457 | **2520** 567000 | **5100** 1150000 | YMB | **3** 0.1 | **499** 19.7 | **586** 23.1 | 0.16 | 4.14 | 6.17 | 4.05 | 0.098 | 680 | 580 | 1200 | **100.9** 222.0 |
| 23092 | **460** 18.1102 | **680** 26.7717 | **163** 6.4173 | **4060** 913000 | **7570** 1700000 | YMB | **5** 0.2 | **512** 20.1 | **631** 24.9 | 0.22 | 3.06 | 4.56 | 2.99 | 0.099 | 640 | 550 | 1090 | **205.0** 451.0 |
| 24092 | **460** 18.1102 | **680** 26.7717 | **218** 8.5827 | **5210** 1170000 | **10300** 2330000 | YMB | **5** 0.2 | **507** 20.0 | **631** 24.8 | 0.28 | 2.37 | 3.53 | 2.32 | 0.099 | 430 | 390 | 900 | **270.8** 595.8 |
| 23192 | **460** 18.1102 | **760** 29.9213 | **240** 9.4488 | **6500** 1460000 | **11100** 2500000 | YMB | **6** 0.2 | **524** 20.6 | **692** 27.2 | 0.30 | 2.24 | 3.33 | 2.19 | 0.101 | 430 | 390 | 760 | **436.9** 961.2 |
| 24192 | **460** 18.1102 | **760** 29.9213 | **300** 11.8110 | **8200** 1840000 | **14900** 3350000 | YMB | **6** 0.2 | **518** 20.4 | **692** 27.2 | 0.37 | 1.84 | 2.74 | 1.80 | 0.102 | 230 | 220 | 460 | **544.9** 1198.7 |
| 23292 | **460** 18.1102 | **830** 32.6772 | **296** 11.6535 | **8680** 1950000 | **14000** 3150000 | YMB | **6** 0.2 | **535** 21.1 | **746** 29.4 | 0.34 | 1.96 | 2.93 | 1.92 | 0.103 | 310 | 290 | 670 | **696.7** 1532.7 |
| 23896 | **480** 18.8976 | **600** 23.6220 | **90** 3.5433 | **1910** 430000 | **3950** 888000 | EMB | **2.5** 0.1 | **511** 20.1 | **576** 22.67 | 0.13 | 5.38 | 8.01 | 5.26 | 0.159 | 340 | 300 | 1110 | **57.0** 127.0 |
| 23996 | **480** 18.8976 | **650** 25.5906 | **128** 5.0394 | **2820** 633000 | **5890** 1320000 | YMB | **4** 0.2 | **523** 20.6 | **612** 24.1 | 0.17 | 3.99 | 5.94 | 3.90 | 0.101 | 640 | 550 | 1120 | **123.3** 271.2 |
| 23096 | **480** 18.8976 | **700** 27.5591 | **165** 6.4961 | **4170** 938000 | **7980** 1790000 | YMB | **5** 0.2 | **532** 21.0 | **651** 25.6 | 0.22 | 3.14 | 4.67 | 3.07 | 0.102 | 600 | 530 | 1050 | **215.0** 473.0 |
| 24096 | **480** 18.8976 | **700** 27.5591 | **218** 8.5827 | **5450** 1230000 | **10900** 2450000 | YMB | **5** 0.2 | **526** 20.7 | **652** 25.7 | 0.28 | 2.45 | 3.64 | 2.39 | 0.101 | 410 | 370 | 820 | **282.1** 620.6 |

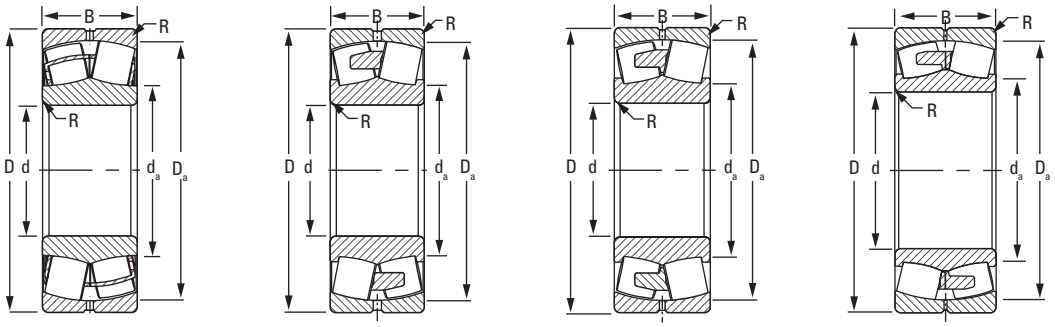
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.




EJ | EM/YM | EMB/YMB | YMD

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Dynamic | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ $X = 1$ $Y_1$ | $\frac{F_a}{F_r} > e$ $X = 0.67$ $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 23196 | **480** 18.8976 | **790** 31.1024 | **248** 9.7638 | **7110** 1600000 | **12400** 2790000 | YMB | **6** 0.2 | **547** 21.5 | **719** 28.3 | 0.30 | 2.26 | 3.36 | 2.21 | 0.104 | 390 | 360 | 840 | **490.4** 1078.9 |
| 24196 | **480** 18.8976 | **790** 31.1024 | **308** 12.1260 | **8580** 1930000 | **15900** 3570000 | YMB | **6** 0.2 | **542** 21.3 | **718** 28.3 | 0.37 | 1.85 | 2.75 | 1.81 | 0.105 | 220 | 210 | 410 | **605.3** 1331.7 |
| 23296 | **480** 18.8976 | **870** 34.2520 | **310** 12.2047 | **9860** 2220000 | **16400** 3690000 | YMB | **6** 0.2 | **561** 22.1 | **779** 30.7 | 0.35 | 1.92 | 2.85 | 1.87 | 0.107 | 280 | 260 | 680 | **821.2** 1806.6 |
| 238/500 | **500** 19.6850 | **620** 24.4094 | **90** 3.5433 | **1750** 393000 | **4010** 902000 | YMB | **2.5** 0.1 | **531** 20.9 | **596** 23.5 | 0.12 | 5.68 | 8.45 | 5.55 | 0.101 | 330 | 290 | 1060 | **60.0** 132.0 |
| 239/500 | **500** 19.6850 | **670** 26.3779 | **128** 5.0394 | **2910** 653000 | **6060** 1360000 | YMB | **4** 0.2 | **542** 21.4 | **634** 25.0 | 0.16 | 4.13 | 6.15 | 4.04 | 0.103 | 610 | 520 | 1070 | **125.7** 276.5 |
| 230/500 | **500** 19.6850 | **720** 28.3465 | **167** 6.5748 | **4290** 965000 | **8160** 1840000 | YMB | **5** 0.2 | **550** 21.7 | **673** 26.5 | 0.21 | 3.26 | 4.85 | 3.18 | 0.104 | 580 | 510 | 1010 | **222.0** 488.4 |
| 240/500 | **500** 19.6850 | **720** 28.3465 | **218** 8.5827 | **5510** 1240000 | **11200** 2510000 | YMB | **5** 0.2 | **547** 21.5 | **673** 26.5 | 0.27 | 2.51 | 3.74 | 2.45 | 0.104 | 390 | 350 | 810 | **290.8** 639.8 |
| 231/500 | **500** 19.6850 | **830** 32.6772 | **264** 10.3937 | **7880** 1770000 | **13900** 3130000 | YMB | **6** 0.2 | **572** 22.5 | **753** 29.7 | 0.30 | 2.22 | 3.30 | 2.17 | 0.107 | 360 | 330 | 800 | **584.3** 1285.5 |
| 241/500 | **500** 19.6850 | **830** 32.6772 | **325** 12.7953 | **9660** 2170000 | **17600** 3950000 | YMB | **6** 0.2 | **563** 22.1 | **755** 29.7 | 0.37 | 1.81 | 2.69 | 1.77 | 0.107 | 200 | 200 | 380 | **700.0** 1540.0 |
| 232/500 | **500** 19.6850 | **920** 36.2205 | **336** 13.2283 | **10900** 2460000 | **17900** 4010000 | YMB | **6** 0.2 | **585** 23.0 | **824** 32.4 | 0.36 | 1.90 | 2.83 | 1.86 | 0.110 | 260 | 250 | 620 | **995.1** 2189.2 |
| 239/530 | **530** 20.8661 | **710** 27.9528 | **136** 5.3543 | **3270** 735000 | **6880** 1550000 | YMB | **4** 0.2 | **575** 22.6 | **672** 26.4 | 0.16 | 4.11 | 6.12 | 4.02 | 0.107 | 560 | 480 | 1000 | **150.4** 330.9 |
| 230/530 | **530** 20.8661 | **780** 30.7087 | **185** 7.2835 | **5150** 1160000 | **9720** 2190000 | YMB | **5** 0.2 | **588** 23.2 | **725** 28.6 | 0.21 | 3.14 | 4.68 | 3.07 | 0.108 | 530 | 460 | 910 | **302.6** 665.7 |
| 240/530 | **530** 20.8661 | **780** 30.7087 | **250** 9.8425 | **6770** 1520000 | **13700** 3080000 | YMB | **5** 0.2 | **583** 23.0 | **725** 28.5 | 0.28 | 2.37 | 3.53 | 2.32 | 0.108 | 350 | 320 | 750 | **408.0** 897.6 |
| 231/530 | **530** 20.8661 | **870** 34.2520 | **272** 10.7087 | **8530** 1920000 | **15100** 3400000 | YMB | **6** 0.2 | **603** 23.7 | **793** 31.2 | 0.30 | 2.27 | 3.38 | 2.22 | 0.111 | 340 | 310 | 740 | **650.6** 1431.3 |
| 241/530 | **530** 20.8661 | **870** 34.2520 | **335** 13.1890 | **10300** 2300000 | **19100** 4290000 | YMD | **6** 0.2 | **596** 23.5 | **794** 31.3 | 0.36 | 1.90 | 2.83 | 1.86 | 0.111 | 190 | 180 | 360 | **791.0** 1740.0 |
| 232/530 | **530** 20.8661 | **980** 38.5827 | **355** 13.9764 | **12400** 2780000 | **20200** 4550000 | YMB | **7** 0.3 | **621** 24.4 | **878** 34.6 | 0.35 | 1.91 | 2.85 | 1.87 | 0.115 | 240 | 230 | 550 | **1164.0** 2560.8 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

*Continued on next page.*

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARINGS – *continued*

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

*Continued from previous page.*

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | Dynamic $\frac{F_a}{F_r} \le e$ $X = 1$ $Y_1$ | Dynamic $\frac{F_a}{F_r} > e$ $X = 0.67$ $Y_2$ | Static In All Cases $Y_0$ | | Thermal Reference Speed[4] Oil | Thermal Reference Speed[4] Grease | Limiting Speed[5] | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 239/560 | **560** 22.0472 | **750** 29.5276 | **140** 5.5118 | **3500** 787000 | **7290** 1640000 | YMB | **4** 0.2 | **607** 23.9 | **710** 28.0 | 0.16 | 4.21 | 6.27 | 4.12 | 0.110 | 530 | 450 | 890 | **172.4** 379.3 |
| 230/560 | **560** 22.0472 | **820** 32.2835 | **195** 7.6772 | **5690** 1280000 | **10800** 2430000 | YMB | **5** 0.2 | **619** 24.4 | **764** 30.1 | 0.22 | 3.14 | 4.67 | 3.07 | 0.112 | 490 | 430 | 850 | **349.1** 768.0 |
| 240/560 | **560** 22.0472 | **820** 32.2835 | **258** 10.1575 | **7140** 1600000 | **14800** 3330000 | YMB | **5** 0.2 | **617** 24.3 | **761** 30.0 | 0.28 | 2.42 | 3.60 | 2.37 | 0.112 | 330 | 300 | 670 | **463.9** 1020.6 |
| 231/560 | **560** 22.0472 | **920** 36.2205 | **280** 11.0236 | **9240** 2080000 | **16400** 3680000 | YMB | **6** 0.2 | **638** 25.1 | **838** 33.0 | 0.29 | 2.33 | 3.47 | 2.28 | 0.115 | 310 | 290 | 690 | **751.0** 1652.2 |
| 241/560 | **560** 22.0472 | **920** 36.2205 | **355** 13.9764 | **11700** 2630000 | **21800** 4900000 | YMB | **6** 0.2 | **630** 24.8 | **839** 33.0 | 0.36 | 1.87 | 2.78 | 1.83 | 0.115 | 170 | 160 | 340 | **941.7** 2071.7 |
| 241/560 | **560** 22.0472 | **920** 36.2205 | **355** 13.9764 | **11700** 2630000 | **21800** 4900000 | YMD | **6** 0.2 | **630** 24.8 | **839** 33.0 | 0.36 | 1.87 | 2.78 | 1.83 | 0.115 | 170 | 160 | 370 | **941.7** 2071.7 |
| 232/560 | **560** 22.0472 | **1030** 40.5512 | **365** 14.3701 | **13200** 2960000 | **22300** 5020000 | YMB | **7** 0.3 | **661** 26.0 | **918** 36.1 | 0.35 | 1.96 | 2.91 | 1.91 | 0.119 | 220 | 210 | 550 | **1333.0** 2932.6 |
| 238/600 | **600** 23.6220 | **730** 28.7402 | **98** 3.8583 | **2100** 473000 | **5080** 1140000 | YMB | **2.5** 0.1 | **634** 25.0 | **705** 27.8 | 0.11 | 6.10 | 9.09 | 5.97 | 0.113 | 260 | 230 | 900 | **81.0** 178.2 |
| 239/600 | **600** 23.6220 | **800** 31.4960 | **150** 5.9055 | **3970** 892000 | **8600** 1930000 | YMB | **4** 0.2 | **650** 25.6 | **757** 29.8 | 0.16 | 4.20 | 6.25 | 4.11 | 0.115 | 480 | 410 | 870 | **209.6** 461.1 |
| 230/600 | **600** 23.6220 | **870** 34.2520 | **200** 7.8740 | **6040** 1360000 | **11700** 2630000 | YMB | **5** 0.2 | **664** 26.1 | **811** 31.9 | 0.21 | 3.27 | 4.87 | 3.20 | 0.117 | 450 | 400 | 770 | **395.0** 869.0 |
| 230/600 | **600** 23.6220 | **870** 34.2520 | **200** 7.8740 | **6040** 1360000 | **11700** 2630000 | YMD | **5** 0.2 | **664** 26.1 | **811** 31.9 | 0.21 | 3.27 | 4.87 | 3.20 | 0.117 | 450 | 400 | 780 | **394.0** 867.0 |
| 240/600 | **600** 23.6220 | **870** 34.2520 | **272** 10.7087 | **8040** 1810000 | **16800** 3780000 | YMB | **5** 0.2 | **658** 25.9 | **811** 31.9 | 0.28 | 2.44 | 3.64 | 2.39 | 0.117 | 290 | 270 | 660 | **538.9** 1185.6 |
| 240/600 | **600** 23.6220 | **870** 34.2520 | **272** 10.7087 | **8040** 1810000 | **16800** 3780000 | YMD | **5** 0.2 | **658** 25.9 | **811** 31.9 | 0.28 | 2.44 | 3.64 | 2.39 | 0.117 | 290 | 270 | 670 | **538.9** 1185.6 |
| 231/600 | **600** 23.6220 | **980** 38.5827 | **300** 11.8110 | **10500** 2360000 | **18800** 4230000 | YMB | **6** 0.2 | **681** 26.8 | **895** 35.2 | 0.29 | 2.32 | 3.46 | 2.27 | 0.120 | 280 | 260 | 620 | **905.0** 1991.0 |
| 241/600 | **600** 23.6220 | **980** 38.5827 | **375** 14.7638 | **12800** 2890000 | **23800** 5360000 | YMB | **6** 0.2 | **673** 26.5 | **896** 35.3 | 0.35 | 1.95 | 2.90 | 1.90 | 0.119 | 160 | 150 | 290 | **1088.9** 2395.4 |
| 241/600 | **600** 23.6220 | **980** 38.5827 | **375** 14.7638 | **12800** 2890000 | **23800** 5360000 | YMD | **6** 0.2 | **673** 26.5 | **896** 35.3 | 0.35 | 1.95 | 2.90 | 1.90 | 0.119 | 160 | 150 | 310 | **1087.9** 2393.6 |
| 232/600 | **600** 23.6220 | **1090** 42.9134 | **388** 15.2756 | **15000** 3370000 | **25700** 5770000 | YMD | **7** 0.3 | **702** 27.6 | **975.6** 38.4 | 0.35 | 1.94 | 2.89 | 1.90 | 0.124 | 190 | 180 | 530 | **1565.1** 3443.2 |
| 239/630 | **630** 24.8031 | **850** 33.4646 | **165** 6.4961 | **4740** 1070000 | **10100** 2260000 | YMB | **5** 0.2 | **684** 26.9 | **804** 31.6 | 0.17 | 4.02 | 5.99 | 3.93 | 0.119 | 440 | 380 | 790 | **267.6** 588.7 |

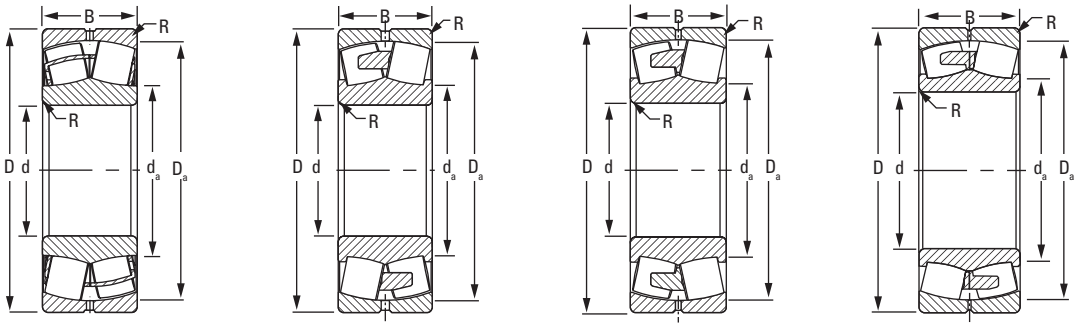
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.




EJ EM/YM EMB/YMB YMD

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | Dynamic $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | Dynamic $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | Static In All Cases $Y_0$ | | Thermal Reference Speed[4] Oil | Thermal Reference Speed[4] Grease | Limiting Speed[5] | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 230/630 | **630** 24.8031 | **920** 36.2205 | **212** 8.3465 | **6940** 1560000 | **13400** 3010000 | YMB | **6** 0.2 | **697** 27.4 | **858** 33.8 | 0.21 | 3.18 | 4.74 | 3.11 | 0.120 | 420 | 370 | 710 | **477.2** 1049.8 |
| 240/630 | **630** 24.8031 | **920** 36.2205 | **290** 11.4173 | **9010** 2030000 | **18700** 4200000 | YMB | **6** 0.2 | **691** 27.2 | **857** 33.7 | 0.28 | 2.41 | 3.59 | 2.36 | 0.120 | 270 | 250 | 600 | **647.8** 1425.2 |
| 240/630 | **630** 24.8031 | **920** 36.2205 | **290** 11.4173 | **9010** 2030000 | **18700** 4200000 | YMD | **6** 0.2 | **691** 27.2 | **857** 33.7 | 0.28 | 2.41 | 3.59 | 2.36 | 0.120 | 270 | 250 | 600 | **647.1** 1423.6 |
| 231/630 | **630** 24.8031 | **1030** 40.5512 | **315** 12.4016 | **11700** 2630000 | **21200** 4760000 | YMD | **6** 0.2 | **715** 28.2 | **940** 37.0 | 0.29 | 2.30 | 3.42 | 2.25 | 0.124 | 260 | 240 | 600 | **1056.3** 2323.9 |
| 241/630 | **630** 24.8031 | **1030** 40.5512 | **400** 15.7480 | **14300** 3220000 | **27200** 6120000 | YMD | **6** 0.2 | **707** 27.8 | **940** 37.0 | 0.36 | 1.88 | 2.81 | 1.84 | 0.124 | 140 | 140 | 320 | **1294.5** 2845.0 |
| 238/670 | **670** 26.3780 | **820** 32.2835 | **112** 4.4094 | **2800** 630000 | **6870** 1550000 | YMB | **3** 0.1 | **709** 27.9 | **790** 31.1 | 0.11 | 5.96 | 8.88 | 5.83 | 0.121 | 210 | 190 | 710 | **125.5** 276.1 |
| 239/670 | **670** 26.3780 | **900** 35.4331 | **170** 6.6929 | **5100** 1150000 | **11000** 2480000 | YMB | **5** 0.2 | **727** 28.6 | **851** 33.5 | 0.16 | 4.15 | 6.18 | 4.06 | 0.124 | 410 | 350 | 740 | **306.7** 674.7 |
| 230/670 | **670** 26.3780 | **980** 38.5827 | **230** 9.0551 | **7890** 1770000 | **15800** 3540000 | YMB | **6** 0.2 | **744** 29.3 | **911** 35.9 | 0.22 | 3.12 | 4.65 | 3.05 | 0.126 | 380 | 330 | 690 | **596.0** 1311.2 |
| 240/670 | **670** 26.3780 | **980** 38.5827 | **308** 12.1260 | **10200** 2300000 | **21800** 4910000 | YMB | **6** 0.2 | **738** 29.1 | **910** 35.8 | 0.28 | 2.39 | 3.55 | 2.33 | 0.126 | 240 | 230 | 540 | **794.5** 1747.9 |
| 231/670 | **670** 26.3780 | **1090** 42.9134 | **336** 13.2283 | **12800** 2880000 | **23400** 5270000 | YMB | **6** 0.2 | **760** 30.0 | **995** 39.2 | 0.29 | 2.31 | 3.44 | 2.26 | 0.128 | 240 | 220 | 530 | **1247.0** 2743.3 |
| 241/670 | **670** 26.3780 | **1090** 42.9134 | **412** 16.2205 | **15700** 3520000 | **30000** 6750000 | YMD | **6** 0.2 | **751** 29.6 | **996** 39.2 | 0.36 | 1.90 | 2.82 | 1.85 | 0.128 | 130 | 130 | 280 | **1513.4** 3329.5 |
| 232/670 | **670** 26.3780 | **1220** 48.0315 | **438** 17.2441 | **18800** 4220000 | **31800** 7140000 | YMD | **9** 0.4 | **779** 30.7 | **1097** 43.2 | 0.35 | 1.95 | 2.91 | 1.91 | 0.126 | 160 | 160 | 440 | **2181.4** 4799.1 |
| 239/710 | **710** 27.9528 | **950** 37.4016 | **180** 7.0866 | **5570** 1250000 | **12400** 2780000 | YMB | **5** 0.2 | **771** 30.4 | **898** 35.3 | 0.16 | 4.13 | 6.15 | 4.04 | 0.129 | 380 | 330 | 690 | **360.6** 793.3 |
| 230/710 | **710** 27.9528 | **1030** 40.5512 | **236** 9.2913 | **8370** 1880000 | **16700** 3750000 | YMB | **6** 0.2 | **785** 30.9 | **960** 37.8 | 0.21 | 3.26 | 4.86 | 3.19 | 0.130 | 350 | 310 | 620 | **658.8** 1449.4 |
| 240/710 | **710** 27.9528 | **1030** 40.5512 | **315** 12.4016 | **10900** 2440000 | **23100** 5200000 | YMD | **6** 0.2 | **779** 30.7 | **960** 37.8 | 0.27 | 2.49 | 3.71 | 2.44 | 0.130 | 230 | 210 | 530 | **865.2** 1903.5 |
| 231/710 | **710** 27.9528 | **1150** 45.2756 | **345** 13.5827 | **13800** 3110000 | **26000** 5850000 | YMB | **7** 0.3 | **809** 31.8 | **1048** 41.3 | 0.28 | 2.38 | 3.54 | 2.32 | 0.133 | 220 | 200 | 500 | **1382.7** 3042.0 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

*Continued on next page.*

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARINGS – *continued*

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

*Continued from previous page.*

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | Dynamic $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | Dynamic $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | Static In All Cases $Y_0$ | | Thermal Reference Speed[4] Oil | Thermal Reference Speed[4] Grease | Limiting Speed[5] | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 241/710 | **710** 27.9528 | **1150** 45.2756 | **438** 17.2441 | **17400** 3910000 | **33800** 7590000 | YMD | **7** 0.3 | **795** 31.3 | **1051** 41.4 | 0.36 | 1.89 | 2.81 | 1.84 | 0.133 | 120 | 110 | 260 | **1754.7** 3860.5 |
| 232/710 | **710** 27.9528 | **1280** 50.3937 | **450** 17.7165 | **20200** 4550000 | **35300** 7950000 | YMD | **9** 0.4 | **827** 32.6 | **1149** 45.2 | 0.34 | 1.97 | 2.93 | 1.93 | 0.131 | 150 | 140 | 420 | **2478.4** 5452.4 |
| 238/750 | **750** 29.5276 | **920** 36.2205 | **128** 5.0394 | **3430** 771000 | **8460** 1900000 | YMB | **4** 0.2 | **795** 31.3 | **886** 34.9 | 0.12 | 5.80 | 8.64 | 5.68 | 0.130 | 180 | 170 | 600 | **182.7** 401.9 |
| 239/750 | **750** 29.5276 | **1000** 39.3701 | **185** 7.2835 | **6010** 1350000 | **13400** 3000000 | YMB | **5** 0.2 | **813** 32.0 | **946** 37.3 | 0.16 | 4.23 | 6.30 | 4.14 | 0.133 | 350 | 310 | 650 | **405.7** 892.6 |
| 230/750 | **750** 29.5276 | **1090** 42.9134 | **250** 9.8425 | **9330** 2100000 | **18700** 4210000 | YMB | **6** 0.2 | **830** 32.7 | **1016** 40.0 | 0.21 | 3.26 | 4.85 | 3.18 | 0.135 | 330 | 290 | 600 | **786.0** 1729.2 |
| 240/750 | **750** 29.5276 | **1090** 42.9134 | **335** 13.1890 | **12200** 2730000 | **26100** 5870000 | YMD | **6** 0.2 | **824** 32.4 | **1015** 40.0 | 0.27 | 2.48 | 3.69 | 2.42 | 0.135 | 210 | 190 | 490 | **1049.2** 2308.2 |
| 241/750 | **750** 29.5276 | **1220** 48.0315 | **475** 18.7008 | **19800** 4450000 | **38700** 8700000 | YMD | **7** 0.3 | **839** 33.0 | **1114** 43.9 | 0.36 | 1.86 | 2.77 | 1.82 | 0.131 | 110 | 100 | 250 | **2144.4** 4717.6 |
| 239/800 | **800** 31.4961 | **1060** 41.7323 | **195** 7.6772 | **6600** 1480000 | **15000** 3380000 | YMB | **5** 0.2 | **866** 34.1 | **1004** 39.5 | 0.16 | 4.27 | 6.36 | 4.17 | 0.138 | 320 | 280 | 600 | **474.2** 1043.2 |
| 249/800 | **800** 31.4961 | **1060** 41.7323 | **258** 10.1575 | **8080** 1820000 | **19800** 4450000 | YMB | **5** 0.2 | **863** 34.0 | **999** 39.3 | 0.21 | 3.25 | 4.84 | 3.18 | 0.136 | 140 | 130 | 430 | **612.7** 1347.9 |
| 230/800 | **800** 31.4961 | **1150** 45.2756 | **258** 10.1575 | **10200** 2300000 | **21100** 4750000 | YMB | **6** 0.2 | **888** 35.0 | **1075** 42.3 | 0.19 | 3.50 | 5.22 | 3.43 | 0.140 | 300 | 260 | 480 | **860.7** 1893.5 |
| 230/800 | **800** 31.4961 | **1150** 45.2756 | **258** 10.1575 | **10200** 2300000 | **21100** 4750000 | YMD | **6** 0.2 | **888** 35.0 | **1075** 42.3 | 0.19 | 3.50 | 5.22 | 3.43 | 0.140 | 300 | 260 | 480 | **887.2** 1951.8 |
| 240/800 | **800** 31.4961 | **1150** 45.2756 | **345** 13.5827 | **13000** 2920000 | **28600** 6420000 | YMD | **6** 0.2 | **877** 34.5 | **1072** 42.2 | 0.26 | 2.55 | 3.80 | 2.50 | 0.140 | 190 | 180 | 460 | **1181.1** 2598.4 |
| 231/800 | **800** 31.4961 | **1280** 50.3937 | **375** 14.7638 | **16600** 3730000 | **31400** 7060000 | YMB | **7** 0.3 | **905** 35.6 | **1172** 46.1 | 0.28 | 2.45 | 3.65 | 2.40 | 0.136 | 180 | 170 | 430 | **1887.0** 4151.4 |
| 241/800 | **800** 31.4961 | **1280** 50.3937 | **475** 18.7008 | **20000** 4490000 | **39200** 8810000 | YMD | **7** 0.3 | **894** 35.2 | **1173** 46.2 | 0.34 | 1.96 | 2.93 | 1.92 | 0.135 | 100 | 100 | 230 | **2320.8** 5105.9 |
| 232/800 | **800** 31.4961 | **1420** 55.9056 | **488** 19.2126 | **23900** 5370000 | **43600** 9800000 | YMD | **11** 0.4 | **935** 36.8 | **1272** 50.1 | 0.33 | 2.04 | 3.03 | 1.99 | 0.140 | 130 | 120 | 400 | **3310.0** 7282.0 |
| 238/850 | **850** 33.4646 | **1030** 40.5512 | **136** 5.3543 | **3920** 881000 | **10400** 2330000 | YMB | **4** 0.2 | **900** 35.4 | **993** 39.1 | 0.11 | 6.23 | 9.27 | 6.09 | 0.141 | 150 | 140 | 570 | **235.7** 518.5 |
| 239/850 | **850** 33.4646 | **1120** 44.0945 | **200** 7.8740 | **7120** 1600000 | **16200** 3650000 | YMB | **5** 0.2 | **918** 36.1 | **1063** 41.9 | 0.15 | 4.40 | 6.56 | 4.31 | 0.144 | 300 | 260 | 580 | **552.7** 1215.9 |
| 249/850 | **850** 33.4646 | **1120** 44.0945 | **272** 10.7087 | **8950** 2010000 | **22000** 4950000 | YMB | **5** 0.2 | **913** 36.0 | **1057** 41.6 | 0.21 | 3.24 | 4.82 | 3.16 | 0.141 | 120 | 120 | 440 | **708.0** 1557.6 |

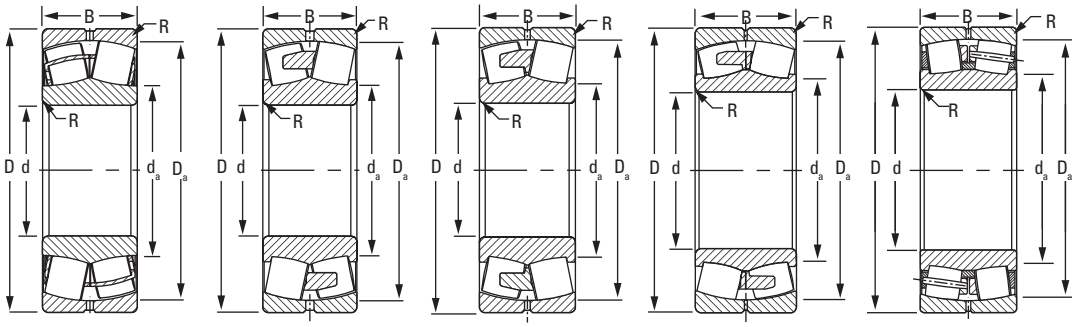
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.




EJ EM/YM EMB/YMB YMD YP

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | Dynamic $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | Dynamic $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | Static In All Cases $Y_0$ | | Thermal Reference Speed[4] Oil | Thermal Reference Speed[4] Grease | Limiting Speed[5] | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 230/850 | **850** 33.4646 | **1220** 48.0315 | **272** 10.7087 | **11100** 2500000 | **23000** 5180000 | YMB | **6** 0.2 | **938** 36.9 | **1139** 44.8 | 0.20 | 3.37 | 5.02 | 3.30 | 0.138 | 280 | 250 | 500 | **1048.0** 2305.6 |
| 240/850 | **850** 33.4646 | **1220** 48.0315 | **365** 14.3701 | **14500** 3260000 | **32200** 7240000 | YMD | **6** 0.2 | **931** 36.7 | **1138** 44.8 | 0.26 | 2.56 | 3.81 | 2.50 | 0.138 | 170 | 160 | 420 | **1401.9** 3084.2 |
| 231/850 | **850** 33.4646 | **1360** 53.5433 | **400** 15.7480 | **18600** 4190000 | **35700** 8020000 | YMB | **9** 0.4 | **962** 37.9 | **1245** 49.0 | 0.28 | 2.44 | 3.63 | 2.39 | 0.141 | 170 | 160 | 400 | **2219.0** 4892.0 |
| 232/850 | **850** 33.4646 | **1500** 59.0551 | **515** 20.2756 | **25600** 5750000 | **47100** 10600000 | YMD | **11** 0.4 | **990** 39.0 | **1347** 53.1 | 0.33 | 2.06 | 3.06 | 2.01 | 0.145 | 120 | 110 | 340 | **3950.8** 8691.8 |
| 239/900 | **900** 35.4331 | **1180** 46.4567 | **206** 8.1102 | **7710** 1730000 | **18100** 4060000 | YMB | **5** 0.2 | **965** 38.0 | **1112** 43.8 | 0.14 | 4.69 | 6.98 | 4.58 | 0.150 | 270 | 240 | 510 | **677.4** 1490.3 |
| 249/900 | **900** 35.4331 | **1180** 46.4567 | **280** 11.0236 | **9480** 2130000 | **23500** 5290000 | YMB | **5** 0.2 | **965** 38.0 | **1113** 43.8 | 0.20 | 3.33 | 4.96 | 3.25 | 0.146 | 120 | 110 | 400 | **811.6** 1785.5 |
| 230/900 | **900** 35.4331 | **1280** 50.3937 | **280** 11.0236 | **12200** 2740000 | **25500** 5740000 | YMB | **6** 0.2 | **989** 39.0 | **1198** 47.2 | 0.20 | 3.41 | 5.08 | 3.33 | 0.143 | 250 | 230 | 460 | **1130.2** 2486.5 |
| 240/900 | **900** 35.4331 | **1280** 50.3937 | **375** 14.7638 | **15700** 3530000 | **35200** 7900000 | YMD | **6** 0.2 | **983** 38.7 | **1198** 47.1 | 0.26 | 2.60 | 3.87 | 2.54 | 0.143 | 160 | 150 | 390 | **1557.0** 3425.1 |
| 231/900 | **900** 35.4331 | **1420** 55.9055 | **412** 16.2205 | **19700** 4420000 | **38900** 8730000 | YMB | **9** 0.4 | **1017** 40.0 | **1301** 51.2 | 0.27 | 2.49 | 3.71 | 2.43 | 0.146 | 150 | 150 | 380 | **2446.0** 5393.0 |
| 241/900 | **900** 35.4331 | **1420** 55.9055 | **515** 20.2756 | **24100** 5430000 | **50300** 11300000 | YMD | **9** 0.4 | **1007** 39.7 | **1299** 51.2 | 0.34 | 2.00 | 2.98 | 1.96 | 0.146 | 80 | 80 | 200 | **3054.3** 6719.6 |
| 232/900 | **900** 35.4331 | **1580** 62.2047 | **515** 20.2756 | **27700** 6230000 | **52300** 11800000 | YMD | **11** 0.4 | **1058** 41.6 | **1417** 55.8 | 0.31 | 2.16 | 3.22 | 2.12 | 0.152 | 100 | 100 | 320 | **4302.0** 9464.4 |
| 239/950 | **950** 37.4016 | **1250** 49.2126 | **224** 8.8189 | **8690** 1950000 | **20400** 4580000 | YMB | **6** 0.2 | **1026** 40.4 | **1186** 46.7 | 0.15 | 4.43 | 6.60 | 4.33 | 0.146 | 260 | 230 | 500 | **712.7** 1567.9 |
| 230/950 | **950** 37.4016 | **1360** 53.5433 | **300** 11.8110 | **13600** 3060000 | **28500** 6410000 | YMB | **6** 0.2 | **1047** 41.2 | **1271** 50.0 | 0.20 | 3.42 | 5.09 | 3.34 | 0.148 | 240 | 210 | 450 | **1428.6** 3142.9 |
| 230/950 | **950** 37.4016 | **1360** 53.5433 | **300** 11.8110 | **13600** 3060000 | **28500** 6410000 | YMD | **6** 0.2 | **1047** 41.2 | **1271** 50.0 | 0.20 | 3.42 | 5.09 | 3.34 | 0.148 | 240 | 210 | 450 | **1530.4** 3366.8 |
| 240/950 | **950** 37.4016 | **1360** 53.5433 | **412** 16.2205 | **18100** 4070000 | **40800** 9180000 | YMD | **6** 0.2 | **1039** 40.9 | **1270** 50.0 | 0.27 | 2.53 | 3.77 | 2.47 | 0.148 | 150 | 140 | 380 | **1921.0** 4225.3 |
| 231/950 | **950** 37.4016 | **1500** 59.0551 | **438** 17.2441 | **22000** 4950000 | **43900** 9880000 | YMB | **9** 0.4 | **1074** 42.3 | **1373** 54.1 | 0.27 | 2.47 | 3.68 | 2.42 | 0.151 | 140 | 130 | 350 | **2905.0** 6404.0 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

*Continued on next page.*

[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARINGS – *continued*

- Shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog and the Timken Engineering Manual (order no. 10424).
- Bearings are available with a tapered bore for adapter-type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).
- Consult your Timken sales engineer for up-to-date information about the availability of the bearings you have selected.

*Continued from previous page.*

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Backing Diameter Shaft $d_a$ | Backing Diameter Housing $D_a$ | e | Dynamic $\frac{F_a}{F_r} \le e$ $X = 1$ $Y_1$ | Dynamic $\frac{F_a}{F_r} > e$ $X = 0.67$ $Y_2$ | Static In All Cases $Y_0$ | | Thermal Reference Speed[4] Oil | Thermal Reference Speed[4] Grease | Limiting Speed[5] | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 241/950 | **950** 37.4016 | **1500** 59.0551 | **545** 21.4567 | **26800** 6030000 | **56400** 12700000 | YMD | **9** 0.4 | **1064** 41.9 | **1372** 54.0 | 0.34 | 2.00 | 2.97 | 1.95 | 0.151 | 80 | 70 | 180 | **3615.0** 7969.0 |
| 238/1000 | **1000** 39.3701 | **1220** 48.0315 | **165** 6.4961 | **5270** 1190000 | **14100** 3180000 | YMB | **5** 0.2 | **1049** 41.3 | **1169** 46.0 | 0.12 | 5.83 | 8.67 | 5.70 | 0.148 | 120 | 110 | 440 | **409.2** 900.3 |
| 239/1000 | **1000** 39.3701 | **1320** 51.9685 | **236** 9.2913 | **9770** 2200000 | **22800** 5120000 | YMB | **6** 0.2 | **1080** 42.5 | **1252** 49.3 | 0.15 | 4.39 | 6.54 | 4.29 | 0.152 | 240 | 210 | 480 | **862.0** 1901.0 |
| 230/1000 | **1000** 39.3701 | **1420** 55.9055 | **308** 12.1260 | **14600** 3290000 | **31700** 7120000 | YMB | **6** 0.2 | **1101** 43.4 | **1327** 52.3 | 0.20 | 3.44 | 5.12 | 3.36 | 0.153 | 220 | 200 | 400 | **1541.0** 3397.0 |
| 240/1000 | **1000** 39.3701 | **1420** 55.9055 | **412** 16.2205 | **18300** 4110000 | **41300** 9270000 | YMD | **6** 0.2 | **1093** 43.1 | **1330** 52.4 | 0.25 | 2.69 | 4.01 | 2.63 | 0.154 | 140 | 130 | 320 | **2087.1** 4591.6 |
| 231/1000 | **1000** 39.3701 | **1580** 62.2047 | **462** 18.1890 | **24400** 5480000 | **49000** 11000000 | YMB | **9** 0.4 | **1131** 44.5 | **1446** 56.9 | 0.27 | 2.47 | 3.68 | 2.42 | 0.156 | 130 | 120 | 330 | **3403.0** 7502.0 |
| 241/1000 | **1000** 39.3701 | **1580** 62.2047 | **580** 22.8346 | **29800** 6700000 | **61400** 13800000 | YMD | **9** 0.4 | **1114** 43.9 | **1451** 57.1 | 0.33 | 2.02 | 3.01 | 1.98 | 0.156 | 70 | 70 | 160 | **4276.4** 9408.1 |
| 238/1060 | **1060** 41.7323 | **1280** 50.3937 | **165** 6.4961 | **5340** 1200000 | **14600** 3290000 | YMD | **5** 0.2 | **1122** 44.2 | **1233** 48.6 | 0.11 | 6.23 | 9.27 | 6.09 | 0.153 | 120 | 110 | 440 | **432.6** 951.7 |
| 239/1060 | **1060** 41.7323 | **1400** 55.1181 | **250** 9.8425 | **10700** 2410000 | **25800** 5810000 | YMB | **6** 0.2 | **1149** 45.3 | **1324** 52.1 | 0.15 | 4.43 | 6.60 | 4.33 | 0.157 | 220 | 190 | 450 | **1056.4** 2324.1 |
| 230/1060 | **1060** 41.7323 | **1500** 59.0551 | **325** 12.7953 | **16200** 3650000 | **35300** 7930000 | YMB | **7** 0.3 | **1165** 45.9 | **1404** 55.3 | 0.20 | 3.44 | 5.12 | 3.36 | 0.159 | 200 | 180 | 390 | **1802.0** 3972.0 |
| 240/1060 | **1060** 41.7323 | **1500** 59.0551 | **438** 17.2441 | **20200** 4550000 | **47300** 10600000 | YMD | **7** 0.3 | **1160** 45.7 | **1401** 55.2 | 0.26 | 2.63 | 3.91 | 2.57 | 0.158 | 130 | 120 | 340 | **2470.5** 5435.1 |
| 231/1060 | **1060** 41.7323 | **1660** 65.3543 | **475** 18.7008 | **26300** 5920000 | **53000** 11900000 | YMB | **11** 0.4 | **1193** 47.0 | **1525** 60.0 | 0.27 | 2.53 | 3.77 | 2.48 | 0.162 | 120 | 110 | 310 | **3815.0** 8412.0 |
| 239/1120 | **1120** 44.0945 | **1460** 57.4803 | **250** 9.8425 | **11200** 2530000 | **26700** 6010000 | YMB | **6** 0.2 | **1204** 47.42 | **1390** 54.7 | 0.15 | 4.62 | 6.87 | 4.51 | 0.162 | 190 | 170 | 370 | **1079.0** 2373.8 |
| 230/1120 | **1120** 44.0945 | **1580** 62.2047 | **345** 13.5827 | **16700** 3750000 | **36700** 8260000 | YMD | **9** 0.4 | **1237** 48.7 | **1480** 58.3 | 0.20 | 3.41 | 5.08 | 3.33 | 0.164 | 190 | 170 | 380 | **2109.0** 4649.0 |
| 240/1120 | **1120** 44.0945 | **1580** 62.2047 | **462** 18.1890 | **22100** 4970000 | **52100** 11700000 | YMB | **7** 0.3 | **1224** 48.2 | **1476** 58.1 | 0.26 | 2.62 | 3.90 | 2.56 | 0.164 | 120 | 110 | 290 | **2824.0** 6226.0 |
| 231/1120 | **1120** 44.0945 | **1750** 68.8976 | **475** 18.7008 | **27700** 6230000 | **55500** 12500000 | YMB | **11** 0.4 | **1261** 49.7 | **1609** 63.4 | 0.25 | 2.67 | 3.98 | 2.62 | 0.167 | 110 | 110 | 290 | **4227.0** 9319.0 |
| 238/1180 | **1180** 46.4567 | **1420** 55.9055 | **180** 7.0866 | **6330** 1420000 | **17600** 3960000 | YMB | **5** 0.2 | **1243** 48.9 | **1365** 53.7 | 0.11 | 6.36 | 9.46 | 6.21 | 0.145 | 100 | 90 | 370 | **545.8** 1200.9 |
| 239/1180 | **1180** 46.4567 | **1540** 60.6300 | **288** 11.3386 | **12700** 2860000 | **31000** 6970000 | YMB | **6** 0.2 | **1271** 50.0 | **1464** 57.6 | 0.15 | 4.51 | 6.71 | 4.41 | 0.168 | 190 | 170 | 410 | **1331.5** 2929.4 |

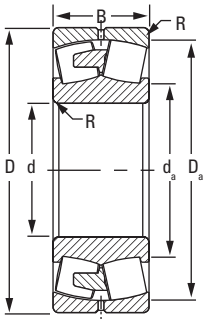
[1]Maximum shaft or housing fillet radius that bearing corners will clear.

[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.

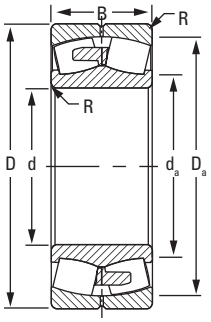
[3]Geometry constant for Lubrication Life Factor a31 is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).

[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.

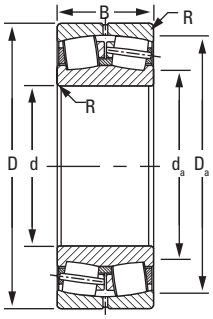
[5]See limiting speed on page 51.




**EMB/YMB**




**YMD**

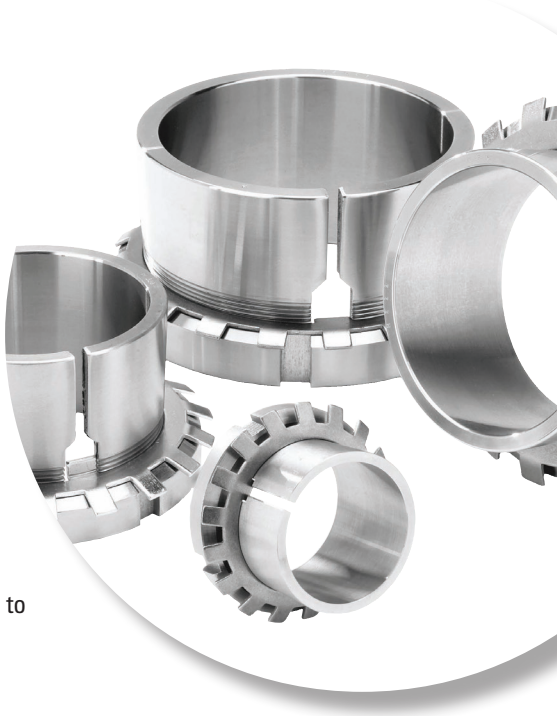



**YP**

| Bearing Part Number | Bearing Dimensions | | | Load Ratings | | Cage Type | Mounting Data | | | Equivalent Radial Load Factors[2] | | | | Geometry Factor[3] $C_g$ | Speed Reference | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Backing Diameter | | Dynamic | | | Static | | Thermal Reference Speed[4] | | Limiting Speed[5] | |
| | Bore d | O.D. D | Width B | Dynamic C | Static $C_o$ | | Fillet[1] (Max.) R | Shaft $d_a$ | Housing $D_a$ | e | $\frac{F_a}{F_r} \le e$ X = 1 $Y_1$ | $\frac{F_a}{F_r} > e$ X = 0.67 $Y_2$ | In All Cases $Y_0$ | | Oil | Grease | | |
| | **mm** in. | **mm** in. | **mm** in. | **kN** lbf. | **kN** lbf. | | **mm** in. | **mm** in. | **mm** in. | | | | | | RPM | RPM | RPM | **kg** lbs. |
| 230/1180 | **1180** 46.4567 | **1660** 65.3543 | **355** 13.9764 | **19200** 4320000 | **43200** 9700000 | YMD | **7** 0.3 | **1293** 50.9 | **1558** 61.34 | 0.19 | 3.50 | 5.21 | 3.42 | 0.170 | 170 | 160 | 340 | **2447.9** 5385.4 |
| 240/1180 | **1180** 46.4567 | **1660** 65.3543 | **475** 18.7008 | **23700** 5320000 | **56000** 12600000 | YMD | **7** 0.3 | **1289** 50.7 | **1553** 61.1 | 0.25 | 2.69 | 4.00 | 2.63 | 0.169 | 110 | 100 | 290 | **3228.3** 7102.3 |
| 231/1180 | **1180** 46.4567 | **1850** 72.8346 | **500** 19.6850 | **30600** 6890000 | **61700** 13900000 | YMB | **11** 0.4 | **1332** 52.4 | **1699** 66.9 | 0.25 | 2.68 | 4.00 | 2.62 | 0.173 | 100 | 100 | 270 | **4996.0** 11014.0 |
| 230/1250 | **1250** 49.2126 | **1750** 68.8976 | **375** 14.7638 | **20700** 4660000 | **46300** 10400000 | YMB | **7** 0.3 | **1370** 54.0 | **1642** 64.6 | 0.19 | 3.56 | 5.30 | 3.48 | 0.175 | 160 | 150 | 310 | **2769.0** 6091.8 |
| 240/1250 | **1250** 49.2126 | **1750** 68.8976 | **500** 19.6850 | **27200** 6120000 | **65800** 14800000 | YMB | **7** 0.3 | **1362** 53.6 | **1640** 64.6 | 0.25 | 2.68 | 3.99 | 2.62 | 0.176 | 100 | 90 | 250 | **3691.0** 8120.2 |
| 231/1250 | **1250** 49.2126 | **1950** 76.7717 | **530** 20.8661 | **34100** 7660000 | **69300** 15600000 | YMB | **11** 0.4 | **1406** 55.4 | **1795** 70.7 | 0.25 | 2.67 | 3.98 | 2.62 | 0.179 | 90 | 90 | 250 | **5843.0** 12854.6 |
| 249/1500 | **1500** 59.0551 | **1950** 76.7717 | **450** 17.7165 | **22700** 5110000 | **61500** 13800000 | YMD | **7** 0.3 | **1611** 63.4 | **1845** 72.6 | 0.20 | 3.43 | 5.10 | 3.35 | 0.191 | 50 | 50 | 190 | **3407.0** 7495.4 |

[1]Maximum shaft or housing fillet radius that bearing corners will clear.
[2]These factors apply for both inch and metric calculations. See engineering section for instructions on use.
[3]Geometry constant for Lubrication Life Factor $a_{31}$ is found in the Bearing Ratings section of the Engineering Manual (order no. 10424).
[4]See thermal reference speed in the Engineering Manual (order no. 10424) and on page 61.
[5]See limiting speed on page 51.

# SPHERICAL ROLLER BEARING METRIC AND INCH ACCESSORIES



Spherical roller bearing accessories are manufactured to the same quality standards as our bearings, ensuring a secure fit to straight and stepped shafts.

- **Sizes**: Accessories are available for metric and inch shaft sizes from 20 mm (0.78 inch) to 1000 mm (40 inch).
- **Features**: Extensive product range, including hydraulic assist, for integration into a full range of industrial applications.
- **Benefits**: Supports full range of installation and removal needs, minimizing the chance for damage to the bearing.


Nomenclature . . . . . 86
Accessories Prefixes and Suffixes . . . . . 87
Inch Sine Bar Gages . . . . . 88

METRIC ACCESSORIES
Metric Accessories Index . . . . . 89
Metric H Adapter Sleeves . . . . . 95
Metric HE Adapter Sleeves for Inch Shaft . . . . . 99
Metric HA Adapter Sleeves for Inch Shaft . . . . . 101
Metric OH Hydraulic Adapter Sleeves . . . . . 103
Metric AH Withdrawal Sleeves . . . . . 107
Metric AOH Hydraulic Withdrawal Sleeves . . . . . 112
Metric HMV Hydraulic Nuts . . . . . 117
Metric Locknuts . . . . . 121
Metric Lockwashers . . . . . 127
Metric Lockplates . . . . . 129

INCH ACCESSORIES
Inch Accessories – Pull-Type Sleeves . . . . . 131
Inch Accessories – Push-Type Sleeves . . . . . 140
Inch Accessories – Locknuts and Lockwashers . . . . . 144
Inch Accessories – Locknuts and Lockplates . . . . . 148
Inch HMVC Hydraulic Nuts . . . . . 152

# *NOMENCLATURE*

Timken provides accessories for your every need. To complement our line of Timken® spherical roller bearings, we offer bearing sleeves and locking devices in a wide range of sizes. These accessories are manufactured to the same quality standards as our bearings, ensuring a secure fit to straight and stepped shafts. Available in sizes up to 1000 mm (39.3701 inch), bearing sleeves are available in two distinct designs: assembled adapter sleeves and adapter sleeve assemblies.

## ADAPTER SLEEVES

Timken adapter sleeves are used in conjunction with a nut and locking device to mount a tapered bore bearing onto a straight shaft using a pull-type fit. Smaller size assemblies (20 mm [0.78 inch] - 200 mm [12 inch] shaft) commonly use simple nuts, whereas larger assemblies (sizes >200 mm [12 inch]) may use HMV hydraulic nuts to assist in mounting. Tables 28, 29 and 30 outline our part number nomenclature, which is consistent with world standards for adapter sleeves.

**TABLE 28. METRIC ADAPTER SLEEVES (H, OH) FOR METRIC SHAFT SIZES ARE SUPPLIED WITH CORRESPONDING LOCKNUT AND LOCKING DEVICE**

| Sleeve | Locknut | Locking Device |
|---|---|---|
| H standard metric/ OH hydraulic assist | KM, KML, HM | MB, MBL, MS |

**TABLE 29. METRIC ADAPTER SLEEVES (HA, HE) FOR INCH SHAFT SIZES ARE SUPPLIED WITH CORRESPONDING LOCKNUT AND LOCKING DEVICE**

| Sleeve | Locknut | Locking Device |
|---|---|---|
| HE standard inch (English Standard)<br>HA standard inch (American standard) | KM, KML | MB, MBL |

**TABLE 30. INCH ADAPTER SLEEVES (SNW, SNP) FOR INCH SHAFT SIZES ARE SUPPLIED WITH CORRESPONDING LOCKNUT AND LOCKING DEVICE**

| Assembly | Sleeve | Locknut | Locking Device |
|---|---|---|---|
| SNW | S | N, AN | W |
| SNP | S | N | P |

SNW assembly consists of a sleeve, locknut and lockwasher.
SNP assembly consists of a sleeve, locknut and lockplate.

## WITHDRAWAL SLEEVES

Withdrawal sleeves feature a push-type mounting arrangement and a locking device (i.e., locknut or lockplate) to secure a bearing to a shaft. This design is not as widely used as the adapter sleeve assembly, and it does require the use of a specially designed dismounting nut. Timken's part number nomenclature for withdrawal sleeves also conforms to industry-accepted standards. Nuts are not supplied with the withdrawal sleeve and must be ordered separately. The dismounting of large assemblies can be eased by using a hydraulic nut (HMV).

**TABLE 31. METRIC WITHDRAWAL SLEEVE FOR METRIC SHAFT SIZES**

| Sleeve | Dismounting Nut | Hydraulic Nut |
|---|---|---|
| AH standard metric/AOH hydraulic assist | KM, HM | HMV |

**TABLE 32. INCH WITHDRAWAL SLEEVE FOR INCH SHAFT SIZES**

| Sleeve | Locknut | Lockwasher/Plate | Dismounting Nut |
|---|---|---|---|
| SK | N, AN | W, P | AN, ARN, RN, N |

## LOCKING DEVICE

Timken offers a wide range of locknuts to locate bearing assemblies on application shafts. Sometimes referred to as shaft or withdrawal nuts, they are used to secure the assembly onto, and sometimes aid with the removal from the shaft.

### LOCKWASHERS (MB, MBL AND W)

Locking washers are designed to secure the relative movement of a properly positioned locknut, so that a bearing and adapter sleeve remain tightly fitted to a shaft or a bearing remains secure against a shaft shoulder. The tab in the bore of the washer engages a keyway in the shaft or slot in the adapter sleeve. There are tabs on the O.D. of the washer that can be bent over into slots on the circumference of the locknut. Locking washers are used with locknuts in the KM and KML series as well as for the locknuts with inch dimensions in the N and AN series.

### LOCKPLATES (MS AND P)

Lockplates are bolted onto the outboard face of the locknut and fit into a keyway machined in the shaft or a slot in the adapter sleeve.

- MS series are mounted on metric shafts sizes with HM locknuts.
- P series are mounted on metric shafts sizes with N locknuts.

To learn more about our spherical roller bearing accessories, contact your Timken sales engineer. Standard suffixes and prefixes are found on page 87.

# ACCESSORIES PREFIXES AND SUFFIXES

| Prefix | Suffix | Part Description | Full Description |
|---|---|---|---|
| AH | | Withdrawal sleeve | Withdrawal sleeve |
| AHX | | Withdrawal sleeve | Withdrawal sleeve – modified |
| AOH | | Withdrawal sleeve – hydraulic | Withdrawal sleeve with oil hole on nut end |
| AOHX | | Withdrawal sleeve – hydraulic | Withdrawal sleeve – modified with oil hole on nut end |
| H | | Adapter sleeve – metric | Adapter sleeve |
| OH | | Adapter sleeve – hydraulic | Adapter sleeve with oil hole on large end (opposite to the threaded end) |
| HA | | Adapter sleeve metric – inch shaft | Metric adapter sleeves for shafts with inch dimensions (American standards) |
| HE | | Adapter sleeve metric – inch shaft | Metric adapter sleeves for shafts with inch dimensions (English standards) |
| SNW | | Adapter sleeve – inch | Adapter sleeves, locknut and lockwasher with inch dimensions |
| SNP | | Adapter sleeve – inch | Adapter sleeves, locknut and lockplate with inch dimensions |
| KM | | Locknut | Locknut |
| KML | | Locknut | Locknut – light; smaller outside diameter |
| HM | | Locknut | Locknut/removal nut |
| HML | | Locknut | Locknut/removal nut – light |
| HME | | Locknut | Locknut/removal nut – with locking screw |
| HM….T | | Locknut | Locknut/removal nut |
| HML….T | | Locknut | Locknut/removal nut – light |
| HMLL… .T | | Locknut | Locknut/removal nut – super light |
| MB | | Lockwasher | Lockwasher |
| MBL | | Lockwasher | Lockwasher – light |
| MS | | Lock clip | Locking clip |
| | G | Sleeve | Thread pitch diameter changed to ISO standard |
| | H | Locknut | Additional threaded holes on locknut for locking screws (no screws) |
| | HS | Locknut | Additional threaded holes on locknut for locking screws and screws |
| OH.. | H | Adapter sleeve – hydraulic | Adapter sleeve with oil hole on nut end – standard design |
| OH.. | HB | Adapter sleeve – hydraulic | Adapter sleeve with grooves and oil hole or two holes for bigger sizes on nut end |
| OH.. | B | Adapter sleeve – hydraulic | Adapter sleeve with grooves and oil hole or two holes for bigger sizes on large end (opposite to the threaded end) |
| OH.. | S | Adapter sleeve – hydraulic | Adapter sleeve with oil hole on large end (opposite to the threaded end) plus nut with eight threaded holes |
| OH.. | BS | Adapter sleeve – hydraulic | Adapter sleeve with grooves and oil hole or two holes for bigger sizes on large end (opposite to the threaded end) plus nut with eight threaded holes |

# INCH SINE BAR GAGES

- Tapered-bore, antifriction bearings are mounted either on adapter sleeves or on tapered shaft seats.
- In cases where tapered bore bearings are mounted directly on the shaft, the shaft must conform to the tapered bore of the bearing to ensure a proper fit. If a proper fit is not achieved, the results could be:
  - Turning of the bearing inner race on the shaft.
  - Uneven loading of the bearing.
  - Severe inner race hoop stress.
  - Insufficient support (back-up) of the inner race on the shaft.
- All of these conditions could lead to premature bearing wear. Therefore, the manufacture, maintenance and measurement of accurate shaft tapers is important.
- There are two accepted ways of measuring tapered shafts: ring gages and sine bar gages.
- Precision measurement of tapered shafts is difficult with ring gages and may be impossible in the case of large shafts where gages are large, cumbersome and heavy.
- Sine bar gages provide an accurate and easy method of measurement.
- Lightweight, and easy to handle and use, sine bar gages achieve precise gaging of the shaft size and taper.
- A complete set for measurement of 1:12 shaft tapers consists of 3 inch, 4 inch, 5½ inch, 7 inch, 10 inch and 14 inch sine bar gages, sine bar saddle no. T-5491-C, web clamp no. T-5489-A and a wooden box no. T-5224-C. A complete set for 1:30 shaft tapers consists of 4 inch, 6 inch, 8 inch and 12 inch sine bar gages.
- Sine bars can be purchased individually or in any combination of sizes to meet your individual needs.
- All sine bars require a sine bar saddle and web clamp. A wooden box is optional.
- For information on the use of sine bars, prices and delivery, consult your Timken sales engineer.

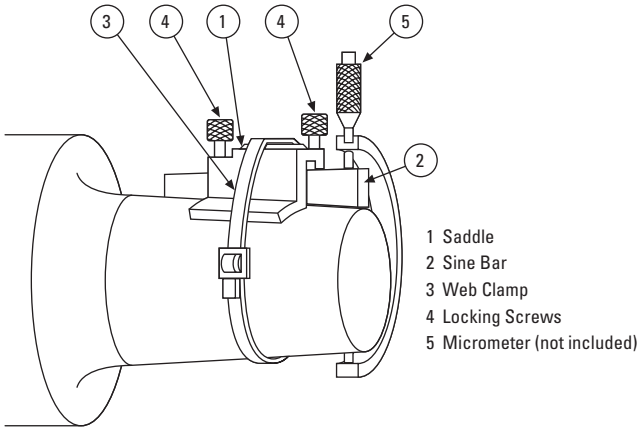



**Fig. 24. Parts of a sine gage.**

**TABLE 33.**

| Part Number | Size | For Bearings |
|---|---|---|
| | in. | |
| T-3071-C | 3.0000 | 22232K to 22240K |
| | 3.0000 | 22322K to 22328K |
| | 3.0000 | 23040K to 23048K |
| | 3.0000 | 23130K to 23136K |
| | 3.0000 | 23226K to 23230K |
| | | 23960K to 23972K |
| T-3072-C | 4.0000 | 22248K to 22256K |
| | 4.0000 | 22330K to 22340K |
| | 4.0000 | 23052K to 23076K |
| | 4.0000 | 23138K to 23148K |
| | 4.0000 | 23232K to 23240K |
| | | 23976K to 239/560K |
| T-3073-C | 5.5000 | 22260K to 22264K |
| | 5.5000 | 23080K to 230/500K |
| | 5.5000 | 23152K to 23164K |
| | 5.5000 | 23244K to 23256K |
| | | 239/600K to 239/710K |

Note: All sine bars require a sine bar saddle, T-5491-C, and a web clamp, T-5489-A.

**TABLE 34.**

| Part Number | Size | For Bearings |
|---|---|---|
| | in. | |
| T-3074-C | 7.0000 | 230/530K to 230/750K |
| | 7.0000 | 23168K to 23196K |
| | 7.0000 | 23260K to 23276K |
| | | 239/750K to 239/1120K |
| T-3075-C | 10.0000 | 230/800K to 230/1180 |
| | 10.0000 | 231/500K to 231/710K |
| | 10.0000 | 23280K to 232/530K |
| | | 230/1250 and up |
| T-3076-C | 14.0000 | 231/750K and up |
| | 14.0000 | 232/560K and up |
| | | 239/118K and up |
| T-5476-C | 4.0000 | 24040K to 24056K |
| | 4.0000 | 24132K to 24144K |
| T-5477-C | 6.0000 | 24060K to 24084K |
| | 6.0000 | 24148K to 24160K |
| T-5478-C | 8.0000 | 24089K to 240/630K |
| | 8.0000 | 24164K to 24192K |
| T-5479-C | 12.0000 | 240/670K and up |
| | 12.0000 | 24196K and up |

The table above represents the sine bar sizes developed for a full range of tapered bore bearings with a 1:12 and a 1:30 taper. Additional sizes are available to fit a variety of width-and-taper combinations. Consult your local Timken sales engineer for availability.

# METRIC ACCESSORIES INDEX

| Bearing Bore | Bearing Part Number | Adapter Sleeve | | Withdrawal Sleeve | |
|---|---|---|---|---|---|
| mm | | Metric Shaft | Hydraulic Metric Shaft | Metric Shaft | Hydraulic Metric Shaft |
| 25 | 22205K | H305 | | | |
| 30 | 22206K | H306 | | | |
| 35 | 22207K | H307 | | | |
| 40 | 21308K | H308 | | AH308 | |
| 40 | 22208K | H308 | | AH308 | |
| 40 | 22308K | H2308 | | AH2308 | |
| 45 | 21309K | H309 | | AH309 | |
| 45 | 22209K | H309 | | AH309 | |
| 45 | 22309K | H2309 | | AH2309 | |
| 50 | 21310K | H310 | | AHX310 | |
| 50 | 22210K | H310 | | AHX310 | |
| 50 | 22310K | H2310 | | AHX2310 | |
| 55 | 21311K | H311 | | AHX311 | |
| 55 | 22211K | H311 | | AHX311 | |
| 55 | 22311K | H2311 | | AHX2311 | |
| 60 | 21312K | H312 | | AHX312 | |
| 60 | 22212K | H312 | | AHX312 | |
| 60 | 22312K | H2312 | | AHX2312 | |
| 65 | 21313K | H313 | | AH313G | |
| 65 | 22213K | H313 | | AH313G | |
| 65 | 22313K | H2313 | | AH2313G | |
| 70 | 21314K | H314 | | AH314G | |
| 70 | 22214K | H314 | | AH314G | |
| 70 | 22314K | H2314 | | AHX2314G | |
| 75 | 21315K | H315 | | AH315G | |
| 75 | 22215K | H315 | | AH315G | |
| 75 | 22315K | H2315 | | AHX2315G | |
| 80 | 21316K | H316 | | AH316 | |
| 80 | 22216K | H316 | | AH316 | |
| 80 | 22316K | H2316 | | AHX2316 | |
| 85 | 21317K | H317 | | AHX317 | |
| 85 | 22217K | H317 | | AHX317 | |
| 85 | 22317K | H2317 | | AHX2317 | |
| 90 | 21318K | H318 | | AHX318 | |
| 90 | 22218K | H318 | | AHX318 | |
| 90 | 22318K | H2318 | | AHX2318 | |
| 90 | 23218K | H2318 | | AHX3218 | |
| 95 | 22219K | H319 | | AHX319 | |
| 95 | 22319K | H2319 | | AHX2319 | |
| 100 | 22220K | H320 | | AHX320 | |
| 100 | 22320K | H2320 | | AHX2320 | |
| 100 | 23120K | H3120 | | AHX3120 | |
| 100 | 23220K | H2320 | | AHX3220 | |
| 105 | 23221K | H2321 | | | |
| 110 | 22222K | H322 | | AHX3122 | |
| 110 | 22322K | H2322 | | AHX2322G | |
| 110 | 23022K | H322 | | AHX322 | |
| 110 | 23122K | H3122 | | AHX3122 | |
| 110 | 23222K | H2322 | | AHX3222G | |
| 110 | 24122K | | | AH24122 | |

*Continued on next page.*

# *METRIC ACCESSORIES INDEX* – *continued*

| Bearing Bore | Bearing Part Number | Adapter Sleeve | | Withdrawal Sleeve | |
|---|---|---|---|---|---|
| mm | | Metric Shaft | Hydraulic Metric Shaft | Metric Shaft | Hydraulic Metric Shaft |
| **120** | 22224K | H3124 | | AHX3124 | |
| **120** | 22324K | H2324 | | AHX2324G | |
| **120** | 23024K | H3024 | | AHX3024 | |
| **120** | 23124K | H3124 | | AHX3124 | |
| **120** | 23224K | H2324 | | AHX3224G | |
| **120** | 24024K | | | AH24024 | |
| **120** | 24124K | | | AH24124 | |
| **130** | 22226K | H3126 | | AHX3126 | |
| **130** | 22326K | H2326 | | AHX2326G | |
| **130** | 23026K | H3026 | | AHX3026 | |
| **130** | 23126K | H3126 | | AHX3126 | |
| **130** | 23226K | H2326 | | AHX3226G | |
| **130** | 23926K | H3926 | | | |
| **130** | 24026K | | | AH24026 | |
| **130** | 24126K | | | AH24126 | |
| **140** | 22228K | H3128 | | AHX3128 | |
| **140** | 22328K | H2328 | | AHX2328G | |
| **140** | 23028K | H3028 | | AHX3028 | |
| **140** | 23128K | H3128 | | AHX3128 | |
| **140** | 23228K | H2328 | | AHX3228G | |
| **140** | 23928K | H3928 | | | |
| **140** | 24028K | | | AH24028 | |
| **140** | 24128K | | | AH24128 | |
| **150** | 22230K | H3130 | | AHX3130G | |
| **150** | 22330K | H2330 | | AHX2330G | |
| **150** | 23030K | H3030 | | AHX3030 | |
| **150** | 23130K | H3130 | | AHX3130G | |
| **150** | 23230K | H2330 | | AHX3230G | |
| **150** | 23930K | H3930 | | | |
| **150** | 24030K | | | AH24030 | |
| **150** | 24130K | | | AH24130 | |
| **160** | 22232K | H3132 | OH3132H | AH3132G | AOH3132G |
| **160** | 22332K | H2332 | OH2332H | AH2332G | AOH2332G |
| **160** | 23032K | H3032 | OH3032H | AH3032 | |
| **160** | 23132K | H3132 | OH3132H | AH3132G | AOH3132G |
| **160** | 23232K | H2332 | OH2332H | AH3232G | AOH3232G |
| **160** | 23932K | H3932 | OH3932H | | |
| **160** | 24032K | | | AH24032 | |
| **160** | 24132K | | | AH24132 | |
| **170** | 22234K | H3134 | OH3134H | AH3134G | AOH3134G |
| **170** | 22334K | H2334 | OH2334H | AH2334G | AOH2334G |
| **170** | 23034K | H3034 | OH3034H | AH3034 | |
| **170** | 23134K | H3134 | OH3134H | AH3134G | AOH3134G |
| **170** | 23234K | H2334 | OH2334H | AH3234G | AOH3234G |
| **170** | 23934K | H3934 | OH3934H | AH3934 | AOH3934 |
| **170** | 24034K | | | AH24034 | |
| **170** | 24134K | | | AH24134 | |
| **180** | 22236K | H3136 | OH3136H | AH2236G | AOH2236G |
| **180** | 22336K | H2336 | OH2336H | AH2336G | AOH2336G |
| **180** | 23036K | H3036 | OH3036H | AH3036 | AOH3036 |

*Continued on next page.*

| Bearing Bore | Bearing Part Number | Adapter Sleeve | | Withdrawal Sleeve | |
|---|---|---|---|---|---|
| mm | | Metric Shaft | Hydraulic Metric Shaft | Metric Shaft | Hydraulic Metric Shaft |
| **180** | 23136K | H3136 | OH3136H | AH3136G | AOH3136G |
| **180** | 23236K | H2336 | OH2336H | AH3236G | AOH3236G |
| **180** | 23936K | H3936 | OH3936H | AH3936 | AOH3936 |
| **180** | 24036K | | | AH24036 | |
| **180** | 24136K | | | AH24136 | |
| **190** | 22238K | H3138 | OH3138H | AH2238G | AOH2238G |
| **190** | 22338K | H2338 | OH2338H | AH2338G | AOH2338G |
| **190** | 23038K | H3038 | OH3038H | AH3038G | AOH3038G |
| **190** | 23138K | H3138 | OH3138H | AH3138G | AOH3138G |
| **190** | 23238K | H2338 | OH2338H | AH3238G | AOH3238G |
| **190** | 23938K | H3938 | OH3938H | AH3938 | AOH3938 |
| **190** | 24038K | | | AH24038 | |
| **190** | 24138K | | | AH24138 | |
| **200** | 22240K | H3140 | OH3140H | AH2240 | AOH2240 |
| **200** | 22340K | H2340 | OH2340H | AH2340 | AOH2340 |
| **200** | 23040K | H3040 | OH3040H | AH3040G | AOH3040G |
| **200** | 23140K | H3140 | OH3140H | AH3140 | AOH3140 |
| **200** | 23240K | H2340 | OH2340H | AH3240 | AOH3240 |
| **200** | 23940K | H3940 | OH3940H | AH3940 | AOH3940 |
| **200** | 24040K | | | AH24040 | |
| **200** | 24140K | | | AH24140 | |
| **220** | 22244K | H3144 | OH3144H | AH2244 | AOH2244 |
| **220** | 22344K | H2344 | OH2344H | AH2344 | AOH2344 |
| **220** | 23044K | H3044 | OH3044H | AH3044G | AOH3044G |
| **220** | 23144K | H3144 | OH3144H | AH3144 | AOH3144 |
| **220** | 23244K | H2344 | OH2344H | AH2344 | AOH2344 |
| **220** | 23944K | H3944 | OH3944H | AH3944 | AOH3944 |
| **220** | 24044K | | | AH24044 | AOH24044 |
| **220** | 24144K | | | AH24144 | AOH24144 |
| **240** | 22248K | H3148 | OH3148H | AH2248 | AOH2248 |
| **240** | 22348K | H2348 | OH2348H | AH2348 | AOH2348 |
| **240** | 23048K | H3048 | OH3048H | AH3048 | AOH3048 |
| **240** | 23148K | H3148 | OH3148H | AH3148 | AOH3148 |
| **240** | 23248K | H2348 | OH2348H | AH2348 | AOH2348 |
| **240** | 23948K | H3948 | OH3948H | AH3948 | AOH3948 |
| **240** | 24048K | | | AH24048 | AOH24048 |
| **240** | 24148K | | | AH24148 | AOH24148 |
| **260** | 22252K | H3152 | OH3152H | AH2252G | AOH2252G |
| **260** | 22352K | H2352 | OH2352H | AH2352G | AOH2352G |
| **260** | 23052K | H3052 | OH3052H | AH3052 | AOH3052 |
| **260** | 23152K | H3152 | OH3152H | AH3152G | AOH3152G |
| **260** | 23252K | H2352 | OH2352H | AH2352G | AOH2352G |
| **260** | 23952K | H3952 | OH3952H | AH3952 | AOH3952 |
| **260** | 24052K | | | | AOH24052G |
| **260** | 24152K | | | AH24152 | AOH24152 |
| **280** | 22256K | H3156 | OH3156H | AH2256G | AOH2256G |
| **280** | 22356K | H2356 | OH2356H | AH2356G | AOH2356G |
| **280** | 23056K | H3056 | OH3056H | AH3056 | AOH3056 |
| **280** | 23156K | H3156 | OH3156H | AH3156G | AOH3156G |
| **280** | 23256K | H2356 | OH2356H | AH2356G | AOH2356G |
| **280** | 23956K | H3956 | OH3956H | AH3956 | AOH3956 |

*Continued on next page.*

# *METRIC ACCESSORIES INDEX* – *continued*

| Bearing Bore | Bearing Part Number | Adapter Sleeve | | Withdrawal Sleeve | |
|---|---|---|---|---|---|
| mm | | Metric Shaft | Hydraulic Metric Shaft | Metric Shaft | Hydraulic Metric Shaft |
| **280** | 24056K | | | | AOH24056G |
| **280** | 24156K | | | AH24156 | AOH24156 |
| **300** | 22260K | H3160 | OH3160H | AH2260G | AOH2260G |
| **300** | 23060K | H3060 | OH3060H | AH3060 | AOH3060 |
| **300** | 23160K | H3160 | OH3160H | AH3160G | AOH3160G |
| **300** | 23260K | H3260 | OH3260H | AH3260G | AOH3260G |
| **300** | 23960K | H3960 | OH3960H | AH3960 | AOH3960 |
| **300** | 24060K | | | | AOH24060G |
| **300** | 24160K | | | AH24160 | AOH24160 |
| **320** | 22264K | H3164 | OH3164H | AH2264G | AOH2264G |
| **320** | 23064K | H3064 | OH3064H | AH3064G | AOH3064G |
| **320** | 23164K | H3164 | OH3164H | AH3164G | AOH3164G |
| **320** | 23264K | H3264 | OH3264H | AH3264G | AOH3264G |
| **320** | 23964K | H3964 | OH3964H | AH3964 | AOH3964 |
| **320** | 24064K | | | | AOH24064G |
| **320** | 24164K | | | AH24164 | AOH24164 |
| **340** | 23068K | H3068 | OH3068H | AH3068G | AOH3068G |
| **340** | 23168K | H3168 | OH3168H | AH3168G | AOH3168G |
| **340** | 23268K | H3268 | OH3268H | AH3268G | AOH3268G |
| **340** | 23968K | H3968 | OH3968H | AH3968 | AOH3968 |
| **340** | 24068K | | | AH24068 | AOH24068 |
| **340** | 24168K | | | AH24168 | AOH24168 |
| **360** | 23072K | H3072 | OH3072H | AH3072G | AOH3072G |
| **360** | 23172K | H3172 | OH3172H | AH3172G | AOH3172G |
| **360** | 23272K | H3272 | OH3272H | AH3272G | AOH3272G |
| **360** | 23972K | H3972 | OH3972H | AH3972 | AOH3972 |
| **360** | 24072K | | | AH24072 | AOH24072 |
| **360** | 24172K | | | AH24172 | AOH24172 |
| **380** | 23076K | H3076 | OH3076H | AH3076G | AOH3076G |
| **380** | 23176K | H3176 | OH3176H | AH3176G | AOH3176G |
| **380** | 23276K | H3276 | OH3276H | AH3276G | AOH3276G |
| **380** | 23976K | H3976 | OH3976H | AH3976 | AOH3976 |
| **380** | 24076K | | | AH24076 | AOH24076 |
| **380** | 24176K | | | AH24176 | AOH24176 |
| **400** | 22380K | H3280 | OH3280H | AH3280G | AOH3280G |
| **400** | 23080K | H3080 | OH3080H | AH3080G | AOH3080G |
| **400** | 23180K | H3180 | OH3180H | AH3180G | AOH3180G |
| **400** | 23280K | H3280 | OH3280H | AH3280G | AOH3280G |
| **400** | 23980K | H3980 | OH3980H | AH3980 | AOH3980 |
| **400** | 24080K | | | AH24080 | AOH24080 |
| **400** | 24180K | | | AH24180 | AOH24180 |
| **420** | 23084K | H3084 | OH3084H | AH3084G | AOH3084G |
| **420** | 23184K | H3184 | OH3184H | AH3184G | AOH3184G |
| **420** | 23284K | H3284 | OH3284H | AH3284G | AOH3284G |
| **420** | 23984K | H3984 | OH3984H | AH3984 | AOH3984 |
| **420** | 24084K | | | AH24084 | AOH24084 |
| **420** | 24184K | | | AH24184 | AOH24184 |
| **440** | 23088K | H3088 | OH3088H | AHX3088G | AOHX3088G |
| **440** | 23188K | H3188 | OH3188H | AHX3188G | AOHX3188G |
| **440** | 23288K | H3288 | OH3288H | AHX3288G | AOHX3288G |
| **440** | 23988K | H3988 | OH3988H | AH3988 | AOH3988 |

*Continued on next page.*

| Bearing Bore | Bearing Part Number | Adapter Sleeve | | Withdrawal Sleeve | |
|---|---|---|---|---|---|
| mm | | Metric Shaft | Hydraulic Metric Shaft | Metric Shaft | Hydraulic Metric Shaft |
| 440 | 24088K | | | AH24088 | AOH24088 |
| 440 | 24188K | | | AH24188 | AOH24188 |
| 460 | 23092K | | OH3092H | AHX3092G | AOHX3092G |
| 460 | 23192K | H3192 | OH3192H | AHX3192G | AOHX3192G |
| 460 | 23292K | H3292 | OH3292H | AHX3292G | AOHX3292G |
| 460 | 23992K | H3992 | OH3992H | AH3992 | AOH3992 |
| 460 | 24092K | | | AH24092 | AOH24092 |
| 460 | 24192K | | | AH24192 | AOH24192 |
| 480 | 23096K | | OH3096H | | AOHX3096G |
| 480 | 23196K | | OH3196H | | AOHX3196G |
| 480 | 23296K | H3296 | OH3296H | AHX3296G | AOHX3296G |
| 480 | 23996K | H3996 | OH3996H | AH3996 | AOH3996 |
| 480 | 24096K | | | AH24096 | AOH24096 |
| 480 | 24196K | | | AH24196 | AOH24196 |
| 500 | 230/500K | | OH30/500H | | AOHX30/500G |
| 500 | 231/500K | | OH31/500H | | AOHX31/500G |
| 500 | 232/500K | | OH32/500H | | AOHX32/500G |
| 500 | 239/500K | | OH39/500H | | AOH39/500 |
| 500 | 240/500K | | | | AOH240/500 |
| 500 | 241/500K | | | | AOH241/500 |
| 530 | 230/530K | | OH30/530H | | AOH30/530 |
| 530 | 231/530K | | OH31/530H | | AOH31/530 |
| 530 | 232/530K | | OH32/530H | | AOH32/530G |
| 530 | 239/530K | | OH39/530H | | AOH39/530 |
| 530 | 240/530K | | | | AOH240/530G |
| 530 | 241/530K | | | | AOH241/530G |
| 560 | 230/560K | | OH30/560H | | AOH30/560 |
| 560 | 231/560K | | OH31/560H | | AOH31/560 |
| 560 | 232/560K | | OH32/560H | | AOH32/560 |
| 560 | 239/560K | | OH39/560H | | AOH39/560 |
| 560 | 240/560K | | | | AOH240/560G |
| 560 | 241/560K | | | | AOH241/560G |
| 600 | 230/600K | | OH30/600H | | AOH30/600 |
| 600 | 231/600K | | OH31/600H | | AOH31/600 |
| 600 | 232/600K | | OH32/600H | | AOH32/600G |
| 600 | 239/600K | | OH39/600H | | AOH39/600 |
| 600 | 240/600K | | | | AOH240/600 |
| 600 | 241/600K | | | | AOH241/600 |
| 630 | 230/630K | | OH30/630H | | AOH30/630 |
| 630 | 231/630K | | OH31/630H | | AOH31/630 |
| 630 | 232/630K | | OH32/630H | | AOH32/630G |
| 630 | 239/630K | | OH39/630H | | AOH39/630 |
| 630 | 240/630K | | | | AOH240/630G |
| 630 | 241/630K | | | | AOH241/630G |
| 670 | 230/670K | | OH30/670H | | AOH30/670 |
| 670 | 231/670K | | OH31/670H | | AOH31/670 |
| 670 | 232/670K | | OH32/670H | | AOH32/670G |
| 670 | 239/670K | | OH39/670H | | AOH39/670 |
| 670 | 240/670K | | | | AOH240/670G |
| 670 | 241/670K | | | | AOH241/670 |

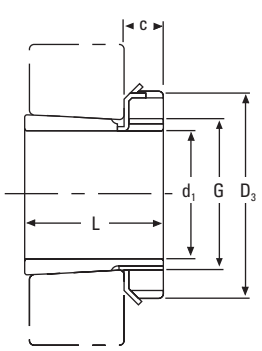
*Continued on next page.*

# *METRIC ACCESSORIES INDEX* – *continued*

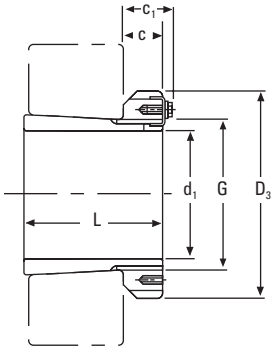
| Bearing Bore | Bearing Part Number | Adapter Sleeve | | Withdrawal Sleeve | |
|---|---|---|---|---|---|
| mm | | Metric Shaft | Hydraulic Metric Shaft | Metric Shaft | Hydraulic Metric Shaft |
| **710** | 230/710K | | OH30/710H | | AOH30/710 |
| **710** | 231/710K | | OH31/710H | | AOH31/710 |
| **710** | 232/710K | | OH32/710H | | AOH32/710G |
| **710** | 239/710K | | OH39/710H | | AOH39/710 |
| **710** | 240/710K | | | | AOH240/710G |
| **710** | 241/710K | | | | AOH241/710 |
| **750** | 230/750K | | OH30/750H | | AOH30/750 |
| **750** | 239/750K | | OH39/750H | | AOH39/750 |
| **750** | 240/750K | | | | AOH240/750G |
| **750** | 241/750K | | | | AOH241/750G |
| **800** | 230/800K | | OH30/800H | | AOH30/800 |
| **800** | 231/800K | | OH31/800H | | AOH31/800 |
| **800** | 232/800K | | OH32/800H | | AOH32/800G |
| **800** | 239/800K | | OH39/800H | | AOH39/800 |
| **800** | 240/800K | | | | AOH240/800G |
| **800** | 241/800K | | | | AOH241/800G |
| **850** | 230/850K | | OH30/850H | | AOH30/850 |
| **850** | 231/850K | | OH31/850H | | AOH31/850 |
| **850** | 232/850K | | OH32/850H | | AOH32/850 |
| **850** | 239/850K | | OH39/850H | | AOH39/850 |
| **850** | 240/850K | | | | AOH240/850G |
| **900** | 230/900K | | OH30/900H | | AOH30/900 |
| **900** | 231/900K | | OH31/900H | | AOH31/900 |
| **900** | 232/900K | | OH32/900H | | AOH32/900 |
| **900** | 239/900K | | OH39/900H | | AOH39/900 |
| **900** | 240/900K | | | | AOH240/900 |
| **900** | 241/900K | | | | AOH241/900 |
| **950** | 230/950K | | OH30/950H | | AOH30/950 |
| **950** | 231/950K | | OH31/950H | | AOH31/950 |
| **950** | 232/950K | | OH32/950H | | AOH32/950 |
| **950** | 239/950K | | OH39/950H | | AOH39/950 |
| **950** | 240/950K | | | | AOH240/950 |
| **950** | 241/950K | | | | AOH241/950 |
| **1000** | 230/1000K | | OH30/1000H | | AOH30/1000 |
| **1000** | 231/1000K | | OH31/1000H | | AOH31/1000 |
| **1000** | 232/1000K | | OH32/1000H | | AOH32/1000 |
| **1000** | 239/1000K | | OH39/1000H | | AOH39/1000 |
| **1000** | 240/1000K | | | | AOH240/1000 |
| **1000** | 241/1000K | | | | AOH241/1000 |
| **1060** | 230/1060K | | OH30/1060H | | AOH30/1060 |
| **1060** | 231/1060K | | OH31/1060H | | AOH31/1060 |
| **1060** | 239/1060K | | OH39/1060H | | AOH39/1060 |
| **1060** | 240/1060K | | | | AOH240/1060 |
| **1120** | 239/1120K | | OH39/1120H | | |

# METRIC H ADAPTER SLEEVES

- Effective tapered bore bearing assembly.
- Includes mounting sleeve, locknut and lockwasher or lockplate.
- Other dimensions may be available, consult your Timken sales engineer.




$d_1 \leq 180$ mm




$d_1 \geq 200$ mm

| $d_1$ | Sleeve Part Number[1] | L | C | Thread[2] G | $D_3$ | $C_1$[3] | Weight | Locknuts | Lockwasher and Lockplates | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | mm | mm | kg | | | |
| 20 | H305 | 29 | 8 | M 25x1.5 | 38 | – | 0.17 | KM5 | MB5 | – |
| 25 | H306 | 31 | 8 | M 30x1.5 | 45 | – | 0.24 | KM6 | MB6 | – |
| 30 | H307 | 35 | 9 | M 35x1.5 | 52 | – | 0.31 | KM7 | MB7 | – |
| 35 | H308 | 36 | 10 | M 40x1.5 | 58 | – | 0.42 | KM8 | MB8 | – |
| 35 | H2308 | 46 | 10 | M 40x1.5 | 58 | – | 0.22 | KM8 | MB8 | – |
| 40 | H309 | 39 | 11 | M 45x1.5 | 65 | – | 0.55 | KM9 | MB9 | – |
| 40 | H2309 | 50 | 11 | M 45x1.5 | 65 | – | 0.28 | KM9 | MB9 | – |
| 45 | H310 | 42 | 12 | M 50x1.5 | 70 | – | 0.67 | KM10 | MB10 | HMV-10 |
| 45 | H2310 | 55 | 12 | M 50x1.5 | 70 | – | 0.36 | KM10 | MB10 | HMV-10 |
| 50 | H311 | 45 | 12 | M 55x2 | 75 | – | 0.76 | KM11 | MB11 | HMV-11 |
| 50 | H2311 | 59 | 12 | M 55x2 | 75 | – | 0.42 | KM11 | MB11 | HMV-11 |
| 55 | H312 | 47 | 13 | M 60x2 | 80 | – | 0.87 | KM12 | MB12 | HMV-12 |
| 55 | H2312 | 62 | 13 | M 60x2 | 80 | – | 0.48 | KM12 | MB12 | HMV-12 |
| 60 | H313 | 50 | 14 | M 65x2 | 85 | – | 1.01 | KM13 | MB13 | HMV-13 |
| 60 | H314 | 52 | 14 | M 70x2 | 92 | – | 1.59 | KM14 | MB14 | HMV-14 |
| 60 | H2313 | 65 | 14 | M 65x2 | 85 | – | 0.56 | KM13 | MB13 | HMV-13 |
| 60 | H2314 | 68 | 14 | M 70x2 | 92 | – | 0.90 | KM14 | MB14 | HMV-14 |
| 65 | H315 | 55 | 15 | M 75x2 | 98 | – | 1.83 | KM15 | MB15 | HMV-15 |
| 65 | H2315 | 73 | 15 | M 75x2 | 98 | – | 1.05 | KM15 | MB15 | HMV-15 |
| 70 | H316 | 59 | 17 | M 80x2 | 105 | – | 2.27 | KM16 | MB16 | HMV-16 |
| 70 | H2316 | 78 | 17 | M 80x2 | 105 | – | 1.28 | KM16 | MB16 | HMV-16 |
| 75 | H317 | 63 | 18 | M 85x2 | 110 | – | 2.60 | KM17 | MB17 | HMV-17 |
| 75 | H2317 | 82 | 18 | M 85x2 | 110 | – | 1.45 | KM17 | MB17 | HMV-17 |
| 80 | H318 | 65 | 18 | M 90x2 | 120 | – | 3.02 | KM18 | MB18 | HMV-18 |
| 80 | H2318 | 86 | 18 | M 90x2 | 120 | – | 1.69 | KM18 | MB18 | HMV-18 |
| 85 | H319 | 68 | 19 | M 95x2 | 125 | – | 3.44 | KM19 | MB19 | HMV-19 |
| 85 | H2319 | 90 | 19 | M 95x2 | 125 | – | 1.92 | KM19 | MB19 | HMV-19 |
| 90 | H320 | 71 | 20 | M 100x2 | 130 | – | 3.73 | KM20 | MB20 | HMV-20 |
| 90 | H3120 | 76 | 20 | M 100x2 | 130 | – | 1.80 | KM20 | MB20 | HMV-20 |
| 90 | H2320 | 97 | 20 | M 100x2 | 130 | – | 2.15 | KM20 | MB20 | HMV-20 |

[1]Adapter sleeves are supplied complete with locknuts and lockwasher or lockplates.

*Continued on next page.*

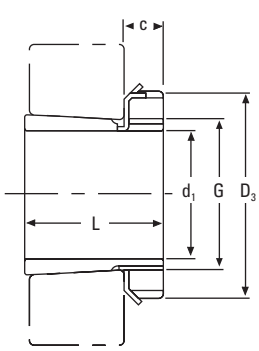
[2]M means metric thread and the digits are major diameter of thread and pitch.

[3]Adapters with a $C_1$ dimension use a lockplate as the locking device as shown in the illustration; otherwise, a lockwasher is used as the locking device.

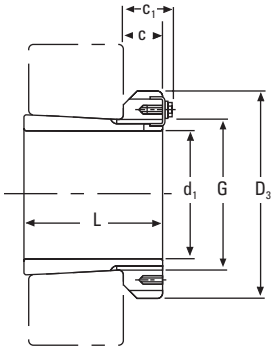
NOTE: Sleeves are not sold separately.

# METRIC H ADAPTER SLEEVES – *continued*

- Effective tapered bore bearing assembly.
- Includes mounting sleeve, locknut and lockwasher or lockplate.
- Other dimensions may be available, consult your Timken sales engineer.




$d_1 \leq 180$ mm




$d_1 \geq 200$ mm

*Continued from previous page.*

| $d_1$ | Sleeve Part Number[1] | L | C | Thread[2] G | $D_3$ | $C_1$[3] | Weight | Locknuts | Lockwasher and Lockplates | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | mm | mm | kg | | | |
| 95 | H321 | 74 | 20 | M 105x2 | 140 | – | 4.30 | KM 21 | MB21 | HMV-21 |
| 95 | H2321 | 101 | 20 | M 105x2 | 140 | – | 2.46 | KM21 | MB21 | HMV-21 |
| 100 | H322 | 77 | 21 | M 110x2 | 145 | – | 4.81 | KM22 | MB22 | HMV-22 |
| 100 | H3122 | 81 | 21 | M 110x2 | 145 | – | 2.25 | KM22 | MB22 | HMV-22 |
| 100 | H2322 | 105 | 21 | M 110x2 | 145 | – | 2.74 | KM22 | MB22 | HMV-22 |
| 110 | H3024 | 72 | 22 | M 120x2 | 145 | – | 1.93 | KML24 | MBL24 | HMV-24 |
| 110 | H3124 | 88 | 22 | M 120x2 | 155 | – | 2.64 | KM24 | MB24 | HMV-24 |
| 110 | H2324 | 112 | 22 | M 120x2 | 155 | – | 3.19 | KM24 | MB24 | HMV-24 |
| 115 | H3926 | 65 | 23 | M 130x2 | 155 | – | 2.40 | KML26 | MBL26 | HMV-26 |
| 115 | H3026 | 80 | 23 | M 130x2 | 155 | – | 2.85 | KML26 | MBL26 | HMV-26 |
| 115 | H3126 | 92 | 23 | M 130x2 | 165 | – | 3.66 | KM26 | MB26 | HMV-26 |
| 115 | H2326 | 121 | 23 | M 130x2 | 165 | – | 4.60 | KM26 | MB26 | HMV-26 |
| 125 | H3928 | 66 | 24 | M 140x2 | 165 | – | 2.70 | KML28 | MBL28 | HMV-28 |
| 125 | H3028 | 82 | 24 | M 140x2 | 165 | – | 3.16 | KML28 | MBL28 | HMV-28 |
| 125 | H3128 | 97 | 24 | M 140x2 | 180 | – | 4.34 | KM28 | MB28 | HMV-28 |
| 125 | H2328 | 131 | 24 | M 140x2 | 180 | – | 5.55 | KM28 | MB28 | HMV-28 |
| 135 | H3930 | 76 | 26 | M 150x2 | 180 | – | 3.60 | KML30 | MBL30 | HMV-30 |
| 135 | H3030 | 87 | 26 | M 150x2 | 180 | – | 3.89 | KML30 | MBL30 | HMV-30 |
| 135 | H3130 | 111 | 26 | M 150x2 | 195 | – | 5.52 | KM30 | MB30 | HMV-30 |
| 135 | H2330 | 139 | 26 | M 150x2 | 195 | – | 6.63 | KM30 | MB30 | HMV-30 |
| 140 | H3932 | 78 | 27.5 | M 160x3 | 190 | – | 4.60 | KML32 | MBL32 | HMV-32 |
| 140 | H3032 | 93 | 27.5 | M 160x3 | 190 | – | 5.21 | KML32 | MBL32 | HMV-32 |
| 140 | H3132 | 119 | 28 | M 160x3 | 210 | – | 7.67 | KM32 | MB32 | HMV-32 |
| 140 | H2332 | 147 | 28 | M 160x3 | 210 | – | 9.14 | KM32 | MB32 | HMV-32 |
| 150 | H3934 | 79 | 27.5 | M 170x3 | 200 | – | 5.00 | KML34 | MBL34 | HMV-34 |
| 150 | H3034 | 101 | 28.5 | M 170x3 | 200 | – | 5.99 | KML34 | MBL34 | HMV-34 |
| 150 | H3134 | 122 | 29 | M 170x3 | 220 | – | 8.38 | KM34 | MB34 | HMV-34 |
| 150 | H2334 | 154 | 29 | M 170x3 | 220 | – | 10.20 | KM34 | MB34 | HMV-34 |

[1]Adapter sleeves are supplied complete with locknuts and lockwasher or lockplates.
[2]M means metric thread and the digits are major diameter of thread and pitch.
[3]Adapters with a $C_1$ dimension use a lockplate as the locking device as shown in the illustration; otherwise, a lockwasher is used as the locking device.
NOTE: Sleeves are not sold separately.

| $d_1$ | Sleeve Part Number[1] | L | C | Thread[2][3] G | $D_3$ | $C_1$[4] | Weight | Locknuts | Lockwasher and Lockplates | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | mm | mm | kg | | | |
| 160 | H3936 | 87 | 29.5 | M 180x3 | 210 | – | 5.70 | KML36 | MBL36 | HMV-36 |
| 160 | H3036 | 109 | 29.5 | M 180x3 | 210 | – | 6.83 | KML36 | MBL36 | HMV-36 |
| 160 | H3136 | 131 | 30 | M 180x3 | 230 | – | 9.50 | KM36 | MB36 | HMV-36 |
| 160 | H2336 | 161 | 30 | M 180x3 | 230 | – | 11.30 | KM36 | MB36 | HMV-36 |
| 170 | H3938 | 89 | 30.5 | M 190x3 | 220 | – | 6.19 | KML38 | MBL38 | HMV-38 |
| 170 | H3038 | 112 | 30.5 | M 190x3 | 220 | – | 7.45 | KML38 | MBL38 | HMV-38 |
| 170 | H3138 | 141 | 31 | M 190x3 | 240 | – | 10.80 | KM38 | MB38 | HMV-38 |
| 170 | H2338 | 169 | 31 | M 190x3 | 240 | – | 12.60 | KM38 | MB38 | HMV-38 |
| 180 | H3940 | 98 | 31.5 | M 200x3 | 240 | – | 7.89 | KML40 | MBL40 | HMV-40 |
| 180 | H3040 | 120 | 31.5 | M 200x3 | 240 | – | 9.19 | KML40 | MBL40 | HMV-40 |
| 180 | H3140 | 150 | 32 | M 200x3 | 250 | – | 12.10 | KM40 | MB40 | HMV-40 |
| 180 | H2340 | 176 | 32 | M 200x3 | 250 | – | 13.90 | KM40 | MB40 | HMV-40 |
| 200 | H3944 | 96 | 30 | Tr 220x4 | 260 | 41 | 8.16 | HM3044 | MS3044 | HMV-44 |
| 200 | H3044 | 126 | 30 | Tr 220x4 | 260 | 41 | 10.30 | HM3044 | MS3044 | HMV-44 |
| 200 | H3144 | 161 | 35 | Tr 220x4 | 280 | – | 15.10 | HM44T | MB44 | HMV-44 |
| 200 | H2344 | 186 | 35 | Tr 220x4 | 280 | – | 17.00 | HM44T | MB44 | HMV-44 |
| 220 | H3948 | 101 | 34 | Tr 240x4 | 290 | 46 | 11.00 | HM3048 | MS3048 | HMV-48 |
| 220 | H3048 | 133 | 34 | Tr 240x4 | 290 | 46 | 13.20 | HM3048 | MS3048 | HMV-48 |
| 220 | H3148 | 172 | 37 | Tr 240x4 | 300 | – | 17.60 | HM48T | MS48 | HMV-48 |
| 220 | H2348 | 199 | 37 | Tr 240x4 | 300 | – | 20.00 | HM48T | MS48 | HMV-48 |
| 240 | H3952 | 116 | 34 | Tr 260x4 | 310 | 46 | 12.80 | HM3052 | MS3052 | HMV-52 |
| 240 | H3052 | 145 | 34 | Tr 260x4 | 310 | 46 | 15.30 | HM3052 | MS3052 | HMV-52 |
| 240 | H3152 | 190 | 39 | Tr 260x4 | 330 | – | 22.30 | HM52T | MB52 | HMV-52 |
| 240 | H2352 | 211 | 39 | Tr 260x4 | 330 | – | 24.50 | HM52T | MB52 | HMV-52 |
| 260 | H3956 | 121 | 38 | Tr 280x4 | 330 | 50 | 15.30 | HM3056 | MS3056 | HMV-56 |
| 260 | H3056 | 152 | 38 | Tr 280x4 | 330 | 50 | 17.70 | HM3056 | MS3056 | HMV-56 |
| 260 | H3156 | 195 | 41 | Tr 280x4 | 350 | – | 25.10 | HM56T | MB56 | HMV-56 |
| 260 | H2356 | 224 | 41 | Tr 280x4 | 350 | – | 28.40 | HM56T | MB56 | HMV-56 |
| 280 | H3960 | 140 | 42 | Tr 300x4 | 360 | 54 | 20.00 | HM3060 | MS3060 | HMV-60 |
| 280 | H3060 | 168 | 42 | Tr 300x4 | 360 | 54 | 22.80 | HM3060 | MS3060 | HMV-60 |
| 280 | H3160 | 208 | 40 | Tr 300x4 | 380 | 53 | 30.20 | HM3160 | MS3160 | HMV-60 |
| 280 | H3260 | 240 | 40 | Tr 300x4 | 380 | 53 | 34.10 | HM3160 | MS3160 | HMV-60 |
| 300 | H3964 | 140 | 42 | Tr 320x5 | 380 | 55 | 21.50 | HM3064 | MS3064 | HMV-64 |
| 300 | H3064 | 171 | 42 | Tr 320x5 | 380 | 55 | 24.60 | HM3064 | MS3064 | HMV-64 |
| 300 | H3164 | 226 | 42 | Tr 320x5 | 400 | 56 | 34.90 | HM3164 | MS3164 | HMV-64 |
| 300 | H3264 | 258 | 42 | Tr 320x5 | 400 | 56 | 39.30 | HM3164 | MS3164 | HMV-64 |

*Continued on next page.*

[1]Adapter sleeves are supplied complete with locknuts and lockwasher or lockplates.

[2]M means metric thread and the digits are major diameter of thread and pitch.

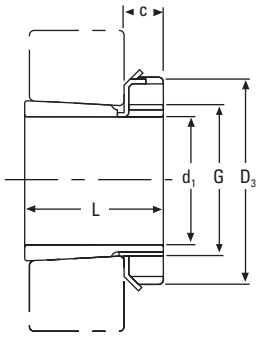
[3]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.

[4]Adapters with a $C_1$ dimension use a lockplate as the locking device as shown in the illustration; otherwise, a lockwasher is used as the locking device.

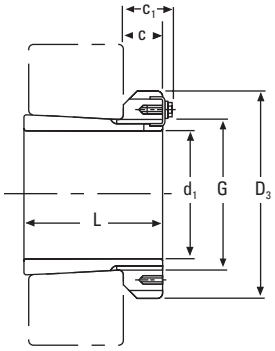
NOTE: Sleeves are not sold separately.

# METRIC H ADAPTER SLEEVES – *continued*

- Effective tapered bore bearing assembly.
- Includes mounting sleeve, locknut and lockwasher or lockplate.
- Other dimensions may be available, consult your Timken sales engineer.




**$d_1 \leq$ 180 mm**




**$d_1 \geq$ 200 mm**

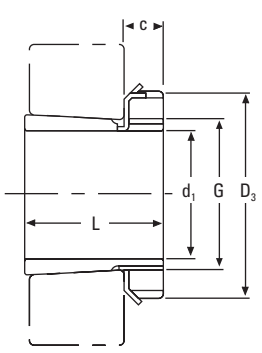
*Continued from previous page.*

| $d_1$ | Sleeve Part Number[1] | L | C | Thread[2] G | $D_3$ | $C_1$[3] | Weight | Locknuts | Lockwasher and Lockplates | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | mm | mm | kg | | | |
| 320 | H3968 | 144 | 45 | Tr 340x5 | 400 | 58 | 24.50 | HM3068 | MS3068 | HMV-68 |
| 320 | H3068 | 187 | 45 | Tr 340x5 | 400 | 58 | 28.70 | HM3068 | MS3068 | HMV-68 |
| 320 | H3168 | 254 | 55 | Tr 340x5 | 440 | 72 | 50.00 | HM3168 | MS3168 | HMV-68 |
| 320 | H3268 | 288 | 55 | Tr 340x5 | 440 | 72 | 54.60 | HM3168 | MS3168 | HMV-68 |
| 340 | H3972 | 144 | 45 | Tr 360x5 | 420 | 58 | 25.20 | HM3072 | MS3072 | HMV-72 |
| 340 | H3072 | 188 | 45 | Tr 360x5 | 420 | 58 | 30.50 | HM3072 | MS3072 | HMV-72 |
| 340 | H3172 | 259 | 58 | Tr 360x5 | 460 | 75 | 56.00 | HM3172 | MS3172 | HMV-72 |
| 340 | H3272 | 299 | 58 | Tr 360x5 | 460 | 75 | 60.60 | HM3172 | MS3172 | HMV-72 |
| 360 | H3976 | 164 | 48 | Tr 380x5 | 450 | 62 | 31.50 | HM3076 | MS3076 | HMV-76 |
| 360 | H3076 | 193 | 48 | Tr 380x5 | 450 | 62 | 35.80 | HM3076 | MS3076 | HMV-76 |
| 360 | H3176 | 264 | 60 | Tr 380x5 | 490 | 77 | 61.70 | HM3176 | MS3176 | HMV-76 |
| 360 | H3276 | 310 | 60 | Tr 380x5 | 490 | 77 | 69.60 | HM3176 | MS3176 | HMV-76 |
| 380 | H3980 | 168 | 52 | Tr 400x5 | 470 | 66 | 35.00 | HM3080 | MS3080 | HMV-80 |
| 380 | H3080 | 210 | 52 | Tr 400x5 | 470 | 66 | 41.30 | HM3080 | MS3080 | HMV-80 |
| 380 | H3180 | 272 | 62 | Tr 400x5 | 520 | 82 | 73.00 | HM3180 | MS3180 | HMV-80 |
| 380 | H3280 | 328 | 62 | Tr 400x5 | 520 | 82 | 81.00 | HM3180 | MS3180 | HMV-80 |
| 400 | H3984 | 168 | 52 | Tr 420x5 | 490 | 66 | 36.60 | HM3084 | MS3084 | HMV-84 |
| 400 | H3084 | 212 | 52 | Tr 420x5 | 490 | 66 | 43.70 | HM3084 | MS3084 | HMV-84 |
| 400 | H3184 | 304 | 70 | Tr 420x5 | 540 | 90 | 84.20 | HM3184 | MS3184 | HMV-84 |
| 400 | H3284 | 352 | 70 | Tr 420x5 | 540 | 90 | 96.00 | HM3184 | MS3184 | HMV-84 |
| 410 | H3988 | 189 | 60 | Tr 440x5 | 520 | 77 | 58.00 | HM3088 | MS3088 | HMV-88 |
| 410 | H3088 | 228 | 60 | Tr 440x5 | 520 | 77 | 65.20 | HM3088 | MS3088 | HMV-88 |
| 410 | H3188 | 307 | 70 | Tr 440x5 | 560 | 90 | 104.00 | HM3188 | MS3188 | HMV-88 |
| 410 | H3288 | 361 | 70 | Tr 440x5 | 560 | 90 | 118.00 | HM3188 | MS3188 | HMV-88 |
| 430 | H3992 | 189 | 60 | Tr 460x5 | 540 | 77 | 60.00 | HM3092 | MS3092 | HMV-92 |
| 430 | H3192 | 326 | 75 | Tr 460x5 | 580 | 95 | 116.00 | HM3192 | MS3192 | HMV-92 |
| 430 | H3292 | 382 | 75 | Tr 460x5 | 580 | 95 | 134.00 | HM3192 | MS3192 | HMC92 |
| 450 | H3996 | 200 | 60 | Tr 480x5 | 560 | 77 | 66.00 | HM3096 | MS3096 | HMV-96 |
| 450 | H3296 | 397 | 75 | Tr 480x5 | 620 | 95 | 153.00 | HM3196 | MS3196 | HMV-96 |

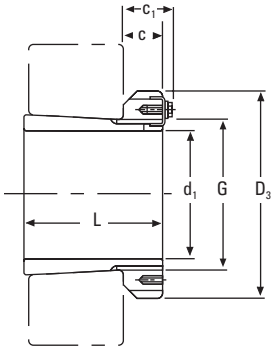
[1]Adapter sleeves are supplied complete with locknuts and lockwasher or lockplates.
[2]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.
[3]Adapters with a $C_1$ dimension use a lockplate as the locking device as shown in the illustration; otherwise, a lockwasher is used as the locking device.
NOTE: Sleeves are not sold separately.

# METRIC HE ADAPTER SLEEVES FOR INCH SHAFT

- Effective tapered bore bearing assembly.
- Includes mounting sleeve, locknut and lockwasher or lockplate.
- Other dimensions may be available, consult your Timken sales engineer.




$d_1 \leq 180$ mm




$d_1 \geq 200$ mm

| $d_1$ | | Part Number[1] | L | C | Thread[2] G | $D_3$ | $C_1$[3] | Weight | Locknuts | Lockwasher and Lockplate | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | mm | | mm | mm | mm | mm | mm | kg | | | |
| ¾ | 19.05 | HE305 | 29 | 8.00 | M 25x1.5 | 38.00 | – | 0.08 | KM5 | MB5 | |
| 1 | 25.40 | HE306 | 31 | 8.00 | M 30x1.5 | 45.00 | – | 0.10 | KM6 | MB6 | |
| 1 ¼ | 31.75 | HE308 | 36 | 10.00 | M 40x1.5 | 58.00 | – | 0.22 | KM8 | MB8 | |
| 1 ¼ | 31.75 | HE2308 | 46 | 10.00 | M 40x1.5 | 58.00 | – | 0.28 | KM8 | MB8 | |
| 1 ½ | 38.10 | HE309 | 39 | 11.00 | M 45x1.5 | 65.00 | – | 0.24 | KM9 | MB9 | |
| 1 ½ | 38.10 | HE2309 | 50 | 11.00 | M 45x1.5 | 65.00 | – | 0.31 | KM9 | MB9 | |
| 1 ¾ | 44.45 | HE310 | 42 | 12.00 | M 50x1.5 | 70.00 | – | 0.29 | KM10 | MB10 | HMV-10 |
| 1 ¾ | 44.45 | HE2310 | 55 | 12.00 | M 50x1.5 | 70.00 | – | 0.36 | KM10 | MB10 | HMV-10 |
| 2 | 50.80 | HE311 | 45 | 12.00 | M 55x2 | 75.00 | – | 0.35 | KM11 | MB11 | HMV-11 |
| 2 | 50.80 | HE2311 | 59 | 12.00 | M 55x2 | 75.00 | – | 0.42 | KM11 | MB11 | HMV-11 |
| 2 ¼ | 57.15 | HE313 | 50 | 14.00 | M 65x2 | 85.00 | – | 0.52 | KM13 | MB13 | HMV-13 |
| 2 ¼ | 57.15 | HE2313 | 65 | 14.00 | M 65x2 | 85.00 | – | 0.65 | KM13 | MB13 | HMV-13 |
| 2 ½ | 63.50 | HE315 | 55 | 15.00 | M 75x2 | 98.00 | – | 0.85 | KM15 | MB15 | HMV-15 |
| 2 ½ | 63.50 | HE2315 | 73 | 15.00 | M 75x2 | 98.00 | – | 1.09 | KM15 | MB15 | HMV-15 |
| 2 ¾ | 69.85 | HE316 | 59 | 17.00 | M 80x2 | 105.00 | – | 0.97 | KM16 | MB16 | HMV-16 |
| 2 ¾ | 69.85 | HE2316 | 78 | 17.00 | M 80x2 | 105.00 | – | 1.20 | KM16 | MB16 | HMV-16 |
| 3 | 76.20 | HE317 | 63 | 18.00 | M 85x2 | 110.00 | – | 1.00 | KM17 | MB17 | HMV-17 |
| 3 | 76.20 | HE2317 | 82 | 18.00 | M 85x2 | 110.00 | – | 1.30 | KM17 | MB17 | HMV-17 |
| 3 ¼ | 82.55 | HE318 | 65 | 18.00 | M 90x2 | 120.00 | – | 1.10 | KM18 | MB18 | HMV-18 |
| 3 ¼ | 82.55 | HE319 | 68 | 19.00 | M 95x2 | 125.00 | – | 1.60 | KM19 | MB19 | HMV-19 |
| 3 ¼ | 82.55 | HE2318 | 86 | 18.00 | M 90x2 | 120.00 | – | 1.40 | KM18 | MB18 | HMV-18 |
| 3 ¼ | 82.55 | HE2319 | 90 | 19.00 | M 95x2 | 125.00 | – | 2.00 | KM19 | MB19 | HMV-19 |
| 3 ½ | 88.90 | HE320 | 71 | 20.00 | M 100x2 | 130.00 | – | 1.75 | KM20 | MB20 | HMV-20 |
| 3 ½ | 88.90 | HE3120 | 76 | 20.00 | M 100x2 | 130.00 | – | 1.80 | KM20 | MB20 | HMV-20 |
| 3 ½ | 88.90 | HE2320 | 97 | 20.00 | M 100x2 | 130.00 | – | 2.20 | KM20 | MB20 | HMV-20 |
| 4 | 101.60 | HE322 | 77 | 21.00 | M 110x2 | 145.00 | – | 1.90 | KM22 | MB22 | HMV-22 |
| 4 | 101.60 | HE3122 | 81 | 21.00 | M 110x2 | 145.00 | – | 2.25 | KM22 | MB22 | HMV-22 |
| 4 | 101.60 | HE2322 | 105 | 21.00 | M 110x2 | 145.00 | – | 2.40 | KM22 | MB22 | HMV-22 |

[1]Adapter sleeves are supplied complete with locknuts and lockwasher or lockplates.

*Continued on next page.*

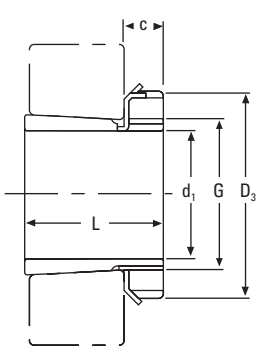
[2]M means metric thread and the digits are major diameter of thread and pitch.

[3]Adapters with a $C_1$ dimension use a lockplate as the locking device as shown in the illustration; otherwise, a lockwasher is used as the locking device.

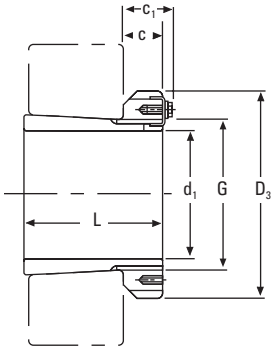
NOTE: Sleeves are not sold separately.

# *METRIC HE ADAPTER SLEEVES FOR INCH SHAFT* – *continued*

- Effective tapered bore bearing assembly.
- Includes mounting sleeve, locknut and lockwasher or lockplate.
- Other dimensions may be available, consult your Timken sales engineer.




**$d_1 \leq 180$ mm**




**$d_1 \geq 200$ mm**

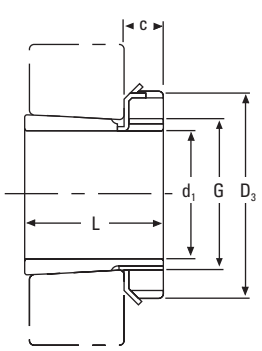
*Continued from previous page.*

| $d_1$ | | Part Number[1] | L | C | Thread[2][3] G | $D_3$ | $C_1$[4] | Weight | Locknuts | Lockwasher and Lockplate | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | mm | | mm | mm | mm | mm | mm | kg | | | |
| 4 ¼ | 107.95 | HE3024 | 72 | 22.00 | M 120x2 | 145.00 | – | 2.00 | KML24 | MBL24 | HMV-24 |
| 4 ¼ | 107.95 | HE3124 | 88 | 22.00 | M 120x2 | 155.00 | – | 2.64 | KM24 | MB24 | HMV-24 |
| 4 ¼ | 107.95 | HE2324 | 112 | 22.00 | M 120x2 | 155.00 | – | 3.35 | KM24 | MB24 | HMV-24 |
| 4 ½ | 114.30 | HE3026 | 80 | 23.00 | M 130x2 | 155.00 | – | 2.90 | KML26 | MBL26 | HMV-26 |
| 4 ½ | 114.30 | HE3126 | 92 | 23.00 | M 130x2 | 165.00 | – | 3.66 | KM26 | MB26 | HMV-26 |
| 4 ½ | 114.30 | HE2326 | 121 | 23.00 | M 130x2 | 165.00 | – | 4.55 | KM26 | MB26 | HMV-26 |
| 5 | 127.00 | HE3028 | 82 | 24.00 | M 140x2 | 165.00 | – | 3.16 | KML28 | MBL28 | HMV-28 |
| 5 | 127.00 | HE3128 | 97 | 24.00 | M 140x2 | 180.00 | – | 3.80 | KM28 | MB28 | HMV-28 |
| 5 | 127.00 | HE2328 | 131 | 24.00 | M 140x2 | 180.00 | – | 5.00 | KM28 | MB28 | HMV-28 |
| 5 ¼ | 133.35 | HE3030 | 87 | 26.00 | M 150x2 | 180.00 | – | 4.00 | KML30 | MBL30 | HMV-30 |
| 5 ¼ | 133.35 | HE3130 | 111 | 26.00 | M 150x2 | 195.00 | – | 5.50 | KM30 | MB30 | HMV-30 |
| 5 ¼ | 133.35 | HE2330 | 139 | 26.00 | M 150x2 | 195.00 | – | 6.80 | KM30 | MB30 | HMV-30 |
| 5 ½ | 139.70 | HE3032 | 93 | 27.50 | M 160x3 | 190.00 | – | 5.10 | KML32 | MBL32 | HMV-32 |
| 5 ½ | 139.70 | HE3132 | 119 | 28.00 | M 160x3 | 210.00 | – | 7.30 | KM32 | MB32 | HMV-32 |
| 5 ½ | 139.70 | HE2332 | 147 | 28.00 | M 160x3 | 210.00 | – | 8.80 | KM32 | MB32 | HMV-32 |
| 6 | 152.40 | HE3034 | 101 | 28.50 | M 170x3 | 200.00 | – | 5.99 | KML34 | MBL34 | HMV-34 |
| 6 | 152.40 | HE3134 | 122 | 29.00 | M 170x3 | 220.00 | – | 7.55 | KM34 | MB34 | HMV-34 |
| 6 | 152.40 | HE2334 | 154 | 29.00 | M 170x3 | 220.00 | – | 10.20 | KM34 | MB34 | HMV-34 |
| 6 ½ | 165.10 | HE3036 | 109 | 29.50 | M 180x3 | 210.00 | – | 6.83 | KML36 | MBL36 | HMV-36 |
| 6 ½ | 165.10 | HE3136 | 131 | 30.00 | M 180x3 | 230.00 | – | 7.80 | KM36 | MB36 | HMV-36 |
| 6 ½ | 165.10 | HE2336 | 161 | 30.00 | M 180x3 | 230.00 | – | 9.35 | KM36 | MB36 | HMV-36 |
| 6 ¾ | 171.45 | HE3038 | 112 | 30.50 | M 190x3 | 220.00 | – | 7.20 | KML38 | MBL38 | HMV-38 |
| 6 ¾ | 171.45 | HE3138 | 141 | 31.00 | M 190x3 | 240.00 | – | 10.80 | KM38 | MB38 | HMV-38 |
| 6 ¾ | 171.45 | HE2338 | 169 | 31.00 | M 190x3 | 240.00 | – | 12.60 | KM38 | MB38 | HMV-38 |
| 7 | 177.80 | HE3040 | 120 | 31.50 | M 200x3 | 240.00 | – | 9.35 | KML40 | MBL40 | HMV-40 |
| 7 | 177.80 | HE3140 | 150 | 32.00 | M 200x3 | 250.00 | – | 12.30 | KM40 | MB40 | HMV-40 |
| 7 | 177.80 | HE2340 | 176 | 32.00 | M 200x3 | 250.00 | – | 14.20 | KM40 | MB40 | HMV-40 |
| 8 | 203.20 | HE3044 | 126 | 30.00 | Tr 220x4 | 260.00 | 41 | 10.30 | HM 3044 | MS3044 | HMV-44 |
| 8 | 203.20 | HE3144 | 161 | 35.00 | Tr 220x4 | 280.00 | – | 14.70 | HM44T | MB44 | HMV-44 |
| 8 | 203.20 | HE2344 | 186 | 35.00 | Tr 220x4 | 280.00 | – | 16.70 | HM44T | MB44 | HMV-44 |

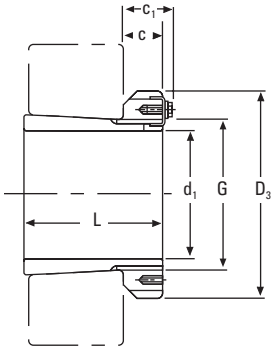
[1]Adapter sleeves are supplied complete with locknuts and lockwasher or lockplates.
[2]M means metric thread and the digits are major diameter of thread and pitch.
[3]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.
[4]Adapters with a $C_1$ dimension use a lockplate as the locking device as shown in the illustration; otherwise, a lockwasher is used as the locking device.
NOTE: Sleeves are not sold separately.

# METRIC HA ADAPTER SLEEVES FOR INCH SHAFT

- Effective tapered bore bearing assembly.
- Includes mounting sleeve, locknut and lockwasher or lockplate.
- Other dimensions may be available, consult your Timken sales engineer.




$d_1 \leq 180$ mm




$d_1 \geq 200$ mm

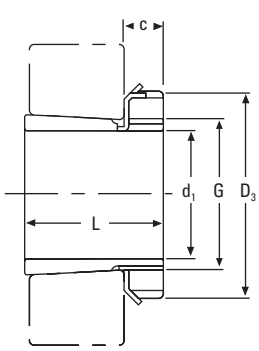
| $d_1$ | | Part Number[1] | L | C | Thread[2] G | $D_3$ | $C_1$[3] | Weight | Locknuts | Lockwasher and Lockplate | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | mm | | mm | mm | mm | mm | mm | kg | | | |
| 15/16 | 23.81 | HA306 | 31 | 8 | M 30x1.5 | 45 | – | 0.12 | KM6 | MB6 | |
| 1 3/16 | 30.16 | HA307 | 35 | 9 | M 35x1.5 | 52 | – | 0.14 | KM7 | MB7 | |
| 1 5/16 | 33.34 | HA308 | 36 | 10 | M 40x1.5 | 58 | – | 0.19 | KM8 | MB8 | |
| 1 5/16 | 33.34 | HA2308 | 46 | 10 | M 40x1.5 | 58 | – | 0.22 | KM8 | MB8 | |
| 1 7/16 | 36.51 | HA309 | 39 | 11 | M 45x1.5 | 65 | – | 0.29 | KM9 | MB9 | |
| 1 7/16 | 36.51 | HA2309 | 50 | 11 | M 45x1.5 | 65 | – | 0.35 | KM9 | MB9 | |
| 1 11/16 | 42.86 | HA310 | 42 | 12 | M 50x1.5 | 70 | – | 0.32 | KM10 | MB10 | HMV-10 |
| 1 11/16 | 42.86 | HA2310 | 55 | 12 | M 50x1.5 | 70 | – | 0.40 | KM10 | MB10 | HMV-10 |
| 1 15/16 | 49.21 | HA311 | 45 | 12 | M 55x2 | 75 | – | 0.34 | KM11 | MB11 | HMV-11 |
| 1 15/16 | 49.21 | HA2311 | 59 | 12 | M 55x2 | 75 | – | 0.42 | KM11 | MB11 | HMV-11 |
| 2 3/16 | 55.56 | HA313 | 50 | 14 | M 65x2 | 85 | – | 0.58 | KM13 | MB13 | HMV-13 |
| 2 3/16 | 55.56 | HA2313 | 65 | 14 | M 65x2 | 85 | – | 0.75 | KM13 | MB13 | HMV-13 |
| 2 7/16 | 61.91 | HA315 | 55 | 15 | M 75x2 | 98 | – | 0.91 | KM15 | MB15 | HMV-15 |
| 2 7/16 | 61.91 | HA2315 | 73 | 15 | M 75x2 | 98 | – | 1.15 | KM15 | MB15 | HMV-15 |
| 2 11/16 | 68.26 | HA316 | 59 | 17 | M 80x2 | 105 | – | 1.05 | KM16 | MB16 | HMV-16 |
| 2 11/16 | 68.26 | HA2316 | 78 | 17 | M 80x2 | 105 | – | 1.30 | KM16 | MB16 | HMV-16 |
| 2 15/16 | 74.61 | HA317 | 63 | 18 | M 85x2 | 110 | – | 1.10 | KM17 | MB17 | HMV-17 |
| 2 15/16 | 74.61 | HA2317 | 82 | 18 | M 85x2 | 110 | – | 1.40 | KM17 | MB17 | HMV-17 |
| 3 3/16 | 80.96 | HA318 | 65 | 18 | M 90x2 | 120 | – | 1.25 | KM18 | MB18 | HMV-18 |
| 3 3/16 | 80.96 | HA2318 | 86 | 18 | M 90x2 | 120 | – | 1.50 | KM18 | MB18 | HMV-18 |
| 3 7/16 | 87.31 | HA320 | 71 | 20 | M 100x2 | 130 | – | 1.80 | KM20 | MB20 | HMV-20 |
| 3 7/16 | 87.31 | HA3120 | 76 | 20 | M 100x2 | 130 | – | 1.80 | KM20 | MB20 | HMV-20 |
| 3 7/16 | 87.31 | HA2320 | 97 | 20 | M 100x2 | 130 | – | 2.35 | KM20 | MB20 | HMV-20 |
| 3 15/16 | 100.01 | HA322 | 77 | 21 | M 110x2 | 145 | – | 2.18 | KM22 | MB22 | HMV-22 |
| 3 15/16 | 100.01 | HA3122 | 81 | 21 | M 110x2 | 145 | – | 2.25 | KM22 | MB22 | HMV-22 |
| 3 15/16 | 100.01 | HA2322 | 105 | 21 | M 110x2 | 145 | – | 2.74 | KM22 | MB22 | HMV-22 |
| 4 3/16 | 106.36 | HA3024 | 72 | 22 | M 120x2 | 145 | – | 2.25 | KML24 | MBL24 | HMV-24 |
| 4 3/16 | 106.36 | HA3124 | 88 | 22 | M 120x2 | 155 | – | 2.90 | KM24 | MB24 | HMV-24 |
| 4 3/16 | 106.36 | HA2324 | 112 | 22 | M 120x2 | 155 | – | 3.19 | KM24 | MB24 | HMV-24 |
| 4 7/16 | 112.71 | HA3026 | 80 | 23 | M 130x2 | 155 | – | 3.05 | KML26 | MBL26 | HMV-26 |
| 4 7/16 | 112.71 | HA3126 | 92 | 23 | M 130x2 | 165 | – | 3.75 | KM26 | MB26 | HMV-26 |
| 4 7/16 | 112.71 | HA2326 | 121 | 23 | M 130x2 | 165 | – | 4.74 | KM26 | MB26 | HMV-26 |

[1]Adapter sleeves are supplied complete with locknuts and lockwasher or lockplates.
[2]M means metric thread and the digits are major diameter of thread and pitch.
[3]Adapters with a $C_1$ dimension use a lockplate as the locking device as shown in the illustration; otherwise, a lockwasher is used as the locking device.

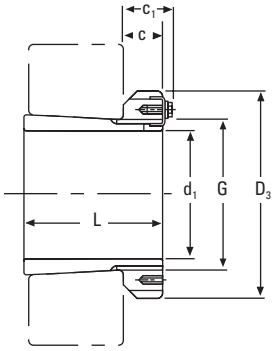
*Continued on next page.*

# *METRIC HA ADAPTER SLEEVES FOR INCH SHAFT* – *continued*

- Effective tapered bore bearing assembly.
- Includes mounting sleeve, locknut and lockwasher or lockplate.
- Other dimensions may be available, consult your Timken sales engineer.




**$d_1 \leq$ 180 mm**




**$d_1 \geq$ 200 mm**

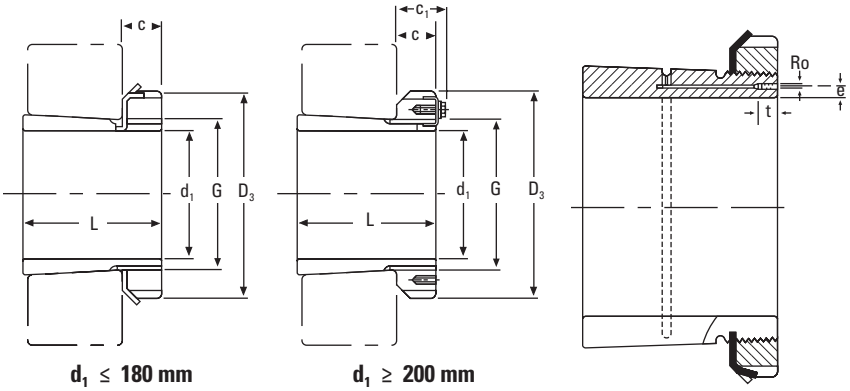
*Continued from previous page.*

| $d_1$ | | Part Number[1] | L | C | Thread[2][3] G | $D_3$ | $C_1$[4] | Weight | Locknuts | Lockwasher and Lockplate | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | mm | | mm | mm | mm | mm | mm | kg | | | |
| 4 15/16 | 125.41 | HA3028 | 82 | 24 | M 140x2 | 165 | – | 3.00 | KML28 | MBL28 | HMV-28 |
| 4 15/16 | 125.41 | HA3128 | 97 | 24 | M 140x2 | 180 | – | 4.10 | KM28 | MB28 | HMV-28 |
| 4 15/16 | 125.41 | HA2328 | 131 | 24 | M 140x2 | 180 | – | 5.30 | KM28 | MB28 | HMV-28 |
| 5 3/16 | 131.76 | HA3030 | 87 | 26 | M 150x2 | 180 | – | 3.89 | KML30 | MBL30 | HMV-30 |
| 5 3/16 | 131.76 | HA3130 | 111 | 26 | M 150x2 | 195 | – | 5.80 | KM30 | MB30 | HMV-30 |
| 5 3/16 | 131.76 | HA2330 | 139 | 26 | M 150x2 | 195 | – | 6.63 | KM30 | MB30 | HMV-30 |
| 5 7/16 | 138.11 | HA3032 | 93 | 28 | M 160x3 | 190 | – | 5.21 | KML32 | MBL32 | HMV-32 |
| 5 7/16 | 138.11 | HA3132 | 119 | 28 | M 160x3 | 210 | – | 7.55 | KM32 | MB32 | HMV-32 |
| 5 7/16 | 138.11 | HA2332 | 147 | 28 | M 160x3 | 210 | – | 9.40 | KM32 | MB32 | HMV-32 |
| 5 15/16 | 150.81 | HA3034 | 101 | 29 | M 170x3 | 200 | – | 5.99 | KML34 | MBL34 | HMV-34 |
| 5 15/16 | 150.81 | HA3134 | 122 | 29 | M 170x3 | 220 | – | 7.80 | KM34 | MB34 | HMV-34 |
| 5 15/16 | 150.81 | HA2334 | 154 | 29 | M 170x3 | 220 | – | 9.60 | KM34 | MB34 | HMV-34 |
| 6 7/16 | 163.51 | HA3036 | 109 | 30 | M 180x3 | 210 | – | 6.00 | KML36 | MBL36 | HMV-36 |
| 6 7/16 | 163.51 | HA3136 | 131 | 30 | M 180x3 | 230 | – | 8.15 | KM36 | MB36 | HMV-36 |
| 6 7/16 | 163.51 | HA2336 | 161 | 30 | M 180x3 | 230 | – | 9.90 | KM36 | MB36 | HMV-36 |
| 6 15/16 | 176.21 | HA3038 | 112 | 31 | M 190x3 | 220 | – | 5.80 | KML38 | MBL38 | HMV-38 |
| 6 15/16 | 176.21 | HA3138 | 141 | 31 | M 190x3 | 240 | – | 8.50 | KM38 | MB38 | HMV-38 |
| 6 15/16 | 176.21 | HA2338 | 169 | 31 | M 190x3 | 240 | – | 12.60 | KM38 | MB38 | HMV-38 |
| 7 3/16 | 182.56 | HA3040 | 120 | 32 | M 200x3 | 240 | – | 8.25 | KML40 | MBL40 | HMV-40 |
| 7 3/16 | 182.56 | HA3140 | 150 | 32 | M 200x3 | 250 | – | 11.20 | KM40 | MB40 | HMV-40 |
| 7 3/16 | 182.56 | HA2340 | 176 | 32 | M 200x3 | 250 | – | 13.90 | KM40 | MB40 | HMV-40 |
| 7 15/16 | 201.61 | HA3044 | 126 | 30 | Tr 220x4 | 260 | 41 | 10.30 | HM3044 | MS3044 | HMV-44 |
| 7 15/16 | 201.61 | HA3144 | 161 | 35 | Tr 220x4 | 280 | – | 14.70 | HM44T | MB44 | HMV-44 |
| 8 15/16 | 227.01 | HA3048 | 133 | 34 | Tr 240x4 | 290 | 46 | 13.20 | HM3048 | MS3048 | HMV-48 |
| 9 7/16 | 239.71 | HA3052 | 145 | 34 | Tr 260x4 | 310 | 46 | 15.30 | HM3052 | MS3052 | HMV-52 |
| 10 7/16 | 265.11 | HA3056 | 152 | 38 | Tr 280x4 | 330 | 50 | 17.70 | HM3056 | MS3056 | HMV-56 |
| 10 15/16 | 277.81 | HA3060 | 168 | 42 | Tr 300x4 | 360 | 54 | 22.80 | HM3060 | MS3060 | HMV-60 |
| 11 15/16 | 303.21 | HA3064 | 171 | 42 | Tr 320x5 | 380 | 55 | 24.60 | HM3064 | MS3064 | HMV-64 |
| 12 7/16 | 315.91 | HA3068 | 187 | 45 | Tr 340x5 | 400 | 58 | 28.70 | HM3068 | MS3068 | HMV-68 |
| 13 7/16 | 341.31 | HA3072 | 188 | 45 | Tr 360x5 | 420 | 58 | 30.50 | HM3072 | MS3072 | HMV-72 |
| 13 15/16 | 354.01 | HA3076 | 193 | 48 | Tr 380x5 | 450 | 62 | 35.80 | HM3076 | MS3076 | HMV-76 |

[1]Adapter sleeves are supplied complete with locknuts and lockwasher or lockplates.
[2]M means metric thread and the digits are major diameter of thread and pitch.
[3]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.
[4]Adapters with a $C_1$ dimension use a lockplate as the locking device as shown in the illustration; otherwise, a lockwasher is used as the locking device.

# METRIC OH HYDRAULIC ADAPTER SLEEVES

- Includes mounting sleeve, locknut and lockwasher or lockplate.
- Hydraulic assistance facilitates mounting of large bearing. Oil pump required to inject pressurized oil.
- Other dimensions may be available, consult your Timken sales engineer.




$d_1 \leq 180$ mm $\quad$ $d_1 \geq 200$ mm

| $d_1$ | Sleeve Part Number[1] | L | C | Thread[2][3] G | $D_3$ | $C_1$[4] | Ro | e | t | Weight | Locknuts | Lockwasher and Lockplate | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | mm | mm | | mm | mm | kg | | | |
| 140 | OH3032H | 93 | 27.5 | M 160x3 | 190 | – | | 4 | 7 | 5.21 | KML32 | MBL32 | HMV-32 |
| 140 | OH3132H | 119 | 28 | M 160x3 | 210 | – | | 4 | 7 | 7.67 | KM32 | MB32 | HMV-32 |
| 150 | OH3034H | 101 | 28.5 | M 170x3 | 200 | – | | 4 | 7 | 5.99 | KML34 | MBL34 | HMV-34 |
| 150 | OH3134H | 122 | 29 | M 170x3 | 220 | – | | 4 | 7 | 8.38 | KM34 | MB34 | HMV-34 |
| 160 | OH3936H | 87 | 29.5 | M 180x3 | 210 | – | | 4 | 7 | 5.70 | KML36 | MBL36 | HMV-36 |
| 160 | OH3036H | 109 | 29.5 | M 180x3 | 210 | – | | 4 | 7 | 6.83 | KML36 | MBL36 | HMV-36 |
| 160 | OH3136H | 131 | 30 | M 180x3 | 230 | – | | 4 | 7 | 9.50 | KM36 | MB36 | HMV-36 |
| 170 | OH3938H | 89 | 30.5 | M 190x3 | 220 | – | | 4 | 7 | 6.19 | KML38 | MBL38 | HMV-38 |
| 170 | OH3038H | 112 | 30.5 | M 190x3 | 220 | – | | 4 | 7 | 7.45 | KML38 | MBL38 | HMV-38 |
| 170 | OH3138H | 141 | 31 | M 190x3 | 240 | – | | 4 | 7 | 10.80 | KM38 | MB38 | HMV-38 |
| 170 | OH2338H | 169 | 31 | M 190x3 | 240 | – | | 4 | 7 | 12.60 | KM38 | MB38 | HMV-38 |
| 180 | OH3940H | 98 | 31.5 | M 200x3 | 240 | – | | 4 | 7 | 7.89 | KML40 | MBL40 | HMV-40 |
| 180 | OH3040H | 120 | 31.5 | M 200x3 | 240 | – | | 4 | 7 | 9.19 | KML40 | MBL40 | HMV-40 |
| 180 | OH3140H | 150 | 32 | M 200x3 | 250 | – | | 4 | 7 | 12.10 | KM40 | MB40 | HMV-40 |
| 180 | OH2340H | 176 | 32 | M 200x3 | 250 | – | | 4 | 7 | 13.90 | KM40 | MB40 | HMV-40 |
| 200 | OH3944H | 96 | 30 | Tr 220x4 | 260 | 41 | M6 | 4 | 7 | 8.16 | HM3044 | MS3044 | HMV-44 |
| 200 | OH3044H | 126 | 30 | Tr 220x4 | 260 | 41 | M6 | 4 | 7 | 10.30 | HM3044 | MS3044 | HMV-44 |
| 200 | OH3144H | 161 | 35 | Tr 220x4 | 280 | – | M6 | 4 | 7 | 15.10 | HM44T | MB44 | HMV-44 |
| 200 | OH2344H | 186 | 35 | Tr 220x4 | 280 | – | M6 | 4 | 7 | 17.00 | HM44T | MB44 | HMV-44 |
| 220 | OH3948H | 101 | 34 | Tr 240x4 | 290 | 46 | M6 | 4 | 7 | 11.00 | HM3048 | MS3048 | HMV-48 |
| 220 | OH3048H | 133 | 34 | Tr 240x4 | 290 | 46 | M6 | 4 | 7 | 13.20 | HM3048 | MS3048 | HMV-48 |
| 220 | OH3148H | 172 | 37 | Tr 240x4 | 300 | – | M6 | 4 | 7 | 17.60 | HM48T | MB48 | HMV-48 |
| 220 | OH2348H | 199 | 37 | Tr 240x4 | 300 | – | M6 | 4 | 7 | 20.00 | HM48T | MB48 | HMV-48 |
| 240 | OH3952H | 116 | 34 | Tr 260x4 | 310 | 46 | M6 | 4 | 7 | 12.80 | HM3052 | MS3052 | HMV-52 |
| 240 | OH3052H | 145 | 34 | Tr 260x4 | 310 | 46 | M6 | 4 | 7 | 15.30 | HM3052 | MS3052 | HMV-52 |
| 240 | OH3152H | 190 | 39 | Tr 260x4 | 330 | – | M6 | 4 | 7 | 22.30 | HM52T | MB52 | HMV-52 |
| 240 | OH2352H | 211 | 39 | Tr 260x4 | 330 | – | M6 | 4 | 7 | 24.50 | HM52T | MB52 | HMV-52 |

[1]Hydraulic adapter sleeves are supplied complete with locknuts and lockwasher or lockplates.

*Continued on next page.*

[2]M means metric thread and the digits are major diameter of thread and pitch.

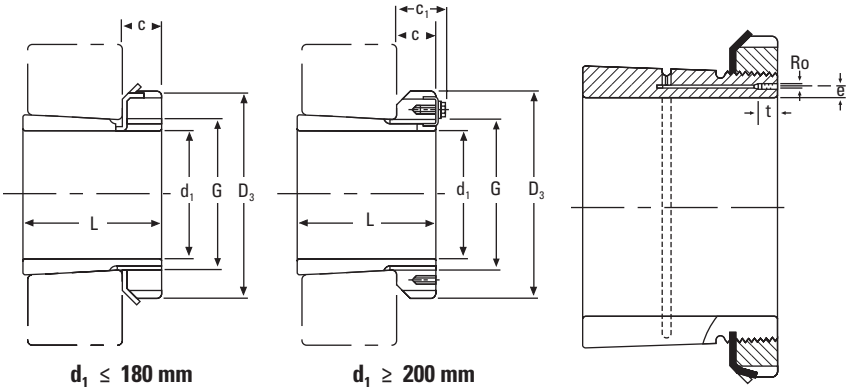
[3]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.

[4]Adapters with a $C_1$ dimension use a lockplate as the locking device as shown in the illustration; otherwise, a lockwasher is used as the locking device.

# METRIC OH HYDRAULIC ADAPTER SLEEVES – *continued*

- Includes mounting sleeve, locknut and lockwasher or lockplate.
- Hydraulic assistance facilitates mounting of large bearing. Oil pump required to inject pressurized oil.
- Other dimensions may be available, consult your Timken sales engineer.

*Continued from previous page.*




$d_1 \leq 180$ mm  $d_1 \geq 200$ mm

| $d_1$ | Sleeve Part Number[1] | L | C | Thread[2] G | $D_3$ | $C_1$[3] | Ro | e | t | Weight | Locknuts | Lockwasher and Lockplate | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | mm | mm | | mm | mm | kg | | | |
| 260 | OH3956H | 121 | 38 | Tr 280x4 | 330 | 50 | M6 | 4 | 7 | 15.30 | HM3056 | MS3056 | HMV-56 |
| 260 | OH3056H | 152 | 38 | Tr 280x4 | 330 | 50 | M6 | 4 | 7 | 17.70 | HM3056 | MS3056 | HMV-56 |
| 260 | OH3156H | 195 | 41 | Tr 280x4 | 350 | – | M6 | 4 | 7 | 25.10 | HM56T | MB56 | HMV-56 |
| 260 | OH2356H | 224 | 41 | Tr 280x4 | 350 | – | M6 | 4 | 7 | 28.40 | HM56T | MB56 | HMV-56 |
| 280 | OH3960H | 140 | 42 | Tr 300x4 | 360 | 54 | M6 | 4 | 7 | 20.00 | HM3060 | MS3060 | HMV-60 |
| 280 | OH3060H | 168 | 42 | Tr 300x4 | 360 | 54 | M6 | 4 | 7 | 22.80 | HM3060 | MS3060 | HMV-60 |
| 280 | OH3160H | 208 | 40 | Tr 300x4 | 380 | 53 | M6 | 4 | 7 | 30.20 | HM3160 | MS3160 | HMV-60 |
| 280 | OH3260H | 240 | 40 | Tr 300x4 | 380 | 53 | M6 | 4 | 7 | 34.10 | HM3160 | MS3160 | HMV-60 |
| 300 | OH3964H | 140 | 42 | Tr 320x5 | 380 | 55 | M6 | 3.5 | 7 | 21.50 | HM3064 | MS3064 | HMV-64 |
| 300 | OH3064H | 171 | 42 | Tr 320x5 | 380 | 55 | M6 | 3.5 | 7 | 24.60 | HM3064 | MS3064 | HMV-64 |
| 300 | OH3164H | 226 | 42 | Tr 320x5 | 400 | 56 | M6 | 3.5 | 7 | 34.90 | HM3164 | MS3164 | HMV-64 |
| 300 | OH3264H | 258 | 42 | Tr 320x54 | 400 | 56 | M6 | 3.5 | 7 | 39.30 | HM3164 | MS3164 | HMV-64 |
| 320 | OH3968H | 144 | 45 | Tr 340x5 | 400 | 58 | M6 | 3.5 | 7 | 24.50 | HM3068 | MS3068 | HMV-68 |
| 320 | OH3068H | 187 | 45 | Tr 340x5 | 400 | 58 | M6 | 3.5 | 7 | 28.70 | HM3068 | MS3068 | HMV-68 |
| 320 | OH3168H | 254 | 55 | Tr 340x5 | 440 | 72 | M6 | 3.5 | 7 | 50.00 | HM3168 | MS3168 | HMV-68 |
| 320 | OH3268H | 288 | 55 | Tr 340x5 | 440 | 72 | M6 | 3.5 | 7 | 54.60 | HM3168 | MS3168 | HMV-68 |
| 340 | OH3972H | 144 | 45 | Tr 360x5 | 420 | 58 | M6 | 3.5 | 7 | 25.20 | HM3072 | MS3072 | HMV-72 |
| 340 | OH3072H | 188 | 45 | Tr 360x5 | 420 | 58 | M6 | 3.5 | 7 | 30.50 | HM3072 | MS3072 | HMV-72 |
| 340 | OH3172H | 259 | 58 | Tr 360x5 | 460 | 75 | M6 | 3.5 | 7 | 56.00 | HM3172 | MS3172 | HMV-72 |
| 340 | OH3272H | 299 | 58 | Tr 360x5 | 460 | 75 | M6 | 3.5 | 7 | 60.60 | HM3172 | MS3172 | HMV-72 |
| 360 | OH3976H | 164 | 48 | Tr 380x5 | 450 | 62 | M6 | 3.5 | 7 | 31.50 | HM3076 | MS3076 | HMV-76 |
| 360 | OH3076H | 193 | 48 | Tr 380x5 | 450 | 62 | M6 | 3.5 | 7 | 35.80 | HM3076 | MS3076 | HMV-76 |
| 360 | OH3176H | 264 | 60 | Tr 380x5 | 490 | 77 | M6 | 3.5 | 7 | 61.70 | HM3176 | MS3176 | HMV-76 |
| 360 | OH3276H | 310 | 60 | Tr 380x5 | 490 | 77 | M6 | 3.5 | 7 | 69.60 | HM3176 | MS3176 | HMV-76 |
| 380 | OH3980H | 168 | 52 | Tr 400x5 | 470 | 66 | M6 | 3.5 | 7 | 35.00 | HM3080 | MS3080 | HMV-80 |
| 380 | OH3080H | 210 | 52 | Tr 400x5 | 470 | 66 | M6 | 3.5 | 7 | 41.30 | HM3080 | MS3080 | HMV-80 |
| 380 | OH3180H | 272 | 62 | Tr 400x5 | 520 | 82 | M6 | 3.5 | 7 | 73.00 | HM3180 | MS3180 | HMV-80 |
| 380 | OH3280H | 328 | 62 | Tr 400x5 | 520 | 82 | M6 | 3.5 | 7 | 81.00 | HM3180 | MS3180 | HMV-80 |

[1]Hydraulic adapter sleeves are supplied complete with locknuts and lockwasher or lockplates.
[2]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.
[3]Adapters with a $C_1$ dimension use a lockplate as the locking device as shown in the illustration; otherwise, a lockwasher is used as the locking device.

| $d_1$ | Sleeve Part Number[1] | L | C | Thread[2] G | $D_3$ | $C_1$[3] | Ro | e | t | Weight | Locknuts | Lockwasher and Lockplate | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | mm | mm | | mm | mm | kg | | | |
| 400 | OH3984H | 168 | 52 | Tr 420x5 | 490 | 66 | M6 | 3.5 | 7 | 36.60 | HM3084 | MS3084 | HMV-84 |
| 400 | OH3084H | 212 | 52 | Tr 420x5 | 490 | 66 | M6 | 3.5 | 7 | 43.70 | HM3084 | MS3084 | HMV-84 |
| 400 | OH3184H | 304 | 70 | Tr 420x5 | 540 | 90 | M6 | 3.5 | 7 | 84.20 | HM3184 | MS3184 | HMV-84 |
| 400 | OH3284H | 352 | 70 | Tr 420x5 | 540 | 90 | M6 | 3.5 | 7 | 96.00 | HM3184 | MS3184 | HMV-84 |
| 410 | OH3988H | 189 | 60 | Tr 440x5 | 520 | 77 | M8 | 6.5 | 12 | 58.00 | HM3088 | MS3088 | HMV-88 |
| 410 | OH3088H | 228 | 60 | Tr 440x5 | 520 | 77 | M8 | 6.5 | 12 | 65.20 | HM3088 | MS3088 | HMV-88 |
| 410 | OH3188H | 307 | 70 | Tr 440x5 | 560 | 90 | M8 | 6.5 | 12 | 104.00 | HM3188 | MS3188 | HMV-88 |
| 410 | OH3288H | 361 | 70 | Tr 440x5 | 560 | 90 | M8 | 6.5 | 12 | 118.00 | HM3188 | MS3188 | HMV-88 |
| 430 | OH3992H | 189 | 60 | Tr 460x5 | 540 | 77 | M8 | 6.5 | 12 | 60.00 | HM3092 | MS3092 | HMV-92 |
| 430 | OH3092H | 234 | 60 | Tr 460x5 | 540 | 77 | M8 | 6.5 | 12 | 71.00 | HM3092 | MS3092 | HMV-92 |
| 430 | OH3192H | 326 | 75 | Tr 460x5 | 580 | 95 | M8 | 6.5 | 12 | 116.00 | HM3192 | MS3192 | HMV-92 |
| 430 | OH3292H | 382 | 75 | Tr 460x5 | 580 | 95 | M8 | 6.5 | 12 | 134.00 | HM3192 | MS3192 | HMV-92 |
| 450 | OH3996H | 200 | 60 | Tr 480x5 | 560 | 77 | M8 | 6.5 | 12 | 66.00 | HM3096 | MS30/96 | HMV-96 |
| 450 | OH3096H | 237 | 60 | Tr 480x5 | 560 | 77 | M8 | 6.5 | 12 | 75.00 | HM3096 | MS30/96 | HMV-96 |
| 450 | OH3196H | 335 | 75 | Tr 480x5 | 620 | 95 | M8 | 6.5 | 12 | 135.00 | HM3196 | MS3196 | HMV-96 |
| 450 | OH3296H | 397 | 75 | Tr 480x5 | 620 | 95 | M8 | 6.5 | 12 | 153.00 | HM3196 | MS3196 | HMV-96 |
| 470 | OH39/500H | 208 | 68 | Tr 500x5 | 580 | 85 | M8 | 6.5 | 12 | 74.30 | HM30/500 | MS30/500 | HMV-100 |
| 470 | OH31/500H | 356 | 80 | Tr 500x5 | 630 | 100 | M8 | 6.5 | 12 | 145.00 | HM31/500 | MS31/500 | HMV-100 |
| 470 | OH32/500H | 428 | 80 | Tr 500x5 | 630 | 100 | M8 | 6.5 | 12 | 166.00 | HM31/500 | MS31/500 | HMV-100 |
| 500 | OH39/530H | 216 | 68 | Tr 530x6 | 630 | 90 | M8 | 6 | 12 | 87.90 | HM30/530 | MS30/530 | HMV-106 |
| 500 | OH31/530H | 364 | 80 | Tr 530x6 | 670 | 105 | M8 | 6 | 12 | 161.00 | HM31/530 | MS31/530 | HMV-106 |
| 500 | OH32/530H | 447 | 80 | Tr 530x6 | 670 | 105 | M8 | 6 | 12 | 192.00 | HM31/530 | MS31/530 | HMV-106 |
| 530 | OH39/560H | 227 | 75 | Tr 560x6 | 650 | 97 | M8 | 6 | 12 | 95.00 | HM30/560 | MS30/560 | HMV-112 |
| 530 | OH31/560H | 377 | 85 | Tr 560x6 | 710 | 110 | M8 | 6 | 12 | 185.00 | HM31/560 | MS31/560 | HMV-112 |
| 530 | OH32/560H | 462 | 85 | Tr 560x6 | 710 | 110 | M8 | 6 | 12 | 219.00 | HM31/560 | MS31/560 | HMV-112 |
| 560 | OH39/600H | 239 | 75 | Tr 600x6 | 700 | 97 | G1/8 | 8 | 13 | 127.00 | HM30/600 | MS30/600 | HMV-120 |
| 560 | OH30/600H | 289 | 75 | Tr 600x6 | 700 | 97 | G1/8 | 8 | 13 | 147.00 | HM30/600 | MS30/600 | HMV-120 |
| 560 | OH31/600H | 399 | 85 | Tr 600x6 | 750 | 110 | G1/8 | 8 | 13 | 234.00 | HM31/600 | MS31/600 | HMV-120 |
| 560 | OH32/600H | 487 | 85 | Tr 600x6 | 750 | 110 | G1/8 | 8 | 13 | 278.00 | HM31/600 | MS31/600 | HMV-120 |
| 600 | OH39/630H | 254 | 75 | Tr 630x6 | 730 | 97 | M8 | 6 | 12 | 124.00 | HM30/630 | MS30/630 | HMV-126 |
| 600 | OH30/630H | 301 | 75 | Tr 630x6 | 730 | 97 | M8 | 6 | 12 | 138.00 | HM30/630 | MS30/630 | HMV-126 |
| 600 | OH31/630H | 424 | 95 | Tr 630x6 | 800 | 120 | M8 | 6 | 12 | 254.00 | HM31/630 | MS31/630 | HMV-126 |
| 600 | OH32/630H | 521 | 95 | Tr 630x6 | 800 | 120 | M8 | 6 | 12 | 300.00 | HM 31/630 | MS31/630 | HMV-126 |

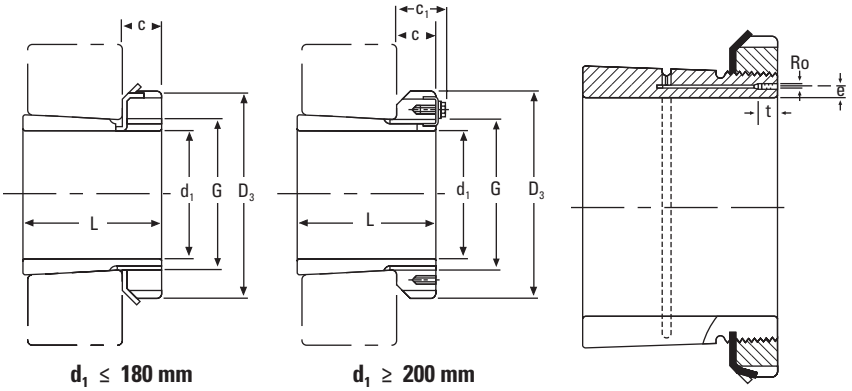
[1]Hydraulic adapter sleeves are supplied complete with locknuts and lockwasher or lockplates.
[2]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.
[3]Adapters with a $C_1$ dimension use a lockplate as the locking device as shown in the illustration; otherwise, a lockwasher is used as the locking device.

*Continued on next page.*

# *METRIC OH HYDRAULIC ADAPTER SLEEVES* – *continued*

- Includes mounting sleeve, locknut and lockwasher or lockplate.
- Hydraulic assistance facilitates mounting of large bearing. Oil pump required to inject pressurized oil.
- Other dimensions may be available, consult your Timken sales engineer.

*Continued from previous page.*



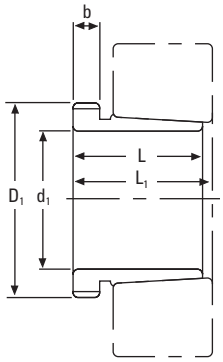

**$d_1 \leq$ 180 mm** **$d_1 \geq$ 200 mm**

| $d_1$ | Sleeve Part Number[1] | L | C | Thread[2] G | $D_3$ | $C_1$[3] | Ro | e | t | Weight | Locknuts | Lockwasher and Lockplate | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | mm | mm | | mm | mm | kg | | | |
| 630 | OH39/670H | 264 | 80 | Tr 670x6 | 780 | 102 | G1/8 | 8 | 13 | 162.00 | HM30/670 | MS30/670 | HMV-134 |
| 630 | OH30/670H | 324 | 80 | Tr 670x6 | 780 | 102 | G1/8 | 8 | 13 | 190.00 | HM30/670 | MS30/670 | HMV-134 |
| 630 | OH31/670H | 456 | 106 | Tr 670x6 | 850 | 131 | G1/8 | 8 | 13 | 340.00 | HM31/670 | MS31/670 | HMV-134 |
| 630 | OH32/670H | 558 | 106 | Tr 670x6 | 850 | 131 | G1/8 | 8 | 13 | 401.00 | HM31/670 | MS31/670 | HMV-134 |
| 670 | OH39/710H | 286 | 90 | Tr 710x7 | 830 | 112 | G1/8 | 8 | 13 | 183.00 | HM30/710 | MS30/710 | HMV-142 |
| 670 | OH30/710H | 342 | 90 | Tr 710x7 | 830 | 112 | G1/8 | 8 | 13 | 228.00 | HM30/710 | MS30/710 | HMV-142 |
| 670 | OH31/710H | 467 | 106 | Tr 710x7 | 900 | 135 | G1/8 | 8 | 13 | 392.00 | HM31/710 | MS31/710 | HMV-142 |
| 670 | OH32/710H | 572 | 106 | Tr 710x7 | 900 | 135 | G1/8 | 8 | 13 | 459.00 | HM31/710 | MS31/710 | HMV-142 |
| 710 | OH39/750H | 291 | 90 | Tr 750x7 | 870 | 112 | G1/8 | 8 | 13 | 211.00 | HM30/750 | MS30/750 | HMV-150 |
| 710 | OH30/750H | 356 | 90 | Tr 750x7 | 870 | 112 | G1/8 | 8 | 13 | 246.00 | HM30/750 | MS30/750 | HMV-150 |
| 710 | OH31/750H | 493 | 112 | Tr 750x7 | 950 | 141 | G1/8 | 8 | 13 | 451.00 | HM31/750 | MS31/750 | HMV-150 |
| 710 | OH32/750H | 603 | 112 | Tr 750x7 | 950 | 141 | G1/8 | 8 | 13 | 526.00 | HM31/750 | MS31/750 | HMV-150 |
| 750 | OH39/800H | 303 | 90 | Tr 800x7 | 920 | 112 | G1/8 | 10 | 13 | 259.00 | HM30/800 | MS30/800 | HMV-160 |
| 750 | OH31/800H | 505 | 112 | Tr 800x7 | 1000 | 141 | G1/8 | 10 | 13 | 535.00 | HM31/800 | MS31/800 | HMV-160 |
| 750 | OH32/800H | 618 | 112 | Tr 800x7 | 1000 | 141 | G1/8 | 10 | 13 | 629.00 | HM31/800 | MS31/800 | HMV-160 |
| 800 | OH39/850H | 308 | 90 | Tr 850x7 | 980 | 115 | G1/8 | 10 | 13 | 288.00 | HM30/850 | MS30/850 | HMV-170 |
| 800 | OH31/850H | 536 | 118 | Tr 850x7 | 1060 | 147 | G1/8 | 10 | 13 | 616.00 | HM31/850 | MS31/850 | HMV-170 |
| 800 | OH32/850H | 651 | 118 | Tr 850x7 | 1060 | 147 | G1/8 | 10 | 13 | 722.00 | HM31/850 | MS31/850 | HMV-170 |
| 850 | OH39/900H | 326 | 100 | Tr 900x7 | 1030 | 125 | G1/8 | 10 | 13 | 330.00 | HM30/900 | MS30/900 | HMV-180 |
| 850 | OH31/900H | 557 | 125 | Tr 900x7 | 1120 | 154 | G1/8 | 10 | 13 | 677.00 | HM31/900 | MS31/900 | HMV-180 |
| 850 | OH32/900H | 660 | 125 | Tr 900x7 | 1120 | 154 | G1/8 | 10 | 13 | 776.00 | HM31/900 | MS31/900 | HMV-180 |
| 900 | OH39/950H | 344 | 100 | Tr 950x8 | 1080 | 125 | G1/8 | 10 | 13 | 362.00 | HM30/950 | MS30/950 | HMV-190 |
| 900 | OH31/950H | 583 | 125 | Tr 950x8 | 1170 | 154 | G1/8 | 10 | 13 | 738.00 | HM31/950 | MS31/950 | HMV-190 |
| 900 | OH32/950H | 675 | 125 | Tr 950x8 | 1170 | 154 | G1/8 | 10 | 13 | 834.00 | HM31/950 | MS31/950 | HMV-190 |
| 950 | OH39/1000H | 358 | 100 | Tr 1000x8 | 1140 | 125 | G1/8 | 10 | 13 | 407.00 | HM30/1000 | MS30/1000 | HMV-200 |
| 950 | OH31/1000H | 609 | 125 | Tr 1000x8 | 1240 | 154 | G1/8 | 10 | 13 | 842.00 | HM31/1000 | MS31/1000 | HMV-200 |
| 950 | OH32/1000H | 707 | 125 | Tr 1000x8 | 1240 | 154 | G1/8 | 10 | 13 | 952.00 | HM31/1000 | MS31/1000 | HMV-200 |
| 1000 | OH39/1060H | 372 | 100 | Tr 1060x8 | 1200 | 125 | G1/8 | 12 | 15 | 490.00 | HM30/1060 | MS30/1000 | HMV-212 |
| 1000 | OH30/1060H | 447 | 100 | Tr 1060x8 | 1200 | 125 | G1/8 | 12 | 15 | 571.00 | HM30/1060 | MS30/1000 | HMV-212 |
| 1000 | OH31/1060H | 622 | 125 | Tr 1060x8 | 1300 | 154 | G1/8 | 12 | 15 | 984.00 | HM31/1060 | MS31/1000 | HMV-212 |

[1]Hydraulic adapter sleeves are supplied complete with locknuts and lockwasher or lockplates.
[2]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.
[3]Adapters with a $C_1$ dimension use a lockplate as the locking device as shown in the illustration; otherwise, a lockwasher is used as the locking device.

# METRIC AH WITHDRAWAL SLEEVES

- Sleeves used in the dismounting of tapered bore bearing from shaft.
- Effective dismounting.
- Other dimensions may be available, consult your Timken sales engineer.



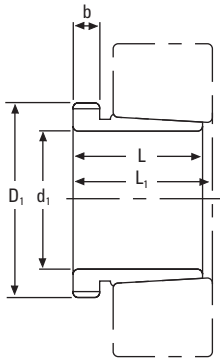

| $d_1$ | Withdrawal Sleeve Part Number | L | $L_1$[1] | b | Thread $D_1$ | Weight | Appropriate Withdrawal Nut No. | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | mm | kg | | |
| 35 | AH308 | 29 | 32 | 6 | M 45x1,5 | 0.09 | KM9 | |
| 35 | AH2308 | 40 | 43 | 7 | M 45x1.5 | 0.13 | KM9 | |
| 40 | AH309 | 31 | 34 | 6 | M 50x1,5 | 0.11 | KM10 | HMV-10 |
| 40 | AH2309 | 44 | 47 | 7 | M 50x1.5 | 0.16 | KM10 | HMV-10 |
| 45 | AHX310 | 35 | 38 | 7 | M 55x2 | 0.14 | KM11 | HMV-11 |
| 45 | AHX2310 | 50 | 53 | 9 | M 55x2 | 0.21 | KM11 | HMV-11 |
| 50 | AHX311 | 37 | 40 | 7 | M 60x2 | 0.16 | KM12 | HMV-12 |
| 50 | AHX2311 | 54 | 57 | 10 | M 60x2 | 0.25 | KM12 | HMV-12 |
| 55 | AHX312 | 40 | 43 | 8 | M 65x2 | 0.19 | KM13 | HMV-13 |
| 55 | AHX2312 | 58 | 61 | 11 | M 65x2 | 0.30 | KM13 | HMV-13 |
| 60 | AH313G | 42 | 45 | 8 | M 70x2 | 0.35 | KM14 | HMV-14 |
| 65 | AH314G | 43 | 47 | 8 | M 75x2 | 0.24 | KM15 | HMV-15 |
| 65 | AHX2314G | 64 | 68 | 12 | M 75x2 | 0.42 | KM15 | HMV-15 |
| 70 | AH315G | 45 | 49 | 8 | M 80x2 | 0.29 | KM16 | HMV-16 |
| 70 | AHX2315G | 68 | 72 | 12 | M 80x2 | 0.48 | KM16 | HMV-16 |
| 75 | AH316 | 48 | 52 | 8 | M 90x2 | 0.37 | KM18 | HMV-18 |
| 75 | AHX2316 | 71 | 75 | 12 | M 90x2 | 0.60 | KM18 | HMV-18 |
| 80 | AHX317 | 52 | 56 | 9 | M 95x2 | 0.43 | KM19 | HMV-19 |
| 80 | AHX2317 | 74 | 78 | 13 | M 95x2 | 0.67 | KM19 | HMV-19 |
| 85 | AHX318 | 53 | 57 | 9 | M 100x2 | 0.46 | KM20 | HMV-20 |
| 85 | AHX3218 | 63 | 67 | 10 | M 100x2 | 0.58 | KM20 | HMV-20 |
| 85 | AHX2318 | 79 | 83 | 14 | M 100x2 | 0.78 | KM20 | HMV-20 |
| 90 | AHX319 | 57 | 61 | 10 | M 105x2 | 0.53 | KM21 | HMV-21 |
| 90 | AHX2319 | 85 | 89 | 16 | M 105x2 | 0.89 | KM21 | HMV-21 |
| 95 | AHX320 | 59 | 63 | 10 | M 110x2 | 0.60 | KM22 | HMV-22 |
| 95 | AHX3120 | 64 | 68 | 11 | M 110x2 | 0.65 | KM22 | HMV-22 |
| 95 | AHX3220 | 73 | 77 | 11 | M 110x2 | 0.77 | KM22 | HMV-22 |
| 95 | AHX2320 | 90 | 94 | 16 | M 110x2 | 1.00 | KM22 | HMV-22 |

[1]Dimension $L_1$ decreases as the withdrawal sleeve is driven in during mounting.

*Continued on next page.*

# *METRIC AH WITHDRAWAL SLEEVES* – *continued*

- Sleeves used in the dismounting of tapered bore bearing from shaft.
- Effective dismounting.
- Other dimensions may be available, consult your Timken sales engineer.




*Continued from previous page.*

| $d_1$ | Withdrawal Sleeve Part Number | L | $L_1$[1] | b | Thread[2] $D_1$ | Weight | Appropriate Withdrawal Nut No. | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|
| **mm** | | **mm** | **mm** | **mm** | **mm** | **kg** | | |
| **105** | AHX322 | **63** | **67** | **12** | **M 120X2** | **0.66** | KM24 | HMV-24 |
| **105** | AHX3122 | **68** | **72** | **11** | **M 120X2** | **0.76** | KM24 | HMV-24 |
| **105** | AH24122 | **82** | **91** | **13** | **M 115x2** | **0.73** | KM23 | HMV-23 |
| **105** | AHX3222G | **82** | **86** | **11** | **M 120X2** | **1.00** | KM24 | HMV-24 |
| **105** | AHX2322G | **98** | **102** | **16** | **M 120X2** | **1.26** | KM24 | HMV-24 |
| **115** | AHX3024 | **60** | **64** | **13** | **M 130x2** | **0.75** | KM26 | HMV-26 |
| **115** | AH24024 | **73** | **82** | **13** | **M 125x2** | **0.65** | KM25 | HMV-25 |
| **115** | AHX3124 | **75** | **79** | **12** | **M 130x2** | **0.95** | KM26 | HMV-26 |
| **115** | AHX3224G | **90** | **94** | **13** | **M 130x2** | **1.20** | KM26 | HMV-26 |
| **115** | AH24124 | **93** | **102** | **13** | **M 130x2** | **1.00** | KM26 | HMV-26 |
| **115** | AHX2324G | **105** | **109** | **17** | **M 130x2** | **1.49** | KM26 | HMV-26 |
| **125** | AHX3026 | **67** | **71** | **14** | **M 140x2** | **0.93** | KM28 | HMV-28 |
| **125** | AHX3126 | **78** | **82** | **12** | **M 140x2** | **1.09** | KM28 | HMV-28 |
| **125** | AH24026 | **83** | **93** | **14** | **M 135x2** | **0.84** | KM27 | HMV-27 |
| **125** | AH24126 | **94** | **104** | **14** | **M 140x2** | **1.15** | KM28 | HMV-28 |
| **125** | AHX3226G | **98** | **102** | **15** | **M 140x2** | **1.47** | KM28 | HMV-28 |
| **125** | AHX2326G | **115** | **119** | **19** | **M 140x2** | **1.83** | KM28 | HMV-28 |
| **135** | AHX3028 | **68** | **73** | **14** | **M 150x2** | **1.01** | KM30 | HMV-30 |
| **135** | AH24028 | **83** | **93** | **14** | **M 145x2** | **0.91** | KM29 | HMV-29 |
| **135** | AHX3128 | **83** | **88** | **14** | **M 150x2** | **1.28** | KM30 | HMV-30 |
| **135** | AH24128 | **99** | **109** | **14** | **M 150x2** | **1.25** | KM30 | HMV-30 |
| **135** | AHX3228G | **104** | **109** | **15** | **M 150x2** | **1.72** | KM30 | HMV-30 |
| **135** | AHX2328G | **125** | **130** | **20** | **M 150x2** | **2.22** | KM30 | HMV-30 |
| **145** | AHX3030 | **72** | **77** | **15** | **M 160x3** | **1.15** | KM32 | HMV-32 |
| **145** | AHX3130G | **96** | **101** | **15** | **M 160x3** | **1.64** | KM32 | HMV-32 |
| **145** | AHX3230G | **114** | **119** | **17** | **M 160x3** | **2.07** | KM32 | HMV-32 |
| **145** | AH24130 | **115** | **126** | **15** | **M 160x3** | **1.60** | KM32 | HMV-32 |
| **145** | AHX2330G | **135** | **140** | **24** | **M 160x3** | **2.60** | KM32 | HMV-32 |

[1]Dimension $L_1$ decreases as the withdrawal sleeve is driven in during mounting.
[2]M means metric thread and the digits are major diameter of thread and pitch.

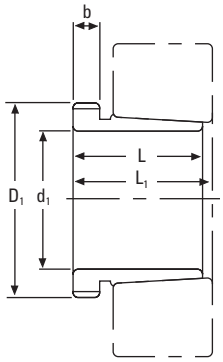
| $d_1$ | Withdrawal Sleeve Part Number | L | $L_1$[1] | b | Thread[2][3] $D_1$ | Weight | Appropriate Withdrawal Nut No. | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | mm | kg | | |
| 150 | AH3032 | 77 | 82 | 16 | M 170x3 | 2.06 | KM34 | HMV-34 |
| 150 | AH24032 | 95 | 106 | 15 | M 170x3 | 2.27 | KM34 | HMV-34 |
| 150 | AH3132G | 103 | 108 | 16 | M 170x3 | 2.90 | KM34 | HMV-34 |
| 150 | AH24132 | 124 | 135 | 15 | M 170x3 | 3.00 | KM34 | HMV-34 |
| 150 | AH3232G | 124 | 130 | 20 | M 170x3 | 3.63 | KM34 | HMV-34 |
| 160 | AH3034 | 85 | 90 | 17 | M 180x3 | 2.43 | KM36 | HMV-36 |
| 160 | AH3134G | 104 | 109 | 16 | M 180x3 | 3.04 | KM36 | HMV-36 |
| 160 | AH24034 | 106 | 117 | 16 | M 180x3 | 2.80 | KM36 | HMV-36 |
| 160 | AH24134 | 125 | 136 | 16 | M 180x3 | 3.21 | KM36 | HMV-36 |
| 160 | AH3234G | 134 | 140 | 24 | M 180x3 | 4.35 | KM36 | HMV-36 |
| 170 | AH3136G | 116 | 122 | 19 | M 190x3 | 3.77 | KM38 | HMV-38 |
| 170 | AH3236G | 140 | 146 | 24 | M 190x3 | 4.77 | KM38 | HMV-38 |
| 180 | AH3038G | 96 | 102 | 18 | M 200x3 | 3.16 | KM40 | HMV-40 |
| 180 | AH24038 | 118 | 131 | 18 | M 200x3 | 3.46 | KM40 | HMV-40 |
| 180 | AH3138G | 125 | 131 | 20 | M 200x3 | 4.38 | KM40 | HMV-40 |
| 180 | AH3238G | 145 | 152 | 25 | M 200x3 | 5.30 | KM40 | HMV-40 |
| 180 | AH24138 | 146 | 159 | 18 | M 200x3 | 4.28 | KM40 | HMV-40 |
| 190 | AH3040G | 102 | 108 | 19 | Tr 210x4 | 3.57 | HM42T | HMV-42 |
| 190 | AH24040 | 127 | 140 | 18 | Tr 210x4 | 3.93 | HM42T | HMV-42 |
| 190 | AH3140 | 134 | 140 | 21 | Tr 220x4 | 5.55 | HM3044 | HMV-44 |
| 190 | AH3240 | 153 | 160 | 25 | Tr 220x4 | 6.59 | HM3044 | HMV-44 |
| 190 | AH24140 | 158 | 171 | 18 | Tr 210x4 | 5.10 | HM42T | HMV-42 |
| 200 | AH3044G | 111 | 117 | 20 | Tr 230x4 | 7.10 | HM46T | HMV-46 |
| 200 | AH24044 | 138 | 152 | 20 | Tr 230x4 | 8.25 | HM46T | HMV-46 |
| 200 | AH3144 | 145 | 151 | 23 | Tr 240x4 | 10.40 | HM48 | HMV-48 |
| 200 | AH24144 | 170 | 184 | 20 | Tr 230x4 | 10.20 | HM46 | HMV-46 |
| 220 | AH3948 | 77 | 83 | 16 | Tr 250x4 | 5.29 | HM50 | HMV-50 |
| 220 | AH3048 | 116 | 123 | 21 | Tr 260x4 | 8.75 | HML52 | HMV-52 |
| 220 | AH24048 | 138 | 153 | 20 | Tr 250x4 | 9.00 | HM50 | HMV-50 |
| 220 | AH3148 | 154 | 161 | 25 | Tr 260x4 | 12.00 | HM52 | HMV-52 |
| 220 | AH24148 | 180 | 195 | 20 | Tr 260x4 | 12.50 | HM52 | HMV-52 |
| 240 | AH3952 | 94 | 100 | 18 | Tr 270x4 | 7.06 | HM54 | HMV-54 |
| 240 | AH3052 | 128 | 135 | 23 | Tr 280x4 | 10.70 | HML56 | HMV-56 |
| 240 | AH3152G | 172 | 179 | 26 | Tr 280x4 | 15.10 | HM56T | HMV-56 |
| 240 | AH24152 | 202 | 218 | 22 | Tr 280x4 | 15.40 | HM56 | HMV-56 |

[1]Dimension $L_1$ decreases as the withdrawal sleeve is driven in during mounting.
[2]M means metric thread and the digits are major diameter of thread and pitch.
[3]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.

*Continued on next page.*

# *METRIC AH WITHDRAWAL SLEEVES* – *continued*

- Sleeves used in the dismounting of tapered bore bearing from shaft.
- Effective dismounting.
- Other dimensions may be available, consult your Timken sales engineer.




*Continued from previous page.*

| $d_1$ | Withdrawal Sleeve Part Number | L | $L_1$[1] | b | Thread[2] $D_1$ | Weight | Appropriate Withdrawal Nut No. | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|
| **mm** | | **mm** | **mm** | **mm** | **mm** | **kg** | | |
| **260** | AH3956 | **94** | **100** | **18** | **Tr 290x4** | **7.70** | HM58 | HMV-58 |
| **260** | AH3056 | **131** | **139** | **24** | **Tr 300x4** | **12.00** | MB52 | HMV-52 |
| **260** | AH3156G | **175** | **183** | **28** | **Tr 300x4** | **16.70** | HM3160 | HMV-60 |
| **260** | AH24156 | **202** | **219** | **22** | **Tr 300x4** | **16.30** | HM60 | HMV-60 |
| **280** | AH3960 | **112** | **119** | **21** | **Tr 310x5** | **10.10** | HM62 | HMV-62 |
| **280** | AH3060 | **145** | **153** | **26** | **Tr 320x5** | **14.40** | HML64 | HMV-64 |
| **280** | AH3160G | **192** | **200** | **30** | **Tr 320x5** | **19.90** | HM3164 | HMV-64 |
| **280** | AH24160 | **224** | **242** | **24** | **Tr 320x5** | **19.50** | HM64 | HMV-64 |
| **280** | AH3260G | **228** | **236** | **34** | **Tr 320x5** | **24.60** | HM3164 | HMV-64 |
| **300** | AH3964 | **112** | **119** | **21** | **Tr 330x5** | **10.80** | HM66 | HMV-66 |
| **300** | AH3064G | **149** | **157** | **27** | **Tr 340x5** | **15.80** | HM3068 | HMV-68 |
| **300** | AH3164G | **209** | **217** | **31** | **Tr 340x5** | **23.60** | HM3168 | HMV-68 |
| **300** | AH24164 | **242** | **260** | **24** | **Tr 340x5** | **21.40** | HM68 | HMV-68 |
| **300** | AH3264G | **246** | **254** | **36** | **Tr 340x5** | **28.90** | HM3168 | HMV-68 |
| **320** | AH3968 | **112** | **119** | **21** | **Tr 360x5** | **12.40** | HML72 | HMV-72 |
| **320** | AH3068G | **162** | **171** | **28** | **Tr 360x5** | **18.60** | HM3072 | HMV-72 |
| **320** | AH3168G | **225** | **234** | **33** | **Tr 360x5** | **27.60** | HM3172 | HMV-72 |
| **320** | AH3268G | **264** | **273** | **38** | **Tr 360x5** | **33.70** | HM3172 | HMV-72 |
| **320** | AH24168 | **269** | **288** | **26** | **Tr 360x5** | **27.10** | HM72 | HMV-72 |
| **340** | AH3972 | **112** | **119** | **21** | **Tr 380x5** | **13.10** | HML76 | HMV-76 |
| **340** | AH3072G | **167** | **176** | **30** | **Tr 380x5** | **20.40** | HM3076 | HMV-76 |
| **340** | AH3172G | **229** | **238** | **35** | **Tr 380x5** | **29.90** | HM3176 | HMV-76 |
| **340** | AH24172 | **269** | **289** | **26** | **Tr 380x5** | **29.60** | HM76 | HMV-76 |
| **340** | AH3272G | **274** | **283** | **40** | **Tr 380x5** | **37.50** | HM3176 | HMV-76 |

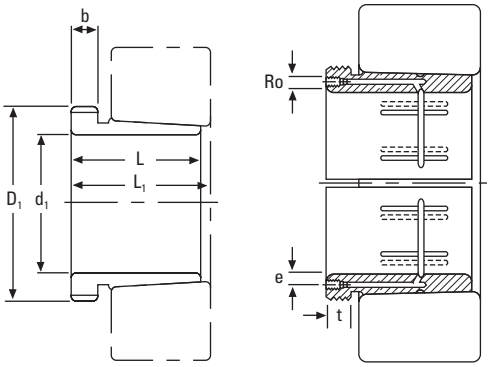
[1]Dimension $L_1$ decreases as the withdrawal sleeve is driven in during mounting.
[2]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.

| $d_1$ | Withdrawal Sleeve Part Number | L | $L_1$[1] | b | Thread[2] $D_1$ | Weight | Appropriate Withdrawal Nut No. | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | mm | kg | | |
| 360 | AH3976 | 130 | 138 | 22 | Tr 400x5 | 15.90 | HML80 | HMV-80 |
| 360 | AH3076G | 170 | 180 | 31 | Tr 400x5 | 22.10 | HM3080 | HMV-80 |
| 360 | AH3176G | 232 | 242 | 36 | Tr 400x5 | 32.20 | HM3180 | HMV-80 |
| 360 | AH24176 | 271 | 291 | 28 | Tr 400x5 | 31.30 | HM80 | HMV-80 |
| 360 | AH3276G | 284 | 294 | 42 | Tr 400x5 | 41.50 | HM3180 | HMV-80 |
| 380 | AH3980 | 130 | 138 | 22 | Tr 420x5 | 17.20 | HML84 | HMV-84 |
| 380 | AH3080G | 183 | 193 | 33 | Tr 420x5 | 25.40 | HM3084 | HMV-84 |
| 380 | AH3280G | 302 | 312 | 44 | Tr 420x5 | 47.40 | HM3184 | HMV-84 |
| 400 | AH3984 | 130 | 138 | 22 | Tr 440x5 | 18.10 | HML88 | HMV-88 |
| 400 | AH3084G | 186 | 196 | 34 | Tr 440x5 | 27.30 | HM3088 | HMV-88 |
| 400 | AH24084 | 230 | 252 | 30 | Tr 440x5 | 29.00 | HML88 | HMV-88 |
| 400 | AH3184G | 266 | 276 | 40 | Tr 440x5 | 42.30 | HM3188 | HMV-88 |
| 400 | AH24184 | 310 | 332 | 30 | Tr 440x5 | 40.30 | HM88 | HMV-88 |
| 400 | AH3284G | 321 | 331 | 46 | Tr 440x5 | 54.00 | HM3188 | HMV-88 |
| 420 | AH3988 | 145 | 153 | 25 | Tr 460x5 | 21.50 | HML92 | HMV-92 |
| 420 | AHX3088G | 194 | 205 | 35 | Tr 460x5 | 30.10 | HM3092 | HMV-92 |
| 420 | AH24088 | 242 | 264 | 30 | Tr 460x5 | 31.90 | HML92 | HMV-92 |
| 420 | AHX3188G | 270 | 281 | 42 | Tr 460x5 | 42.30 | HM3192 | HMV-92 |
| 420 | AH24188 | 310 | 332 | 30 | Tr 460x5 | 42.30 | HM92 | HMV-92 |
| 420 | AHX3288 | 330 | 341 | 48 | Tr 460x5 | 63.80 | HM3192 | HMV-92 |
| 420 | AHX3288G | 330 | 341 | 48 | Tr 460x5 | 58.80 | HM3192 | HMV-92 |
| 440 | AH3992 | 145 | 153 | 25 | Tr 480x5 | 22.50 | HML96 | HMV-96 |
| 440 | AHX3092G | 202 | 213 | 37 | Tr 480x5 | 33.10 | HM3096 | HMV-96 |
| 440 | AH24092 | 250 | 273 | 32 | Tr 480x5 | 34.70 | HML96 | HMV-96 |
| 440 | AHX3192G | 285 | 296 | 43 | Tr 480x5 | 50.80 | HML3196 | HMV-96 |
| 440 | AH24192 | 332 | 355 | 32 | Tr 480x5 | 47.60 | HM96 | HMV-96 |
| 440 | AHX3292G | 349 | 360 | 50 | Tr 480x5 | 66.30 | HM3196 | HMV-96 |
| 460 | AH3996 | 158 | 167 | 28 | Tr 500x5 | 26.00 | HML100 | HMV-100 |
| 460 | AH24096 | 250 | 273 | 32 | Tr 500x5 | 36.60 | HML100 | HMV-100 |
| 460 | AHX3196G | 295 | 307 | 45 | Tr 500x5 | 55.50 | HM31/500 | HMV-100 |
| 460 | AH24196 | 340 | 363 | 32 | Tr 500x5 | 52.70 | HM100 | HMV-100 |
| 460 | AHX3296G | 364 | 376 | 52 | Tr 500x5 | 73.40 | HM31/500 | HMV-100 |
| 710 | AH32/750 | 540 | 556 | 65 | Tr 800x7 | 317.00 | HM31/800 | HMV-160 |

[1]Dimension $L_1$ decreases as the withdrawal sleeve is driven in during mounting.
[2]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.

# *METRIC AOH HYDRAULIC WITHDRAWAL SLEEVES*

- Sleeves used in the dismounting of tapered bore bearing from shaft.
- Hydraulic assistance facilitates dismounting of large bearing. Oil pump required to inject pressurized oil.
- Other dimensions may be available, consult your Timken sales engineer.




| $d_1$ | Withdrawal Sleeve Part Number | L | $L_1$[1] | b | Ro | e | t | Thread[2] $D_1$ | Weight | Appropriate Withdrawal Nut No. | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | | mm | mm | mm | kg | | |
| 200 | AOH3044G | 111 | 117 | 20 | G ⅛ | 6.5 | 12 | Tr 230x4 | 7.29 | HM46T | HMV-46 |
| 200 | AOH2244 | 130 | 136 | 20 | G ¼ | 9 | 15 | Tr 240x4 | 9.1 | HM3048 | HMV-48 |
| 200 | AOH24044 | 138 | 152 | 20 | G ⅛ | 6.5 | 12 | Tr 230x4 | 8.25 | HM46T | HMV-46 |
| 200 | AOH3144 | 145 | 151 | 23 | G ¼ | 9 | 15 | Tr 240x4 | 10.4 | HM3048 | HMV-48 |
| 200 | AOH24144 | 170 | 184 | 20 | G ⅛ | 6.5 | 12 | Tr 230x4 | 10.2 | HM46T | HMV-46 |
| 200 | AOH2344 | 181 | 189 | 30 | G ¼ | 9 | 15 | Tr 240x4 | 13.5 | HM3048 | HMV-48 |
| 220 | AOH3948 | 77 | 83 | 16 | M 8 | 7.5 | 12 | Tr 250x4 | 5.29 | HM50 | HMV-50 |
| 220 | AOH3048 | 116 | 123 | 21 | G ¼ | 9 | 15 | Tr 260x4 | 8.75 | HM3052 | HMV-52 |
| 220 | AOH24048 | 138 | 153 | 20 | G ⅛ | 6.5 | 12 | Tr 250x4 | 9 | HM50T | HMV-50 |
| 220 | AOH3148 | 154 | 161 | 25 | G ¼ | 9 | 15 | Tr 260x4 | 12 | HM3052 | HMV-52 |
| 220 | AOH24148 | 180 | 195 | 20 | G ¼ | 9 | 15 | Tr 260x4 | 12.5 | HM3052 | HMV-52 |
| 220 | AOH2348 | 189 | 197 | 30 | G ¼ | 9 | 15 | Tr 260x4 | 15.5 | HM3052 | HMV-52 |
| 240 | AOH3952 | 94 | 100 | 18 | M 8 | 7.5 | 12 | Tr 270x4 | 7.06 | HM54 | HMV-54 |
| 240 | AOH3052 | 128 | 135 | 23 | G ¼ | 9 | 15 | Tr 280x4 | 10.7 | HM3056 | HMV-56 |
| 240 | AOH2252G | 155 | 161 | 23 | G ¼ | 9 | 15 | Tr 280x4 | 13 | HM3056 | HMV-56 |
| 240 | AOH24052G | 162 | 178 | 22 | G ⅛ | 6.5 | 12 | Tr 280x4 | 12.3 | HM3056 | HMV-56 |
| 240 | AOH3152G | 172 | 179 | 26 | G ¼ | 9 | 15 | Tr 280x4 | 15.5 | HM3056 | HMV-56 |
| 240 | AOH24152 | 202 | 218 | 22 | G ¼ | 9 | 15 | Tr 280x4 | 15.4 | HM3056 | HMV-56 |
| 240 | AOH2352G | 205 | 213 | 30 | G ¼ | 9 | 15 | Tr 280x4 | 18.9 | HM3056 | HMV-56 |
| 260 | AOH3956 | 94 | 100 | 18 | M 8 | 7.5 | 12 | Tr 290x4 | 7.07 | HM58 | HMV-58 |
| 260 | AOH3056 | 131 | 139 | 24 | G ¼ | 9 | 15 | Tr 300x4 | 12 | HM3060 | HMV-60 |
| 260 | AOH2256G | 155 | 163 | 24 | G ¼ | 9 | 15 | Tr 300x4 | 14.6 | HM3160 | HMV-60 |
| 260 | AOH24056G | 162 | 179 | 22 | G ⅛ | 6.5 | 12 | Tr 300x4 | 13.4 | HM3160 | HMV-60 |
| 260 | AOH3156G | 175 | 183 | 28 | G ¼ | 9 | 15 | Tr 300x4 | 17.1 | HM3160 | HMV-60 |
| 260 | AOH24156 | 202 | 219 | 22 | G ¼ | 9 | 15 | Tr 300x4 | 16.3 | HM3160 | HMV-60 |
| 260 | AOH2356G | 212 | 220 | 30 | G ¼ | 9 | 15 | Tr 300x4 | 21.3 | HM3160 | HMV-60 |

[1]Dimension $L_1$ decreases as the hydraulic withdrawal sleeve is driven in during mounting.
[2]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.

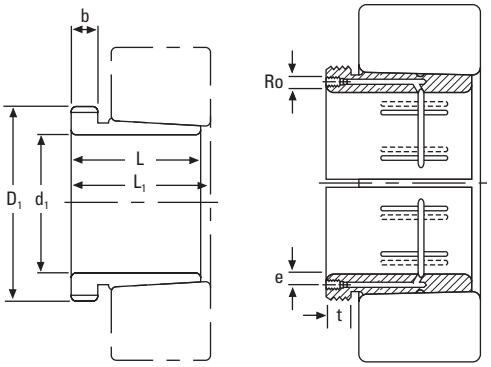
| $d_1$ | Withdrawal Sleeve Part Number | L | $L_1$[1] | b | Ro | e | t | Thread[2] $D_1$ | Weight | Appropriate Withdrawal Nut No. | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | | mm | mm | mm | kg | | |
| 280 | AOH3960 | 112 | 119 | 21 | M 8 | 7.5 | 12 | Tr 310x5 | 10.1 | HM62 | HMV-62 |
| 280 | AOH3060 | 145 | 153 | 26 | G ¼ | 9 | 15 | Tr 320x5 | 14.4 | HM3064 | HMV-64 |
| 280 | AOH2260G | 170 | 178 | 26 | G ¼ | 9 | 15 | Tr 320x5 | 17.5 | HM3164 | HMV-64 |
| 280 | AOH24060G | 184 | 202 | 24 | G ⅛ | 6.5 | 12 | Tr 320x5 | 16.4 | HM3164 | HMV-64 |
| 280 | AOH3160G | 192 | 200 | 30 | G ¼ | 9 | 15 | Tr 320x5 | 20.4 | HM3164 | HMV-64 |
| 280 | AOH24160 | 224 | 242 | 24 | G ¼ | 9 | 15 | Tr 320x5 | 20.2 | HM3164 | HMV-64 |
| 280 | AOH3260G | 228 | 236 | 34 | G ¼ | 9 | 15 | Tr 320x5 | 23.4 | HM3164 | HMV-64 |
| 300 | AOH3964 | 112 | 119 | 21 | M 8 | 7.5 | 12 | Tr 330x5 | 10.8 | HM66 | HMV-66 |
| 300 | AOH3064G | 149 | 157 | 27 | G ¼ | 9 | 15 | Tr 340x5 | 15.6 | HM3068 | HMV-68 |
| 300 | AOH2264G | 180 | 190 | 27 | G ¼ | 9 | 15 | Tr 340x5 | 19.7 | HM3168 | HMV-68 |
| 300 | AOH24064G | 184 | 202 | 24 | G ⅛ | 6.5 | 12 | Tr 340x5 | 17.5 | HM3168 | HMV-68 |
| 300 | AOH3164G | 209 | 217 | 31 | G ¼ | 9 | 15 | Tr 340x5 | 23.6 | HM3168 | HMV-68 |
| 300 | AOH24164 | 242 | 260 | 24 | G ¼ | 9 | 15 | Tr 340x5 | 21.4 | HM3168 | HMV-68 |
| 300 | AOH3264G | 246 | 254 | 36 | G ¼ | 9 | 15 | Tr 340x5 | 28.9 | HM3168 | HMV-68 |
| 320 | AOH3968 | 112 | 119 | 21 | M 8 | 7.5 | 12 | Tr 360x5 | 12.4 | HML72 | HMV-72 |
| 320 | AOH3068G | 162 | 171 | 28 | G ¼ | 9 | 15 | Tr 360x5 | 18.6 | HM3072 | HMV-72 |
| 320 | AOH24068 | 206 | 225 | 26 | G ¼ | 9 | 15 | Tr 360x5 | 21.7 | HM3172 | HMV-72 |
| 320 | AOH3168G | 225 | 234 | 33 | G ¼ | 9 | 15 | Tr 360x5 | 27.6 | HM3172 | HMV-72 |
| 320 | AOH3268G | 264 | 273 | 38 | G ¼ | 9 | 15 | Tr 360x5 | 31.9 | HM3172 | HMV-72 |
| 320 | AOH24168 | 269 | 288 | 26 | G ¼ | 9 | 15 | Tr 360x5 | 27.1 | HM3172 | HMV-72 |
| 340 | AOH3972 | 112 | 119 | 21 | M 8 | 7.5 | 12 | Tr 380x5 | 13.1 | HML76 | HMV-76 |
| 340 | AOH3072G | 167 | 176 | 30 | G ¼ | 9 | 15 | Tr 380x5 | 20.4 | HM3076 | HMV-76 |
| 340 | AOH24072 | 206 | 226 | 26 | G ¼ | 9 | 15 | Tr 380x5 | 22.7 | HM3176 | HMV-76 |
| 340 | AOH3172G | 229 | 238 | 35 | G ¼ | 9 | 15 | Tr 380x5 | 30.6 | HM3176 | HMV-76 |
| 340 | AOH24172 | 269 | 289 | 26 | G ¼ | 9 | 15 | Tr 380x5 | 30.0 | HM3176 | HMV-76 |
| 340 | AOH3272G | 274 | 283 | 40 | G ¼ | 9 | 15 | Tr 380x5 | 35.4 | HM3176 | HMV-76 |
| 360 | AOH3976 | 130 | 138 | 22 | M 8 | 7.5 | 12 | Tr 400x5 | 15.9 | HML80 | HMV-80 |
| 360 | AOH3076G | 170 | 180 | 31 | G ¼ | 9 | 15 | Tr 400x5 | 22.7 | HM3080 | HMV-80 |
| 360 | AOH24076 | 208 | 228 | 28 | G ¼ | 9 | 15 | Tr 400x5 | 23.7 | HM3180 | HMV-80 |
| 360 | AOH3176G | 232 | 242 | 36 | G ¼ | 9 | 15 | Tr 400x5 | 32.9 | HM3180 | HMV-80 |
| 360 | AOH24176 | 271 | 291 | 28 | G ¼ | 9 | 15 | Tr 400x5 | 31.3 | HM3180 | HMV-80 |
| 360 | AOH3276G | 284 | 294 | 42 | G ¼ | 9 | 15 | Tr 400x5 | 42.1 | HM3180 | HMV-80 |
| 380 | AOH3980 | 130 | 138 | 22 | M 8 | 7.5 | 12 | Tr 420x5 | 17.2 | HML84 | HMV-84 |

[1]Dimension $L_1$ decreases as the hydraulic withdrawal sleeve is driven in during mounting.
[2]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.

*Continued on next page.*

# *METRIC AOH HYDRAULIC WITHDRAWAL SLEEVES – continued*

- Sleeves used in the dismounting of tapered bore bearing from shaft.
- Hydraulic assistance facilitates dismounting of large bearing. Oil pump required to inject pressurized oil.
- Other dimensions may be available, consult your Timken sales engineer.




*Continued from previous page.*

| $d_1$ | Withdrawal Sleeve Part Number | L | $L_1$[1] | b | Ro | e | t | Thread[2] $D_1$ | Weight | Appropriate Withdrawal Nut No. | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **mm** | | **mm** | **mm** | **mm** | | **mm** | **mm** | **mm** | **kg** | | |
| **380** | AOH3080G | **183** | **193** | **33** | G ¼ | **9** | **15** | **Tr 420x5** | **26.1** | HM3084 | HMV-84 |
| **380** | AOH24080 | **228** | **248** | **28** | G ¼ | **9** | **15** | **Tr 420x5** | **27.1** | HM3184 | HMV-84 |
| **380** | AOH3180G | **240** | **250** | **38** | G ¼ | **9** | **15** | **Tr 420x5** | **36.1** | HM3184 | HMV-84 |
| **380** | AOH24180 | **278** | **298** | **28** | G ¼ | **9** | **15** | **Tr 420x5** | **35.0** | HM3184 | HMV-84 |
| **380** | AOH3280G | **302** | **312** | **44** | G ¼ | **9** | **15** | **Tr 420x5** | **48.0** | HM3184 | HMV-84 |
| **400** | AOH3984 | **130** | **138** | **22** | M 8 | **7.5** | **12** | **Tr 440x5** | **18.1** | HML88 | HMV-88 |
| **400** | AOH3084G | **186** | **196** | **34** | G ¼ | **9** | **15** | **Tr 440x5** | **27.3** | HM3088 | HMV-88 |
| **400** | AOH24084 | **230** | **252** | **30** | G ¼ | **9** | **15** | **Tr 440x5** | **29.0** | HM3188 | HMV-88 |
| **400** | AOH3184G | **266** | **276** | **40** | G ¼ | **9** | **15** | **Tr 440x5** | **42.3** | HM3188 | HMV-88 |
| **400** | AOH24184 | **310** | **332** | **30** | G ¼ | **9** | **15** | **Tr 440x5** | **40.3** | HM3188 | HMV-88 |
| **400** | AOH3284G | **321** | **331** | **46** | G ¼ | **9** | **15** | **Tr 440x5** | **54.0** | HM3188 | HMV-88 |
| **420** | AOH3988 | **145** | **153** | **25** | Rc ⅛ | **8.5** | **14** | **Tr 460x5** | **21.5** | HML92 | HMV-92 |
| **420** | AOHX3088G | **194** | **205** | **35** | G ¼ | **9** | **15** | **Tr 460x5** | **31.0** | HM3092 | HMV-92 |
| **420** | AOHX3188G | **270** | **281** | **42** | G ¼ | **9** | **15** | **Tr 460x5** | **46.0** | HM3192 | HMV-92 |
| **420** | AOHX3288 | **330** | **341** | **48** | G ¼ | **14.5** | **15** | **Tr 480x5** | **63.8** | HM3196 | HMV-96 |
| **420** | AOHX3288G | **330** | **341** | **48** | G ¼ | **9** | **15** | **Tr 460x5** | **64.5** | HM3192 | HMV-92 |
| **440** | AOH3992 | **145** | **153** | **25** | Rc ⅛ | **8.5** | **14** | **Tr 480x5** | **22.5** | HML96 | HMV-96 |
| **440** | AOHX3092G | **202** | **213** | **37** | G ¼ | **9** | **15** | **Tr 480x5** | **34.0** | HM3096 | HMV-96 |
| **440** | AOH24092 | **250** | **273** | **32** | G ¼ | **9** | **15** | **Tr 480x5** | **34.7** | HM3196 | HMV-96 |
| **440** | AOHX3192G | **285** | **296** | **43** | G ¼ | **9** | **15** | **Tr 480x5** | **51.5** | HM3196 | HMV-96 |
| **440** | AOH24192 | **332** | **355** | **32** | G ¼ | **9** | **15** | **Tr 480x5** | **47.4** | HM3196 | HMV-96 |
| **440** | AOHX3292 | **349** | **360** | **50** | G ¼ | **15** | **15** | **Tr 510x6** | **74.8** | HM102T | HMV-102 |
| **440** | AOHX3292G | **349** | **360** | **50** | G ¼ | **9** | **15** | **Tr 480x5** | **80.0** | HM3196 | HMV-96 |

[1]Dimension $L_1$ decreases as the hydraulic withdrawal sleeve is driven in during mounting.
[2]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.

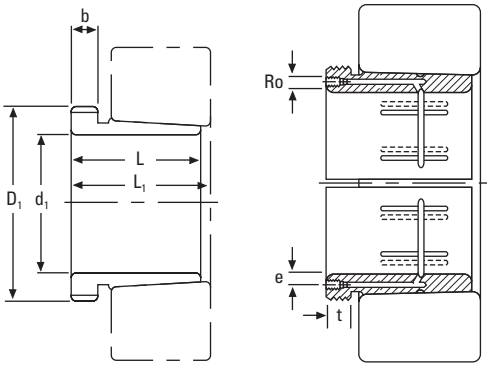
| $d_1$ | Withdrawal Sleeve Part Number | L | $L_1$[1] | b | Ro | e | t | Thread[2] $D_1$ | Weight | Appropriate Withdrawal Nut No. | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | | mm | mm | mm | | mm | mm | mm | kg | | |
| 460 | AOH3996 | 158 | 167 | 28 | Rc ⅛ | 8.5 | 14 | Tr 500x5 | 26.0 | HML100 | HMV-100 |
| 460 | AOHX3096G | 205 | 217 | 38 | G ¼ | 9 | 15 | Tr 500x5 | 34.0 | HM30/500 | HMV-100 |
| 460 | AOH24096 | 250 | 273 | 32 | G ¼ | 9 | 15 | Tr 500x5 | 36.3 | HM31/500 | HMV-100 |
| 460 | AOHX3196G | 295 | 307 | 45 | G ¼ | 9 | 15 | Tr 500x5 | 63.0 | HM31/500 | HMV-100 |
| 460 | AOH24196 | 340 | 363 | 32 | G ¼ | 9 | 15 | Tr 500x5 | 53.7 | HM31/500 | HMV-100 |
| 460 | AOHX3296 | 364 | 376 | 52 | G ¼ | 15.5 | 15 | Tr 530x6 | 82.1 | HM31/530 | HMV-106 |
| 460 | AOHX3296G | 364 | 376 | 52 | G ¼ | 9 | 15 | Tr 500x5 | 81.0 | HM31/500 | HMV-100 |
| 480 | AOH39/500 | 162 | 172 | 32 | Rc ⅛ | 8.5 | 14 | Tr 530x6 | 30.1 | HML106 | HMV-106 |
| 480 | AOHX30/500G | 209 | 221 | 40 | G ¼ | 9 | 15 | Tr 530x6 | 41.0 | HM30/530 | HMV-106 |
| 480 | AOHX31/500G | 313 | 325 | 47 | G ¼ | 9 | 15 | Tr 530x6 | 66.5 | HM31/530 | HMV-106 |
| 480 | AOH241/500 | 360 | 383 | 35 | G ¼ | 9 | 15 | Tr 530x6 | 59.6 | HM31/530 | HMV-106 |
| 480 | AOHX32/500 | 393 | 405 | 54 | G ¼ | 16.5 | 15 | Tr 550x6 | 94.6 | HM110T | HMV-110 |
| 480 | AOHX32/500G | 393 | 405 | 54 | G ¼ | 9 | 15 | Tr 530x6 | 89.5 | HM31/530 | HMV-106 |
| 500 | AOH30/530 | 230 | 242 | 45 | G ¼ | 10 | 15 | Tr 560x6 | 63.5 | HM30/560 | HMV-112 |
| 500 | AOH240/530G | 285 | 309 | 35 | G ¼ | 9 | 15 | Tr 560x6 | 64.5 | HM31/560 | HMV-112 |
| 500 | AOH31/530 | 325 | 337 | 53 | G ¼ | 10 | 15 | Tr 560x6 | 93.5 | HM31/560 | HMV-112 |
| 500 | AOH241/530G | 370 | 394 | 35 | G ¼ | 9 | 15 | Tr 560x6 | 92.0 | HM31/560 | HMV-112 |
| 500 | AOH32/530G | 412 | 424 | 57 | G ¼ | 10 | 15 | Tr 560x6 | 127.0 | HM31/560 | HMV-113 |
| 530 | AOH31/560 | 335 | 347 | 55 | G ¼ | 11 | 15 | Tr 600x6 | 107.0 | HM31/600 | HMV-120 |
| 530 | AOH241/560G | 393 | 417 | 38 | G ¼ | 9 | 15 | Tr 600x6 | 107.0 | HM31/600 | HMV-120 |
| 570 | AOH30/600 | 245 | 259 | 45 | G ¼ | 11 | 15 | Tr 630x6 | 77.0 | HM30/630 | HMV-126 |
| 570 | AOH31/600 | 355 | 369 | 55 | G ¼ | 11 | 15 | Tr 630x6 | 120.0 | HM31/630 | HMV-126 |
| 570 | AOH241/600 | 413 | 439 | 38 | G ¼ | 9 | 15 | Tr 630x6 | 120.0 | HM31/630 | HMV-126 |
| 570 | AOH32/600G | 445 | 459 | 55 | G ¼ | 11 | 15 | Tr 630x6 | 159.0 | HM31/630 | HMV-126 |
| 600 | AOH30/630 | 258 | 272 | 45 | G ¼ | 11 | 15 | Tr 670x6 | 88.5 | HM30/670 | HMV-134 |
| 600 | AOH31/630 | 375 | 389 | 60 | G ¼ | 11 | 15 | Tr 670x6 | 139.0 | HM31/670 | HMV-134 |
| 600 | AOH241/630G | 440 | 466 | 40 | G ¼ | 9 | 15 | Tr 670x6 | 139.0 | HM31/670 | HMV-134 |
| 600 | AOH32/630G | 475 | 489 | 63 | G ¼ | 11 | 15 | Tr 670x6 | 188.0 | HM31/670 | HMV-134 |
| 630 | AOH30/670 | 280 | 294 | 50 | G ¼ | 12 | 15 | Tr 710x7 | 125.0 | HM30/710 | HMV-142 |
| 630 | AOH241/670 | 452 | 478 | 40 | G ¼ | 12 | 15 | Tr 710x7 | 180.0 | HM31/710 | HMV-142 |
| 630 | AOH32/670G | 500 | 514 | 62 | G ¼ | 12 | 15 | Tr 710x7 | 252.0 | HM31/710 | HMV-142 |
| 670 | AOH32/710G | 515 | 531 | 65 | G ¼ | 15 | 15 | Tr 750x7 | 278.0 | HM31/750 | HMV-150 |
| 710 | AOH30/750 | 300 | 316 | 50 | G ¼ | 15 | 15 | Tr 800x7 | 145.0 | HM30/800 | HMV-160 |

[1]Dimension $L_1$ decreases as the hydraulic withdrawal sleeve is driven in during mounting.
[2]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.

*Continued on next page.*

# *METRIC AOH HYDRAULIC WITHDRAWAL SLEEVES – continued*

- Sleeves used in the dismounting of tapered bore bearing from shaft.
- Hydraulic assistance facilitates dismounting of large bearing. Oil pump required to inject pressurized oil.
- Other dimensions may be available, consult your Timken sales engineer.




*Continued from previous page.*

| $d_1$ | Withdrawal Sleeve Part Number | L | $L_1$[1] | b | Ro | e | t | Thread[2] $D_1$ | Weight | Appropriate Withdrawal Nut No. | Appropriate Hydraulic Nut |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **mm** | | **mm** | **mm** | **mm** | | **mm** | **mm** | **mm** | **kg** | | |
| **710** | AOH31/750 | **425** | **441** | **60** | G ¼ | **15** | **15** | **Tr 800x7** | **238.0** | HM31/800 | HMV-160 |
| **710** | AOH32/750 | **540** | **556** | **65** | G ¼ | **15** | **15** | **Tr 800x7** | **320.0** | HM31/800 | HMV-160 |
| **750** | AOH30/800 | **308** | **326** | **50** | G ¼ | **15** | **15** | **Tr 850x7** | **204.0** | HM30/850 | HMV-170 |
| **750** | AOH31/800 | **438** | **456** | **63** | G ¼ | **15** | **15** | **Tr 850x7** | **305.0** | HM31/850 | HMV-170 |
| **750** | AOH32/800G | **550** | **568** | **67** | G ¼ | **15** | **15** | **Tr 850x7** | **401.0** | HM31/850 | HMV-170 |
| **800** | AOH30/850 | **325** | **343** | **53** | G ¼ | **15** | **15** | **Tr 900x7** | **230.0** | HM30/900 | HMV-180 |
| **800** | AOH31/850 | **462** | **480** | **62** | G ¼ | **15** | **15** | **Tr 900x7** | **345.0** | HM31/900 | HMV-180 |
| **800** | AOH32/850 | **585** | **603** | **70** | G ¼ | **15** | **15** | **Tr 900x7** | **461.0** | HM31/900 | HMV-180 |
| **850** | AOH30/900 | **335** | **355** | **55** | G ¼ | **15** | **15** | **Tr 950x8** | **250.0** | HM30/950 | HMV-190 |
| **850** | AOH240/900 | **430** | **475** | **55** | G ¼ | **15** | **15** | **Tr 950x8** | **296.0** | HM31/950 | HMV-190 |
| **850** | AOH31/900 | **475** | **495** | **63** | G ¼ | **15** | **15** | **Tr 950x8** | **379.0** | HM31/950 | HMV-190 |
| **850** | AOH32/900 | **585** | **605** | **70** | G ¼ | **15** | **15** | **Tr 950x8** | **489.0** | HM31/950 | HMV-190 |
| **900** | AOH30/950 | **355** | **375** | **55** | G ¼ | **15** | **15** | **Tr 1000x8** | **285.0** | HM30/1000 | HMV-200 |
| **900** | AOH31/950 | **500** | **520** | **62** | G ¼ | **15** | **15** | **Tr 1000x8** | **426.0** | HM31/1000 | HMV-200 |
| **900** | AOH32/950 | **600** | **620** | **70** | G ¼ | **15** | **15** | **Tr 1000x8** | **533.0** | HM31/1000 | HMV-200 |
| **950** | AOH30/1000 | **365** | **387** | **57** | G ¼ | **15** | **15** | **Tr 1060x8** | **318.0** | HM30/1060 | HMV-212 |
| **950** | AOH31/1000 | **525** | **547** | **63** | G ¼ | **15** | **15** | **Tr 1060x8** | **485.0** | HM31/1060 | HMV-212 |
| **950** | AOH32/1000 | **630** | **652** | **70** | G ¼ | **15** | **15** | **Tr 1060x8** | **608.0** | HM31/1060 | HMV-212 |
| **950** | AOH241/1000 | **645** | **695** | **65** | G ¼ | **15** | **15** | **Tr 1060x8** | **519.0** | HM31/1060 | HMV-212 |
| **1000** | AOH30/1060 | **385** | **407** | **60** | G ¼ | **15** | **15** | **Tr 1120x8** | **406.0** | HM30/1120 | HMV-224 |
| **1000** | AOH31/1060 | **540** | **562** | **65** | G ¼ | **15** | **15** | **Tr 1120x8** | **599.0** | HM31/1120 | HMV-224 |
| **1000** | AOH241/1060 | **665** | **715** | **65** | G ¼ | **15** | **15** | **Tr 1120x8** | **652.0** | HM31/1120 | HMV-224 |

[1]Dimension $L_1$ decreases as the hydraulic withdrawal sleeve is driven in during mounting.
[2]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.

# *METRIC HMV HYDRAULIC NUTS*

## INTRODUCTION

- Designed to install and remove tapered bore bearings with minimal effort.
- Allow better control of the bearing internal clearance reduction without damaging the bearing or other components.
- Substantially reduces downtime during installation or removal of tapered bore bearings.

## DESCRIPTION

- Consist of a female threaded ring and a male ring with two O-ring seals.
- All hydraulic nuts are supplied with:
  - Quick connection fittings (male G¼ inch and female ⅜ NPT).
  - One G¼ ball plug.
  - One set of spare O-rings.

## ORDERING COMPONENTS:

- To order spare components for the hydraulic nuts, order part numbers as listed below:

| Part Number | Description | Qty. |
|---|---|---|
| **HMV-SPAREKIT** | **Component (Maintenance) Kit (Same for All Sizes)** | |
| | G¼ Sealing Washer | 1 |
| | M8 x 40 mm Threaded Pins | 3 |
| | M5 x 10 mm Nylon Cheese Head Screw | 10 |
| | M8 Flat Copper Sealing Washer | 3 |
| | M8 x 12 MM Socket Head Cap Screw | 3 |
| **HMV-N-SEALKIT** | **O-ring Seal Kits*** | |
| | Inner O-Ring | 10 |
| | Outer O-Ring | 10 |
| **HMV-G1/4-NW** | **Male Nipple w/Sealing Washer (Same for All Sizes)** | |
| | G¼ Sealing Washer 100 MPa | 1 |
| | G¼ Male Nipple 100 MPa | 1 |
| **HMV-3/8NPT-FC** | **3/8 NPT Female Quick Connect Coupling 100 MPa (Same for All Sizes)** | 1 |
| **HMV-G1/4-BP** | **Ball Plug (Same for All Sizes)** | 1 |

* Part Number varies depending on size. N = Hydraulic Nut Size

## ENGINEERING SERVICES

- Special applications should be referred to a Timken sales engineer for review.

## INSTRUCTIONS

- When the hydraulic nut is used, the piston must be in the innermost position.
- For this operation, please ensure the valve of the hydraulic hose is disconnected from the nut so the nut is not under pressure.
- To contract the piston inside the female threaded ring, insert a rod or bar in one of the four drilled holes located on the outside diameter of the female threaded ring.
- Screw the hydraulic nut on the thread with the piston in contact with the surface, until the groove machined on the outside diameter of the piston near the outboard face is level with the face of the female threaded ring.
- One of the two threaded holes must be plugged with the G¼ pipe plug before the hydraulic nut is pressurized.
- The maximum permissible pressure in the HMV series hydraulic nut is as follows:
  - HMV-10-60: 80 MPa (11600 psi)
  - HMV-62-100: 50 MPa (7250 psi)
  - HMV-102-236: 30 MPa (4350 psi)
- The oil viscosity suggested is 1400 SUS (300cSt) at operating temperature (SAE 90 oil).
- To avoid overextension of the piston, a second groove has been machined on the outside diameter of the piston inboard used to judge contraction.
- When this second groove is level with the face of the female threaded ring, the piston has reached its length of travel as shown in the illustration. If the second groove of the piston travels past the face of the female threaded ring, the hydraulic nut can be damaged.
- Should the oil start to leak from the piston area, it is certain that the O-ring seals are damaged or worn and need to be replaced.
- When the hydraulic nut is not in use, ensure that the threaded holes are plugged to prevent entry of contaminants in the piston cavity.
- To help prevent against corrosion during storage, apply a coat of light oil on the hydraulic nut surfaces.

### Installation

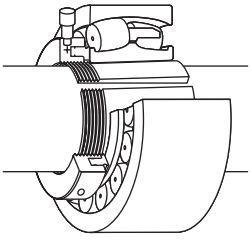


**Fig. 25. Hydraulic nut used to mount the bearing on a pull-type sleeve.**

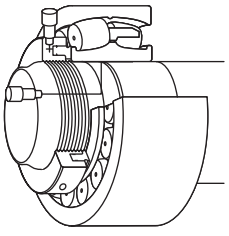


**Fig. 26. Hydraulic nut used to mount the bearing on tapered journal.**

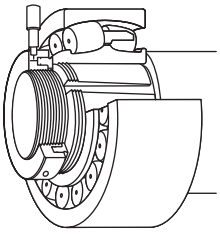
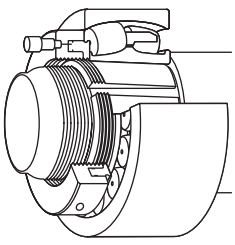


**Fig. 27. Hydraulic nut used to mount the bearing on a push-type adapter sleeve.**

### Removal

**Fig. 28. Hydraulic nut used to withdraw a push-type adapter sleeve.**

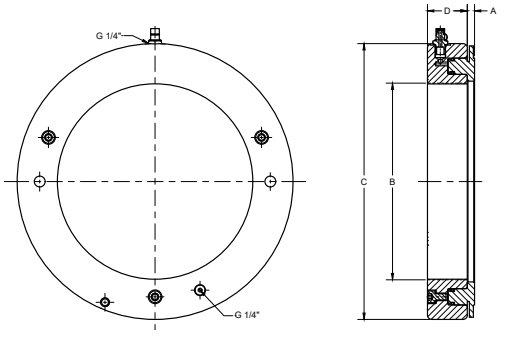


**⚠ WARNING**

***Failure to observe the following warning could create a risk of death or serious injury.***

Proper maintenance and handling practices are critical. Always follow installation instructions and maintain proper lubrication.

# METRIC HMV HYDRAULIC NUTS




| Part Number | Thread[1] B | Dimensions | | | Piston Length of Travel | Piston Area | Assembly Weight |
|---|---|---|---|---|---|---|---|
| | | C | D | A | | | |
| | mm | mm | mm | mm | mm | mm² | kg. |
| HMV-10 | M 50X1.5 | 114 | 38 | 4 | 5 | 2900 | 2.5 |
| HMV-12 | M 60X2 | 125 | 38 | 5 | 5 | 3200 | 2.8 |
| HMV-13 | M 65X2 | 135 | 38 | 5 | 5 | 3500 | 3.0 |
| HMV-14 | M 70X2 | 140 | 38 | 5 | 5 | 3900 | 3.3 |
| HMV-15 | M 75X2 | 145 | 38 | 5 | 5 | 4100 | 3.5 |
| HMV-16 | M 80X2 | 150 | 38 | 5 | 5 | 4200 | 3.8 |
| HMV-17 | M 85X2 | 155 | 38 | 5 | 5 | 4400 | 3.9 |
| HMV-18 | M 90X2 | 160 | 38 | 5 | 5 | 4800 | 4.1 |
| HMV-19 | M 95X2 | 165 | 38 | 5 | 5 | 5000 | 4.4 |
| HMV-20 | M 100X2 | 170 | 38 | 6 | 5 | 5200 | 4.5 |
| HMV-21 | M 105X2 | 175 | 38 | 6 | 5 | 5400 | 5.4 |
| HMV-22 | M 110X2 | 180 | 38 | 6 | 5 | 5700 | 5.7 |
| HMV-23 | M 115X2 | 185 | 38 | 6 | 5 | 5900 | 5.1 |
| HMV-24 | M 120X2 | 190 | 38 | 6 | 5 | 6100 | 5.3 |
| HMV-25 | M 125X2 | 195 | 38 | 6 | 5 | 6300 | 5.4 |
| HMV-26 | M 130X2 | 200 | 38 | 6 | 5 | 6500 | 5.7 |
| HMV-27 | M 135X2 | 205 | 38 | 6 | 5 | 6700 | 5.9 |
| HMV-28 | M 140X2 | 210 | 38 | 7 | 5 | 6900 | 6.1 |
| HMV-29 | M 145X2 | 215 | 39 | 7 | 5 | 7300 | 6.5 |
| HMV-30 | M 150X2 | 220 | 39 | 7 | 5 | 7500 | 6.6 |
| HMV-31 | M 155X3 | 225 | 39 | 7 | 5 | 8100 | 6.9 |
| HMV-32 | M 160X3 | 235 | 40 | 7 | 6 | 8600 | 7.7 |
| HMV-33 | M 165X3 | 240 | 40 | 7 | 6 | 9000 | 8.0 |
| HMV-34 | M 170X3 | 245 | 41 | 7 | 6 | 9500 | 8.4 |
| HMV-36 | M 180X3 | 255 | 41 | 7 | 6 | 10300 | 9.1 |

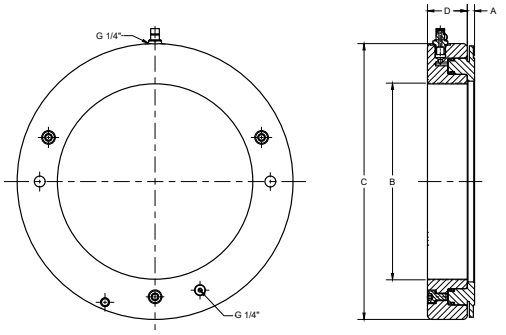
[1]M means metric thread and the digits are major diameter of thread and pitch.
HMV-10 through HMV-40 have a Metric ISO fine-thread profile.
HMV-41 through HMV-236 have a Metric ISO trapezoidal thread.

| Part Number | Thread[1][2] B | Dimensions | | | Piston Length of Travel | Piston Area | Assembly Weight |
|---|---|---|---|---|---|---|---|
| | | C | D | A | | | |
| | mm | mm | mm | mm | mm | $mm^2$ | kg. |
| HMV-38 | M 190X3 | 270 | 42 | 8 | 7 | 11500 | 10.8 |
| HMV-40 | M 200X3 | 280 | 43 | 8 | 8 | 12500 | 11.4 |
| HMV-41 | Tr 205X4 | 290 | 43 | 8 | 8 | 12900 | 12.2 |
| HMV-42 | Tr 210X4 | 295 | 44 | 8 | 9 | 13500 | 12.5 |
| HMV-43 | Tr 215X4 | 300 | 44 | 8 | 9 | 13800 | 13.0 |
| HMV-44 | Tr 220X4 | 305 | 44 | 8 | 9 | 14400 | 13.4 |
| HMV-45 | Tr 225X4 | 315 | 45 | 8 | 9 | 15200 | 14.6 |
| HMV-46 | Tr 230X4 | 320 | 45 | 8 | 9 | 15600 | 14.8 |
| HMV-47 | Tr 235X4 | 325 | 46 | 8 | 10 | 16200 | 16.0 |
| HMV-48 | Tr 240X4 | 330 | 46 | 9 | 10 | 16500 | 16.3 |
| HMV-50 | Tr 250X4 | 345 | 46 | 9 | 10 | 17800 | 17.6 |
| HMV-52 | Tr 260X4 | 355 | 47 | 9 | 11 | 18800 | 19.0 |
| HMV-54 | Tr 270X4 | 370 | 48 | 9 | 12 | 19700 | 20.4 |
| HMV-56 | Tr 280X4 | 380 | 49 | 9 | 12 | 21100 | 22.0 |
| HMV-58 | Tr 290X4 | 390 | 49 | 9 | 13 | 22600 | 22.5 |
| HMV-60 | Tr 300X4 | 405 | 51 | 10 | 14 | 23600 | 25.6 |
| HMV-62 | Tr 310X5 | 415 | 52 | 10 | 14 | 24900 | 27.0 |
| HMV-64 | Tr 320X5 | 430 | 53 | 10 | 14 | 26300 | 29.6 |
| HMV-66 | Tr 330X5 | 440 | 53 | 10 | 14 | 27000 | 31.0 |
| HMV-68 | Tr 340X5 | 450 | 53 | 10 | 14 | 28400 | 32.5 |
| HMV-69 | Tr 345X5 | 455 | 54 | 10 | 14 | 29400 | 33.6 |
| HMV-70 | Tr 350X5 | 465 | 56 | 10 | 14 | 30000 | 35.0 |
| HMV-72 | Tr 360X5 | 475 | 56 | 10 | 15 | 31300 | 37.0 |
| HMV-73 | Tr 365X5 | 482 | 57 | 11 | 15 | 31700 | 38.5 |
| HMV-74 | Tr 370X5 | 490 | 57 | 11 | 16 | 32800 | 39.2 |
| HMV-76 | Tr 380X5 | 500 | 58 | 11 | 16 | 33600 | 41.0 |
| HMV-77 | Tr 385X5 | 505 | 58 | 11 | 16 | 34700 | 42.0 |
| HMV-80 | Tr 400X5 | 525 | 60 | 11 | 17 | 36700 | 46.0 |
| HMV-82 | Tr 410X5 | 535 | 61 | 11 | 17 | 38300 | 48.2 |
| HMV-84 | Tr 420X5 | 545 | 61 | 11 | 17 | 40000 | 50.4 |
| HMV-86 | Tr 430X5 | 555 | 62 | 11 | 17 | 40800 | 53.0 |
| HMV-88 | Tr 440X5 | 565 | 62 | 12 | 17 | 42500 | 55.0 |
| HMV-90 | Tr 450X5 | 580 | 64 | 12 | 17 | 44100 | 58.2 |
| HMV-92 | Tr 460X5 | 590 | 64 | 12 | 17 | 45000 | 61.0 |
| HMV-94 | Tr 470X5 | 600 | 65 | 12 | 18 | 46900 | 63.7 |
| HMV-96 | Tr 480X5 | 612 | 65 | 12 | 19 | 48500 | 65.0 |
| HMV-98 | Tr 490X5 | 625 | 66 | 12 | 19 | 49800 | 69.0 |
| HMV-100 | Tr 500X5 | 635 | 67 | 12 | 19 | 52000 | 71.5 |
| HMV-102 | Tr 510X6 | 645 | 68 | 12 | 20 | 53300 | 75.0 |
| HMV-104 | Tr 520X6 | 657 | 68 | 13 | 20 | 54200 | 77.0 |

[1]M means metric thread and the digits are major diameter of thread and pitch.
[2]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.
HMV-10 through HMV-40 have a Metric ISO fine-thread profile.
HMV-41 through HMV-236 have a Metric ISO trapezoidal thread.

*Continued on next page.*

# *METRIC HMV HYDRAULIC NUTS* – *continued*

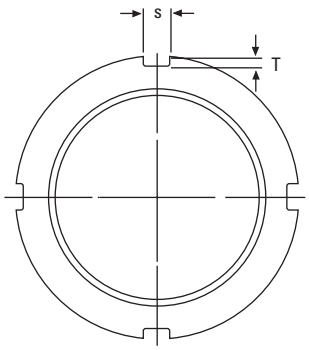


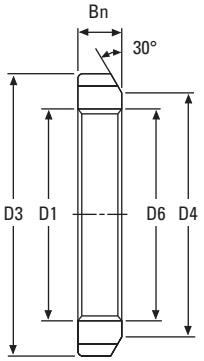

*Continued from previous page.*

| Part Number | Thread[1] B | Dimensions | | | Piston Length of Travel | Piston Area | Assembly Weight |
|---|---|---|---|---|---|---|---|
| | | C | D | A | | | |
| | **mm** | **mm** | **mm** | **mm** | **mm** | **mm²** | **kg.** |
| HMV-106 | **Tr 530X6** | **670** | **69** | **13** | **21** | **56200** | **80.0** |
| HMV-108 | **Tr 540X6** | **680** | **69** | **13** | **21** | **58200** | **83.0** |
| HMV-110 | **Tr 550X6** | **692** | **70** | **13** | **21** | **59200** | **86.0** |
| HMV-112 | **Tr 560X6** | **705** | **71** | **13** | **22** | **61200** | **90.0** |
| HMV-114 | **Tr 570X6** | **715** | **72** | **13** | **23** | **63200** | **93.0** |
| HMV-116 | **Tr 580X6** | **725** | **72** | **13** | **23** | **64200** | **96.0** |
| HMV-120 | **Tr 600X6** | **750** | **73** | **13** | **23** | **67400** | **100.0** |
| HMV-126 | **Tr 630X6** | **780** | **74** | **14** | **23** | **72900** | **110.0** |
| HMV-130 | **Tr 650X6** | **805** | **75** | **14** | **23** | **76200** | **116.0** |
| HMV-134 | **Tr 670X6** | **825** | **76** | **14** | **24** | **79500** | **123.0** |
| HMV-138 | **Tr 690X6** | **850** | **77** | **14** | **25** | **84200** | **130.0** |
| HMV-142 | **Tr 710X7** | **870** | **78** | **15** | **25** | **87700** | **137.0** |
| HMV-146 | **Tr 730X7** | **885** | **79** | **15** | **25** | **90000** | **143.0** |
| HMV-150 | **Tr 750X7** | **915** | **79** | **15** | **25** | **97000** | **150.0** |
| HMV-160 | **Tr 800X7** | **970** | **80** | **16** | **25** | **104000** | **173.0** |
| HMV-170 | **Tr 850X7** | **1020** | **83** | **16** | **26** | **114600** | **190.0** |
| HMV-180 | **Tr 900X7** | **1070** | **86** | **17** | **30** | **124000** | **210.0** |
| HMV-190 | **Tr 950X8** | **1125** | **86** | **17** | **30** | **135600** | **238.0** |
| HMV-200 | **Tr 1000X8** | **1180** | **88** | **17** | **34** | **145600** | **263.0** |
| HMV-212 | **Tr 1060X8** | **1255** | **95** | **18** | **34** | **161200** | **325.0** |
| HMV-216 | **Tr 1080X8** | **1280** | **100** | **18** | **34** | **167400** | **345.0** |
| HMV-224 | **Tr 1120X8** | **1340** | **106** | **19** | **36** | **178200** | **410.0** |
| HMV-236 | **Tr 1180X8** | **1420** | **115** | **22** | **40** | **189200** | **530.0** |

[1]Tr means 30°. Trapezoid thread and the digits are outside diameter of thread and pitch.
HMV-10 through HMV-40 have a Metric ISO fine-thread profile.
HMV-41 through HMV-236 have a Metric ISO trapezoidal thread.

# METRIC LOCKNUTS



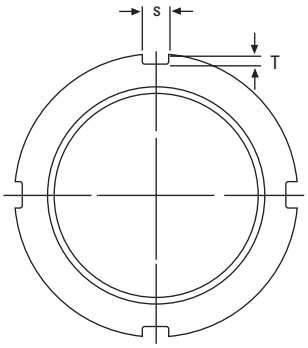



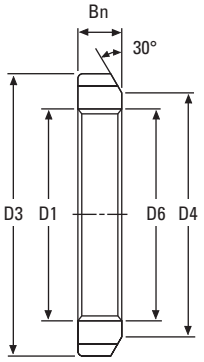

| Locknut No.[1] | Thread[2] $D_1$ | $D_3$ | $D_4$ | $B_n$ | s | T | $D_6$ | Weight | Lockwasher No. |
|---|---|---|---|---|---|---|---|---|---|
| | mm | mm | mm | mm | mm | mm | mm | kg | |
| KM0 | M 10 X 0.75 | 18 | 13 | 4 | 3 | 2 | 10.5 | 0.01 | MB00 |
| KM1 | M 12 X 1.0 | 22 | 17 | 4 | 3 | 2 | 12.5 | 0.01 | MB01 |
| KM2 | M 15 X 1.0 | 25 | 21 | 5 | 4 | 2 | 15.5 | 0.01 | MB02 |
| KM3 | M 17 X 1.0 | 28 | 24 | 5 | 4 | 2 | 17.5 | 0.01 | MB03 |
| KM4 | M 20 X 1.0 | 32 | 26 | 6 | 4 | 2 | 20.5 | 0.02 | MB04 |
| KM5 | M 25 X 1.5 | 38 | 32 | 7 | 5 | 2 | 25.8 | 0.03 | MB05 |
| KM6 | M 30 X 1.5 | 45 | 38 | 7 | 5 | 2 | 30.8 | 0.04 | MB06 |
| KM7 | M 35 X 1.5 | 52 | 44 | 8 | 5 | 2 | 35.8 | 0.05 | MB07 |
| KM8 | M 40 X 1.5 | 58 | 50 | 9 | 6 | 2.5 | 40.8 | 0.09 | MB08 |
| KM9 | M 45 X 1.5 | 65 | 56 | 10 | 6 | 2.5 | 45.8 | 0.12 | MB09 |
| KM10 | M 50 X 1.5 | 70 | 61 | 11 | 6 | 2.5 | 50.8 | 0.15 | MB10 |
| KM11 | M 55 X 2.0 | 75 | 67 | 11 | 7 | 3 | 56.0 | 0.16 | MB11 |
| KM12 | M 60 X 2.0 | 80 | 73 | 11 | 7 | 3 | 61.0 | 0.17 | MB12 |
| KM13 | M 65 X 2.0 | 85 | 79 | 12 | 7 | 3 | 66.0 | 0.20 | MB13 |
| KM14 | M 70 X 2.0 | 92 | 85 | 12 | 8 | 3.5 | 71.0 | 0.24 | MB14 |
| KM15 | M 75 X 2.0 | 98 | 90 | 13 | 8 | 3.5 | 76.0 | 0.29 | MB15 |
| KM16 | M 80 X 2.0 | 105 | 95 | 15 | 8 | 3.5 | 81.0 | 0.40 | MB16 |
| KM17 | M 85 X 2.0 | 110 | 102 | 16 | 8 | 3.5 | 86.0 | 0.45 | MB17 |
| KM18 | M 90 X 2.0 | 120 | 108 | 16 | 10 | 4 | 91.0 | 0.56 | MB18 |
| KM19 | M 95 X 2.0 | 125 | 113 | 17 | 10 | 4 | 96.0 | 0.66 | MB19 |
| KM20 | M 100 X 2.0 | 130 | 120 | 18 | 10 | 4 | 101.0 | 0.70 | MB20 |
| KM21 | M 105 X 2.0 | 140 | 126 | 18 | 12 | 5 | 106.0 | 0.85 | MB21 |
| KM22 | M 110 X 2.0 | 145 | 133 | 19 | 12 | 5 | 111.0 | 0.97 | MB22 |
| KM23 | M 115 X 2.0 | 150 | 137 | 19 | 12 | 5 | 116.0 | 1.01 | MB23 |
| KM24 | M 120 X 2.0 | 160 | 148 | 21 | 12 | 5 | 126.0 | 1.80 | MB24 |
| KM25 | M 125 X 2.0 | 160 | 148 | 21 | 12 | 5 | 126.0 | 1.19 | MB25 |
| KM26 | M 130 X 2.0 | 165 | 149 | 21 | 12 | 5 | 131.0 | 1.25 | MB26 |
| KM27 | M 135 X 2.0 | 175 | 160 | 22 | 14 | 6 | 136.0 | 1.55 | MB27 |
| KM28 | M 140 X 2.0 | 180 | 160 | 22 | 14 | 6 | 141.0 | 1.56 | MB28 |
| KM29 | M145 X 2.0 | 190 | 172 | 24 | 14 | 6 | 146.0 | 2.00 | MB29 |

[1]No. KM0-KM40 also available in 304 stainless steel.
[2]M means metric thread and the digits are major diameter of thread and pitch.

*Continued on next page.*

# METRIC LOCKNUTS – *continued*




*Continued from previous page.*

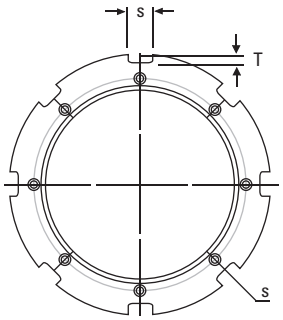
| Locknut No.[1] | Thread[2] $D_1$ | $D_3$ | $D_4$ | $B_n$ | s | T | $D_6$ | Weight | Lockwasher No. |
|---|---|---|---|---|---|---|---|---|---|
| | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **kg** | |
| KM30 | **M150 X 2.0** | **195** | **171** | **24** | **14** | **6** | **151.0** | **2.03** | MB30 |
| KM31 | **M155 X 3.0** | **200** | **182** | **25** | **16** | **7** | **156.5** | **2.21** | MB31 |
| KM32 | **M160 X 3.0** | **210** | **182** | **25** | **16** | **7** | **161.5** | **2.59** | MB32 |
| KM33 | **M165 X 3.0** | **210** | **193** | **26** | **16** | **7** | **166.5** | **2.43** | MB33 |
| KM34 | **M170 X 3.0** | **220** | **193** | **26** | **16** | **7** | **171.5** | **2.80** | MB34 |
| KM36 | **M180 X 3.0** | **230** | **203** | **27** | **18** | **8** | **181.5** | **3.07** | MB36 |
| KM38 | **M190 X 3.0** | **240** | **214** | **28** | **18** | **8** | **191.5** | **3.39** | MB38 |
| KM40 | **M200 X 3.0** | **250** | **226** | **29** | **18** | **8** | **201.5** | **3.69** | MB40 |

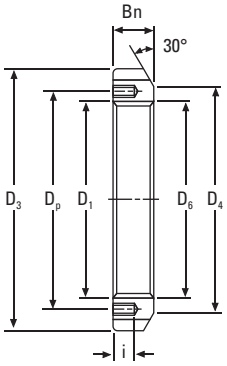
[1]No. KM0 - KM40 also available in 304 stainless steel.
[2]M means metric thread and the digits are major diameter of thread and pitch.

| Locknut No.[1] | Thread[2] $D_1$ | $D_3$ | $D_4$ | $B_n$ | s | T | $D_6$ | Weight | Lockwasher No. |
|---|---|---|---|---|---|---|---|---|---|
| | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **kg** | |
| KML24 | **M120 x 2.0** | **145** | **133** | **20** | **12** | **5** | **121** | **0.78** | MBL24 |
| KML26 | **M130 x 2.0** | **155** | **143** | **21** | **12** | **5** | **131** | **0.88** | MBL26 |
| KML28 | **M140 x 2.0** | **165** | **151** | **22** | **14** | **6** | **141** | **0.99** | MBL28 |
| KML30 | **M150 x 2.0** | **180** | **164** | **24** | **14** | **6** | **151** | **1.38** | MBL30 |
| KML32 | **M160 x 3.0** | **190** | **174** | **25** | **16** | **7** | **161.5** | **1.56** | MBL32 |
| KML34 | **M170 x 3.0** | **200** | **184** | **26** | **16** | **7** | **171.5** | **1.72** | MBL34 |
| KML36 | **M180 x 3.0** | **210** | **192** | **27** | **18** | **8** | **181.5** | **1.95** | MBL36 |
| KML38 | **M190 x 3.0** | **220** | **202** | **28** | **18** | **8** | **191.5** | **2.08** | MBL38 |
| KML40 | **M200 x 3.0** | **240** | **218** | **29** | **18** | **8** | **201.5** | **2.98** | MBL40 |

[1]No. KML24 - KML40 also available in 304 stainless steel.
[2]M means metric thread and the digits are major diameter of thread and pitch.

# METRIC LOCKNUTS – *continued*



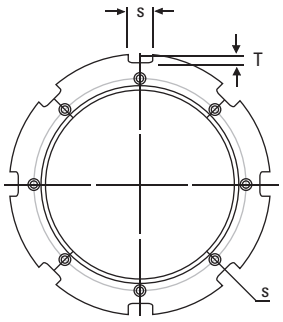



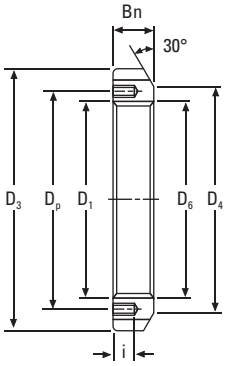

| Locknut No. | Thread[1] $D_1$ | $D_3$ | $D_4$ | s | T | $D_6$ | $B_n$ | i | Tapped Hole Threads | $D_p$ | Appropriate Lockplate No. | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | | **mm** | | **kg** |
| HM3144 | **Tr 220 x 4** | **280** | **250** | **20** | **10** | **222** | **32** | **15** | M 8 x 1.25 | **238** | MS3144 | **5.20** |
| HM3148 | **Tr 240 x 4** | **300** | **270** | **20** | **10** | **242** | **34** | **15** | M 8 x 1.25 | **258** | MS3148 | **5.95** |
| HM3152 | **Tr 260 x 4** | **330** | **300** | **24** | **12** | **262** | **36** | **18** | M 10 x 1.5 | **281** | MS3152 | **8.05** |
| HM3156 | **Tr 280 x 4** | **350** | **320** | **24** | **12** | **282** | **38** | **18** | M 10 x 1.5 | **301** | MS3156 | **9.05** |
| HM3160 | **Tr 300 x 4** | **380** | **340** | **24** | **12** | **302** | **40** | **18** | M 10 x 1.5 | **326** | MS3160 | **11.80** |
| HM3164 | **Tr 320 x 5** | **400** | **360** | **24** | **12** | **322.5** | **42** | **18** | M 10 x 1.5 | **345** | MS3164 | **13.10** |
| HM3168 | **Tr 340 x 5** | **440** | **400** | **28** | **15** | **342.5** | **55** | **21** | M 12 x 1.75 | **372** | MS3168 | **23.10** |
| HM3172 | **Tr 360 x 5** | **460** | **420** | **28** | **15** | **362.5** | **58** | **21** | M 12 x 1.75 | **392** | MS3172 | **25.10** |
| HM3176 | **Tr 380 x 5** | **490** | **450** | **32** | **18** | **382.5** | **60** | **21** | M 12 x 1.75 | **414** | MS3176 | **30.90** |
| HM3180 | **Tr 400 x 5** | **520** | **470** | **32** | **18** | **402.5** | **62** | **27** | M 16 x 2 | **439** | MS3180 | **36.90** |
| HM3184 | **Tr 420 x 5** | **540** | **490** | **32** | **18** | **422.5** | **70** | **27** | M 16 x 2 | **459** | MS3184 | **43.50** |
| HM3188 | **Tr 440 x 5** | **560** | **510** | **36** | **20** | **442.5** | **70** | **27** | M 16 x 2 | **477** | MS3188 | **45.30** |
| HM3192 | **Tr 460 x 5** | **580** | **540** | **36** | **20** | **462.5** | **75** | **27** | M 16 x 2 | **497** | MS3192 | **50.40** |
| HM3196 | **Tr 480 x 5** | **620** | **560** | **36** | **20** | **482.5** | **75** | **27** | M 16 x 2 | **527** | MS3196 | **62.20** |
| HM31/500 | **Tr 500 x 5** | **630** | **580** | **40** | **23** | **502.5** | **80** | **27** | M 16 x 2 | **539** | MS31/500 | **63.30** |

[1]Tr means 30°; trapezoid thread and the digits are major diameter of thread and pitch.

*Continued on next page.*

# METRIC LOCKNUTS – *continued*



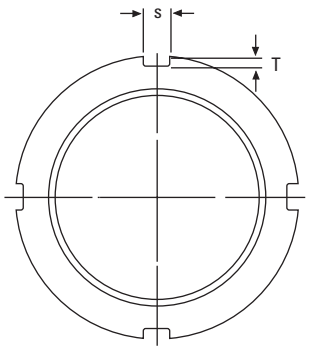



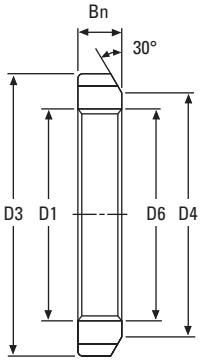

*Continued from previous page.*

| Locknut No. | Thread[1] $D_1$ | $D_3$ | $D_4$ | s | T | $D_6$ | $B_n$ | i | Tapped Hole Threads | $D_p$ | Appropriate Lockplate No. | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | **mm** | | **mm** | | **kg** |
| HM3044 | **Tr 220 x 4** | **260** | **242** | **20** | **9** | **222** | **30** | **12** | M 6 x 1 | **229** | MS3044 | **3.09** |
| HM3048 | **Tr 240 x 4** | **290** | **270** | **20** | **10** | **242** | **34** | **15** | M 8 x 1.25 | **253** | MS3048 | **5.16** |
| HM3052 | **Tr 260 x 4** | **310** | **290** | **20** | **10** | **262** | **34** | **15** | M 8 x 1.25 | **273** | MS3052 | **5.67** |
| HM3056 | **Tr 280 x 4** | **330** | **310** | **24** | **10** | **282** | **38** | **15** | M 8 x 1.25 | **293** | MS3056 | **6.78** |
| HM3060 | **Tr 300 x 4** | **360** | **336** | **24** | **12** | **302** | **42** | **15** | M 8 x 1.25 | **316** | MS3060 | **9.62** |
| HM3064 | **Tr 320 x 5** | **380** | **356** | **24** | **12** | **322.5** | **42** | **15** | M 8 x 1.25 | **335** | MS3064 | **9.94** |
| HM3068 | **Tr 340 x 5** | **400** | **376** | **24** | **12** | **342.5** | **45** | **15** | M 8 x 1.25 | **355** | MS3068 | **11.70** |
| HM3072 | **Tr 360 x 5** | **420** | **394** | **28** | **13** | **362.5** | **45** | **15** | M 8 x 1.25 | **374** | MS3072 | **12.00** |
| HM3076 | **Tr 380 x 5** | **450** | **422** | **28** | **14** | **382.5** | **48** | **18** | M 10 x 1.5 | **398** | MS3076 | **14.90** |
| HM3080 | **Tr 400 x 5** | **470** | **442** | **28** | **14** | **402.5** | **52** | **18** | M 10 x 1.5 | **418** | MS3080 | **16.90** |
| HM3084 | **Tr 420 x 5** | **490** | **462** | **32** | **14** | **422.5** | **52** | **18** | M 10 x 1.5 | **438** | MS3084 | **17.40** |
| HM3088 | **Tr 440 x 5** | **520** | **490** | **32** | **15** | **442.5** | **60** | **21** | M 12 x 1.75 | **462** | MS3088 | **26.20** |
| HM3092 | **Tr 460 x 5** | **540** | **510** | **32** | **15** | **462.5** | **60** | **21** | M 12 x 1.75 | **482** | MS3092 | **29.60** |
| HM3096 | **Tr 480 x 5** | **560** | **530** | **36** | **15** | **482.5** | **60** | **21** | M 12 x 1.75 | **502** | MS3096 | **28.30** |
| HM30/500 | **Tr 500 x 5** | **580** | **550** | **36** | **15** | **502.5** | **68** | **21** | M 12 x 1.75 | **522** | MS30/500 | **33.60** |

[1]Tr means 30°; trapezoid thread and the digits are major diameter of thread and pitch.

# METRIC LOCKNUTS – *continued*



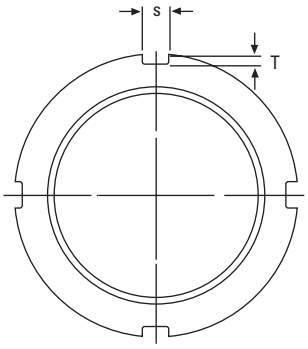



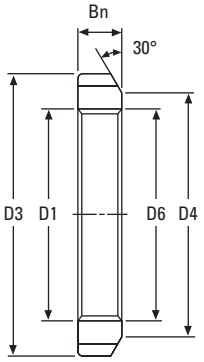

| Locknut No. | Thread[1] $D_1$ | $D_3$ | $D_4$ | $B_n$ | s | T | $D_6$ | Weight |
|---|---|---|---|---|---|---|---|---|
| | mm | mm | mm | mm | mm | mm | mm | kg |
| HM42 | Tr 210 x 4 | 270 | 238 | 30 | 20 | 10 | 212 | 4.75 |
| HM44 | Tr 220 x 4 | 280 | 250 | 32 | 20 | 10 | 222 | 5.35 |
| HM46 | Tr 230 x 4 | 290 | 260 | 34 | 20 | 10 | 232 | 5.80 |
| HM48 | Tr 240 x 4 | 300 | 270 | 34 | 20 | 10 | 242 | 6.20 |
| HM50 | Tr 250 x 4 | 320 | 290 | 36 | 20 | 10 | 252 | 7.00 |
| HM52 | Tr 260 x 4 | 330 | 300 | 36 | 24 | 12 | 262 | 8.55 |
| HM54 | Tr 270 x 4 | 340 | 310 | 38 | 24 | 12 | 272 | 9.20 |
| HM56 | Tr 280 x 4 | 350 | 320 | 38 | 24 | 12 | 282 | 10.00 |
| HM58 | Tr 290 x 4 | 370 | 330 | 40 | 24 | 12 | 292 | 11.80 |
| HM60 | Tr 300 x 4 | 380 | 340 | 40 | 24 | 12 | 302 | 12.00 |
| HM62 | Tr 310 x 5 | 390 | 350 | 42 | 24 | 12 | 312.5 | 13.40 |
| HM64 | Tr 320 x 5 | 400 | 360 | 42 | 24 | 12 | 322.5 | 13.50 |
| HM66 | Tr 330 x 5 | 420 | 380 | 52 | 28 | 15 | 332.5 | 20.40 |
| HM68 | Tr 340 x 5 | 440 | 400 | 55 | 28 | 15 | 342.5 | 24.50 |
| HM70 | Tr 350 x 5 | 450 | 410 | 55 | 28 | 15 | 352.5 | 25.20 |
| HM72 | Tr 360 x 5 | 460 | 420 | 58 | 28 | 15 | 362.5 | 27.50 |
| HM74 | Tr 370 x 5 | 470 | 430 | 58 | 28 | 15 | 372.5 | 28.20 |
| HM76 | Tr 380 x 5 | 490 | 450 | 60 | 32 | 18 | 382.5 | 33.50 |
| HM80 | Tr 400 x 5 | 520 | 470 | 62 | 32 | 18 | 402.5 | 40.00 |
| HM84 | Tr 420 x 5 | 540 | 490 | 70 | 32 | 18 | 422.5 | 46.90 |
| HM88 | Tr 440 x 5 | 560 | 510 | 70 | 36 | 20 | 442.5 | 48.50 |
| HM92 | Tr 460 x 5 | 580 | 540 | 75 | 36 | 20 | 462.5 | 55.00 |
| HM96 | Tr 480 x 5 | 620 | 560 | 75 | 36 | 20 | 482.5 | 67.00 |
| HM100 | Tr 500 x 5 | 630 | 590 | 80 | 40 | 23 | 502.5 | 69.00 |
| HM102 | Tr 510 x 6 | 650 | 590 | 80 | 40 | 23 | 513 | 75.00 |
| HM106 | Tr 530 x 6 | 670 | 610 | 80 | 40 | 23 | 533 | 78.00 |
| HM110 | Tr 550 x 6 | 700 | 640 | 80 | 40 | 23 | 553 | 92.50 |

[1]Tr means 30°; trapezoid thread and the digits are major diameter of thread and pitch.

*Continued on next page.*

# METRIC LOCKNUTS – *continued*



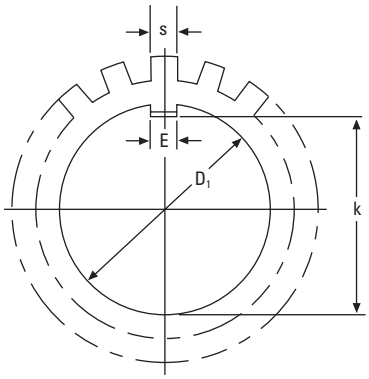



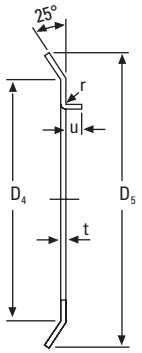

*Continued from previous page.*

| Locknut No. | Thread[1] $D_1$ | $D_3$ | $D_4$ | $B_n$ | s | T | $D_6$ | Weight |
|---|---|---|---|---|---|---|---|---|
| | mm | mm | mm | mm | mm | mm | mm | kg |
| HML41 | Tr 205 x 4 | 250 | 232 | 30 | 18 | 8 | 207 | 3.43 |
| HML43 | Tr 215 x 4 | 260 | 242 | 30 | 20 | 9 | 217 | 3.72 |
| HML47 | Tr 235 x 4 | 280 | 262 | 34 | 20 | 9 | 237 | 4.60 |
| HML52 | Tr 260 x 4 | 310 | 290 | 34 | 20 | 10 | 262 | 5.80 |
| HML56 | Tr 280 x 4 | 330 | 310 | 38 | 24 | 10 | 282 | 6.72 |
| HML60 | Tr 300 x 4 | 360 | 336 | 42 | 24 | 12 | 302 | 9.60 |
| HML64 | Tr 320 x 5 | 380 | 356 | 42 | 24 | 12 | 322.5 | 10.30 |
| HML69 | Tr 345 x 5 | 410 | 384 | 45 | 28 | 13 | 347.5 | 11.50 |
| HML72 | Tr 360 x 5 | 420 | 394 | 45 | 28 | 13 | 362.5 | 12.10 |
| HML73 | Tr 365 x 5 | 430 | 404 | 48 | 28 | 13 | 367.5 | 14.20 |
| HML76 | Tr 380 x 5 | 450 | 422 | 48 | 28 | 14 | 382.5 | 16.00 |
| HML77 | Tr 385 x 5 | 450 | 422 | 48 | 28 | 14 | 387.5 | 15.00 |
| HML80 | Tr 400 x 5 | 470 | 442 | 52 | 28 | 14 | 402.5 | 18.50 |
| HML82 | Tr 410 x 5 | 480 | 452 | 52 | 32 | 14 | 412.5 | 19.00 |
| HML84 | Tr 420 x 5 | 490 | 462 | 52 | 32 | 14 | 422.5 | 19.40 |
| HML86 | Tr 430 x 5 | 500 | 472 | 52 | 32 | 14 | 432.5 | 19.80 |
| HML88 | Tr 440 x 5 | 520 | 490 | 60 | 32 | 15 | 442.5 | 27.00 |
| HML90 | Tr 450 x 5 | 520 | 490 | 60 | 32 | 15 | 452.5 | 23.80 |
| HML92 | Tr 460 x 5 | 540 | 510 | 60 | 32 | 15 | 462.5 | 28.00 |
| HML94 | Tr 470 x 5 | 540 | 510 | 60 | 32 | 15 | 472.5 | 25.00 |
| HML96 | Tr 480 x 5 | 560 | 530 | 60 | 36 | 15 | 482.5 | 29.50 |
| HML98 | Tr 490 x 5 | 580 | 550 | 60 | 36 | 15 | 492.5 | 34.00 |
| HML100 | Tr 500 x 5 | 580 | 550 | 68 | 36 | 15 | 502.5 | 35.00 |
| HML104 | Tr 520 x 6 | 600 | 570 | 68 | 36 | 15 | 523 | 37.00 |
| HML106 | Tr 530 x 6 | 630 | 590 | 68 | 40 | 20 | 533 | 47.00 |
| HML108 | Tr 540 x 6 | 630 | 590 | 68 | 40 | 20 | 543 | 43.50 |

[1]Tr means 30°; trapezoid thread and the digits are major diameter of thread and pitch.

# METRIC LOCKWASHERS



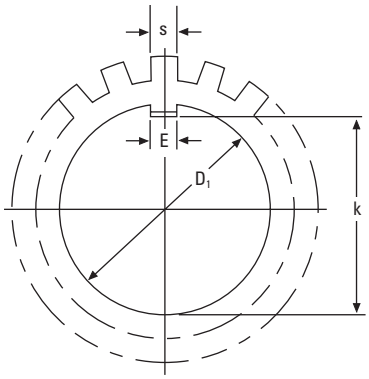



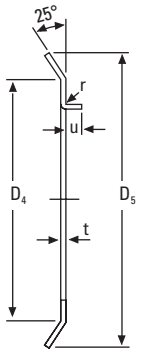

| Lockwasher[1] No. | Thread $D_1$ | k | E | t | S | $D_4$ | $D_5$ | r[2] | u[2] | Number of Tangs | Weight per 100 pieces | Locknut No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | | kg | |
| MB0 | 10 | 8.5 | 3 | 1 | 3 | 13 | 21 | 0.5 | 2 | 9 | 0.13 | KM00 |
| MB1 | 12 | 10.5 | 3 | 1 | 3 | 17 | 25 | 0.5 | 2 | 9 | 0.19 | KM01 |
| MB2 | 15 | 13.5 | 4 | 1 | 4 | 21 | 28 | 1 | 2.5 | 13 | 0.25 | KM02 |
| MB3 | 17 | 15.5 | 4 | 1 | 4 | 24 | 32 | 1 | 2.5 | 13 | 0.31 | KM03 |
| MB4 | 20 | 18.5 | 4 | 1 | 4 | 26 | 36 | 1 | 2.5 | 13 | 0.35 | KM04 |
| MB5 | 25 | 23 | 5 | 1.2 | 5 | 32 | 42 | 1 | 2.5 | 13 | 0.64 | KM05 |
| MB6 | 30 | 27.5 | 5 | 1.2 | 5 | 38 | 49 | 1 | 2.5 | 13 | 0.78 | KM06 |
| MB7 | 35 | 32.5 | 6 | 1.2 | 5 | 44 | 57 | 1 | 2.5 | 15 | 1.04 | KM07 |
| MB8 | 40 | 37.5 | 6 | 1.2 | 6 | 50 | 62 | 1 | 2.5 | 15 | 1.23 | KM08 |
| MB9 | 45 | 42.5 | 6 | 1.2 | 6 | 56 | 69 | 1 | 2.5 | 17 | 1.52 | KM09 |
| MB10 | 50 | 47.5 | 6 | 1.2 | 6 | 61 | 74 | 1 | 2.5 | 17 | 1.60 | KM10 |
| MB11 | 55 | 52.5 | 8 | 1.2 | 7 | 67 | 81 | 1 | 4 | 17 | 1.96 | KM11 |
| MB12 | 60 | 57.5 | 8 | 1.5 | 7 | 73 | 86 | 1.2 | 4 | 17 | 2.53 | KM12 |
| MB13 | 65 | 62.5 | 8 | 1.5 | 7 | 79 | 92 | 1.2 | 4 | 19 | 2.90 | KM13 |
| MB14 | 70 | 66.5 | 8 | 1.5 | 8 | 85 | 98 | 1.2 | 4 | 19 | 3.34 | KM14 |
| MB15 | 75 | 71.5 | 8 | 1.5 | 8 | 90 | 104 | 1.2 | 4 | 19 | 3.56 | KM15 |
| MB16 | 80 | 76.5 | 10 | 1.8 | 8 | 95 | 112 | 1.2 | 4 | 19 | 4.64 | KM16 |
| MB17 | 85 | 81.5 | 10 | 1.8 | 8 | 102 | 119 | 1.2 | 4 | 19 | 5.24 | KM17 |
| MB18 | 90 | 86.5 | 10 | 1.8 | 10 | 108 | 126 | 1.2 | 4 | 19 | 6.23 | KM18 |
| MB19 | 95 | 91.5 | 10 | 1.8 | 10 | 113 | 133 | 1.2 | 4 | 19 | 6.70 | KM19 |
| MB20 | 100 | 96.5 | 12 | 1.8 | 10 | 120 | 142 | 1.2 | 6 | 19 | 7.65 | KM20 |
| MB21 | 105 | 100.5 | 12 | 1.8 | 12 | 126 | 145 | 1.2 | 6 | 19 | 8.26 | KM21 |
| MB22 | 110 | 105.5 | 12 | 1.8 | 12 | 133 | 154 | 1.2 | 6 | 19 | 9.40 | KM22 |
| MB23 | 115 | 110.5 | 12 | 2 | 12 | 137 | 159 | 1.5 | 6 | 19 | 10.80 | KM23 |
| MB24 | 120 | 115 | 14 | 2 | 12 | 138 | 164 | 1.5 | 6 | 19 | 10.50 | KM24 |
| MB25 | 125 | 120 | 14 | 2 | 12 | 148 | 170 | 1.5 | 6 | 19 | 11.80 | KM25 |
| MB26 | 130 | 125 | 14 | 2 | 12 | 149 | 175 | 1.5 | 6 | 19 | 11.30 | KM26 |
| MB27 | 135 | 130 | 14 | 2 | 14 | 160 | 185 | 1.5 | 6 | 19 | 14.40 | KM27 |
| MB28 | 140 | 135 | 16 | 2 | 14 | 160 | 192 | 1.5 | 8 | 19 | 14.20 | KM28 |
| MB29 | 145 | 140 | 16 | 2 | 14 | 171 | 202 | 1.5 | 8 | 19 | 16.80 | KM29 |

[1]No. MB0-MB40 also available in 304 stainless steel.
[2]Straight tangs when t ≥ 3 mm.

*Continued on next page.*

# METRIC LOCKWASHERS – *continued*




*Continued from previous page.*

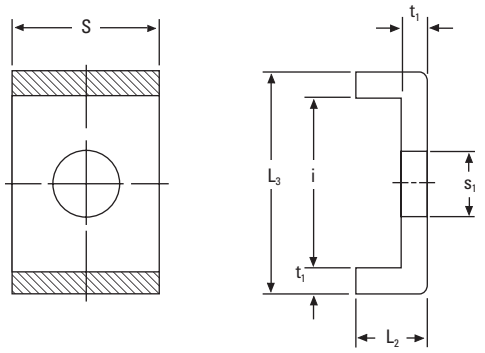
| Lockwasher[1] No. | Thread $D_1$ | k | E | t | S | $D_4$ | $D_5$ | r[2] | u[2] | Number of Tangs | Weight per 100 pieces | Locknut No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | | kg | |
| MB30 | 150 | 145 | 16 | 2 | 14 | 171 | 205 | 1.5 | 8 | 19 | 15.50 | KM30 |
| MB31 | 155 | 147.5 | 16 | 2.5 | 16 | 182 | 212 | 1.5 | 8 | 19 | 20.90 | KM31 |
| MB32 | 160 | 154 | 18 | 2.5 | 18 | 182 | 217 | 1.5 | 8 | 19 | 22.20 | KM32 |
| MB33 | 165 | 157.5 | 18 | 2.5 | 16 | 193 | 222 | 1.5 | 8 | 19 | 24.10 | KM33 |
| MB34 | 170 | 164 | 18 | 2.5 | 16 | 193 | 232 | 1.5 | 8 | 19 | 24.70 | KM34 |
| MB36 | 180 | 174 | 20 | 2.5 | 18 | 203 | 242 | 1.5 | 8 | 19 | 26.80 | KM36 |
| MB38 | 190 | 184 | 20 | 2.5 | 18 | 214 | 252 | 1.5 | 8 | 19 | 27.80 | KM38 |
| MB40 | 200 | 194 | 20 | 2.5 | 18 | 226 | 262 | 1.5 | 8 | 19 | 29.30 | KM40 |
| MB44 | 220 | 213 | 24 | 3.0 | 20 | 250 | 292 | – | – | 19 | 48.30 | HM3144 |
| MB48 | 240 | 233 | 24 | 3.0 | 20 | 270 | 312 | – | – | 19 | 50.20 | HM3148 |
| MB52 | 260 | 253 | 28 | 3.0 | 24 | 300 | 342 | – | – | 23 | 72.90 | HM3152 |
| MB56 | 280 | 273 | 28 | 3.0 | 24 | 320 | 362 | – | – | 23 | 75.90 | HM3156 |

[1]No. MB0-MB40 also available in 304 stainless steel.
[2]Straight tangs when t ≥ 3 mm.

| Lockwasher[1] No. | Thread $D_1$ | k | E | t | S | $D_4$ | $D_5$ | r | u | Number of Tangs | Weight per 100 pieces | Locknut No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | | kg | |
| MBL24 | 120 | 115 | 14 | 2 | 12 | 133 | 155 | 1.5 | 6 | 19 | 7.70 | KML24 |
| MBL26 | 130 | 125 | 14 | 2 | 12 | 143 | 165 | 1.5 | 6 | 19 | 8.70 | KML26 |
| MBL28 | 140 | 135 | 16 | 2 | 14 | 151 | 175 | 1.5 | 8 | 19 | 10.90 | KML28 |
| MBL30 | 150 | 145 | 16 | 2 | 14 | 164 | 190 | 1.5 | 8 | 19 | 11.30 | KML30 |
| MBL32 | 160 | 154 | 18 | 2.5 | 16 | 174 | 200 | 1.5 | 8 | 19 | 16.20 | KML32 |
| MBL34 | 170 | 164 | 18 | 2.5 | 16 | 184 | 210 | 1.5 | 8 | 19 | 19.00 | KML34 |
| MBL36 | 180 | 174 | 20 | 2.5 | 18 | 192 | 220 | 1.5 | 8 | 19 | 18.00 | KML36 |
| MBL38 | 190 | 184 | 20 | 2.5 | 18 | 202 | 230 | 1.5 | 8 | 19 | 20.50 | KML38 |
| MBL40 | 200 | 194 | 20 | 2.5 | 18 | 218 | 240 | 1.5 | 8 | 19 | 21.40 | KML40 |

[1]No. MBL24-MBL40 also available in 304 stainless steel.

# METRIC LOCKPLATES

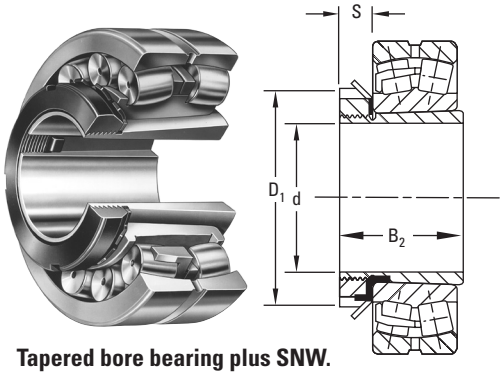



| Lockplate No. | $t_1$ | S | $L_2$ | $S_1$ | i | $L_3$ | Appropriate Locknut No. | Weight per 100 pieces |
|---|---|---|---|---|---|---|---|---|
| | mm | mm | mm | mm | mm | mm | | kg |
| MS3144 | 4 | 20 | 12 | 9 | 22.5 | 30.5 | HM3144 | 2.60 |
| MS3148 | 4 | 20 | 12 | 9 | 22.5 | 30.5 | HM3148 | 2.60 |
| MS3152 | 4 | 24 | 12 | 12 | 25.5 | 33.5 | HM3152 | 3.39 |
| MS3156 | 4 | 24 | 12 | 12 | 25.5 | 33.5 | HM3156 | 3.39 |
| MS3160 | 4 | 24 | 12 | 12 | 30.5 | 38.5 | HM3160 | 3.79 |
| MS3164 | 5 | 24 | 15 | 12 | 31 | 41 | HM3164 | 5.35 |
| MS3168 | 5 | 28 | 15 | 14 | 38 | 48 | HM3168 | 6.65 |
| MS3172 | 5 | 28 | 15 | 14 | 38 | 48 | HM3172 | 6.65 |
| MS3176 | 5 | 32 | 15 | 14 | 40 | 50 | HM3176 | 7.96 |
| MS3180 | 5 | 32 | 15 | 18 | 45 | 55 | HM3180 | 8.20 |
| MS3184 | 5 | 32 | 15 | 18 | 45 | 55 | HM3184 | 8.20 |
| MS3188 | 5 | 36 | 15 | 18 | 43 | 53 | HM3188 | 9.00 |
| MS3192 | 5 | 36 | 15 | 18 | 43 | 53 | HM3192 | 9.00 |
| MS3196 | 5 | 36 | 15 | 18 | 53 | 63 | HM3196 | 10.40 |
| MS31/500 | 5 | 40 | 15 | 18 | 45 | 55 | HM31/500 | 10.50 |
| MS3044 | 4 | 20 | 12 | 7 | 13.5 | 21.5 | HM3044 | 2.12 |
| MS3048 | 4 | 20 | 12 | 9 | 17.5 | 25.5 | HM3048 | 2.29 |
| MS3052 | 4 | 20 | 12 | 9 | 17.5 | 25.5 | HM3052 | 2.29 |
| MS3056 | 4 | 24 | 12 | 9 | 17.5 | 25.5 | HM3056 | 2.92 |
| MS3060 | 4 | 24 | 12 | 9 | 20.5 | 28.5 | HM3060 | 3.16 |
| MS3064 | 5 | 24 | 15 | 9 | 21 | 31 | HM3064 | 4.56 |
| MS3068 | 5 | 24 | 15 | 9 | 21 | 31 | HM3068 | 4.56 |
| MS3072 | 5 | 28 | 15 | 9 | 20 | 30 | HM3072 | 5.03 |
| MS3076 | 5 | 28 | 15 | 12 | 24 | 34 | HM3076 | 5.28 |
| MS3080 | 5 | 28 | 15 | 12 | 24 | 34 | HM3080 | 5.28 |
| MS3084 | 5 | 32 | 15 | 12 | 24 | 34 | HM3084 | 6.11 |
| MS3088 | 5 | 32 | 15 | 14 | 28 | 38 | HM3088 | 6.45 |
| MS3092 | 5 | 32 | 15 | 14 | 28 | 38 | HM3092 | 6.45 |
| MS3096 | 5 | 36 | 15 | 14 | 28 | 38 | HM3096 | 7.29 |
| MS30/500 | 5 | 36 | 15 | 14 | 28 | 38 | HM30/500 | 7.29 |

# *INCH ACCESSORIES – PULL-TYPE SLEEVES*

## SNW/SNP – PULL-TYPE SLEEVE, LOCKNUT, LOCKWASHER/LOCKPLATE ASSEMBLIES

- The table below shows dimensions for adapter assemblies and components used in the mounting of tapered bore bearings on shafts.
- SNW assembly consists of a sleeve, locknut and lockwasher.
- SNP assembly consists of a sleeve, locknut and lockplate.




**Tapered bore bearing plus SNW.**

| Bearing Number[1] | Accessory Numbers | | | | Shaft Dimensions | | Adapter Dimensions | | | SNW/SNP Assembly Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| | Assembly | Sleeve | Locknut | Lockwasher Lockplate | Diameter d | Tolerance[2] | $B_2$ | S | $D_1$ | |
| | | | | | in. | in. | in. | in. | in. | lbs. |
| **SERIES 222K** | | | | | | | | | | |
| **22207K** | **SNW-07 x 1 3/16** | **S-07** | **N-07** | **W-07** | **1 3/16** | **-0.003** | **1 29/64** | **29/64** | **2 1/16** | **0.32** |
| **22208K** | **SNW-08 x 1 5/16** | **S-08** | **N-08** | **W-08** | **1 5/16** | **-0.003** | **1 21/32** | **29/64** | **2 1/4** | **0.42** |
| | SNW-09 x 1 3/8 | S-09 x 1 3/8 | | | 1 3/8 | | | | | |
| **22209K** | **SNW-09 x 1 7/16** | **S-09** | **N-09** | **W-09** | **1 7/16** | **-0.003** | **1 37/64** | **1/2** | **2 17/32** | **0.6** |
| | SNW-09 x 1 1/2 | S-09 x 1 1/2 | | | 1 1/2 | | | | | |
| | SNW-10 x 1 5/8 | S-10 x 1 5/8 | | | 1 5/8 | | | | | |
| **22210K** | **SNW-10 x 1 11/16** | **S-10** | **N-10** | **W-10** | **1 11/16** | **-0.003** | **1 49/64** | **9/16** | **2 11/16** | **0.7** |
| | SNW-10 x 1 3/4 | S-10 x 1 3/4 | | | 1 3/4 | | | | | |
| | SNW-11 x 1 7/8 | S-11 x 1 7/8 | | | 1 7/8 | | | | | |
| **22211K** | **SNW-11 x 1 15/16** | **S-11** | **N-11** | **W-11** | **1 15/16** | **-0.003** | **1 27/32** | **9/16** | **2 31/32** | **0.8** |
| | SNW-11 x 2 | S-11 x 2 | | | 2 | | | | | |
| **22212K** | **SNW-12 x 2 1/16** | **S-12** | **N-12** | **W-12** | **2 1/16** | **-0.004** | **1 63/64** | **19/32** | **3 5/32** | **1.1** |
| | SNW-13 x 2 1/8 | S-13 x 2 1/8 | | | 2 1/8 | | | | | |
| **22213K** | **SNW-13 x 2 3/16** | **S-13** | **N-13** | **W-13** | **2 3/16** | **-0.004** | **2 3/32** | **5/8** | **3 3/8** | **1.4** |
| | SNW-13 x 2 1/4 | S-13 x 2 1/4 | | | 2 1/4 | | | | | |
| **22214K** | **SNW-14 x 2 5/16** | **S-14** | **N-14** | **W-14** | **2 5/16** | **-0.004** | **2 11/64** | **5/8** | **3 5/8** | **1.8** |
| | SNW-15 x 2 3/8 | S-15 x 2 3/8 | | | 2 3/8 | | | | | |
| **22215K** | **SNW-15 x 2 7/16** | **S-15** | **AN-15** | **W-15** | **2 7/16** | **-0.004** | **2 19/64** | **43/64** | **3 7/8** | **2** |
| | SNW-15 x 2 1/2 | S-15 x 2 1/2 | | | 2 1/2 | | | | | |
| | SNW-16 x 2 5/8 | S-16 x 2 5/8 | | | 2 5/8 | | | | | |
| **22216K** | **SNW-16 x 2 11/16** | **S-16** | **AN-16** | **W-16** | **2 11/16** | **-0.004** | **2 3/8** | **43/64** | **4 5/32** | **2.4** |
| | SNW-16 x 2 3/4 | S-16 x 2 3/4 | | | 2 3/4 | | | | | |
| | SNW-17 x 2 13/16 | S-17 x 2 13/16 | | | 2 13/16 | | | | | |
| | SNW-17 x 2 7/8 | S-17 x 2 7/8 | | | 2 7/8 | | | | | |
| **22217K** | **SNW-17 x 2 15/16** | **S-17** | **AN-17** | **W-17** | **2 15/16** | **-0.004** | **2 31/64** | **45/64** | **4 13/32** | **3.0** |
| | SNW-17 x 3 | S-17 x 3 | | | 3 | | | | | |
| | SNW-18 x 3 1/16 | S-18 x 3 1/16 | | | 3 1/16 | | | | | |
| | SNW-18 x 3 1/8 | S-18 x 3 1/8 | | | 3 1/8 | | | | | |
| **22218K** | **SNW-18 x 3 3/16** | **S-18** | **AN-18** | **W-18** | **3 3/16** | **-0.004** | **2 41/64** | **25/32** | **4 21/32** | **3.0** |
| | SNW-18 x 3 1/4 | S-18 x 3 1/4 | | | 3 1/4 | | | | | |
| **22219K** | **SNW-19 x 3 5/16** | **S-19** | **AN-19** | **W-19** | **3 5/16** | **-0.004** | **2 49/64** | **13/16** | **4 15/16** | **3.3** |
| | SNW-20 x 3 3/8 | S-20 x 3 3/8 | | | 3 3/8 | | | | | |
| **22220K** | **SNW-20 x 3 7/16** | **S-20** | **AN-20** | **W-20** | **3 7/16** | **-0.004** | **2 7/8** | **27/32** | **5 3/16** | **4.4** |
| | SNW-20 x 3 1/2 | S-20 x 3 1/2 | | | 3 1/2 | | | | | |
| | SNW-22 x 3 13/16 | S-22 x 3 13/16 | | | 3 13/16 | | | | | |
| | SNW-22 x 3 7/8 | S-22 x 3 7/8 | | | 3 7/8 | | | | | |
| **22222K** | **SNW-22 x 3 15/16** | **S-22** | **AN-22** | **W-22** | **3 15/16** | **-0.004** | **3 13/64** | **29/32** | **5 23/32** | **5.0** |
| | SNW-22 x 4 | S-22 x 4 | | | 4 | | | | | |

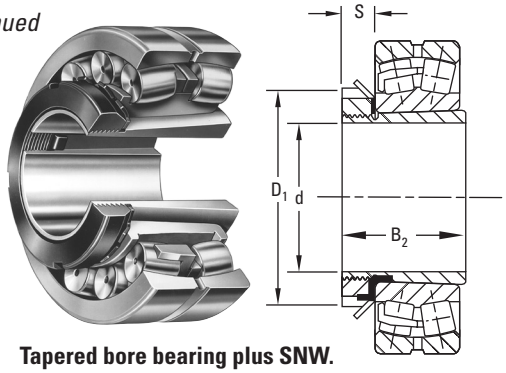
[1]Bold shaft sizes are standard. When ordering non-standard accessories, specify shaft size.
[2]Tolerance range is from +0 to value listed.

*Continued on next page.*

# *INCH ACCESSORIES – PULL-TYPE SLEEVES* – *continued*

## SNW/SNP – PULL-TYPE SLEEVE, LOCKNUT, LOCKWASHER/LOCKPLATE ASSEMBLIES

- The table below shows dimensions for adapter assemblies and components used in the mounting of tapered bore bearings on shafts.
- SNW assembly consists of a sleeve, locknut and lockwasher.
- SNP assembly consists of a sleeve, locknut and lockplate.




**Tapered bore bearing plus SNW.**

*Continued from previous page.*

| Bearing Number[1] | Accessory Numbers | | | | Shaft Dimensions | | Adapter Dimensions | | | SNW/SNP Assembly Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| | Assembly | Sleeve | Locknut | Lockwasher Lockplate | Diameter d | Tolerance[2] | $B_2$ | S | $D_1$ | |
| | | | | | in. | in. | in. | in. | in. | lbs. |
| | SNW-24 x 4 1/16 | S-24 x 4 1/16 | | | 4 1/16 | | | | | |
| | SNW-24 x 4 1/8 | S-24 x 4 1/8 | | | 4 1/8 | | | | | |
| **22224K** | **SNW-24 x 4 3/16** | **S-24** | **AN-24** | **W-24** | **4 3/16** | **-0.005** | **3 15/32** | **15/16** | **6 1/8** | **6.7** |
| | SNW-24 x 4 1/4 | S-24 x 4 1/4 | | | 4 1/4 | | | | | |
| | SNW-26 x 4 5/16 | S-26 x 4 5/16 | | | 4 5/16 | | | | | |
| | SNW-26 x 4 3/8 | S-26 x 4 3/8 | | | 4 3/8 | | | | | |
| **22226K** | **SNW-26 x 4 7/16** | **S-26** | **AN-26** | **W-26** | **4 7/16** | **-0.005** | **3 49/64** | **1** | **6 3/4** | **8.6** |
| | SNW-26 x 4 1/2 | S-26 x 4 1/2 | | | 4 1/2 | | | | | |
| | SNW-28 x 4 13/16 | S-28 x 4 13/16 | | | 4 13/16 | | | | | |
| | SNW-28 x 4 7/8 | S-28 x4 7/8 | | | 4 7/8 | | | | | |
| **22228K** | **SNW-28 x 4 15/16** | **S-28** | **AN-28** | **W-28** | **4 15/16** | **-0.005** | **3 63/64** | **1 1/16** | **7 3/32** | **10.3** |
| | SNW-28 x 5 | S-28 x 5 | | | 5 | | | | | |
| | SNW-30 x 5 1/8 | S-30 x 5 1/8 | | | 5 1/8 | | | | | |
| **22230K** | **SNW-30 x 5 3/16** | **S-30** | **AN-30** | **W-30** | **5 3/16** | **-0.005** | **4 15/64** | **1 1/8** | **7 11/16** | **13.5** |
| | SNW-30 x 5 1/4 | S-30 x 5 1/4 | | | 5 1/4 | | | | | |
| | SNW-32 x 5 3/8 | S-30 x 5 3/8 | | | 5 3/8 | | | | | |
| **22232K** | **SNW-32 x 5 7/16** | **S-32** | **AN-32** | **W-32** | **5 7/16** | **-0.005** | **4 37/64** | **1 3/16** | **8 1/16** | **15.6** |
| | SNW-32 x 5 1/2 | S-32 x 5 1/2 | | | 5 1/2 | | | | | |
| | SNW-34 x 5 13/16 | S-34 x 5 13/16 | | | 5 13/16 | | | | | |
| | SNW-34 x 5 7/8 | S-34 x 5 7/8 | | | 5 7/8 | | | | | |
| **22234K** | **SNW-34 x 5 15/16** | **S-34** | **AN-34** | **W-34** | **5 15/16** | **-0.005** | **4 27/32** | **1 7/32** | **8 21/32** | **19.4** |
| | SNW-34 x 6 | S-34 x 6 | | | 6 | | | | | |
| | SNW-36 x 6 5/16 | S-36 x 6 5/16 | | | 6 5/16 | | | | | |
| | SNW-36 x 6 3/8 | S-36 x 6 3/8 | | | 6 3/8 | | | | | |
| **22236K** | **SNW-36 x 6 7/16** | **S-36** | **AN-36** | **W-36** | **6 7/16** | **-0.005** | **5 1/32** | **1 1/4** | **9 1/16** | **20.5** |
| | SNW-36 x 6 1/2 | S-36 x 6 1/2 | | | 6 1/2 | | | | | |
| | SNW-38 x 6 13/16 | S-38 x 6 13/16 | | | 6 13/16 | | | | | |
| | SNW-38 x 6 7/8 | S-38 x 6 7/8 | | | 6 7/8 | | | | | |
| **22238K** | **SNW-38 x 6 15/16** | **S-38** | **AN-38** | **W-38** | **6 15/16** | **-0.005** | **5 17/64** | **1 9/32** | **9 15/32** | **23.4** |
| | SNW-38 x 7 | S-38 x 7 | | | 7 | | | | | |
| | SNW-40 x 7 1/8 | S-40 x 7 1/8 | | | 7 1/8 | | | | | |
| **22240K** | **SNW-40 x 7 3/16** | **S-40** | **AN-40** | **W-40** | **7 3/16** | **-0.005** | **5 31/64** | **1 11/32** | **9 27/32** | **30.5** |
| | SNW-40 x 7 1/4 | S-40 x 7 1/4 | | | 7 1/4 | | | | | |
| | SNW-44 x 7 13/16 | S-44 x 7 13/16 | | | 7 13/16 | | | | | |
| | SNW-44 x 7 7/8 | S-44 x 7 7/8 | | | 7 7/8 | | | | | |
| **22244K** | **SNW-44 x 7 15/16** | **S-44** | **N-044** | **W-44** | **7 15/16** | **-0.005** | **5 29/32** | **1 3/8** | **11** | **33.0** |
| | SNW-44 x 8 | S-44 x 8 | | | 8 | | | | | |
| **22248K** | **SNP-48 x 8 7/16** | **S-48** | **N-048** | **P-48** | **8 7/16** | **-0.006** | **6 5/8** | **1 23/64** | **11 7/16** | **37.5** |
| | SNP-48 x 8 15/16 | S-48 x 8 15/16 | | | 8 15/16 | | | | | |
| **22252K** | **SNP-52 x 9 7/16** | **S-52** | **N-052** | **P-52** | **9 7/16** | **-0.006** | **7 37/64** | **1 27/64** | **12 3/16** | **44.0** |

[1]Bold shaft sizes are standard. When ordering non-standard accessories, specify shaft size.
[2]Tolerance range is from +0 to value listed.

| Bearing Number[1] | Accessory Numbers | | | | Shaft Dimensions | | Adapter Dimensions | | | SNW/SNP Assembly Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| | Assembly | Sleeve | Locknut | Lockwasher Lockplate | Diameter d | Tolerance[2] | $B_2$ | S | $D_1$ | |
| | | | | | in. | in. | in. | in. | in. | lbs. |
| **SERIES 230K** | | | | | | | | | | |
| | SNW-3024 x 4 1/16 | S-3024 x 4 1/16 | | | 4 1/16 | | | | | |
| | SNW-3024 x 4 1/8 | S-3024 x 4 1/8 | | | 4 1/8 | | | | | |
| **23024K** | **SNW-3024 x 4 3/16** | **S-3024** | **N-024** | **W-024** | **4 3/16** | **-0.005** | **2 61/64** | **13/16** | **5 11/16** | **6.1** |
| | SNW-3024 x 4 1/4 | S-3024 x 4 1/4 | | | 4 1/4 | | | | | |
| | SNW-3026 x 4 5/16 | S-3024 x 4 5/16 | | | 4 5/16 | | | | | |
| | SNW-3026 x 4 3/8 | S-3024 x 4 3/8 | | | 4 3/8 | | | | | |
| **23026K** | **SNW-3026 x 4 7/16** | **S-3026** | **N-026** | **W-026** | **4 7/16** | **-0.005** | **3 15/64** | **7/8** | **6 1/8** | **7.5** |
| | SNW-3026 x 4 1/2 | S-3026 x 4 1/2 | | | 4 1/2 | | | | | |
| | SNW-3028 x 4 13/16 | S-3028 x 4 13/16 | | | 4 13/16 | | | | | |
| | SNW-3028 x 4 7/8 | S-3028 x 4 7/8 | | | 4 7/8 | | | | | |
| **23028K** | **SNW-3028 x 4 15/16** | **S-3028** | **N-028** | **W-028** | **4 15/16** | **-0.005** | **3 11/32** | **15/16** | **6 1/2** | **8.4** |
| | SNW-3030 x 5 1/8 | S-3030 x 5 1/8 | | | 5 1/8 | | | | | |
| **23030K** | **SNW-3030 x 5 3/16** | **S-3030** | **N-030** | **W-030** | **5 3/16** | **-0.005** | **3 31/64** | **31/32** | **7 1/8** | **9.8** |
| | SNW-3030 x 5 1/4 | S-3030 x 5 1/4 | | | 5 1/4 | | | | | |
| | SNW-3032 x 5 3/8 | S-3032 x 5 3/8 | | | 5 3/8 | | | | | |
| **23032K** | **SNW-3032 x 5 7/16** | **S-3032** | **N-032** | **W-032** | **5 7/16** | **-0.005** | **3 23/32** | **1 1/32** | **7 1/2** | **11.8** |
| | SNW-3032 x 5 1/2 | S-3032 x 5 1/2 | | | 5 1/2 | | | | | |
| | SNW-3034 x 5 13/16 | S-3034 x 5 13/16 | | | 5 13/16 | | | | | |
| | SNW-3034 x 5 7/8 | S-3034 x 5 7/8 | | | 5 7/8 | | | | | |
| **23034K** | **SNW-3034 x 5 15/16** | **S-3034** | **N-034** | **W-034** | **5 15/16** | **-0.005** | **4 1/64** | **1 1/16** | **7 7/8** | **13.3** |
| | SNW-3034 x 6 | S-3034 x 6 | | | 6 | | | | | |
| | SNW-3036 x 6 5/16 | S-3036 x 6 5/16 | | | 6 5/16 | | | | | |
| | SNW-3036 x 6 3/8 | S-3036 x 6 3/8 | | | 6 3/8 | | | | | |
| **23036K** | **SNW-3036 x 6 7/16** | **S-3036** | **N-036** | **W-036** | **6 7/16** | **-0.005** | **4 11/32** | **1 3/32** | **8 1/4** | **15.2** |
| | SNW-3036 x 6 1/2 | S-3036 x 6 1/2 | | | 6 1/2 | | | | | |
| | SNW-3038 x 6 13/16 | S-3038 x 6 13/16 | | | 6 13/16 | | | | | |
| | SNW-3038 x 6 7/8 | S-3038 x 6 7/8 | | | 6 7/8 | | | | | |
| **23038K** | **SNW-3038 x 6 15/16** | **S-3038** | **N-038** | **W-038** | **6 15/16** | **-0.005** | **4 13/32** | **1 1/8** | **8 11/16** | **16.7** |
| | SNW-3038 x 7 | S-3038 x 7 | | | 7 | | | | | |
| | SNW-3040 x 7 1/8 | S-3040 x 7 1/8 | | | 7 1/8 | | | | | |
| **23040K** | **SNW-3040 x 7 3/16** | **S-3040** | **N-040** | **W-040** | **7 3/16** | **-0.005** | **4 3/4** | **1 3/16** | **9 7/16** | **19.7** |
| | SNW-3040 x 7 1/4 | S-3040 x 7 1/4 | | | 7 1/4 | | | | | |
| | SNW-3044 x 7 13/16 | S-3044 x 7 13/16 | | | 7 13/16 | | | | | |
| | SNW-3044 x 7 7/8 | S-3044 x 7 7/8 | | | 7 7/8 | | | | | |
| **23044K** | **SNW-3044 x 7 15/16** | **S-3044** | **N-044** | **W-044** | **7 15/16** | **-0.005** | **5 1/8** | **1 1/4** | **10 1/4** | **24.4** |
| | SNW-3044 x 8 | S-3044 x 8 | | | 8 | | | | | |

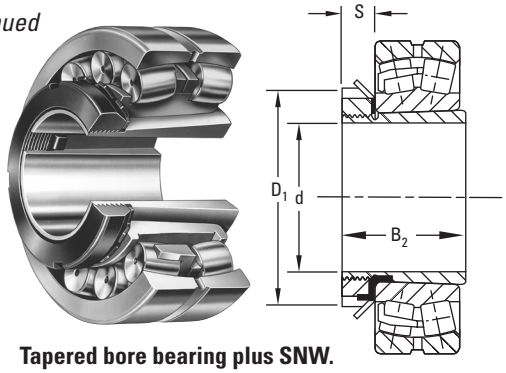
[1]Bold shaft sizes are standard. When ordering non-standard accessories, specify shaft size.
[2]Tolerance range is from +0 to value listed.

*Continued on next page.*

# *INCH ACCESSORIES – PULL-TYPE SLEEVES* – *continued*

## SNW/SNP – PULL-TYPE SLEEVE, LOCKNUT, LOCKWASHER/LOCKPLATE ASSEMBLIES

- The table below shows dimensions for adapter assemblies and components used in the mounting of tapered bore bearings on shafts.
- SNW assembly consists of a sleeve, locknut and lockwasher.
- SNP assembly consists of a sleeve, locknut and lockplate.




**Tapered bore bearing plus SNW.**

*Continued from previous page.*

| Bearing Number[1] | Accessory Numbers | | | | Shaft Dimensions | | Adapter Dimensions | | | SNW/SNP Assembly Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| | Assembly | Sleeve | Locknut | Lockwasher Lockplate | Diameter d | Tolerance[2] | $B_2$ | S | $D_1$ | |
| | | | | | in. | in. | in. | in. | in. | lbs. |
| | SNP-3048 x 8 7/16 | S-3048 x 8 7/16 | | | 8 7/16 | | | | | |
| | SNP-3048 x 8 1/2 | S-3048 x 8 1/2 | | | 8 1/2 | | | | | |
| **23048K** | **SNP-3048 x 8 15/16** | **S-3048** | **N-048** | **P-48** | **8 15/16** | **-0.006** | **5 7/16** | **1 11/32** | **11 7/16** | **32.2** |
| | SNP-3048 x 9 | S-3048 x 9 | | | 9 | | | | | |
| **23052K** | **SNP-3052 x 9 7/16** | **S-3052** | **N-052** | **P-52** | **9 7/16** | **-0.006** | **6 1/64** | **1 13/32** | **12 3/16** | **41.1** |
| | SNP-3052 x 9 1/2 | S-3052 x 9 1/2 | | | 9 1/2 | | | | | |
| | SNP-3056 x 9 15/16 | S-3056 x 9 15/16 | | | 9 15/16 | | | | | |
| | SNP-3056 x 10 | S-3056 x 10 | | | 10 | | | | | |
| **23056K** | **SNP-3056 x 10 7/16** | **S-3056** | **N-056** | **P-56** | **10 7/16** | **-0.007** | **6 3/16** | **1 1/2** | **13** | **45.4** |
| | SNP-3056 x 10 1/2 | S-3056 x 10 1/2 | | | 10 1/2 | | | | | |
| **23060K** | **SNP-3060 x 10 15/16** | **S-3060** | **N-060** | **P-60** | **10 15/16** | **-0.007** | **6 47/64** | **1 9/16** | **14 3/16** | **58.9** |
| | SNP-3060 x 11 | S-3060 x 11 | | | 11 | | | | | |
| | SNP-3064 x 11 7/16 | S-3064 x 11 7/16 | | | 11 7/16 | | | | | |
| | SNP-3064 x 11 1/2 | S-3064 x 11 1/2 | | | 11 1/2 | | | | | |
| **23064K** | **SNP-3064 x 11 15/16** | **S-3064** | **N-064** | **P-64** | **11 15/16** | **-0.007** | **6 61/64** | **1 21/32** | **15** | **65.7** |
| | SNP-3064 x 12 | S-3064 x 12 | | | 12 | | | | | |
| **23068K** | **SNP-3068 X 12 7/16** | **S-3068** | **N-068** | **P-68** | **12 7/16** | **-0.008** | **7 35/64** | **1 25/32** | **15 3/4** | **77.8** |
| | SNP-3068 X 12 1/2 | S-3068 x 12 1/2 | | | 12 1/2 | | | | | |
| | SNP-3072 X 12 15/16 | S-3072 x 12 15/16 | | | 12 15/16 | | | | | |
| | SNP-3072 X 13 | S-3072 x 13 | | | 13 | | | | | |
| **23072K** | **SNP-3072 X 13 7/16** | **S-3072** | **N-072** | **P-72** | **13 7/16** | **-0.008** | **7 37/64** | **1 25/32** | **16 1/2** | **86.2** |
| | SNP-3072 X 13 1/2 | S-3072 x 13 1/2 | | | 13 1/2 | | | | | |
| **23076K** | **SNP-3076 X 13 15/16** | **S-3076** | **N-076** | **P-76** | **13 15/16** | **-0.008** | **7 3/4** | **1 57/64** | **17 3/4** | **94.3** |
| | SNP-3076 X 14 | S-3076 x 14 | | | 14 | | | | | |
| **23080K** | **SNP-3080 x 15** | **S-3080** | **N-080** | **P-80** | **15** | **-0.008** | **8 13/32** | **2 1/16** | **18 1/2** | **100.0** |
| **23084K** | **SNP-3084 x 15 3/4** | **S-3084** | **N-084** | **P-84** | **15 3/4** | **-0.008** | **8 31/64** | **2 1/16** | **19 5/16** | **110.0** |
| **23088K** | **SNP-3088 x 16 1/2** | **S-3088** | **N-088** | **P-88** | **16 1/2** | **-0.008** | **9 7/64** | **2 3/8** | **20 1/2** | **144.0** |
| **23092K** | **SNP-3092 x 17** | **S-3092** | **N-092** | **P-92** | **17** | **-0.008** | **9 11/32** | **2 3/8** | **21 1/4** | **153.0** |
| **23096K** | **SNP-3096 x 18** | **S-3096** | **N-096** | **P-96** | **18** | **-0.008** | **9 29/64** | **2 3/8** | **22 1/16** | **162.0** |
| **230/500K** | **SNP-30/500 x 18 1/2** | **S-30/500** | **N-500** | **P-500** | **18 1/2** | **-0.008** | **9 27/32** | **2 45/64** | **22 13/16** | **180.0** |
| **230/530K** | **SNP-30/530 x 19 1/2** | **S-30/530** | **N-530** | **P-530** | **19 1/2** | **-0.008** | **10 37/64** | **2 45/64** | **24 13/16** | **221.0** |
| **230/560K** | **SNP-30/560 x 20 15/16** | **S-30/560** | **N-560** | **P-560** | **20 15/16** | **-0.008** | **11 7/32** | **2 61/64** | **25 9/16** | **243.0** |
| **230/600K** | **SNP-30/600 x 21 15/16** | **S-30/600** | **N-600** | **P-600** | **21 15/16** | **-0.008** | **11 29/64** | **2 61/64** | **27 9/16** | **322.0** |
| **230/630K** | **SNP-30/630 x 23 15/16** | **S-30/630** | **N-630** | **P-630** | **23 15/16** | **-0.008** | **11 59/64** | **2 61/64** | **28 3/4** | **350.0** |
| **230/670K** | **SNP-30/670 x 24 15/16** | **S-30/670** | **N-670** | **P-670** | **24 15/16** | **-0.008** | **12 27/32** | **3 9/64** | **30 11/16** | **421.0** |
| **230/710K** | **SNP-30/710 x 26 7/16** | **S-30/710** | **N-710** | **P-710** | **26 7/16** | **-0.008** | **13 1/2** | **3 37/64** | **32 11/16** | **492.0** |
| **230/750K** | **SNP-30/750 x 27 15/16** | **S-30/750** | **N-750** | **P-750** | **27 15/16** | **-0.008** | **14 3/32** | **3 37/64** | **34 1/4** | **536.0** |
| **230/800K** | **SNP-30/800 x 29 7/16** | **S-30/800** | **N-800** | **P-800** | **29 7/16** | **-0.008** | **14 13/32** | **3 37/64** | **36 1/4** | **662.0** |
| **230/850K** | **SNP-30/850 x 31 7/16** | **S-30/850** | **N-850** | **P-850** | **31 7/16** | **-0.008** | **15** | **3 37/64** | **38 9/16** | **747.0** |
| **230/900K** | **SNP-30/900 x 33 7/16** | **S-30/900** | **N-900** | **P-900** | **33 7/16** | **-0.008** | **15 11/16** | **3 61/64** | **40 9/16** | **853.0** |
| **230/950K** | **SNP-30/950 x 34 7/16** | **S-30/950** | **N-950** | **P-950** | **35 7/16** | **-0.008** | **16 1/2** | **3 61/64** | **43** | **935.0** |

[1]Bold shaft sizes are standard. When ordering non-standard accessories, specify shaft size.
[2]Tolerance range is from +0 to value listed.

| Bearing Number[1] | Accessory Numbers | | | | Shaft Dimensions | | Adapter Dimensions | | | SNW/SNP Assembly Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| | Assembly | Sleeve | Locknut | Lockwasher Lockplate | Diameter d | Tolerance[2] | $B_2$ | S | $D_1$ | |
| | | | | | in. | in. | in. | in. | in. | lbs. |
| **SERIES 223K AND 232K** | | | | | | | | | | |
| **22308K** | **SNW-108 x 1 5/16** | **S-108** | **N-08** | **W-08** | **1 5/16** | **-0.003** | **2 1/64** | **1/2** | **2 1/4** | **0.8** |
| **22309K** | **SNW-109 x 1 7/16** | **S-109** | **N-09** | **W-09** | **1 7/16** | **-0.003** | **2 9/64** | **1/2** | **2 17/32** | **0.8** |
| **22310K** | **SNW-110 x 1 11/16** | **S-110** | **N-10** | **W-10** | **1 11/16** | **-0.003** | **2 25/64** | **9/16** | **2 11/16** | **0.9** |
| **22311K** | **SNW-111 x 1 15/16** | **S-111** | **N-11** | **W-11** | **1 15/16** | **-0.003** | **2 33/64** | **9/16** | **2 31/32** | **0.9** |
| **22312K** | **SNW-112 x 2 1/16** | **S-112** | **N-12** | **W-12** | **2 1/16** | **-0.004** | **2 21/32** | **19/32** | **3 5/32** | **1.2** |
| **22313K** | **SNW-113 x 2 3/16** | **S-113** | **N-13** | **W-13** | **2 3/16** | **-0.004** | **2 49/64** | **5/8** | **3 3/8** | **1.7** |
| **22314K** | **SNW-114 x 2 5/16** | **S-114** | **N-14** | **W-14** | **2 5/16** | **-0.004** | **2 61/64** | **5/8** | **3 5/8** | **2.3** |
| | SNW-115 x 2 3/8 | S-115 x 2 3/8 | | | 2 3/8 | | | | | |
| **22315K** | **SNW-115 x 2 7/16** | **S-115** | **AN-15** | **W-15** | **2 7/16** | **-0.004** | **3 5/64** | **43/64** | **3 7/8** | **3.0** |
| | SNW-115 x 2 1/2 | S-115 x 2 1/2 | | | 2 1/2 | | | | | |
| | SNW-116 x 2 5/8 | S-116 x 2 5/8 | | | 2 5/8 | | | | | |
| **22316K** | **SNW-116 x 2 11/16** | **S-116** | **AN-16** | **W-16** | **2 11/16** | **-0.004** | **3 13/64** | **43/64** | **4 5/32** | **3.2** |
| | SNW-116 x 2 3/4 | S-116 x 3/4 | | | 2 3/4 | | | | | |
| | SNW-117 x 2 13/16 | S-117 x 2 13/16 | | | 2 13/16 | | | | | |
| | SNW-117 x 2 7/8 | S-117 x 2 7/8 | | | 2 7/8 | | | | | |
| **22317K** | **SNW-117 x 2 15/16** | **S-117** | **AN-17** | **W-17** | **2 15/16** | **-0.004** | **3 5/16** | **45/64** | **4 13/32** | **3.5** |
| | SNW-117 x 3 | S-117 x 3 | | | 3 | | | | | |
| | SNW-118 x 3 1/16 | S-118 x 3 1/16 | | | 3 1/16 | | | | | |
| | SNW-118 x 3 1/8 | S-118 x 3 1/8 | | | 3 1/8 | | | | | |
| **22318K** | **SNW-118 x 3 3/16** | **S-118** | **AN-18** | **W-18** | **3 3/16** | **-0.004** | **3 35/64** | **25/32** | **4 21/32** | **4.0** |
| | SNW-118 x 3 1/4 | S-118 x 3 1/4 | | | 3 1/4 | | | | | |
| **22319K** | **SNW-119 x 3 5/16** | **S-119** | **AN-19** | **W-19** | **3 5/16** | **-0.004** | **3 45/64** | **13/16** | **4 15/16** | **5.0** |
| | SNW-120 x 3 5/16 | S-120 x 3 5/16 | | | 3 5/16 | | | | | |
| | SNW-120 x 3 3/8 | S-120 x 3 7/8 | | | 3 3/8 | | | | | |
| **22320K 23220K** | **SNW-120 x 3 7/16** | **S-120** | **AN-20** | **W-20** | **3 7/16** | **-0.004** | **3 31/32** | **27/32** | **5 3/16** | **6.2** |
| | SNW-120 x 3 1/2 | S-120 x 3 1/2 | | | 3 1/2 | | | | | |
| | SNW-122 x 3 13/16 | S-122 x 3 13/16 | | | 3 13/16 | | | | | |
| | SNW-122 x 3 3/8 | S-122 x 3 3/8 | | | 3 7/8 | | | | | |
| **22322K 23222K** | **SNW-122 x 3 15/16** | **S-122** | **AN-22** | **W-22** | **3 15/16** | **-0.004** | **4 11/32** | **29/32** | **5 23/32** | **6.5** |
| | SNW-122 x 4 | S-122 x 4 | | | 4 | | | | | |

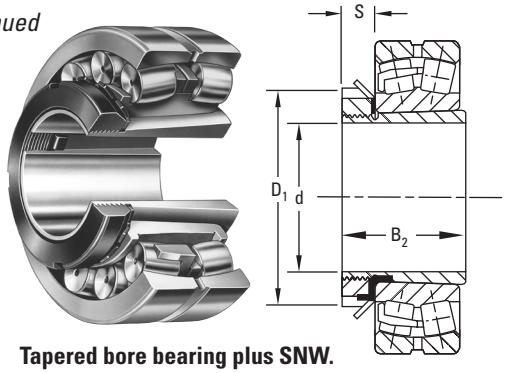
[1]Bold shaft sizes are standard. When ordering non-standard accessories, specify shaft size.
[2]Tolerance range is from +0 to value listed.

*Continued on next page.*

# *INCH ACCESSORIES – PULL-TYPE SLEEVES* – *continued*

## SNW/SNP – PULL-TYPE SLEEVE, LOCKNUT, LOCKWASHER/LOCKPLATE ASSEMBLIES

- The table below shows dimensions for adapter assemblies and components used in the mounting of tapered bore bearings on shafts.
- SNW assembly consists of a sleeve, locknut and lockwasher.
- SNP assembly consists of a sleeve, locknut and lockplate.




**Tapered bore bearing plus SNW.**

*Continued from previous page.*

| Bearing Number[1] | | Accessory Numbers | | | | Shaft Dimensions | | Adapter Dimensions | | | SNW/SNP Assembly Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Assembly | Sleeve | Locknut | Lockwasher Lockplate | Diameter d | Tolerance[2] | $B_2$ | S | $D_1$ | |
| | | | | | | in. | in. | in. | in. | in. | lbs. |
| | | SNW-124 x 4 1/16 | S-124 x 4 1/16 | | | 4 1/16 | | | | | |
| | | SNW-124 x 4 1/8 | S-124 x 4 1/8 | | | 4 1/8 | | | | | |
| **22324K** | **23224K** | **SNW-124 x 4 3/16** | **S-124** | **AN-24** | **W-24** | **4 3/16** | **-0.005** | **4 41/64** | **15/16** | **6 1/8** | **8.0** |
| | | SNW-124 x 4 1/4 | S-124 x 4 1/4 | | | 4 1/4 | | | | | |
| | | SNW-126 x 4 5/16 | S-126 x 4 5/16 | | | 4 5/16 | | | | | |
| | | SNW-126 x 4 3/8 | S-126 4 3/8 | | | 4 3/8 | | | | | |
| **22326K** | **23226K** | **SNW-126 x 4 7/16** | **S-126** | **AN-26** | **W-26** | **4 7/16** | **-0.005** | **4 63/64** | **1** | **6 3/4** | **12.4** |
| | | SNW-126 x 4 1/2 | S-126 x 4 1/2 | | | 4 1/2 | | | | | |
| | | SNW-126 x 4 9/16 | S-126 x 4 9/16 | | | 4 9/16 | | | | | |
| | | SNW-128 x 4 13/16 | S-128 x 4 13/16 | | | 4 13/16 | | | | | |
| | | SNW-128 x 4 7/8 | S-128 x 4 7/8 | | | 4 7/8 | | | | | |
| **22328K** | **23228K** | **SNW-128 x 4 15/16** | **S-128** | **AN-28** | **W-28** | **4 15/16** | **-0.005** | **5 21/64** | **1 1/16** | **7 3/32** | **13.0** |
| | | SNW-128 x 5 | S-128 x 5 | | | 5 | | | | | |
| | | SNW-130 x 5 1/8 | S-130 x 5 1/8 | | | 5 1/8 | | | | | |
| **22330K** | **23230K** | **SNW-130 x 5 3/16** | **S-130** | **AN-30** | **W-30** | **5 3/16** | **-0.005** | **5 5/8** | **1 1/8** | **7 11/16** | **17.6** |
| | | SNW-130 x 5 1/4 | S-130 x 5 1/4 | | | 5 1/4 | | | | | |
| | | SNW-130 x 5 5/16 | S-130 x 5 5/16 | | | 5 5/16 | | | | | |
| | | SNW-130 x 5 3/8 | S-130 x 5 3/8 | | | 5 3/8 | | | | | |
| | | SNW-132 x 5 3/8 | S-132 x 5 3/8 | | | | | | | | |
| **22332K** | **23232K** | **SNW-132 x 5 7/16** | **S-132** | **AN-32** | **W-32** | **5 7/16** | **-0.005** | **5 59/64** | **1 3/16** | **8 1/16** | **18.5** |
| | | SNW-132 x 5 1/2 | S-132 x 5 1/2 | | | | | | | | |
| | | SNW-134 x 5 13/16 | S-134 x 5 13/16 | | | | | | | | |
| | | SNW-134 x 5 7/8 | S-134 x 5 7/8 | | | | | | | | |
| **22334K** | **23234K** | **SNW-134 x 5 15/16** | **S-134** | **AN-34** | **W-34** | **5 15/16** | **-0.005** | **6 3/16** | **1 7/32** | **8 21/32** | **21.0** |
| | | SNW-134 x 6 | S-134 x 6 | | | | | | | | |
| **22336K** | **23236K** | **SNW-136 x 6 7/16** | **S-136** | **AN-36** | **W-36** | **6 7/16** | **-0.005** | **6 29/64** | **1 1/4** | **9 1/16** | **22.5** |
| | | SNW-138 x 6 13/16 | S-138 x 6 13/16 | | | | | | | | |
| | | SNW-138 x 6 7/8 | S-138 x 6 7/8 | | | | | | | | |
| **22338K** | **23238K** | **SNW-138 x 6 15/16** | **S-138** | **AN-38** | **W-38** | **6 15/16** | **-0.005** | **6 3/4** | **1 9/32** | **9 15/32** | **28.0** |
| | | SNW-138 x 7 | S-138 x 7 | | | | | | | | |
| | | SNW-140 x 7 1/8 | S-140 x 7 1/8 | | | 7 1/8 | | | | | |
| **22340K** | **23240K** | **SNW-140 x 7 3/16** | **S-140** | **AN-40** | **W-40** | **7 3/16** | **-0.005** | **7 3/32** | **1 11/32** | **9 27/32** | **36.0** |
| | | SNW-140 x 7 1/4 | S-140 x 7 1/4 | | | 7 1/4 | | | | | |

[1]Bold shaft sizes are standard. When ordering non-standard accessories, specify shaft size.
[2]Tolerance range is from +0 to value listed.

| Bearing Number[1] | | Accessory Numbers | | | | Shaft Dimensions | | Adapter Dimensions | | | SNW/SNP Assembly Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Assembly | Sleeve | Locknut | Lockwasher Lockplate | Diameter d | Tolerance[2] | $B_2$ | S | $D_1$ | |
| | | | | | | in. | in. | in. | in. | in. | lbs. |
| **22344K** | **23244K** | **SNW-144 x 7 15/16** | **S-144** | **N-044** | **W-44** | **7 15/16** | **-0.005** | **7 9/32** | **1 3/8** | **11** | **47.0** |
| **22348K** | **23248K** | **SNP-148 x 8 15/16** | **S-148** | **N-048** | **P-48** | **8 15/16** | **-0.006** | **8 7/64** | **1 11/32** | **11 7/16** | **38.3** |
| | | SNP-148 x 9 | S-148 x 9 | | | 9 | | | | | |
| **22352K** | **23252K** | **SNP-152 x 9 7/16** | **S-152** | **N-052** | **P-52** | **9 7/16** | **-0.006** | **8 49/64** | **1 13/32** | **12 13/16** | **53.4** |
| | | SNP-152 x 9 ½ | S-152 x 9 ½ | | | 9 ½ | | | | | |
| **22356K** | **23256K** | **SNP-3256 x 10 7/16** | **S-3256** | **N-056** | **P-56** | **10 7/16** | **-0.007** | **8 15/16** | **1 ½** | **13** | **61.3** |
| | | SNP-3256 x 10 ½ | S-3256 x 10 ½ | | | 10 ½ | -0.007 | | | | |
| **23260K** | | **SNP-3260 x 10 15/16** | **S-3260** | **N-060** | **P-60** | **10 15/16** | **-0.007** | **9 5/8** | **1 9/16** | **14 3/32** | **68.5** |
| | | SNP-3260 x 11 | S-3260 x 11 | | | 11 | -0.007 | | | | |
| **23264K** | | **SNP-3264 x 11 15/16** | **S-3264** | **N-064** | **P-64** | **11 15/16** | **-0.007** | **10 23/64** | **1 21/32** | **15** | **98.0** |
| | | SNP-3264 x 12 | S-3264 x 12 | | | 12 | -0.007 | | | | |
| | | SNP-3268 x 12 ½ | S-3268 x 12 ½ | | | 12 ½ | -0.007 | | | | |
| **23268K** | | **SNP-3268 x 12 7/8** | **S-3268** | **N-068** | **P-68** | **12 7/8** | **-0.007** | **11 1/8** | **1 25/32** | **15 3/4** | **105.0** |
| **23272K** | | **SNP-3272 x 13 7/16** | **S-3272** | **N-072** | **P-72** | **13 7/16** | **-0.007** | **11 27/64** | **1 25/32** | **16 ½** | **135.0** |
| | | SNP-3272 x 13 ½ | S-3272 x 13 ½ | | | 13 ½ | -0.007 | | | | |
| **23276K** | | **SNP-3276 x 13 15/16** | **S-3276** | **N-076** | **P-76** | **13 15/16** | **-0.007** | **11 7/8** | **1 29/32** | **17 3/4** | **145.0** |
| | | SNP-3276 x 14 | S-3276 x 14 | | | 14 | -0.007 | | | | |
| **23280K** | | **SNP-3280 x 15** | **S-3280** | **N-080** | **P-80** | **15** | **-0.007** | **12 21/32** | **2 1/16** | **18 ½** | **165.0** |
| **23284K** | | **SNP-3284 x 15 3/4** | **S-3284** | **N-084** | **P-84** | **15 3/4** | **-0.007** | **13 19/64** | **2 1/16** | **19 5/16** | **170.0** |
| **23288K** | | **SNP-3288 x 16 ½** | **S-3288** | **N-088** | **P-88** | **16 ½** | **-0.007** | **13 61/64** | **2 3/8** | **20 ½** | **260.0** |
| **23292K** | | **SNP-3292 x 16 15/16** | **S-3292** | **N-092** | **P-92** | **16 15/16** | **-0.007** | **18 1/16** | **2 3/8** | **21 1/4** | **291.0** |
| **23296K** | | **SNP-3296 x 17 15/16** | **S-3296** | **N-096** | **P-96** | **17 15/16** | **-0.007** | **15 5/32** | **2 3/8** | **22 1/16** | **335.0** |
| **232/500K** | | **SNP-32/500 x 18 7/16** | **S-32/500** | **N-500** | **P-500** | **18 7/16** | **-0.007** | **16 ½** | **2 45/64** | **22 13/16** | **366.0** |
| **232/530K** | | **SNP-32/530 x 18 15/16** | **S-32/530 x 18 15/16** | **N-530** | **P-530** | **18 15/16** | **-0.007** | **17 17/64** | **2 45/64** | **24 13/16** | **421.0** |
| | | SNP-32/530 x 19 7/16 | S-32/530 x 19 7/16 | | | 19 7/16 | -0.007 | | | | |
| **232/560K** | | **SNP-32/560 x 20 15/16** | **S-32/560** | **N-560** | **P-560** | **20 15/16** | **-0.007** | **17 59/64** | **2 61/64** | **25 9/16** | **478.0** |
| **232/600K** | | **SNP-32/600 x 21 15/16** | **S-32/600** | **N-600** | **P-600** | **21 15/16** | **-0.007** | **18 55/64** | **2 61/64** | **27 9/16** | **613.0** |
| **232/630K** | | **SNP-32/630 x 23 15/16** | **S-32/630** | **N-630** | **P-630** | **23 15/16** | **-0.007** | **19 51/64** | **2 61/64** | **28 3/4** | **657.0** |
| **232/670K** | | **SNP-32/670 x 24 15/16** | **S-32/670** | **N-670** | **P-670** | **24 15/16** | **-0.007** | **21 1/32** | **3 9/64** | **30 11/16** | **891.0** |
| **232/710K** | | **SNP-32/710 x 26 7/16** | **S-32/710** | **N-710** | **P-710** | **26 7/16** | **-0.007** | **21 15/16** | **3 37/64** | **32 11/16** | **979.0** |
| **232/750K** | | **SNP-32/750 x 27 15/16** | **S-32/750** | **N-750** | **P-750** | **27 15/16** | **-0.007** | **22 63/64** | **3 37/64** | **34 1/4** | **1118.0** |

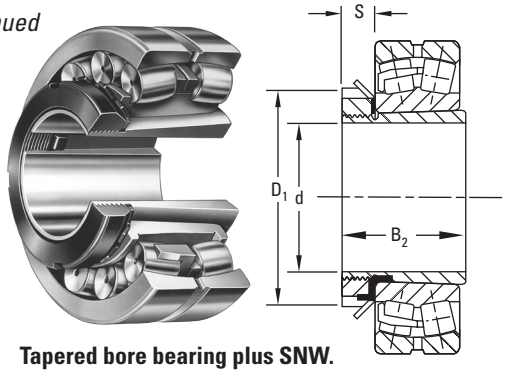
[1]Bold shaft sizes are standard. When ordering non-standard accessories, specify shaft size.
[2]Tolerance range is from +0 to value listed.

*Continued on next page.*

# *INCH ACCESSORIES – PULL-TYPE SLEEVES* – *continued*

## SNW/SNP – PULL-TYPE SLEEVE, LOCKNUT, LOCKWASHER/LOCKPLATE ASSEMBLIES

- The table below shows dimensions for adapter assemblies and components used in the mounting of tapered bore bearings on shafts.
- SNW assembly consists of a sleeve, locknut and lockwasher.
- SNP assembly consists of a sleeve, locknut and lockplate.




**Tapered bore bearing plus SNW.**

*Continued from previous page.*

| Bearing Number[1] | Accessory Numbers | | | | Shaft Dimensions | | Adapter Dimensions | | | SNW/SNP Assembly Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| | Assembly | Sleeve | Locknut | Lockwasher Lockplate | Diameter d | Tolerance[2] | $B_2$ | S | $D_1$ | |
| | | | | | in. | in. | in. | in. | in. | lbs. |
| **SERIES 231K** | | | | | | | | | | |
| **23122K** | **SNW-3122 x 3 15/16** | **S-22** | **N-022** | **W-022** | **3 15/16** | **-0.004** | **3 13/64** | **25/32** | **5 5/32** | **4.2** |
| **23124K** | **SNW-3124 x 4 3/16** | **S-24** | **N-024** | **W-024** | **4 3/16** | **-0.005** | **3 15/32** | **13/16** | **5 11/16** | **5.8** |
| **23126K** | **SNW-3126 x 4 7/16** | **S-26** | **N-026** | **W-026** | **4 7/16** | **-0.005** | **3 49/64** | **7/8** | **6 1/8** | **8.3** |
| **23128K** | **SNW-3128 x 4 15/16** | **S-28** | **N-028** | **W-028** | **4 15/16** | **-0.005** | **3 63/64** | **15/16** | **6 1/2** | **8.8** |
| **23130K** | **SNW-3130 x 5 3/16** | **S-30** | **N-030** | **W-030** | **5 3/16** | **-0.005** | **4 15/64** | **31/32** | **7 1/8** | **13.7** |
| **23132K** | **SNW-3132 x 5 7/16** | **S-32** | **N-032** | **W-032** | **5 7/16** | **-0.005** | **4 37/64** | **1 1/32** | **7 1/2** | **13.3** |
| **23134K** | **SNW-3134 x 5 15/16** | **S-34** | **N-034** | **W-034** | **5 15/16** | **-0.005** | **4 27/32** | **1 1/16** | **7 7/8** | **16.1** |
| **23136K** | **SNW-3136 x 6 7/16** | **S-36** | **N-036** | **W-036** | **6 7/16** | **-0.005** | **5 1/32** | **1 3/32** | **8 1/4** | **17.1** |
| **23138K** | **SNW-3138 x 6 15/16** | **S-38** | **N-038** | **W-038** | **6 15/16** | **-0.005** | **5 17/64** | **1 1/8** | **8 11/16** | **19.7** |
| **23140K** | **SNW-3140 x 7 3/16** | **S-40** | **N-040** | **W-040** | **7 3/16** | **-0.005** | **5 31/64** | **1 3/16** | **9 7/16** | **28.4** |
| **23144K** | **SNW-3144 x 7 15/16** | **S-44** | **N-044** | **W-044** | **7 15/16** | **-0.005** | **5 29/32** | **1 1/4** | **10 1/4** | **28.1** |
| **23148K** | **SNP-3148 x 8 15/16** | **S-48** | **N-048** | **P-48** | **8 15/16** | **-0.006** | **6 41/64** | **1 11/32** | **11 7/16** | **36.0** |
| **23152K** | **SNP-3152 x 9 7/16** | **S-52** | **N-052** | **P-52** | **9 7/16** | **-0.006** | **7 19/32** | **1 13/32** | **12 3/16** | **39.0** |
| | SNP-3152 x 9 1/2 | S-52 x 9 1/2 | | | 9 1/2 | | | | | |
| | SNP-3156 x 9 15/16 | S-3156 x 9 15/16 | | | 9 15/16 | | | | | |
| | SNP-3156 x 10 | S-3156 x 10 | | | 10 | | | | | |
| **23156K** | **SNP-3156 x 10 7/16** | **S-3156** | **N-056** | **P-56** | **10 7/16** | **-0.007** | **7 49/64** | **1 1/2** | **13** | **60.0** |
| | SNP-3156 x 10 1/2 | S-3156 x 10 1/2 | | | 10 1/2 | | | | | |
| **23160K** | **SNP-3160 x 10 15/16** | **S-3160** | **N-060** | **P-60** | **10 15/16** | **-0.007** | **8 3/8** | **1 9/16** | **14 3/16** | **65.0** |
| | SNP-3160 x 11 | S-3160 x 11 | | | 11 | | | | | |
| **23164K** | **SNP-3164 x 11 15/16** | **S-3164** | **N-064** | **P-64** | **11 15/16** | **-0.007** | **9 7/64** | **1 21/32** | **15** | **70.0** |
| | SNP-3164 x 12 | S-3164 x 12 | | | 12 | | | | | |
| | SNP-3168 x 12 1/2 | S-3168 x 12 1/2 | | | 12 1/2 | | | | | |
| **23168K** | **SNP-3168 x 12 7/8** | **S-3168** | **N-068** | **P-68** | **12 7/8** | **-0.007** | **9 25/32** | **1 25/32** | **15 3/4** | **93.5** |
| **23172K** | **SNP-3172 x 13 7/16** | **S-3172** | **N-072** | **P-72** | **13 7/16** | **-0.007** | **11 27/64** | **1 25/32** | **16 1/2** | **120.0** |
| | SNP-3172 x 13 1/2 | S-3172 x 13 1/2 | | | 13 1/2 | | | | | |
| **23176K** | **SNP-3176 x 13 15/16** | **S-3176** | **N-076** | **P-76** | **13 15/16** | **-0.007** | **11 7/8** | **1 29/32** | **17 3/4** | **125.0** |
| | SNP-3176 x 14 | S-3176 x 14 | | | 14 | | | | | |
| | SNP-3180 x 14 15/16 | S-3180 x 14 15/16 | | | 14 15/16 | | | | | |
| **23180K** | **SNP-3180 x 15** | **S-3180** | **N-080** | **P-80** | **15** | **-0.007** | **12 21/32** | **2 1/16** | **18 1/2** | **140.0** |

[1]Bold shaft sizes are standard. When ordering non-standard accessories, specify shaft size.
[2]Tolerance range is from +0 to value listed.

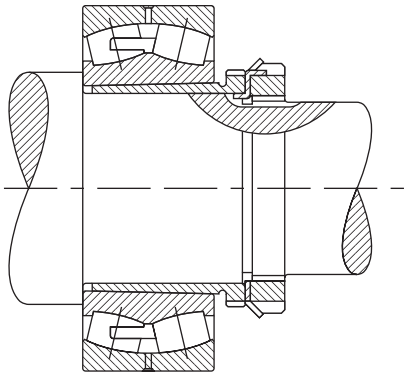
| Bearing Number[1] | Accessory Numbers | | | | Shaft Dimensions | | Adapter Dimensions | | | SNW/SNP Assembly Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| | Assembly | Sleeve | Locknut | Lockwasher Lockplate | Diameter d | Tolerance[2] | $B_2$ | S | $D_1$ | |
| | | | | | in. | in. | in. | in. | in. | lbs. |
| **23184K** | **SNP-3184 x 15 3/4** | **S-3184** | **N-084** | **P-84** | **15 3/4** | **-0.007** | **13 19/64** | **2 1/16** | **19 5/16** | **145.0** |
| **23188K** | **SNP-3188 x 16 1/2** | **S-3188** | **N-088** | **P-88** | **16 1/2** | **-0.007** | **13 61/64** | **2 3/8** | **20 1/2** | **229.0** |
| **23192K** | **SNP-3192 x 17** | **S-3192** | **N-092** | **P-92** | **17** | **-0.007** | **18 1/16** | **2 3/8** | **21 1/4** | **255.0** |
| **23196K** | **SNP-3196 x 18** | **S-3196** | **N-096** | **P-96** | **18** | **-0.007** | **15 5/32** | **2 3/8** | **22 1/16** | **293.0** |
| **231/500K** | **SNP-31/500 x 18 7/16** | **S-31/500** | **N-500** | **P-500** | **18 7/16** | **-0.007** | **16 1/2** | **2 45/64** | **22 13/16** | **315.0** |
| **231/530K** | **SNP-31/530 x 18 15/16**<br>SNP-31/530 x 19 7/16 | **S-31/530 x 18 15/16**<br>S-31/530 x 19 7/16 | **N-530** | **P-530** | **18 15/16**<br>19 7/16 | **-0.007** | **17 17/64** | **2 45/64** | **24 13/16** | **355.0** |
| **231/560K** | **SNP-31/560 x 20 15/16** | **S-31/560** | **N-560** | **P-560** | **20 15/16** | **-0.007** | **17 59/64** | **2 61/64** | **25 9/16** | **408.0** |
| **231/600K** | **SNP-31/600 x 21 15/16** | **S-31/600** | **N-600** | **P-600** | **21 15/16** | **-0.007** | **18 55/64** | **2 61/64** | **27 9/16** | **516.0** |
| **231/630K** | **SNP-31/630 x 23 15/16** | **S-31/630** | **N-630** | **P-630** | **23 15/16** | **-0.007** | **19 51/64** | **2 61/64** | **28 3/4** | **556.0** |
| **231/670K** | **SNP-31/670 x 24 15/16** | **S-31/670** | **N-670** | **P-670** | **24 15/16** | **-0.007** | **21 1/32** | **3 9/64** | **30 11/16** | **759.0** |
| **231/710K** | **SNP-31/710 x 26 7/16** | **S-31/710** | **N-710** | **P-710** | **26 7/16** | **-0.007** | **21 15/16** | **3 37/64** | **32 11/16** | **833.0** |
| **231/750K** | **SNP-31/750 x 27 15/16** | **S-31/750** | **N-750** | **P-750** | **27 15/16** | **-0.007** | **22 63/64** | **3 37/64** | **34 1/4** | **997.0** |
| **231/800K** | **SNP-31/800 x 29 7/16** | **S-31/800** | **N-800** | **P-800** | **29 7/16** | **-0.007** | **19 1/64** | **3 37/64** | **36 1/4** | **1136.0** |
| **231/850K** | **SNP31/850 x 31 7/16** | **S-31/850** | **N-850** | **P-850** | **31 7/16** | **-0.007** | **20 1/32** | **3 37/64** | **38 9/16** | **1303.0** |

[1]Bold shaft sizes are standard. When ordering non-standard accessories, specify shaft size.
[2]Tolerance range is from +0 to value listed.

# *INCH ACCESSORIES – PUSH-TYPE SLEEVES*

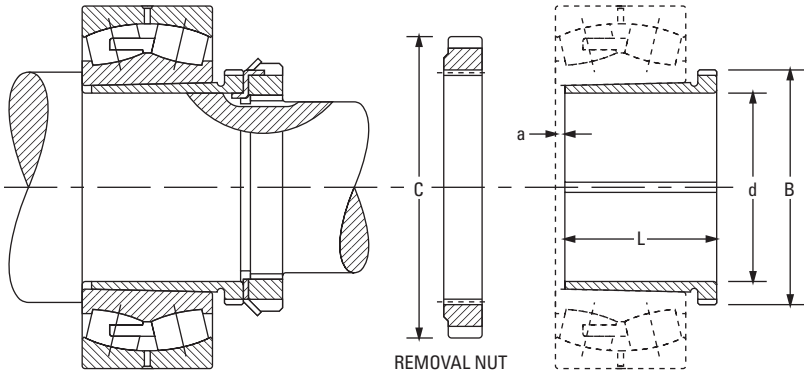
## PUSH-TYPE REMOVABLE SLEEVE, LOCKNUT AND LOCKWASHER

The chart below shows dimensions for adapter assemblies and components used in the tapered bore bearings on shafts.



| Bearing Number | Accessory Numbers | | | | Shaft Dimensions | | Adapter Dimensions | | | Removal Nut O.D. C | Sleeve Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sleeve | Locknut | Lockwasher Lockplate | Removal Nut | Diameter d | Tolerance[1] | Pitch Diameter B | L | a | | |
| | | | | | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **kg.** lbs. |
| **SERIES 222K** | | | | | | | | | | | |
| 22216K | SK-8022 | N-14 | W-14 | AN-18 | **70** 2.7559 | **-0.10** -0.004 | **88.19** 3.472 | **50** 1.969 | **3.50** 0.138 | **118.39** 4.661 | **0.5** 1.2 |
| 22217K | SK-8522 | AN-15 | W-15 | AN-19 | **75** 2.9528 | **-0.10** -0.004 | **93.35** 3.675 | **52** 2.047 | **3.50** 0.138 | **125.55** 4.943 | **0.6** 1.4 |
| 22218K | SK-9022 | AN-16 | W-16 | AN-20 | **80** 3.1496 | **-0.10** -0.004 | **98.12** 3.863 | **53** 2.087 | **3.50** 0.138 | **131.90** 5.193 | **0.6** 1.5 |
| 22219K | SK-9522 | AN-17 | W-17 | AN-21 | **85** 3.3465 | **-0.10** -0.004 | **103.28** 4.066 | **57** 2.244 | **4.00** 0.157 | **138.25** 5.443 | **0.8** 1.8 |
| 22220K | SK-10022 | AN-18 | W-18 | AN-22 | **90** 3.5433 | **-0.10** -0.004 | **109.12** 4.269 | **59** 2.323 | **4.00** 0.157 | **145.39** 5.724 | **0.9** 2.0 |
| 22222K | SK-11022 | AN-20 | W-20 | ARN-22 | **100** 3.9370 | **-0.10** -0.004 | **119.94** 4.722 | **65** 2.559 | **4.00** 0.157 | **158.75** 6.250 | **1.1** 2.4 |
| 22224K | SK-12022 | AN-22 | W-22 | ARN-24 | **110** 4.3307 | **-0.13** -0.005 | **130.28** 5.129 | **72** 2.835 | **4.00** 0.157 | **174.63** 6.875 | **1.4** 3.1 |
| 22226K | SK-13022 | AN-22 | W-22 | ARN-26 | **115** 4.5276 | **-0.13** -0.005 | **141.38** 5.566 | **78** 3.071 | **4.00** 0.15.7 | **184.15** 7.250 | **2.2** 5.0 |
| 22228K | SK-14022 | AN-24 | W-24 | RN-28 | **125** 4.9213 | **-0.13** -0.005 | **152.73** 6.013 | **82** 3.228 | **5.00** 0.197 | **200.03** 7.875 | **2.6** 5.8 |
| 22230K | SK-15022 | AN-26 | W-26 | RN-30 | **135** 5.3150 | **-0.13** -0.005 | **163.04** 6.419 | **88** 3.465 | **5.00** 0.197 | **209.55** 8.250 | **3.0** 6.8 |
| 22232K | SK-16022 | AN-28 | W-28 | RN-32 | **140** 5.5118 | **-0.13** -0.005 | **173.76** 6.841 | **96** 3.780 | **5.00** 0.197 | **225.43** 8.875 | **4.5** 9.9 |

[1]Tolerance range is from +0 to value listed.




**Tapered bore bearing mounted with push-type removable sleeve.**

| Bearing Number | Accessory Numbers | | | | Shaft Dimensions | | Adapter Dimensions | | | Removal Nut O.D. C | Sleeve Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sleeve | Locknut | Lockwasher Lockplate | Removal Nut | Diameter d | Tolerance[1] | Pitch Diameter B | L | a | | |
| | | | | | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **kg.** lbs. |
| 22234K | SK-17022 | AN-30 | W-30 | RN-34 | **150** 5.9055 | **-0.13** -0.005 | **184.07** 7.247 | **104** 4.095 | **5.00** 0.197 | **234.95** 9.250 | **5.2** 11.5 |
| 22236K | SK-18022 | AN-32 | W-32 | RN-36 | **160** 6.2992 | **-0.13** -0.005 | **194.79** 7.669 | **104** 4.095 | **5.00** 0.197 | **247.65** 9.750 | **5.6** 12.5 |
| 22238K | SK-19022 | AN-34 | W-34 | RN-38 | **170** 6.6929 | **-0.13** -0.005 | **205.92** 8.107 | **112** 4.409 | **5.00** 0.197 | **269.88** 10.625 | **6.5** 14.5 |
| 22240K | SK-20022 | AN-36 | W-36 | N-044 | **180** 7.0866 | **-0.13** -0.005 | **217.02** 8.544 | **118** 4.646 | **5.00** 0.197 | **279.53** 11.005 | **7.4** 16.3 |
| 22244K | SK-22022 | AN-40 | W-40 | N-048 | **200** 7.8740 | **-0.13** -0.005 | **236.98** 9.330 | **130** 5.118 | **6.00** 0.236 | **290.65** 11.443 | **8.8** 19.6 |
| 22248K | SK-24022 | N-44 | W-44 | N-052 | **220** 8.6614 | **-0.15** -0.006 | **256.03** 10.080 | **144** 5.669 | **6.00** 0.236 | **309.70** 12.193 | **11.0** 24.3 |
| 22252K | SK-26022 | N-048 | P-48 | N-056 | **240** 9.4488 | **-0.15** -0.006 | **276.66** 10.892 | **155** 6.102 | **6.00** 0.236 | **330.33** 13.005 | **14.0** 30.9 |
| 22256K | SK-28022 | N-052 | P-52 | RN-56 | **260** 10.2362 | **-0.15** -0.006 | **301.27** 11.861 | **155** 6.102 | **8.00** 0.315 | **425.45** 16.750 | **15.0** 33.1 |
| 22260K | SK-30022 | N-056 | P-56 | RN-60 | **280** 11.0236 | **-0.15** -0.006 | **325.88** 12.830 | **170** 6.693 | **8.00** 0.315 | **416.10** 16.382 | **17.7** 39.2 |
| 22264K | SK-32022 | N-060 | P-60 | RN-64 | **300** 11.8110 | **-0.15** -0.006 | **345.72** 13.611 | **180** 7.087 | **10.00** 0.394 | **431.8** 17.000 | **21.0** 46.3 |

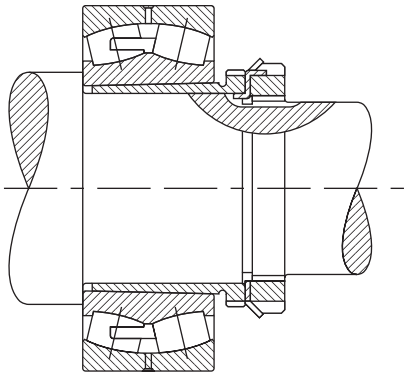
[1]Tolerance range is from +0 to value listed.

*Continued on next page.*

# *INCH ACCESSORIES – PUSH-TYPE SLEEVES* – *continued*

## PUSH-TYPE REMOVABLE SLEEVE, LOCKNUT AND LOCKWASHER

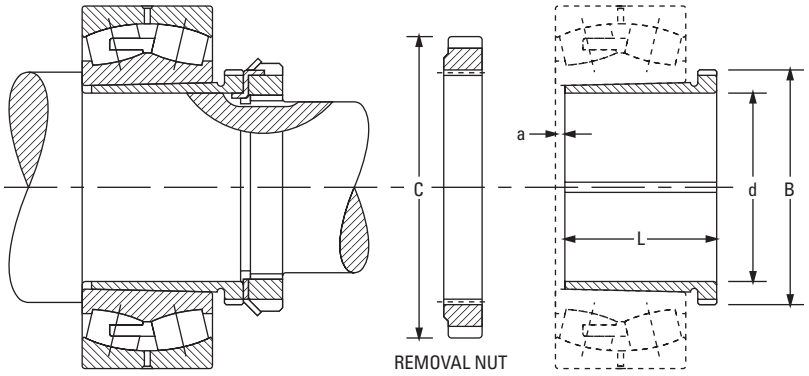
The chart below shows dimensions for adapter assemblies and components used in the tapered bore bearings on shafts.



*Continued from previous page.*

| Bearing Number | Accessory Numbers | | | | Shaft Dimensions | | Adapter Dimensions | | | Removal Nut O.D. C | Sleeve Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sleeve | Locknut | Lockwasher Lockplate | Removal Nut | Diameter d | Tolerance[1] | Pitch Diameter B | L | a | | |
| | | | | | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **kg.** lbs. |
| **SERIES 223K** | | | | | | | | | | | |
| 22308K | SK-4023 | N-07 | W-07 | N-09 | **35** 1.3780 | **-0.08** -0.003 | **43.94** 1.730 | **40** 1.575 | **3.00** 0.118 | **64.41** 2.536 | **0.1** 0.2 |
| 22309K | SK-4523 | N-08 | W-08 | N-10 | **40** 1.5748 | **-0.08** -0.003 | **49.02** 1.930 | **44** 1.732 | **3.00** 0.118 | **68.40** 2.693 | **0.1** 0.3 |
| 22310K | SK-5023 | N-09 | W-09 | RN-10 | **45** 1.7717 | **-0.08** -0.003 | **55.04** 2.167 | **50** 1.969 | **3.00** 0.118 | **76.20** 3.000 | **0.2** 0.4 |
| 22311K | SK-5523 | N-10 | W-10 | RN-11 | **50** 1.9685 | **-0.08** -0.003 | **60.20** 2.370 | **54** 2.126 | **3.00** 0.118 | **81.76** 3.219 | **0.2** 0.5 |
| 22312K | SK-6023 | N-11 | W-11 | RN-12 | **55** 2.1654 | **-0.10** -0.004 | **65.76** 2.589 | **57** 2.244 | **3.50** 0.138 | **87.33** 3.438 | **0.3** 0.6 |
| 22313K | SK-6523 | N-12 | W-12 | AN-15 | **60** 2.3622 | **-0.10** -0.004 | **73.10** 2.878 | **61** 2.402 | **3.50** 0.138 | **98.55** 3.880 | **0.3** 0.8 |
| 22314K | SK-7023 | N-12 | W-12 | AN-16 | **60** 2.3622 | **-0.10** -0.004 | **78.28** 3.082 | **65** 2.559 | **3.50** 0.138 | **105.69** 4.161 | **0.6** 1.5 |
| 22315K | SK-7523 | N-13 | W-13 | AN-17 | **65** 2.5591 | **-0.10** -0.004 | **83.44** 3.285 | **69** 2.717 | **3.50** 0.138 | **112.04** 4.411 | **0.8** 1.7 |
| 22316K | SK-8023 | N-14 | W-14 | AN-18 | **70** 2.7559 | **-0.10** -0.004 | **88.19** 3.472 | **72** 2.835 | **3.50** 0.138 | **118.39** 4.661 | **0.9** 2.0 |
| 22317K | SK-8523 | AN-15 | W-15 | AN-19 | **75** 2.9528 | **-0.10** -0.004 | **93.35** 3.675 | **75** 2.953 | **3.50** 0.138 | **125.55** 4.943 | **1.0** 2.2 |
| 22318K | SK-9023 | AN-16 | W-16 | AN-20 | **80** 3.1496 | **-0.10** -0.004 | **98.12** 3.863 | **80** 3.150 | **3.50** 0.138 | **131.90** 5.193 | **1.1** 2.5 |
| 22319K | SK-9523 | AN-17 | W-17 | AN-21 | **85** 3.3465 | **-0.10** -0.004 | **103.28** 4.066 | **85** 3.346 | **4.00** 0.157 | **138.25** 5.443 | **1.3** 2.9 |
| 22320K | SK-10023 | AN-18 | W-18 | AN-22 | **90** 3.5433 | **-0.10** -0.004 | **109.12** 4.269 | **90** 3.543 | **4.00** 0.157 | **145.39** 5.724 | **1.5** 3.3 |

[1]Tolerance range is from +0 to value listed.



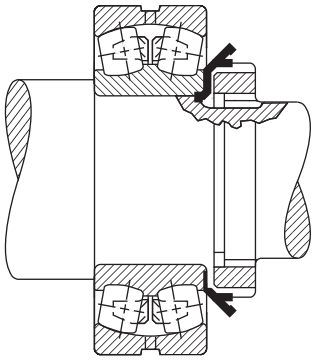

**Tapered bore bearing mounted with push-type removable sleeve.**

| Bearing Number | Accessory Numbers | | | | Shaft Dimensions | | Adapter Dimensions | | | Removal Nut O.D. C | Sleeve Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sleeve | Locknut | Lockwasher Lockplate | Removal Nut | Diameter d | Tolerance[1] | Pitch Diameter B | L | a | | |
| | | | | | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **kg.** lbs. |
| 22322K | SK-11023 | AN-20 | W-20 | ARN-22 | **100** 3.9370 | **-0.10** -0.004 | **119.94** 4.722 | **98** 3.858 | **4.00** 0.157 | **158.75** 6.250 | **1.9** 4.2 |
| 22324K | SK-12023 | AN-22 | W-22 | ARN-24 | **110** 4.3307 | **-0.13** -0.005 | **130.28** 5.129 | **105** 4.134 | **4.00** 0.157 | **174.63** 6.875 | **2.2** 5.0 |
| 22326K | SK-13023 | AN-22 | W-22 | ARN-26 | **115** 4.5276 | **-0.13** -0.005 | **141.38** 5.566 | **115** 4.528 | **4.00** 0.157 | **184.15** 7.250 | **3.6** 8.0 |
| 22328K | SK-14023 | AN-24 | W-24 | RN-28 | **125** 4.9213 | **-0.13** -0.005 | **152.73** 6.013 | **125** 4.921 | **5.00** 0.197 | **200.03** 7.875 | **4.3** 9.5 |
| 22330K | SK-15023 | AN-26 | W-26 | RN-30 | **135** 5.3150 | **-0.13** -0.005 | **163.04** 6.419 | **135** 5.315 | **5.00** 0.197 | **209.55** 8.250 | **5.1** 11.4 |
| 22332K | SK-16023 | AN-28 | W-28 | RN-32 | **140** 5.5118 | **-0.13** -0.005 | **173.76** 6.841 | **140** 5.512 | **6.00** 0.236 | **225.43** 8.875 | **7.0** 15.5 |
| 22334K | SK-17023 | AN-30 | W-30 | RN-34 | **150** 5.9055 | **-0.13** -0.005 | **184.07** 7.247 | **146** 5.748 | **6.00** 0.236 | **234.95** 9.250 | **7.8** 17.2 |
| 22336K | SK-18023 | AN-32 | W-32 | RN-36 | **160** 6.2992 | **-0.13** -0.005 | **194.79** 7.669 | **154** 6.063 | **6.00** 0.236 | **247.65** 9.750 | **9.1** 20.2 |
| 22338K | SK-19023 | AN-34 | W-34 | RN-38 | **170** 6.6929 | **-0.13** -0.005 | **205.92** 8.107 | **160** 6.299 | **7.00** 0.276 | **269.88** 10.625 | **10.0** 22.1 |
| 22340K | SK-20023 | AN-36 | W-36 | N-044 | **180** 7.0866 | **-0.13** -0.005 | **217.02** 8.544 | **170** 6.693 | **7.00** 0.276 | **279.53** 11.005 | **11.4** 25.2 |
| 22344K | SK-22023 | AN-40 | W-40 | N-048 | **200** 7.8740 | **-0.13** -0.005 | **236.98** 9.330 | **181** 7.126 | **8.00** 0.315 | **290.65** 11.443 | **13.3** 29.5 |
| 22348K | SK-24023 | N-44 | W-44 | N-052 | **220** 8.6614 | **-0.15** -0.006 | **256.03** 10.080 | **189** 7.441 | **8.00** 0.315 | **309.70** 12.193 | **15.5** 34.2 |
| 22352K | SK-26023 | N-048 | P-48 | N-056 | **240** 9.4488 | **-0.15** -0.006 | **276.66** 10.892 | **200** 7.874 | **8.00** 0.315 | **330.33** 13.005 | **18.2** 40.2 |
| 22356K | SK-28023 | N-052 | P-52 | RN-56 | **260** 10.2362 | **-0.15** -0.006 | **301.27** 11.861 | **210** 8.268 | **10.00** 0.394 | **425.45** 16.75 | **22.0** 48.5 |

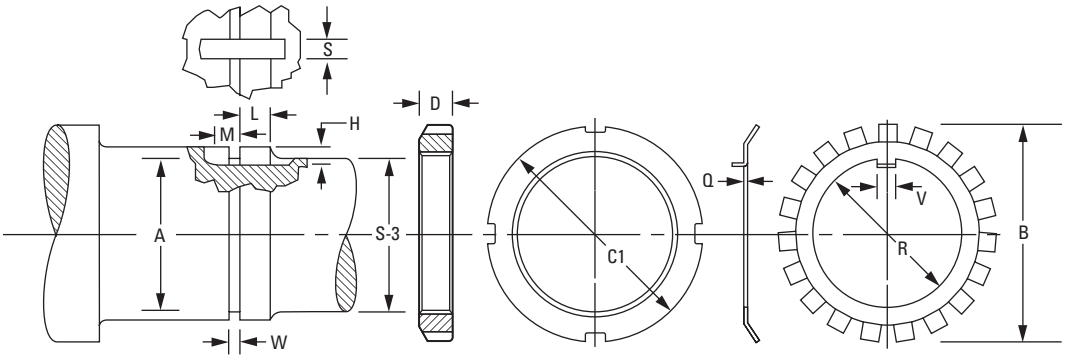
[1]Tolerance range is from +0 to value listed.

# *INCH ACCESSORIES – LOCKNUTS AND LOCKWASHERS*

- The chart below shows dimensions for locknuts and lockwashers used in the mounting of straight bore bearings on shafts.
- Other dimensions and tolerances related to shaft configurations are also shown.
- Dimensions are presented according to bearing bore size and are applicable to bearings in the various series (e.g., 222, 223, etc.).



| Bearing Bore | Locknut | Lockwasher | Threads Per Inch | Threads | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Major Diameter | | Pitch Diameter | | Minor Dia. | Relief Dia. A |
| | | | | Max. | Min. | Max. | Min. | | |
| **mm** | | | | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. |
| **35** | N 07 | W 07 | 18 | **34.950** 1.3760 | **34.740** 1.3678 | **34.030** 1.3399 | **33.930** 1.3359 | **33.220** 1.3078 | **32.820** 1.2922 |
| **40** | N 08 | W 08 | 18 | **39.700** 1.5630 | **39.490** 1.5548 | **38.780** 1.5269 | **38.670** 1.5224 | **37.970** 1.4948 | **37.570** 1.4792 |
| **45** | N 09 | W 09 | 18 | **44.880** 1.7670 | **44.670** 1.7588 | **43.960** 1.7309 | **43.850** 1.7264 | **43.150** 1.6988 | **42.750** 1.6832 |
| **50** | N 10 | W 10 | 18 | **49.960** 1.9670 | **49.750** 1.9588 | **49.050** 1.9309 | **48.930** 1.9264 | **48.230** 1.8988 | **47.830** 1.8832 |
| **55** | N 11 | W 11 | 18 | **54.790** 2.1570 | **54.580** 2.1488 | **53.870** 2.1209 | **53.740** 2.1158 | **53.060** 2.0888 | **52.660** 2.0732 |
| **60** | N 12 | W 12 | 18 | **59.940** 2.3600 | **59.740** 2.3518 | **59.030** 2.3239 | **58.900** 2.3188 | **58.210** 2.2918 | **57.820** 2.2762 |
| **65** | N 13 | W 13 | 18 | **64.720** 2.5480 | **64.510** 2.5398 | **63.800** 2.5119 | **63.670** 2.5068 | **62.990** 2.4798 | **62.590** 2.4642 |
| **70** | N 14 | W 14 | 18 | **69.880** 2.7510 | **69.670** 2.7428 | **68.960** 2.7149 | **68.830** 2.7098 | **68.140** 2.6828 | **67.750** 2.6672 |
| **75** | AN 15 | W 15 | 12 | **74.500** 2.9330 | **74.210** 2.9218 | **73.120** 2.8789 | **72.990** 2.8735 | **71.900** 2.8308 | **71.110** 2.7995 |
| **80** | AN 16 | W 16 | 12 | **79.680** 3.1370 | **79.400** 3.1258 | **78.310** 3.0829 | **78.160** 3.0770 | **77.080** 3.0348 | **76.290** 3.0035 |
| **85** | AN 17 | W 17 | 12 | **84.840** 3.3400 | **84.550** 3.3288 | **83.460** 3.2859 | **83.310** 3.2800 | **82.240** 3.2378 | **81.450** 3.2065 |
| **90** | AN 18 | W 18 | 12 | **89.590** 3.5270 | **89.300** 3.5158 | **88.210** 3.4729 | **88.020** 3.4655 | **86.990** 3.4248 | **86.200** 3.3935 |
| **95** | AN 19 | W 19 | 12 | **94.740** 3.7300 | **94.460** 3.7188 | **93.370** 3.6759 | **93.180** 3.6685 | **92.150** 3.6278 | **91.350** 3.5965 |
| **100** | AN 20 | W 20 | 12 | **99.520** 3.9180 | **99.230** 3.9068 | **98.140** 3.8639 | **97.960** 3.8565 | **96.920** 3.8158 | **96.130** 3.7845 |
| **105** | AN 21 | W 21 | 12 | **104.700** 4.1220 | **104.410** 4.1108 | **103.320** 4.0679 | **103.110** 4.0596 | **102.100** 4.0198 | **101.310** 3.9885 |
| **110** | AN 22 | W 22 | 12 | **109.860** 4.3250 | **109.570** 4.3138 | **108.480** 4.2709 | **108.270** 4.2626 | **107.260** 4.2228 | **106.460** 4.1915 |
| **120** | AN 24 | W 24 | 12 | **119.790** 4.7160 | **119.500** 4.7048 | **118.410** 4.6619 | **118.200** 4.6536 | **117.190** 4.6138 | **116.400** 4.5825 |



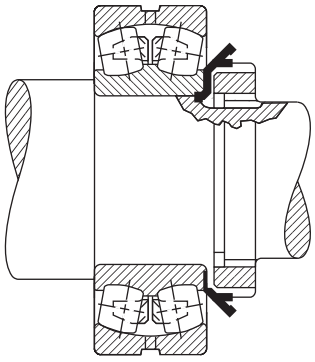

| Shaft | | | | | | Locknut | | Lockwasher | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S-3 | W[1] | L[1] | H[1] | S[1] | M[1] | $C_1$ | D | Q | R | B | V |
| **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in |
| **31.750**<br>1 1/4 | **2.4**<br>3/32 | **12.7**<br>1/2 | **2.4**<br>3/32 | **4.8**<br>3/16 | **3.2**<br>1/8 | **52.39**<br>2 1/16 | **11.40**<br>0.448 | **1.30**<br>0.050 | **36.00**<br>1.416 | **57.20**<br>2 1/4 | **4.50**<br>0.176 |
| **36.510**<br>1 7/16 | **3.2**<br>1/8 | **13.5**<br>17/32 | **2.4**<br>3/32 | **7.9**<br>5/16 | **3.2**<br>1/8 | **57.15**<br>2 1/4 | **11.40**<br>0.448 | **1.50**<br>0.058 | **40.70**<br>1.603 | **62.70**<br>2 15/32 | **7.40**<br>0.290 |
| **42.860**<br>1 11/16 | **3.2**<br>1/8 | **13.5**<br>17/32 | **2.4**<br>3/32 | **7.9**<br>5/16 | **4.0**<br>5/32 | **64.30**<br>2 17/32 | **11.40**<br>0.448 | **1.50**<br>0.058 | **46.20**<br>1.817 | **69.50**<br>2 47/64 | **7.40**<br>0.290 |
| **47.630**<br>1 7/8 | **3.2**<br>1/8 | **15.1**<br>19/32 | **2.4**<br>3/32 | **7.9**<br>5/16 | **4.0**<br>5/32 | **68.30**<br>2 11/16 | **13.00**<br>0.510 | **1.50**<br>0.058 | **51.20**<br>2.017 | **74.20**<br>2 59/64 | **7.40**<br>0.290 |
| **52.390**<br>2 1/16 | **3.2**<br>1/8 | **15.1**<br>19/32 | **3.2**<br>1/8 | **7.9**<br>5/16 | **4.0**<br>5/32 | **75.40**<br>2 31/32 | **13.00**<br>0.510 | **1.60**<br>0.063 | **56.10**<br>2.207 | **79.00**<br>3 7/64 | **7.40**<br>0.290 |
| **57.150**<br>2 1/4 | **3.2**<br>1/8 | **15.9**<br>5/8 | **3.2**<br>1/8 | **7.9**<br>5/16 | **4.0**<br>5/32 | **80.20**<br>3 5/32 | **13.70**<br>0.541 | **1.60**<br>0.063 | **61.60**<br>2.425 | **85.00**<br>3 11/32 | **7.40**<br>0.290 |
| **61.910**<br>2 7/16 | **3.2**<br>1/8 | **16.7**<br>21/32 | **3.2**<br>1/8 | **7.9**<br>5/16 | **4.0**<br>5/32 | **85.70**<br>3 3/8 | **14.60**<br>0.573 | **1.60**<br>0.063 | **66.40**<br>2.613 | **90.90**<br>3 37/64 | **7.40**<br>0.290 |
| **66.680**<br>2 5/8 | **3.2**<br>1/8 | **16.7**<br>21/32 | **3.2**<br>1/8 | **7.9**<br>5/16 | **6.4**<br>1/4 | **92.10**<br>3 5/8 | **14.60**<br>0.573 | **1.60**<br>0.063 | **71.50**<br>2.816 | **97.20**<br>3 53/64 | **7.40**<br>0.290 |
| **71.440**<br>2 13/16 | **4.0**<br>5/32 | **17.5**<br>11/16 | **3.2**<br>1/8 | **7.9**<br>5/16 | **6.4**<br>1/4 | **98.40**<br>3 7/8 | **15.30**<br>0.604 | **1.60**<br>0.072 | **76.30**<br>3.003 | **104.40**<br>4 7/64 | **7.40**<br>0.290 |
| **76.200**<br>3 | **4.0**<br>5/32 | **17.5**<br>11/16 | **3.2**<br>1/8 | **9.5**<br>3/8 | **6.4**<br>1/4 | **105.60**<br>4 5/32 | **15.30**<br>0.604 | **1.80**<br>0.072 | **81.50**<br>3.207 | **111.10**<br>4 3/8 | **9.00**<br>0.353 |
| **80.960**<br>3 3/16 | **4.0**<br>5/32 | **16.7**<br>21/32 | **3.2**<br>1/8 | **9.5**<br>3/8 | **6.4**<br>1/4 | **111.90**<br>4 13/32 | **16.10**<br>0.635 | **1.80**<br>0.072 | **87.00**<br>3.425 | **117.50**<br>4 5/8 | **9.00**<br>0.353 |
| **85.730**<br>3 3/8 | **4.0**<br>5/32 | **20.6**<br>13/16 | **4.0**<br>5/32 | **9.5**<br>3/8 | **6.4**<br>1/4 | **118.30**<br>4 21/32 | **17.70**<br>0.698 | **2.40**<br>0.094 | **91.70**<br>3.612 | **125.40**<br>4 15/16 | **9.00**<br>0.353 |
| **90.490**<br>3 9/16 | **4.0**<br>5/32 | **21.4**<br>27/32 | **4.0**<br>5/32 | **9.5**<br>3/8 | **6.4**<br>1/4 | **125.40**<br>4 15/16 | **18.50**<br>0.729 | **2.40**<br>0.094 | **97.30**<br>3.830 | **132.60**<br>5 7/32 | **9.00**<br>0.353 |
| **96.840**<br>3 13/16 | **4.0**<br>5/32 | **22.2**<br>7/8 | **4.0**<br>5/32 | **9.5**<br>3/8 | **7.9**<br>5/16 | **131.80**<br>5 3/16 | **19.30**<br>0.760 | **2.40**<br>0.094 | **102.10**<br>4.018 | **139.70**<br>5 1/2 | **9.00**<br>0.353 |
| **100.010**<br>3 15/16 | **4.0**<br>5/32 | **22.2**<br>7/8 | **4.0**<br>5/32 | **9.5**<br>3/8 | **7.9**<br>5/16 | **138.10**<br>5 7/16 | **19.30**<br>0.760 | **2.40**<br>0.094 | **107.20**<br>4.222 | **144.90**<br>5 45/64 | **9.00**<br>0.353 |
| **106.360**<br>4 3/16 | **4.0**<br>5/32 | **23**<br>29/32 | **4.8**<br>3/16 | **9.5**<br>3/8 | **7.9**<br>5/16 | **145.30**<br>5 23/32 | **20.10**<br>0.791 | **3.20**<br>0.125 | **112.40**<br>4.425 | **154.00**<br>6 1/16 | **9.00**<br>0.353 |
| **115.890**<br>4 9/16 | **4.0**<br>5/32 | **23.8**<br>15/16 | **4.8**<br>3/16 | **9.5**<br>3/8 | **7.9**<br>5/16 | **155.60**<br>6 1/8 | **20.90**<br>0.823 | **3.20**<br>0.125 | **122.70**<br>4.831 | **164.30**<br>6 15/32 | **9.00**<br>0.353 |

[1]For W, L, H, S and M, tolerance is -0 to +1/64 inch, -0 to +0.4 mm.

*Continued on next page.*

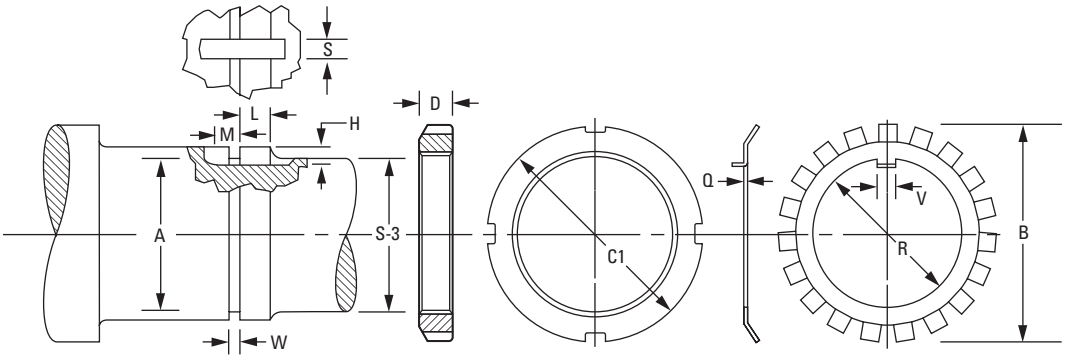
# *INCH ACCESSORIES – LOCKNUTS AND LOCKWASHERS – continued*

- The chart below shows dimensions for locknuts and lockwashers used in the mounting of straight bore bearings on shafts.
- Other dimensions and tolerances related to shaft configurations are also shown.
- Dimensions are presented according to bearing bore size and are applicable to bearings in the various series (e.g., 222 and 223, etc.).



*Continued from previous page.*

| Bearing Bore | Locknut | Lockwasher | Threads Per Inch | Threads | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Major Diameter | | Pitch Diameter | | Minor Dia. | Relief Dia. A |
| | | | | Max. | Min. | Max. | Min. | | |
| **mm** | | | | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. | **mm** in. |
| **130** | AN 26 | W 26 | 12 | **129.690** 5.1060 | **129.410** 5.0948 | **128.320** 5.0519 | **128.110** 5.0436 | **127.100** 5.0038 | **126.300** 4.9725 |
| **140** | AN 28 | W 28 | 12 | **139.620** 5.4970 | **139.340** 5.4858 | **138.250** 5.4429 | **138.040** 5.4346 | **137.030** 5.3948 | **136.230** 5.3635 |
| **150** | AN 30 | W 30 | 12 | **149.560** 5.8880 | **149.270** 5.8768 | **148.180** 5.8339 | **147.970** 5.8256 | **146.960** 5.7858 | **146.160** 5.7545 |
| **160** | AN 32 | W 32 | 8 | **159.610** 6.2840 | **159.230** 6.2688 | **157.550** 6.2028 | **157.320** 6.1937 | **155.720** 6.1306 | **154.920** 6.0993 |
| **170** | AN 34 | W 34 | 8 | **169.140** 6.6590 | **168.750** 6.6438 | **167.080** 6.5778 | **166.850** 6.5687 | **165.240** 6.5056 | **164.450** 6.4743 |
| **180** | AN 36 | W 36 | 8 | **179.480** 7.0660 | **179.090** 7.0508 | **177.410** 6.9848 | **177.180** 6.9757 | **175.580** 6.9126 | **174.790** 6.8813 |
| **190** | AN 38 | W 38 | 8 | **189.790** 7.4720 | **189.400** 7.4568 | **187.730** 7.3908 | **187.500** 7.3817 | **185.890** 7.3186 | **185.100** 7.2873 |
| **200** | AN 40 | W 40 | 8 | **199.310** 7.8470 | **198.930** 7.8318 | **197.250** 7.7658 | **196.960** 7.7544 | **195.420** 7.6936 | **194.620** 7.6623 |
| **220** | N 044 | W 44 | 8 | **219.150** 8.6280 | **218.770** 8.6128 | **217.090** 8.5468 | **216.780** 8.5347 | **215.250** 8.4746 | **214.460** 8.4433 |

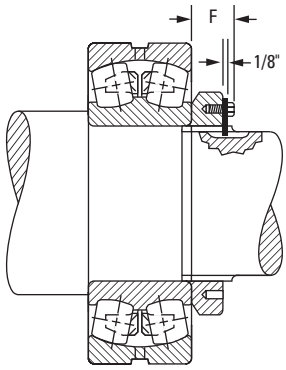



| Shaft | | | | | | Locknut | | Lockwasher | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S-3 | W(1) | L(1) | H(1) | S(1) | M(1) | $C_1$ | D | Q | R | B | V |
| **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in |
| **125.410**<br>4 15/16 | **4.0**<br>5/32 | **25.4**<br>1 | **4.8**<br>3/16 | **12.7**<br>1/2 | **7.9**<br>5/16 | **171.50**<br>6 3/4 | **22.50**<br>0.885 | **3.20**<br>0.125 | **132.70**<br>5.226 | **178.60**<br>7 1/32 | **11.10**<br>0.435 |
| **134.940**<br>5 5/16 | **4.0**<br>5/32 | **27**<br>1 1/16 | **4.8**<br>3/16 | **15.9**<br>5/8 | **7.9**<br>5/16 | **180.20**<br>7 3/32 | **24.10**<br>0.948 | **3.20**<br>0.125 | **142.70**<br>5.617 | **188.90**<br>7 7/16 | **15.00**<br>0.590 |
| **146.050**<br>5 3/4 | **4.0**<br>5/32 | **28.6**<br>1 1/8 | **5.6**<br>7/32 | **15.9**<br>5/8 | **9.5**<br>3/8 | **195.30**<br>7 11/16 | **24.90**<br>0.979 | **4.00**<br>0.156 | **152.90**<br>6.018 | **204.80**<br>8 1/16 | **15.00**<br>0.590 |
| **153.990**<br>6 1/16 | **6.4**<br>1/4 | **30.2**<br>1 3/16 | **6.0**<br>15/64 | **15.9**<br>5/8 | **9.5**<br>3/8 | **204.80**<br>8 1/16 | **26.40**<br>1.041 | **4.00**<br>0.156 | **163.20**<br>6.424 | **214.30**<br>8 7/16 | **15.00**<br>0.590 |
| **163.510**<br>6 7/16 | **6.4**<br>1/4 | **31**<br>1 7/32 | **6.0**<br>15/64 | **19.1**<br>3/4 | **9.5**<br>3/8 | **219.90**<br>8 21/32 | **27.30**<br>1.073 | **4.00**<br>0.156 | **172.70**<br>6.799 | **230.20**<br>9 1/16 | **18.20**<br>0.715 |
| **174.630**<br>6 7/8 | **6.4**<br>1/4 | **31.8**<br>1 1/4 | **6.0**<br>15/64 | **19.1**<br>3/4 | **9.5**<br>3/8 | **230.20**<br>9 1/16 | **28.00**<br>1.104 | **4.00**<br>0.156 | **183.00**<br>7.206 | **239.70**<br>9 7/16 | **18.20**<br>0.715 |
| **184.150**<br>7 1/4 | **6.4**<br>1/4 | **32.5**<br>1 9/32 | **6.0**<br>15/64 | **19.1**<br>3/4 | **9.5**<br>3/8 | **240.50**<br>9 15/32 | **28.80**<br>1.135 | **4.00**<br>0.156 | **193.30**<br>7.612 | **250.80**<br>9 7/8 | **18.20**<br>0.715 |
| **193.680**<br>7 5/8 | **6.4**<br>1/4 | **34.1**<br>1 11/32 | **6.0**<br>15/64 | **22.2**<br>7/8 | **9.5**<br>3/8 | **250.00**<br>9 27/32 | **30.40**<br>1.198 | **4.00**<br>0.156 | **203.60**<br>8.017 | **261.90**<br>10 5/16 | **21.30**<br>0.840 |
| **211.140**<br>8 5/16 | **6.4**<br>1/4 | **34.9**<br>1 3/8 | **9.5**<br>3/8 | **27.0**<br>1 1/16 | **9.5**<br>3/8 | **279.40**<br>11 | **31.80**<br>1.250 | **3.20**<br>0.125 | **221.10**<br>8.703 | **290.50**<br>11 7/16 | **23.90**<br>0.940 |

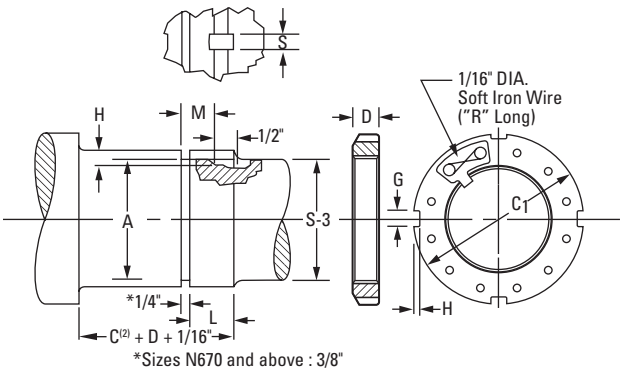
(1)For W, L, H, S and M, tolerance is -0 to +1/64 inch, -0 to +0.4 mm.

# *INCH ACCESSORIES – LOCKNUTS AND LOCKPLATES*

- The chart below shows dimensions for locknuts and lockplates used in the mounting of straight bore bearings on shafts.
- Other dimensions and tolerances related to shaft configurations are also shown.
- Dimensions are presented according to bearing bore size and are applicable to bearings in the various series (e.g., 222, 223, etc.).




| Bearing Bore | Locknut | Lockplate | Threads Per Inch | Threads | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Major Diameter | | Pitch Diameter | | Minor Dia. | Relief Dia. A |
| | | | | Max. | Min. | Max. | Min. | | |
| **mm** | | | | **mm** in | **mm** in | **mm** in | **mm** in | **mm** in | **mm** in |
| **240** | N 048 | P 48 | 6 | **239.83** 9.442 | **239.31** 9.4218 | **237.08** 9.3337 | **236.76** 9.3213 | **234.63** 9.2374 | **233.44** 9.1905 |
| **260** | N 052 | P 52 | 6 | **258.88** 10.192 | **258.36** 10.1718 | **256.13** 10.0837 | **255.8** 10.0707 | **253.68** 9.9874 | **252.49** 9.9405 |
| **280** | N 056 | P 56 | 6 | **279.50** 11.004 | **278.99** 10.9838 | **276.75** 10.8957 | **276.42** 10.8827 | **274.31** 10.7994 | **273.11** 10.7525 |
| **300** | N 060 | P 60 | 6 | **299.34** 11.785 | **298.83** 11.7648 | **296.59** 11.6767 | **296.26** 11.6637 | **294.14** 11.5804 | **292.95** 11.5335 |
| **320** | N 064 | P 64 | 6 | **319.08** 12.562 | **318.56** 12.5418 | **316.32** 12.4537 | **315.98** 12.4402 | **313.88** 12.3574 | **312.69** 12.3105 |
| **340** | N 068 | P 68 | 5 | **337.90** 13.303 | **337.49** 13.287 | **335.36** 13.203 | **334.95** 13.187 | **332.31** 13.083 | **331.11** 13.036 |
| **360** | N 072 | P 72 | 5 | **359.00** 14.134 | **358.60** 14.118 | **356.46** 14.034 | **356.06** 14.018 | **353.42** 13.914 | **352.22** 13.867 |
| **380** | N 076 | P 76 | 5 | **378.99** 14.921 | **378.59** 14.905 | **376.45** 14.821 | **376.05** 14.805 | **373.41** 14.701 | **372.21** 14.654 |
| **400** | N 080 | P 80 | 5 | **399.01** 15.709 | **398.60** 15.693 | **396.47** 15.609 | **396.06** 15.593 | **393.42** 15.489 | **392.23** 15.442 |
| **420** | N 084 | P 84 | 5 | **419.00** 16.496 | **418.59** 16.480 | **416.46** 16.396 | **416.05** 16.380 | **413.41** 16.276 | **412.22** 16.229 |
| **440** | N 088 | P 88 | 5 | **438.99** 17.283 | **438.58** 17.267 | **436.45** 17.183 | **436.05** 17.167 | **433.40** 17.063 | **432.21** 17.016 |
| **460** | N 092 | P 92 | 5 | **459.00** 18.071 | **458.60** 18.055 | **456.46** 17.971 | **456.06** 17.955 | **453.42** 17.851 | **452.22** 17.804 |
| **480** | N 096 | P 96 | 5 | **478.99** 18.858 | **478.59** 18.842 | **476.45** 18.758 | **476.05** 18.742 | **473.41** 18.638 | **472.21** 18.591 |




*Sizes N670 and above : 3/8"

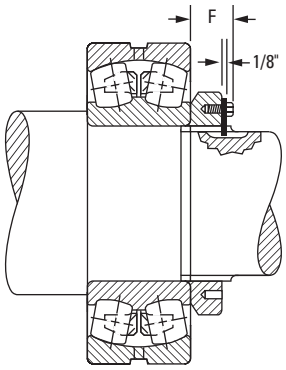
| Shaft | | | | | Locknut/Lockplate | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S-3 | L(1) | H(1) | S(1) | M(1) | $C_1$ | D | G | H ±0.25 mm ±0.010 in. | R | F |
| mm<br>in | mm<br>in | mm<br>in | mm<br>in | mm<br>in | mm<br>in | mm<br>in | mm<br>in | mm<br>in | mm<br>in | mm<br>in |
| **233.36**<br>9 3/16 | **42.86**<br>1 11/16 | **11.1**<br>7/16 | **28.6**<br>1 1/8 | **34.9**<br>1 3/8 | **290.5**<br>11 7/16 | **34.1**<br>1 11/32 | **22.48**<br>0.885 | **9.5**<br>3/8 | **203.2**<br>8 | **43.26**<br>1 45/64 |
| **252.41**<br>9 15/16 | **45.24**<br>1 25/32 | **11.1**<br>7/16 | **30.2**<br>1 3/16 | **37.3**<br>1 15/32 | **309.6**<br>12 3/16 | **35.7**<br>1 13/32 | **22.48**<br>0.885 | **9.5**<br>3/8 | **228.6**<br>9 | **44.85**<br>1 49/64 |
| **273.05**<br>10 3/4 | **47.63**<br>1 7/8 | **11.1**<br>7/16 | **31.8**<br>1 1/4 | **39.7**<br>1 9/16 | **330.2**<br>13 | **38.1**<br>1 1/2 | **25.65**<br>1.010 | **9.5**<br>3/8 | **228.6**<br>9 | **47.23**<br>1 55/64 |
| **292.1**<br>11 1/2 | **49.21**<br>1 15/16 | **11.1**<br>7/16 | **34.9**<br>1 3/8 | **41.3**<br>1 5/8 | **360.4**<br>14 3/16 | **39.7**<br>1 9/16 | **25.65**<br>1.010 | **12.7**<br>1/2 | **254.0**<br>10 | **50.01**<br>1 31/32 |
| **312.74**<br>12 5/16 | **51.59**<br>2 1/32 | **11.1**<br>7/16 | **36.5**<br>1 7/16 | **43.7**<br>1 23/32 | **381.0**<br>15 | **42.1**<br>1 21/32 | **25.65**<br>1.010 | **12.7**<br>1/2 | **254.0**<br>10 | **52.39**<br>2 1/16 |
| **331.79**<br>13 1/16 | **56.36**<br>2 7/32 | **11.1**<br>7/16 | **38.1**<br>1 1/2 | **48.4**<br>1 29/32 | **400.1**<br>15 3/4 | **45.2**<br>1 25/32 | **25.65**<br>1.010 | **12.7**<br>1/2 | **279.4**<br>11 | **55.56**<br>2 3/16 |
| **350.84**<br>13 13/16 | **56.36**<br>2 7/32 | **12.7**<br>1/2 | **38.1**<br>1 1/2 | **48.4**<br>1 29/32 | **419.1**<br>16 1/2 | **45.2**<br>1 25/32 | **32.00**<br>1.260 | **12.7**<br>1/2 | **279.4**<br>11 | **55.56**<br>2 3/16 |
| **371.48**<br>14 5/8 | **59.53**<br>2 11/32 | **12.7**<br>1/2 | **38.1**<br>1 1/2 | **51.59**<br>2 1/32 | **450.9**<br>17 3/4 | **48.4**<br>1 29/32 | **32.00**<br>1.260 | **15.1**<br>19/32 | **304.8**<br>12 | **61.12**<br>2 13/32 |
| **390.53**<br>15 3/8 | **63.50**<br>2 1/2 | **12.7**<br>1/2 | **41.3**<br>1 5/8 | **55.6**<br>2 3/16 | **469.9**<br>18 1/2 | **52.4**<br>2 1/16 | **32.00**<br>1.260 | **15.1**<br>19/32 | **330.2**<br>13 | **65.09**<br>2 9/16 |
| **411.16**<br>16 3/16 | **63.50**<br>2 1/2 | **12.7**<br>1/2 | **41.3**<br>1 5/8 | **55.6**<br>2 3/16 | **490.5**<br>19 5/16 | **52.4**<br>2 1/16 | **35.18**<br>1.385 | **15.1**<br>19/32 | **330.2**<br>13 | **65.09**<br>2 9/16 |
| **431.80**<br>17 | **71.44**<br>2 13/16 | **12.7**<br>1/2 | **46.0**<br>1 13/16 | **63.50**<br>2 1/2 | **520.7**<br>20 1/2 | **60.3**<br>2 3/8 | **35.18**<br>1.385 | **15.1**<br>19/32 | **355.6**<br>14 | **75.41**<br>2 31/32 |
| **450.85**<br>17 3/4 | **71.44**<br>2 13/16 | **12.7**<br>1/2 | **46.0**<br>1 13/16 | **63.50**<br>2 1/2 | **539.8**<br>21 1/4 | **60.3**<br>2 3/8 | **35.18**<br>1.385 | **15.1**<br>19/32 | **406.4**<br>16 | **75.41**<br>2 31/32 |
| **469.9**<br>18 1/2 | **71.44**<br>2 13/16 | **12.7**<br>1/2 | **46.0**<br>1 13/16 | **63.50**<br>2 1/2 | **560.4**<br>22 1/16 | **60.3**<br>2 3/8 | **38.35**<br>1.510 | **15.1**<br>19/32 | **406.4**<br>16 | **75.41**<br>2 31/32 |

(1) For L, H, S and M, tolerance is -0 to +1/64 inch, -0 to + 0.4 mm.
(2) C is outer-ring width that may be obtained from bearing dimension tables.

*Continued on next page.*

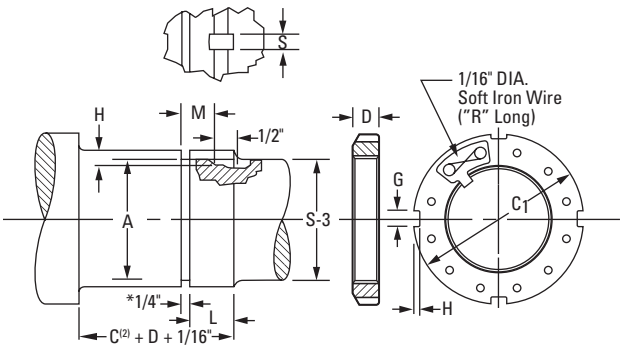
# *INCH ACCESSORIES – LOCKNUTS AND LOCKPLATES – continued*

- The chart below shows dimensions for locknuts and lockplates used in the mounting of straight bore bearings on shafts.
- Other dimensions and tolerances related to shaft configurations are also shown.
- Dimensions are presented according to bearing bore size and are applicable to bearings in the various series (e.g., 222, 223, etc.).




*Continued from previous page.*

| Bearing Bore | Locknut | Lockplate | Threads Per Inch | Threads | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Major Diameter | | Pitch Diameter | | Minor Dia. | Relief Dia. A |
| | | | | Max. | Min. | Max. | Min. | | |
| **mm** | | | | **mm** in | **mm** in | **mm** in | **mm** in | **mm** in | **mm** in |
| **500** | N 500 | P 500 | 5 | **499.01** 19.646 | **498.60** 19.630 | **496.47** 19.546 | **496.06** 19.530 | **493.42** 19.426 | **492.23** 19.379 |
| **530** | N 530 | P 530 | 4 | **529.01** 20.827 | **528.50** 20.807 | **525.83** 20.702 | **525.32** 20.682 | **522.15** 20.557 | **520.55** 20.494 |
| **560** | N 560 | P 560 | 4 | **559.00** 22.008 | **558.50** 21.988 | **555.83** 21.883 | **555.32** 21.863 | **552.15** 21.738 | **550.55** 21.675 |
| **600** | N 600 | P 600 | 4 | **599.01** 23.583 | **598.50** 23.563 | **595.83** 23.458 | **595.33** 23.438 | **592.15** 23.313 | **590.55** 23.250 |
| **630** | N 630 | P 630 | 4 | **629.01** 24.764 | **628.50** 24.744 | **625.83** 24.639 | **625.32** 24.619 | **622.15** 24.494 | **520.55** 24.431 |
| **670** | N 670 | P 670 | 4 | **669.01** 26.339 | **668.50** 26.319 | **665.84** 26.214 | **665.33** 26.194 | **662.15** 26.069 | **660.55** 26.006 |
| **710** | N 710 | P 710 | 3 | **709.02** 27.914 | **708.33** 27.887 | **704.77** 27.747 | **704.09** 27.720 | **700.02** 27.56 | **698.42** 27.497 |
| **750** | N 750 | P 750 | 3 | **749.02** 29.489 | **748.34** 29.462 | **744.78** 29.322 | **744.09** 29.295 | **740.03** 29.135 | **738.43** 29.072 |
| **800** | N 800 | P 800 | 3 | **799.01** 31.457 | **798.32** 31.430 | **794.77** 31.290 | **794.08** 31.263 | **790.02** 31.103 | **788.42** 31.040 |
| **850** | N 850 | P 850 | 3 | **849.02** 33.426 | **848.34** 33.399 | **844.78** 33.259 | **844.09** 33.232 | **840.03** 33.072 | **838.43** 33.009 |
| **900** | N 900 | P 900 | 3 | **899.01** 35.394 | **898.32** 35.367 | **894.77** 35.227 | **894.08** 35.200 | **890.02** 35.040 | **888.42** 34.977 |
| **950** | N 950 | P 950 | 3 | **949.02** 37.363 | **948.33** 37.336 | **944.78** 37.196 | **944.09** 37.169 | **940.03** 37.009 | **938.43** 36.946 |

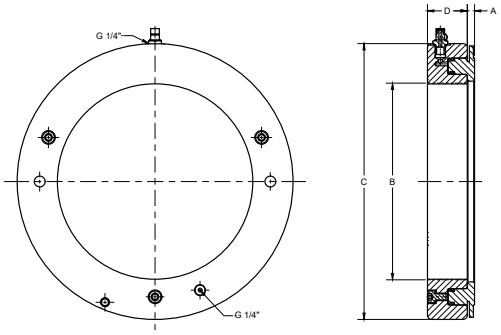


*Sizes N670 and above : 3/8"

| Shaft | | | | | Locknut/Lockplate | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S-3 | L(1) | H(1) | S(1) | M(1) | $C_1$ | D | G | H ±0.25 mm ±0.010 in. | R | F |
| **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in | **mm**<br>in |
| **489.0**<br>19 1/4 | **79.4**<br>3 1/8 | **12.7**<br>1/2 | **46.0**<br>1 13/16 | **71.4**<br>2 13/16 | **579.4**<br>22 13/16 | **68.3**<br>2 11/16 | **38.35**<br>1.510 | **15.1**<br>19/32 | **406.4**<br>16 | **83.3**<br>3 9/32 |
| **517.5**<br>20 3/8 | **79.4**<br>3 1/8 | **12.7**<br>1/2 | **46.0**<br>1 13/16 | **71.4**<br>2 13/16 | **630.2**<br>24 13/16 | **68.3**<br>2 11/16 | **41.53**<br>1.635 | **20.6**<br>13/16 | **425.5**<br>16 3/4 | **83.3**<br>3 9/32 |
| **549.3**<br>21 5/8 | **85.7**<br>3 3/8 | **12.7**<br>1/2 | **46.0**<br>1 13/16 | **77.8**<br>3 1/16 | **649.3**<br>25 9/16 | **74.6**<br>2 15/16 | **41.53**<br>1.635 | **20.6**<br>13/16 | **476.3**<br>18 3/4 | **89.7**<br>3 17/32 |
| **587.4**<br>23 1/8 | **85.7**<br>3 3/8 | **12.7**<br>1/2 | **46.0**<br>1 13/16 | **77.8**<br>3 1/16 | **700.1**<br>27 9/16 | **74.6**<br>2 15/16 | **41.53**<br>1.635 | **20.6**<br>13/16 | **508.0**<br>20 | **89.7**<br>3 17/32 |
| **619.1**<br>24 3/8 | **85.7**<br>3 3/8 | **12.7**<br>1/2 | **50.8**<br>2 | **77.8**<br>3 1/16 | **730.3**<br>28 3/4 | **74.6**<br>2 15/16 | **47.88**<br>1.885 | **20.6**<br>13/16 | **520.7**<br>20 1/2 | **92.1**<br>3 5/8 |
| **657.2**<br>25 7/8 | **90.5**<br>3 9/16 | **12.7**<br>1/2 | **50.8**<br>2 | **82.6**<br>3 1/4 | **779.5**<br>30 11/16 | **79.4**<br>3 1/8 | **47.88**<br>1.885 | **20.6**<br>13/16 | **546.1**<br>21 1/2 | **96.8**<br>3 13/16 |
| **695.3**<br>27 3/8 | **101.6**<br>4 | **15.9**<br>5/8 | **50.8**<br>2 | **93.7**<br>3 11/16 | **830.3**<br>32 11/16 | **90.5**<br>3 9/16 | **51.30**<br>2.020 | **25.4**<br>1 | **571.5**<br>22 1/2 | **108.0**<br>4 1/4 |
| **736.6**<br>29 | **101.6**<br>4 | **15.9**<br>5/8 | **50.8**<br>2 | **93.7**<br>3 11/16 | **870.0**<br>34 1/4 | **90.5**<br>3 9/16 | **57.66**<br>2.270 | **25.4**<br>1 | **584.2**<br>23 | **108.0**<br>4 1/4 |
| **787.4**<br>31 | **101.6**<br>4 | **15.9**<br>5/8 | **50.8**<br>2 | **93.7**<br>3 11/16 | **920.8**<br>36 1/4 | **90.5**<br>3 9/16 | **57.66**<br>2.270 | **25.4**<br>1 | **616.0**<br>24 1/4 | **108.0**<br>4 1/4 |
| **835.0**<br>32 7/8 | **101.6**<br>4 | **15.9**<br>5/8 | **50.8**<br>2 | **93.7**<br>3 11/16 | **979.5**<br>38 9/16 | **90.5**<br>3 9/16 | **64.01**<br>2.520 | **25.4**<br>1 | **647.7**<br>25 1/2 | **108.0**<br>4 1/4 |
| **885.8**<br>34 7/8 | **111.1**<br>4 3/8 | **15.9**<br>5/8 | **50.8**<br>2 | **103.2**<br>4 1/16 | **1030.3**<br>40 9/16 | **100.0**<br>3 15/16 | **64.01**<br>2.520 | **25.4**<br>1 | **666.8**<br>26 1/4 | **117.5**<br>4 5/8 |
| **933.5**<br>36 3/4 | **114.3**<br>4 1/2 | **19.1**<br>3/4 | **50.8**<br>2 | **108**<br>4 1/4 | **1092.2**<br>43 | **100.0**<br>3 15/16 | **64.01**<br>2.520 | **25.4**<br>1 | **692.2**<br>27 1/4 | **117.5**<br>4 5/8 |

(1)For L, H, S and M, tolerance is -0 to +1/64 inch, -0 to + 0.4 mm.
(2)C is outer-ring width that may be obtained from bearing dimension tables.

# INCH HMVC HYDRAULIC NUTS




| Part Number | Major Dia. B | Threads No. Per Inch | Dimensions | | | Piston Length of Travel | Piston Area | Assembly Weight |
|---|---|---|---|---|---|---|---|---|
| | | | C | D | A | | | |
| | | | in. | in. | in. | in. | in.$^2$ | lbs. |
| HMVC-10 | 1.967 | 18 | 4.488 | 1.496 | 0.157 | 0.197 | 4.5 | 5.5 |
| HMVC-12 | 2.360 | 18 | 4.921 | 1.496 | 0.197 | 0.197 | 5.0 | 6.2 |
| HMVC-13 | 2.548 | 18 | 5.315 | 1.496 | 0.197 | 0.197 | 5.4 | 6.6 |
| HMVC-14 | 2.751 | 18 | 5.512 | 1.496 | 0.197 | 0.197 | 6.0 | 7.3 |
| HMVC-15 | 2.933 | 12 | 5.709 | 1.496 | 0.197 | 0.197 | 6.3 | 7.7 |
| HMVC-16 | 3.137 | 12 | 5.906 | 1.496 | 0.197 | 0.197 | 6.5 | 8.4 |
| HMVC-17 | 3.340 | 12 | 6.102 | 1.496 | 0.197 | 0.197 | 6.8 | 8.6 |
| HMVC-18 | 3.527 | 12 | 6.299 | 1.496 | 0.197 | 0.197 | 7.4 | 9.0 |
| HMVC-19 | 3.730 | 12 | 6.496 | 1.496 | 0.197 | 0.197 | 7.7 | 9.7 |
| HMVC-20 | 3.918 | 12 | 6.693 | 1.496 | 0.236 | 0.197 | 8.1 | 10.0 |
| HMVC-22 | 4.325 | 12 | 7.087 | 1.496 | 0.236 | 0.197 | 8.8 | 12.5 |
| HMVC-24 | 4.716 | 12 | 7.480 | 1.496 | 0.236 | 0.197 | 9.5 | 11.7 |
| HMVC-26 | 5.106 | 12 | 7.874 | 1.496 | 0.236 | 0.197 | 10.1 | 12.5 |
| HMVC-28 | 5.497 | 12 | 8.268 | 1.496 | 0.276 | 0.197 | 10.7 | 13.4 |
| HMVC-30 | 5.888 | 12 | 8.661 | 1.535 | 0.276 | 0.197 | 11.6 | 14.5 |
| HMVC-32 | 6.284 | 8 | 9.252 | 1.575 | 0.276 | 0.236 | 13.3 | 17.0 |
| HMVC-34 | 6.659 | 8 | 9.645 | 1.614 | 0.276 | 0.236 | 14.7 | 18.5 |
| HMVC-36 | 7.066 | 8 | 10.039 | 1.615 | 0.276 | 0.236 | 16.0 | 20.0 |
| HMVC-38 | 7.472 | 8 | 10.630 | 1.653 | 0.315 | 0.276 | 17.8 | 23.1 |
| HMVC-40 | 7.847 | 8 | 11.024 | 1.693 | 0.315 | 0.276 | 19.4 | 25.1 |
| HMVC-44 | 8.628 | 8 | 12.008 | 1.732 | 0.315 | 0.354 | 22.3 | 29.5 |
| HMVC-48 | 9.442 | 6 | 12.992 | 1.811 | 0.354 | 0.394 | 25.6 | 35.9 |
| HMVC-52 | 10.192 | 6 | 13.976 | 1.850 | 0.354 | 0.433 | 29.1 | 41.8 |
| HMVC-56 | 11.004 | 6 | 14.961 | 1.929 | 0.354 | 0.472 | 32.7 | 48.4 |
| HMVC-60 | 11.785 | 6 | 15.945 | 2.008 | 0.394 | 0.551 | 36.6 | 56.3 |
| HMVC-64 | 12.562 | 6 | 16.929 | 2.087 | 0.394 | 0.551 | 40.8 | 65.1 |
| HMVC-68 | 13.334 | 5 | 17.717 | 2.087 | 0.394 | 0.551 | 44.0 | 71.5 |
| HMVC-72 | 14.170 | 5 | 18.701 | 2.205 | 0.394 | 0.590 | 48.5 | 81.4 |
| HMVC-76 | 14.957 | 5 | 19.685 | 2.283 | 0.433 | 0.630 | 52.1 | 90.2 |
| HMVC-80 | 15.745 | 5 | 20.669 | 2.362 | 0.433 | 0.669 | 56.9 | 101.2 |
| HMVC-84 | 16.532 | 5 | 21.457 | 2.401 | 0.433 | 0.669 | 62.0 | 110.9 |
| HMVC-88 | 17.319 | 5 | 22.244 | 2.441 | 0.472 | 0.669 | 65.9 | 121.0 |
| HMVC-92 | 18.107 | 5 | 23.228 | 2.520 | 0.472 | 0.669 | 69.8 | 134.2 |
| HMVC-96 | 18.894 | 5 | 24.094 | 2.559 | 0.472 | 0.748 | 75.2 | 143.0 |
| HMVC-100 | 19.682 | 5 | 25.000 | 2.598 | 0.472 | 0.748 | 80.6 | 157.3 |
| HMVC-106 | 20.867 | 4 | 26.378 | 2.716 | 0.512 | 0.827 | 87.1 | 176.0 |
| HMVC-112 | 22.048 | 4 | 27.756 | 2.795 | 0.512 | 0.866 | 94.9 | 198.0 |
| HMVC-120 | 23.623 | 4 | 29.528 | 2.874 | 0.512 | 0.905 | 104.5 | 220.0 |
| HMVC-126 | 24.804 | 4 | 30.709 | 2.913 | 0.551 | 0.905 | 113.0 | 242.0 |
| HMVC-134 | 26.379 | 4 | 32.480 | 2.992 | 0.551 | 0.945 | 123.2 | 270.6 |
| HMVC-142 | 27.961 | 3 | 34.252 | 3.071 | 0.590 | 0.984 | 135.9 | 301.4 |
| HMVC-150 | 29.536 | 3 | 36.024 | 3.110 | 0.590 | 0.984 | 150.4 | 330.0 |
| HMVC-160 | 31.504 | 3 | 38.189 | 3.150 | 0.630 | 0.984 | 161.2 | 380.6 |
| HMVC-170 | 33.473 | 3 | 40.157 | 3.268 | 0.630 | 1.024 | 177.6 | 418.0 |
| HMVC-180 | 35.441 | 3 | 42.126 | 3.386 | 0.669 | 1.181 | 192.2 | 462.0 |
| HMVC-190 | 37.410 | 3 | 44.291 | 3.386 | 0.669 | 1.181 | 210.2 | 523.6 |

HMVC-10 through HMVC-64 have American National Threads Class 3.

03-26 Order No. 10446 | Timken® is a registered trademark of The Timken Company. | © 2026 The Timken Company

To view more Timken catalogs, go to www.timken.com/catalogs for interactive versions, or to download a catalog app for your smart phone or mobile device scan the QR code or go to timkencatalogs.squawqr.com.

TIMKEN

The Timken team applies their know-how to improve the reliability and performance of machinery in diverse markets worldwide. The company designs, makes and markets bearings, gear drives, automated lubrication systems, belts, brakes, clutches, chain, couplings, linear motion products and related industrial motion rebuild and repair services.

**Price: USD $75**

**www.timken.com**

محرک چرخش

## تأمین‌کننده تخصصی بلبرینگ و رولبرینگ

BEARINGS · SEALS · BELTS · POWER TRANSMISSION

بلبرینگ | رولبرینگ | کاسه نمد | تسمه | اورینگ | یاتاقان | پکینگ | گریس


| | |
|---|---|
| وب‌سایت | moharekcharkhesh.com |
| تلفن | 021 3399 8121 · 021 3399 8100 |
| همراه | 0912 464 6470 |
| ایمیل | MoharekCharkhesh@proton.me |
| آدرس | تهران، خیابان امیرکبیر، کوچه ناظم‌الاطبا شمالی، پاساژ تهران، طبقه سوم، پلاک ۱۴۲ |
| ساعت کاری | شنبه تا پنج‌شنبه، ۹:۰۰ تا ۱۸:۰۰ |


SCAN TO VISIT

تماس با کارشناس فروش

مشاهده محصولات در سایت

برای استعلام قیمت، اعلام موجودی و ثبت سفارش تکی و عمده بلبرینگ TIMKEN با کارشناسان محرک چرخش تماس بگیرید.


تمامی حقوق کاتالوگ متعلق به سازنده TIMKEN است

© Moharek Charkhesh — TIMKEN catalogue, distributed for reference