# 1. UNDERSTANDING TAPERED ROLLER BEARINGS

# A. Basic tapered roller bearing design

Because of their geometry and design features, Timken tapered roller bearings provide several important and unique performance characteristics to meet a wide range of application requirements.

Tapered roller bearings consist of four basic components. These are the cone, the cup, tapered rollers and a cage (roller retainer) (fig. 1-1). Under normal operating conditions, the cone, cup and rollers carry the load while the cage separates the rollers. The cone, rollers and cage are referred to as the "cone assembly" and this is usually separable from the cup, facilitating equipment assembly.

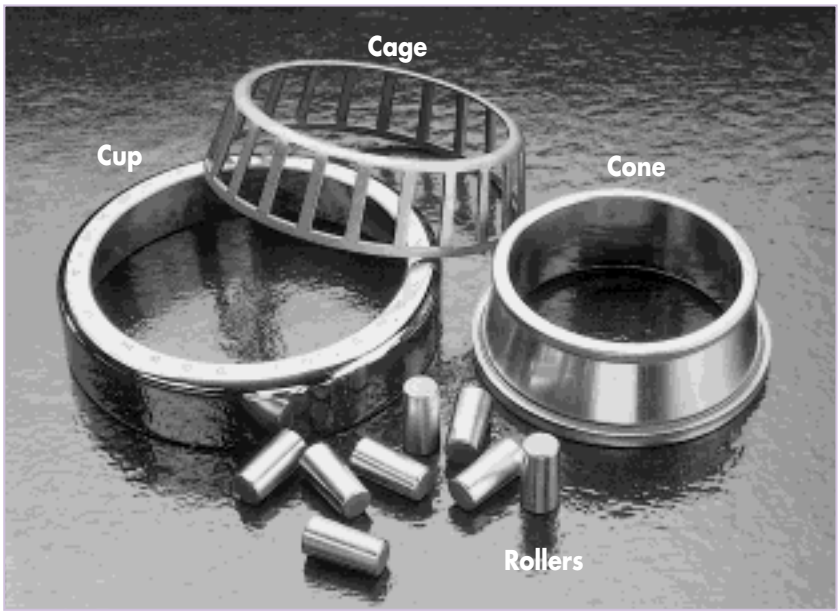



*Fig. 1-1*
*Components of a single-row tapered roller bearing (type TS).*

## True rolling motion

The extensions of the raceways and rollers of a tapered roller bearing are designed to converge at a common point on the axis of rotation called the apex (fig. 1-2). This results in true rolling motion of the rollers on the raceways, at every point along the roller body.

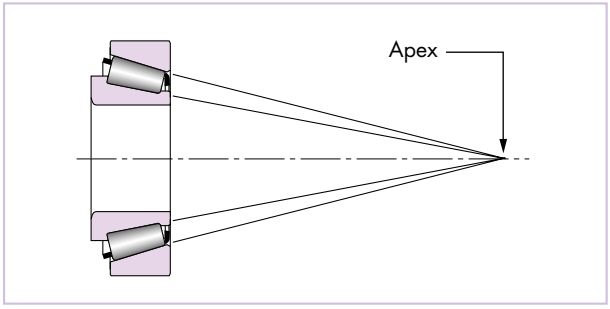



*Fig. 1-2*
*On-apex design results in true rolling motion at all points long the roller body.*

## Combined radial and thrust load capability

The angled raceways allow the tapered roller bearing to carry combinations of radial and thrust loads. The greater the angle between the cup and bearing centerline, the greater the ratio of thrust to radial load capacity (fig. 1-3). Long line roller/race contact gives the tapered roller bearing a high load carrying capacity. This and the capability to carry radial loads, thrust loads, or any combination of the two, makes tapered roller bearings the ideal choice for most applications.

For a given bore, it is possible to select a light or heavy section to meet application load/duty requirements (fig. 1-4).

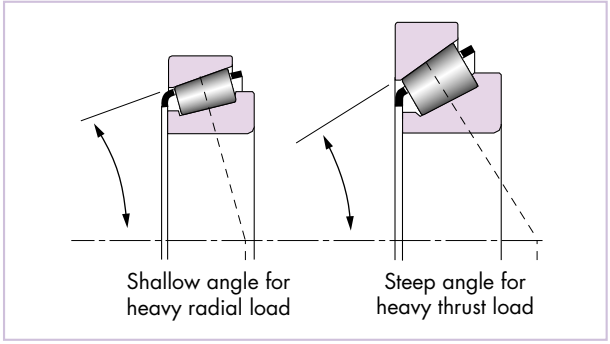



*Fig. 1-3*
*Designs to support radial and thrust loads in any combination.*

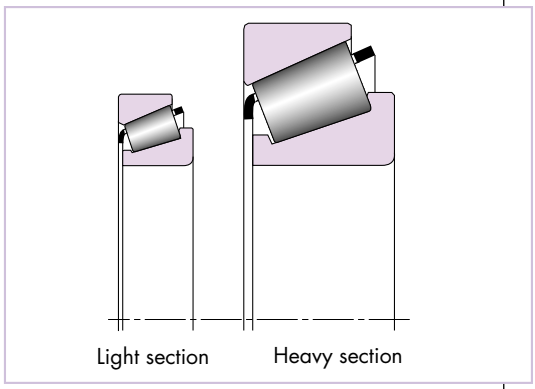



*Fig. 1-4*
*Designs to suit the space available.*

## Positive roller alignment

Positive roller alignment is one of the major features of tapered roller bearings. The tapered configuration of the roller not only ensures true rolling motion with long line load-bearing contact, but also generates a "seating force" that pushes the roller against the large rib of the cone. This seating force is a function of the different angles of the cups and cones (see vector diagram fig. 1-5). It prevents the rollers from skewing off apex, thereby always keeping them positively aligned and located against the cone large rib.

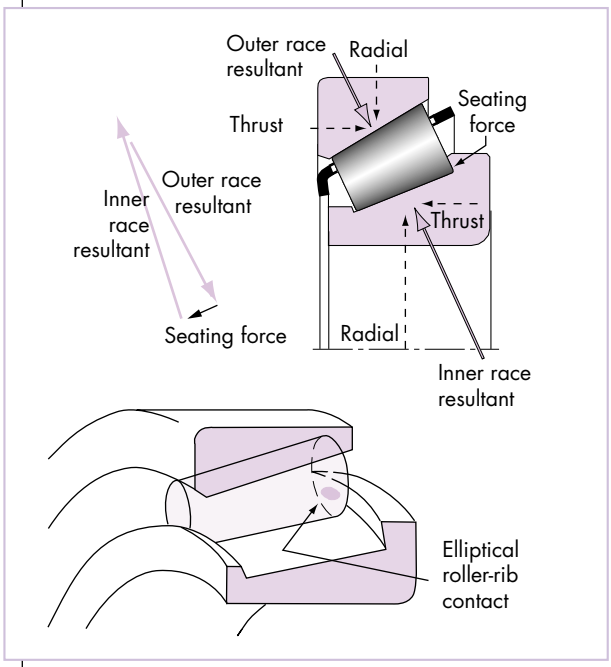



*Fig. 1-5*
*Small seating force against the cone rib keeps rollers aligned on the raceway.*

Timken tapered roller bearings have a spherical surface ground on the large ends of the rollers. The radius of this surface is slightly less than the apex length (distance from the roller large end to the apex). The roller large end makes point contact with the cone large rib when under light load. Under heavier load, this contact area becomes elliptical. The roller rib interface geometry promotes hydrodynamic lubrication in the contact area.

The seating force of the roller against the rib is normally small and therefore contact stresses are relatively low. This is true whether pure radial load or pure thrust load is involved.

## Contact geometry

Standard tapered roller bearings have components with specific profiles that result in uniform stress distribution under normal loading conditions along the effective roller contact length (fig. 1-6). For extremely heavy loads or significant misalignment, or both, modified profiles can be provided to minimize geometric stress concentration at the ends of roller contact.

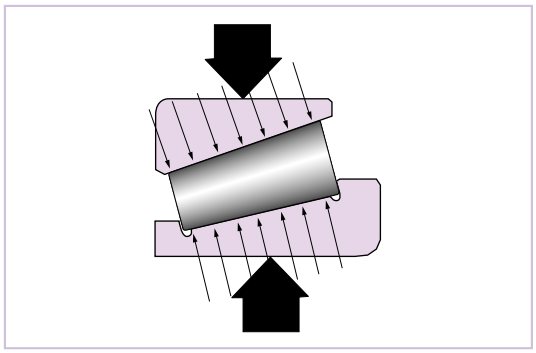


*Fig. 1-6*
*Internal roller profiling of components result in uniform stress distribution under normal loading conditions.*

## Bearing material

Bearing reliability begins with the material from which the product is made. The material selection can have a dramatic impact on a bearing's ability to meet the application requirements. Additionally, the heat-treatment process that accompanies material selection largely dictates durability by its impact on several bearing characteristics, including hardness profile, bearing microstructure, final raceway surface finish and residual stress.

Traditionally, Timken bearings have been produced from low-carbon, carburizing grades of steel. The introduction of carbon during manufacture, and the high alloys in the steel, assures the proper combination of a hard, fatigue-resistant case and a tough, ductile core (fig. 1-7). Benefits of case-hardened bearings include:

- Residual compressive stresses in the surface that retard propagation of fatigue cracks.
- An enhanced ability to endure heavy shock loads as a result of the tough, ductile core.
- Improved debris resistance due to the metallurgical characteristics of the surface.


*Fig. 1-7*
*Hardened case of bearing components provides fatigue resistance and the ductile core provides toughness.*

Through-hardened bearings are typically manufactured from high carbon steel grades. Steel with this high carbon content requires no additional carbon to be added during the heat-treatment process to achieve the appropriate hardness for bearing applications. Although the uniform hardness found in through-hardened product can result in rapid crack propagation and lower fatigue life, the likelihood of a bearing with sufficiently clean material developing a premature crack and propagating may be low when the application has moderate loading with no impact loads.

It is widely accepted that case-hardened bearings outperform through-hardened bearings in adverse environmental conditions such as high loading, high temperature, thin lubricant film, heavy press fits and shock loading. Through-hardened product also requires better raceway surface finishes to achieve the equivalent lubricating benefits of case-hardened bearings. However, there are applications where through-hardened products adequately meet performance requirements. Timken offers both case-hardened and through-hardened bearings to encourage the selection of the most cost-effective performance option based on the application's needs.
Bearing performance and life have been extensively studied at The Timken Company (as well as in field conditions) to determine the best steel composition and heat-treatment combinations. Bearings for normal service conditions are applicable when:

- Maximum temperatures do not exceed 150°C (300°F).
- Minimum ambient temperatures are not below –50°C (–65°F).
- The maximum Hertzian contact stresses do not exceed 4,000 MPa (580,000 PSI).
- Normal sustained operating temperature should not exceed 121°C (250°F).

Premium steels are available for applications requiring extended life and reliability where inclusion origin fatigue is anticipated. Specialty steels for high-temperature applications are also available. Contact your Timken sales engineer or representative to specify the right material for an application's requirements.

## Cage material and design

The cage of a tapered roller bearing does not carry load and serves only to retain and space the rollers around the race. Therefore, the cages on most Timken bearings are made from a low-carbon, mild steel stamping.

## Pin-type cages

The pin-type cage (fig. 1-8) consists of two rings, one at each end of the rollers. Cage pins pass through holes in the center of each roller and are threaded into one cage ring and welded into the other. When designed with a pin-type cage, medium and large bore TS bearings can have more rollers and therefore an increased load-carrying capacity.


*Fig. 1-8*
*Pin-type cage for large bearings.*

## Polymer cages

Some bearings designed for specific field applications, such as the UNIPAC™ bearing (page 9), have polymer cages. Other specialized bearings, such as crossed roller bearings (page 10), use polymer separators between the rollers instead of a one-piece cage.

## Non ferrous machined cages

Some thrust bearings are supplied with nonferrous machined cages.

## Special reinforced and guided cages

For specific applications subject to high loads combined with high speeds, heavy shock loading, vibrations (torsional, lateral, etc.) and/or high accelerations and decelerations, bearings with special reinforced and guided cages must be selected.
These specific "L Riding" cages are produced with heavier material thickness, larger bridge sections (fewer rollers are therefore present when compared to the standard bearing design) and their design allows the cage to be guided onto the cone small rib O.D. (fig. 1-9).
A full range of these products in type TS is currently available. For more information, consult a Timken Company sales engineer or representative.

When necessary, alternative cage material can be provided for most bearings.

For maximum load carrying capacity a bearing can be designed having a 'full complement' of rollers (i.e. with no cage), but these are limited to applications operating at relatively low speeds.

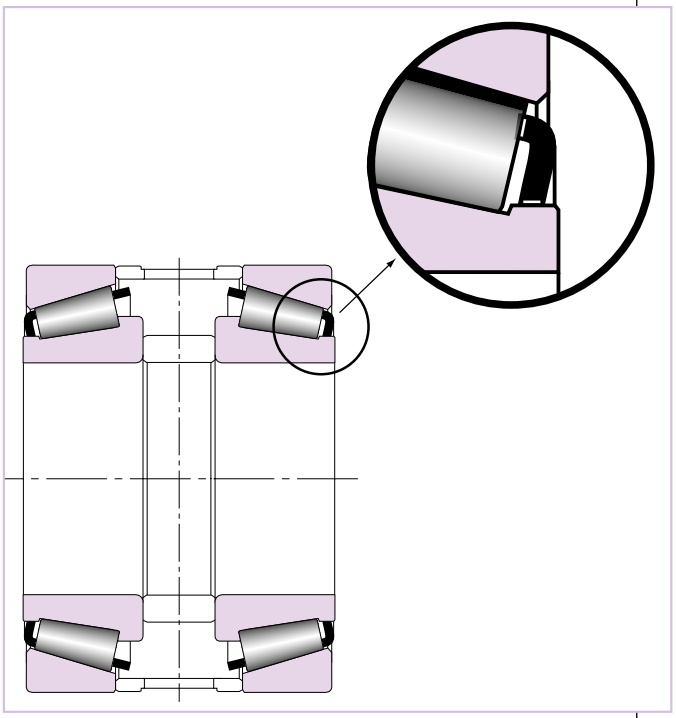
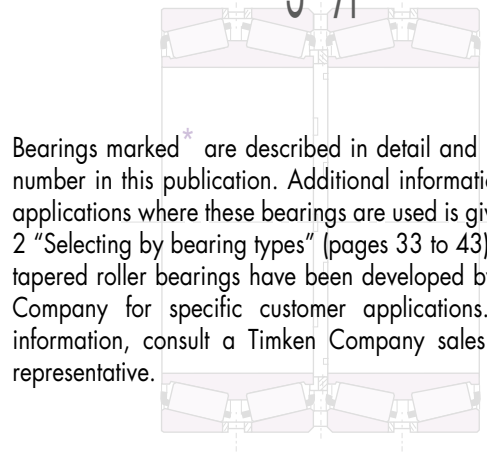


*Fig. 1-9*
*Bearing equipped with 'L Riding' cage.*

TM = Trademark of The Timken Company

# B. Timken bearing types

Bearings marked * are described in detail and listed by part number in this publication. Additional information on typical applications where these bearings are used is given in section 2 "Selecting by bearing types" (pages 33 to 43). Many other tapered roller bearings have been developed by The Timken Company for specific customer applications. For further information, consult a Timken Company sales engineer or representative.





## 1. Popular bearing types

1.1. Single-row bearings
- TS *
- TSF *

1.2. Two-row bearings
- TDO * / DC / CD
- TDI / TDIT *
- TNA / TNASW / TNASWE *

1.3. Spacer assemblies
- SS *
- SR *
- 2TS-IM
- 2TS-DM
- 2TS-TM

1.4. Package bearings
- Pinion-Pac™
- Unipac™
- Unipac-Plus™
- "AP"™ *
- "SP"™

1.5. Thrust bearings
- TTC *
- TTSP *
- TTHD *

## 2. Sealed bearings

- TSL *

## 3. Precision bearings

- 3.1. Single-row bearings TS and TSF *
- 3.2. Hydra-Rib™ bearings TSHR *
- 3.3. High speed bearings TSMA
- 3.4. Crossed roller bearings TXR *

## 4. Other two-row bearings

- TDIE / TDIA
- TNASWH / TNASWHF

## 5. Four-row bearing assemblies

- TQO / TQOW
- TQITS / TQITSE
- Sealed Work Roll Bearings

## 6. Heavy duty thrust bearings

- TTHDSV / TTHDSX / TTHDFL

## 7. Other tapered roller bearing types

* Bearings listed in the Bearing Data Tables

TM = Trademark of The Timken Company

# 1. Popular bearing types

## 1.1. Single-row bearings

### TS - single row*

TS

This is the basic and the most widely used type of tapered roller bearing. It consists of the cone assembly and the cup. It is usually fitted as one of an opposing pair (see choice of mounting configuration (fig. 3-9) on page 52).

During equipment assembly single-row bearings can be "set" to the required clearance (endplay) or preload condition to optimize performance (see page 104).

### TSF - single-row, with flanged cup*

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

TSF

## 1.2. Two-row bearings

### TDO - double cup*

TDO

This has a one-piece (double) cup and two single cones. It is usually supplied complete with an cone spacer as a pre-set assembly. This configuration gives a wide effective bearing spread and is, therefore, frequently chosen for applications where overturning moments are a significant load component. TDO bearings can be used in fixed (locating) positions or allowed to float in the housing bore - for instance to compensate for shaft expansion.

TDODC or TDOCD cups are also available in most sizes. These cups have holes in the O.D. that permit the use of pins to prevent cup rotation in the housing.

### TDI - double cone*

### TDIT - double cone with tapered bore*

TDI

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

TDIT

### TNA - non-adjustable*

### TNASW - non-adjustable with lubricant slots*

### TNASWE - non-adjustable with lubricant slots and extended back face rib*

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

TNA

TNASW

TNASWE

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

## 1.3. Spacer assemblies

Practically any two single-row bearings (type TS) can be supplied as a two-row, pre-set, ready-to-fit assembly by the addition of spacers, machined to pre-determined dimensions and tolerances. This principle is, in fact, adopted in two standard ranges of spacer assemblies listed in the main sections of this guide: types "SS" and "SR".
However, the concept can be applied to produce custom-made two-row bearings to suit specific applications. In addition to providing a bearing that automatically gives a pre-determined setting at assembly without the need for a manual setting, it is possible to modify the assembly width to suit an application, simply by varying the spacer lengths.

### SS - two single-row assembly*

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

SS

### SR - "Set-Right"™ assembly*

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

SR

There are three basic types of spacer assemblies:

2TS-IM

### Type 2TS-IM (indirect mounting)

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

### Type 2TS-DM (direct mounting)

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

2TS-DM

### Type 2TS-TM (tandem mounting)

2TS-TM

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

TM = Trademark of The Timken Company

## 1.4. Package bearings

### Pinion Pac™

PINION PAC

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

### UNIPAC™

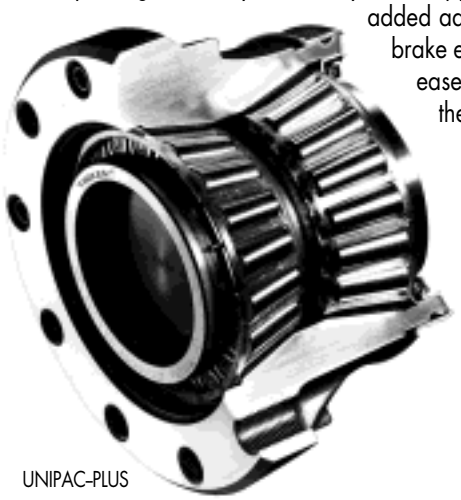
The UNIPAC bearing is a two-row tapered roller bearing, supplied as a maintenance free, pre-set, pre-lubricated and sealed package. Originally designed for the high-volume needs of passenger car wheels, the UNIPAC bearing now has wider application in wheel hubs of heavy vehicles as well as in industrial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

UNIPAC

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

### UNIPAC-PLUS ™

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



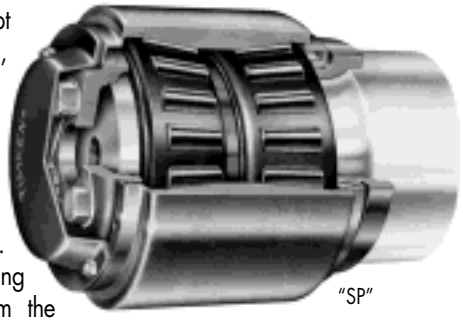
UNIPAC-PLUS

### "AP"™ bearing*

"AP"

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

### "SP"™ bearing



"SP"

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

## 1.5. Thrust bearings

TTC - cageless*

TTSP - steering pivot*

TTHD - heavy duty*


TTC


TTSP


TTHD

Designed for specific fields of duty where the only load component is thrust, there are two basic types of Timken thrust bearings: those for oscillating applica-tions (TTC - without cage, and TTSP - with cage) and a heavy-duty type capable of operating at relatively high speeds (TTHD).

## 2. Sealed bearings

### TSL*

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

TSL

## 3. Precision bearings

### 3.1. TS and TSF single row bearings*

These bearings are similar in design to the types described in item 1.1. They are only produced in high precision quality to be used in machine tool spindles, printing press cylinders and other applications where accuracy of rotation is required.


TSHR

### 3.2. TSHR - "Hydra-Rib"™ bearing with preload adjustment device*

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

### 3.3. High speed bearings

#### TSMA - Single row, with axial oil provision

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

TSMA

### 3.4. TXR - Crossed roller bearing*

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

TXRDO

Crossed roller bearings are manufactured in precision classes.

## 4. Other two-row bearings

#### Type TDIE - Extended double cone

#### Type TDIA

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


TDIE

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


TDIE (Square Bore)

TM = Trademark of The Timken Company

Type TDIA is similar to type TDIE with cylindrical bore. There is, however, a provision for a locking collar at one end only. The compact configuration is suited to pillow block and similar applications. On all types, the hardened and ground O.D. of the cone extension provides an excellent surface for effective closure or sealing.

TDIA

### Type TNASWH - non adjustable, heavy duty, double cup

### Type TNASWHF - non adjustable, heavy duty, with flanged double cup

These are two-row bearing assemblies with two cones and a one-piece cup, similar to type TNASW/E listed in the main section of this guide.
However, the cups have a heavy wall section which is self-supporting, allowing the bearings themselves to be used directly, for example, as steady rest rollers, in sheet and strip levellers or, with a flange (type TNASWHF), as a complete wheel assembly for use on rails.
The cup is extended at both ends and counterbored to accept stamped closures and the bearings can be supplied with these ready fitted as a unit assembly (BUT NOT PRE-LUBRICATED). Rubbing seals are available for certain sizes.


TNASWH

TNASWHF

## 5. Four-row bearing assemblies

In essence, four-row bearings combine the inherent high-load, radial/thrust capacity and direct/indirect mounting variations of tapered roller bearings into assemblies of maximum load rating in a minimum space. Their main application is on the roll necks of rolling mill equipment.
All four-row bearings are supplied as pre-set matched assemblies with all components numbered to ensure correct installation sequence.

### Type TQO

### Type TQOW

TQO

TQOW

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

### Sealed Roll Neck Bearing

Sealed Roll Neck Bearing

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

### Type TQITS

### Type TQITSE

TQITS

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

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

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

TQITSE

## 6. Heavy duty thrust bearings

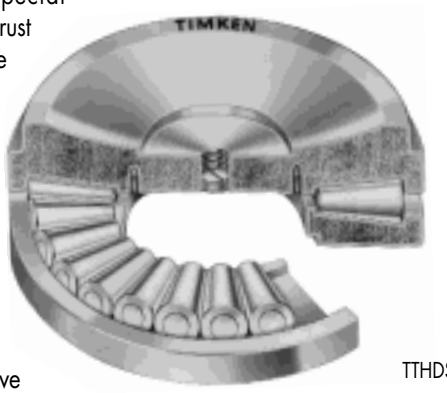
### Type TTHDSV

### Type TTHDSX

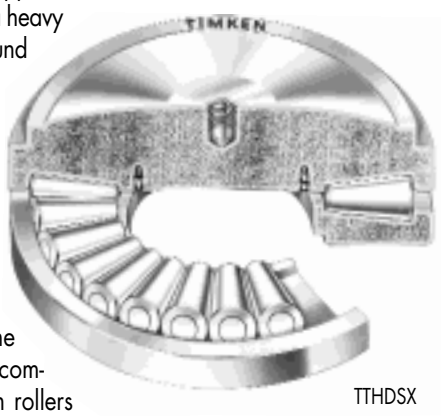
### Type TTHDFL

These are special versions of thrust bearings type TTHD. They are designed primarily for oscillating duty in the automatic screw-down mechanisms of rolling mills where sensitive screw-down response is required. The upper races are made with a heavy wall section ground concave (type TTHDSV) or convex (type TTHDSX) as required to match the end of the screw. Because of the type of duty, the bearings are completely filled with rollers for maximum load capacity.

The TTHDFL bearing is similar to the basic TTHD bearing, except one of its thrust races is flat.



TTHDSV



TTHDSX

TTHDFL

## 7. Other tapered roller bearing types

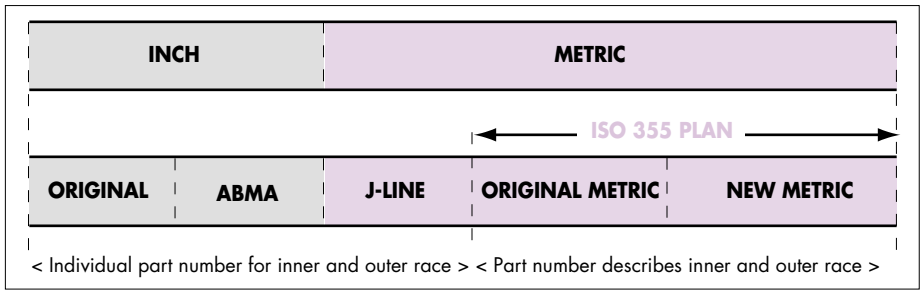
One of the most important single attributes of the tapered roller bearing is its adaptability to almost any application requirement.

This inherent adaptability has led, over the years, to the development of a great many design variants to meet specific bearing requirements.

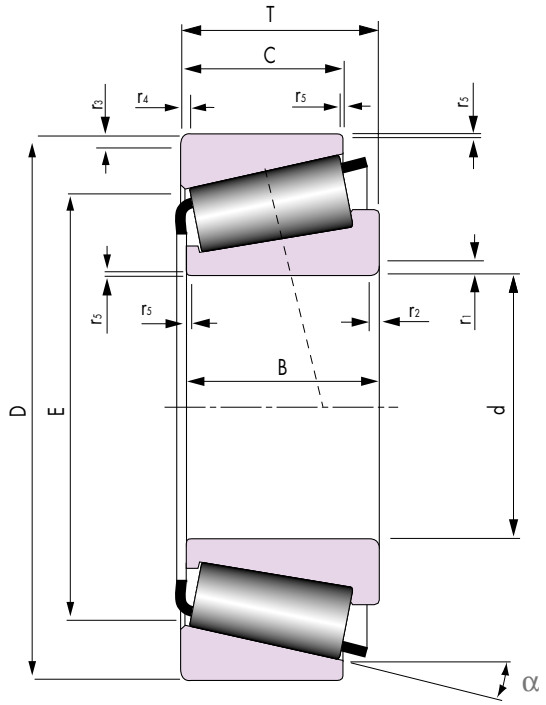
Detailed information in this guide is necessarily confined to those ranges of tapered roller bearings most commonly used throughout industry. It has not been possible to cover fully the variety of other types of bearings that The Timken Company regards as specialty bearings, but which have been developed for particular or specialized fields of application. Some of these other bearing types are outlined in this section and in most cases comprehensive technical literature about them is available on request.

# C. How to recognize your part number

The part numbering systems for single-row tapered roller bearings (type TS) are internationally recognized. Several part number systems have been developed that can be classified according to "metric" or "inch" systems. Within both the metric and inch systems, different part number systems have been developed. Inch system bearings are normally assigned individual part numbers for the cone and cups, whereas ISO bearings are assigned a unique part number for the bearing assembly (cone and cup).




## 1. Symbols




*d* = *bearing bore diameter*
*D* = *bearing outside diameter*
*T* = *bearing width*
*B* = *cone width*
*C* = *cup width*
*E* = *cup small inside diameter*
α = *1/2 included cup contact angle*
*r1* = *cone back face radius height*
*r2* = *cone back face radius width*
*r3* = *cup back face radius height*
*r4* = *cup back face radius width*
*r5* = *cone and cup front face chamfer height and width*

## 2. Bearing series

In all the part numbering systems the term "bearing series" is used to describe bearings having the same basic internal geometry (i.e. roller size, included cone and cup angle). Any cone (including roller set) can be matched with any cup within the same series providing that the same type of bearing is being used.

## 3. Inch part numbering systems

### 3.1. Original inch part numbering system

The original system developed by The Timken Company was based on a family of bearings designed around a common roller. Varying the number of rollers and the angle of the raceways allows different bearings to be designed for predominant radial load (shallow angle) or thrust load (steep angle).
For example, all the tapered roller bearings in the 500 family use the same roller. However, the 595 series has a steep angle and 24 rollers while the 525 series has a shallow angle and 15 rollers.
Individual part numbers are assigned to the cone and cups. Although there are exceptions, the general rule is that the cup has a part number that is lower than the series number, whereas the cone is assigned a higher number. For example:

| | |
|---|---|
| Series | 575 |
| Cup | 572 |
| Cone | 576 |

## 3.2. ABMA inch part numbering system

A new inch part numbering system was developed by the American Bearing Manufacturers Association (ABMA) to address the expansion in the number of new applications and tapered roller bearing designs.

This part numbering system has become the international standard for inch-sized bearings.

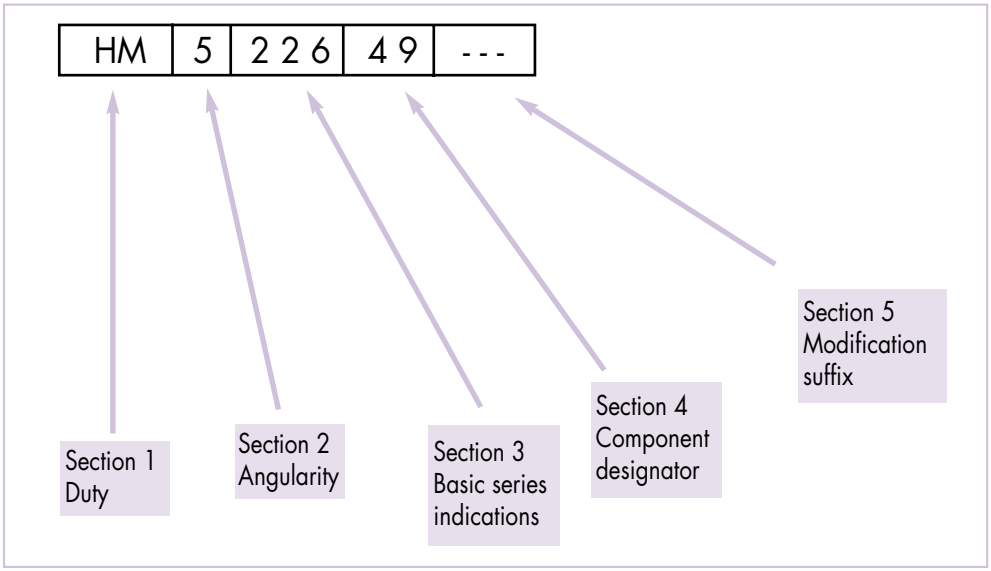
The ABMA part numbering system applies to new bearing series only. Existing part numbers according to the original system, new part numbers that are added to the existing series and proprietary part numbers of special bearings continue to be used.

The new part number is divided into 5 alpha-numeric sections:

**Section 1 -** Prefix letters

The prefixes will consist of one or two letters and will designate the duty class for which the bearing is designed.

| | | | |
|---|---|---|---|
| EL | Extra Light | HM | Heavy Medium |
| LL | Lighter than Light | H | Heavy |
| L | Light | HH | Heavier than Heavy |
| LM | Light Medium | EH | Extra Heavy |
| M | Medium | T | Thrust only |




**Section 2 -** Angularity designator

The first digit following the prefix will represent the angle coding as determined by the included angle of the cup.

| Included cup angle | | Code |
|---|---|---|
| 0 | to 23° 59′ 59.99″ | 1 |
| 24° | to 25° 29′ 59.99″ | 2 |
| 25° 30′ | to 26° 59′ 59.99″ | 3 |
| 27° | to 28° 29′ 59.99″ | 4 |
| 28° 30′ | to 30° 29′ 59.99″ | 5 |
| 30° 30′ | to 32° 29′ 59.99″ | 6 |
| 32° 30′ | to 35° 59′ 59.99″ | 7 |
| 36° | to 44° 59′ 59.99″ | 8 |
| 45° | Up, but not thrust only | 9 |
| 90° | Thrust bearing only | 0 |

**Section 3 -** Basic series indication

The 2nd, 3rd, and 4th digits following the prefix letters are reserved for the basic series indication.

The selection of the basic series indication in relation to the maximum theoretical bore of the bearing will then be in accordance with the following tabulation:

| Maximum bore range (inches) | Series indication | Maximum bore range (inches) | Series indication |
|---|---|---|---|
| 0 - 1 | 00 to 19 incl. | 15 - 16 | 640 to 659 incl. |
| 1 - 2 | 20 to 99 incl. | 16 - 17 | 660 to 679 incl. |
| | 000 to 029 incl. | 17 - 18 | 680 to 694 incl. |
| 2 - 3 | 030 to 129 incl. | 18 - 19 | 695 to 709 incl. |
| 3 - 4 | 130 to 189 incl. | 19 - 20 | 710 to 724 incl. |
| 4 - 5 | 190 to 239 incl. | 20 - 21 | 725 to 739 incl. |
| 5 - 6 | 240 to 289 incl. | 21 - 22 | 740 to 754 incl. |
| 6 - 7 | 290 to 339 incl. | 22 - 23 | 755 to 769 incl. |
| 7 - 8 | 340 to 389 incl. | 23 - 24 | 770 to 784 incl. |
| 8 - 9 | 390 to 429 incl. | 24 - 25 | 785 to 799 incl. |
| 9 - 10 | 430 to 469 incl. | 25 - 30 | 800 to 829 incl. |
| 10 - 11 | 470 to 509 incl. | 30 - 35 | 830 to 859 incl. |
| 11 - 12 | 510 to 549 incl. | 35 - 40 | 860 to 879 incl. |
| 12 - 13 | 550 to 579 incl. | 40 - 50 | 880 to 889 incl. |
| 13 - 14 | 580 to 609 incl. | 50 - 72.5 | 890 to 899 incl. |
| 14 - 15 | 610 to 639 incl. | 72.5 and over | 900 to 999 incl. |

**Section 4 -** Component designator

The 5th and 6th digits, or the last two digits, following the prefix letters will indicate the actual part number of the bearing component.

cup numbers will be indicated by the digits 10 to 19, inclusive, the first cup made to minimum section in any series starting with the number 10. If more than 10 cups appear in any series, numbers 20 to 29 will be utilized where available.

Cone numbers will be indicated by the digits 30 to 49, inclusive, the first cone made to minimum section in any series being numbered 49.

**Section 5 -** Suffix

This will consist of one letter to three letters in pre-arranged combinations, indicating modifications in external form or internal arrangement.

## 3.3. Prefixes and Suffixes

Some of the symbols used by The Timken Company and prefixes and suffixes that are part of the ABMA part numbering standard:

| PREFIX | SUFFIX | CONE OR CUP | EXPLANATION |
|---|---|---|---|
| A | | Cone & Cup | Standard basic series part number. |
| | A | Cone | Different radius from basic part number. |
| | A | Cone | Different bore from basic part number. |
| | A | Cone | Different complement of rollers. |
| | A | Cup | Different OD from basic part number. |
| | A | Cup | Different radius from basic part number. |
| | A | Cup | Different width from basic part number. |
| | AA | Cone & Cup | Different bore, OD, width or radius from basic part number. |
| | AB | Cone | Different bore, width or radius from basic part number, assembled with brass cage. |
| | AB | Cup | Flanged cup. (Non-interchangeable with basic part number.) |
| | AC | Cone | Different bore or radius, different internal geometry. |
| | AC | Cup | Different OD, width or radius from basic part number. |
| | AD | Cup | Double Cup. (Non-interchangeable with basic part number.) |
| | ADW | Cone | Double Cone. Pilots and slots each end, holes in large rib. |
| | AH | Cone | Assembled with special cage, rollers, and/or internal geometry |
| | AL | Cone | Assembled with Duo-Face seal. |
| | ARB | Cup | Single cup with snap ring groove in OD. |
| | AS | Cone & Cup | Different bore, OD, width, or radius from basic part number. |
| | ASB | Cone | Single cone, different bore or width from basic part number, assembled with brass cage. |
| | AV | Cone & Cup | Made of special steel. |
| | AW | Cone & Cup | Keyway or slotted cone or cup. |
| | AX | Cone & Cup | Different bore, OD, width, or radius from basic part number. |
| | AXB | Cone | Different bore, width, or radius from basic part number, assembled with brass cage. |
| | AXD | Cup | ISO cup - double cup without oil holes or groove. |
| | AXV | Cone & Cup | Different OD, width, or radius from basic part number. Made of special steel. |
| | AXX | Cone & Cup | Different OD, width, or radius from basic part number. Made of special steel. |
| | B | Cup | Flanged cup. (Non-interchangeable with basic part number.) |
| | B | Cone | Cone using brass cage. |
| | B | Cone & Cup | ISO bearing with same boundary dimensions as basic part number, but with different internal geometry, steeper included cup angle. |
| | BA | Cup | Flanged cup. (Non-interchangeable with basic part number.) |
| | BNA | Cone | ISO cone used in assemblies with 2 cones mated with double cup to form a double row non-adjusting bearing. (Non-interchangeable with other cones having the same basic part numbers, which may vary in bore or width dimensions.) |
| | BR | Cup | Single cup with groove in OD for snap ring. |
| | BS | Cup | Flanged cup. (Non-interchangeable with basic part number.) |
| | BW | Cup | Flanged cup with slot. (Non-interchangeable with basic part number.) |
| | BX | Cup | Flanged Cup. (Non-interchangeable with basic part number.) |
| | BXX | Cup | Flanged single cup. Made of special steel. |
| | C | Cone | Single cone, envelope dimensions same as basic part number, different internal geometry. |
| | C | Cup | Dimensionally different from basic part number. (Non-interchangeable.) |
| | CA | Cone | Single cone, envelope dimensions same as basic part number, different internal geometry. |
| | CB | Cone | Single cone, dimensionally different from basic part number. |
| | CD | Cup | Double cup with oil holes and groove. One hole counter-bored for locking pin. |
| | CE | Cup | Dimensionally different from basic part number. (Non-interchangeable.) |
| CN | | Cup | Neoprene cushioned cup. |
| | CP | Cone & Cup | Flash chrome plated. Otherwise, interchangeable with basic part number |
| | CP | Cone & Cup | Envelope dimensions same as basic part number, different internal geometry, customized for performance. |
| | CR | Cone & Cup | Ribbed cup bearing series. |
| | CS | Cone & Cup | Dimensionally different from basic part number. (Non-interchangeable.) |
| | CX | Cone | Dimensionally different from basic part number. (Non-interchangeable.) |
| | D | Cone & Cup | Double cone or Double cup. (Non-interchangeable with basic part number.) |
| | DA | Cone | Double cone. (Non-interchangeable with cones having same basic part number.) |
| | DA | Cup | Spherical OD double cup. (Non-interchangeable with basic part number or other double cups having same basic numbers.) |
| | DB | Cup | Double cup with flange. (Non-interchangeable with basic part number or double cups having same basic numbers.) |
| | DB | Cone | Double cone assembled with brass cages. |

| PREFIX | SUFFIX | CONE OR CUP | EXPLANATION |
|---|---|---|---|
| | DC | Cup | Double cup with hole for locking pin. |
| | DD | Cone & Cup | Special long double cone or cup. (Non-interchangeable with basic part number or other double parts having same basic numbers.) |
| | DE | Cone & Cup | Double cone or double cup having different dimensions or other characteristics from single and double parts identified with same basic part number. |
| | DF | Cup | Double cup with oil holes and groove. Snap ring groove on OD. |
| | DG | Cone | Double cone with pressure removal groove or helical groove in bore. |
| | DGA | Cone | Double cone with pressure removal groove or helical groove in bore. (Non-interchangeable with basic part number.) |
| | DGE | Cone | Double cone with pressure removal groove or helical groove in bore. (Non-interchangeable with basic part number.) |
| | DGH | Cone | Double cone with presure removal groove or helical groove in bore and with special cage, rollers, and/or internal geometry. |
| | DGW | Cone | Double cone with pressure removal groove or helical groove in bore, and having face slots. |
| | DH | Cone | Double cone with special cage, rollers, and/or internal geometry. |
| | DP | Cone | Double cone with puller groove. |
| | DR | Cup | Double cup for ribbed cup series. (Non-interchangeable with single and double cups identified with same basic part number.) |
| | DRB | Cup | Double cup with snap ring groove. |
| | DS | Cup | Crowned OD double cup. (Non-interchangeable with other cups having same basic part numbers.) |
| | DT | Cup | Tapered OD double cup. (Non-interchangeable with other cups having same basic part numbers.) |
| | DV | Cone & Cup | Double cone or double cup made of special steel. |
| | DVH | Cone | Double cone, special steel, and/or internal geometry. |
| | DW | Cone & Cup | Double cone or double cup with keyway or slot. (Non-interchangeable with cones or cups identified with same basic part numbers.) |
| | DWA | Cone | Double cone with one end extended and with oil slots in extended end. (Asymmetrical) |
| | DWH | Cone | Double cone with oil slots, assembled with special cage, rollers, and/or internal geometry. |
| | DWV | Cone & Cup | Double cone or double cup with keyway or slot. (Non-interchangeable with cones or cups identified with same basic part numbers.) Made of special steel. |
| | DX | Cup | Adaptor for spherical or straight OD cup. |
| | DX | Cup | Threaded OD double cup. (Non-interchangeable with cups identified with same basic part numbers.) |
| | DXX | Cone & Cup | Double cone or double cup made of special steel. |
| | E | Cone & Cup | Cones or cups having special characteristics differing from and non-interchangeable with other cones or cups identified with the same basic part numbers. |
| | ED | Cup | Double cups. (Non-interchangeable with other cups identified with same basic part numbers.) |
| | EDC | Cup | Double cups, special hole in OD for locking pin. |
| EE | | Cone | Large and small ribs - close guided rollers. (Non-interchangeable with other cones identified with same basic part numbers.) |
| EH | | Cone & Cup | Extra heavy series. |
| EL | | Cone & Cup | Extra light series. |
| EX | | Cone & Cup | Experimental. |
| | EXX | Cone & Cup | Cones or cups having special characteristics differing from and non-interchangable with other cones or cups identified with the same basic part numbers. Made of special steel. |
| | F | Cone | Assembled with polymer cage. |
| FL | | Cone & Cup | 'Free lateral' series, no large or small ribs. |
| FX | | Cone & Cup | Factory identification number only. |
| | G | Cone | Retainer groove in bore. |
| H | | Cone & Cup | Heavy series. (Non-interchangeable with other cones and cups identified with same basic part numbers.) |
| | H | Cone | Assembled with special cage, rollers, and/or internal geometry. |
| | HV | Cone | Assembled with special cage, rollers, and/or internal geometry. Made of special steel. |
| HH | | Cone & Cup | Heavy-Heavy series. (Non-interchangeable with other cones and cups identified with same basic part numbers.) |
| HM | | Cone & Cup | Heavy-Medium series. (Non-interchangeable with other cones cups identified with same basic part numbers.) |
| | HP | Cone | Assembled with special cage and/or roller, different internal geometry. Customized for performance. |

| PREFIX | SUFFIX | CONE OR CUP | EXPLANATION |
|---|---|---|---|
| | HR | Cup | Special cup used in 'Hydra-Rib' bearing. |
| J | | Cone & Cup | Used alone or with other prefix letters to indicate metric bore and/or OD. |
| JC | | Cone & Cup | Metric Series. |
| JD | | Cone & Cup | Metric Series. |
| JE | | Cone & Cup | Metric Series. |
| JF | | Cone & Cup | Metric Series. |
| JG | | Cone & Cup | Metric Series. |
| JN | | Cone & Cup | Metric Series. |
| JP | | Cone & Cup | Metric Series. |
| JR | | Cone & Cup | Metric Series. |
| JRM | | Cone & Cup | Metric Series, UNIPAC bearing. |
| JS | | Cone & Cup | Metric Series. |
| JT | | Cone & Cup | Metric Series. |
| JU | | Cone & Cup | Metric Series. |
| JW | | Cone & Cup | Metric Series. |
| K | | Cup | Double cup with heavy section. May have unusual features such as flange, tapered OD, etc. |
| K | | Cone & Cup | Through hardened components, Non-DIN 720 Part Numbers |
| K | | Miscellaneous | K prefix with 5 or 6 digits following also used for miscellaneous components (seals, bolts, filler rings, etc.) |
| | KP | Thrust Bearing | Cadmium plated. |
| L | | Cone & Cup | Light series. (Non-interchangeable with other cones and cups identified with same basic part numbers.) |
| | L | Cone | Cone assembled with Duo-Face seal. |
| | L | Cup | Loose rib. (Part of Unit-Bearing.) |
| | LA | Cone | Cone assembled with Duo-Face-Plus seal. |
| | LA, LB, LC, etc. | Seal | These suffixes are used on a basic Duo-Face-Plus seal number to identify the assembly resulting from the use of the seal with various cones in the series. |
| LL | | Cone & Cup | Light-Light series. |
| LM | | Cone & Cup | Light-Medium series. |
| M | | Cone & Cup | Medium series. |
| | M | Cone & Cup | Through hardened components, DIN 720 Part Numbers, IsoClass Part Numbers |
| N | | Cone | Bock or Gilliam type bearings. |
| NA | NA | Cone | Two cones mated with double cup to form double row non-adjustable bearing. (Non-interchangeable with other cones having same basic part numbers which may vary in bore, OD, and width dimensions.) |
| | NA | Cup | Etched electric pencil on double cups mated with two 'NA' type single cones to form double row non-adjustable bearings. |
| | NAV | Cone | 'NA' cone made of special steel. |
| | NC | Cup | Cushioned cup (usually neoprene.) |
| | NI | Cone | Tapered or threaded bore. |
| NP | | Cone & Cup | Used with random numbers for product differentiation. |
| | NR | Cone | 'NA' type ribless cone for ribbed cup series. |
| | NW | Cone | 'NA' type cone with slotted front face. |
| | NWV | Cone | 'NA' type cone with slotted front face. Made of special steel. |
| | NX | Cone | Lapped front face. |
| | P | Cone | Puller groove. |
| | P | Cone & Cup | Customized for performance. |
| R | | Cone & Cup | Gilliam replacement series. (Non-interchangeable with other cones and cups identified with same basic numbers.) |
| | R | Cone & Cup | Special feature bearing. (Non-interchangeable with bearings having the same basic part numbers.) |
| | R | Cone & Cup | Bock type bearing. |
| | R | Cone | Basic part number with polymer lubricant. |
| | RB | Cup | Snap ring on OD. |
| RC | | Cone & Cup | Special ribbed cup bearing. |
| | RN | Various | Used with random numbers, not to exceed six (6) digits, for purchased items that are distributed by Timken. |
| | RR | Cone & Cup | 'Relieved race.' |
| | S | Cone & Cup | Special feature bearing. (Non-interchangable with bearings having same basic part numbers.) |
| | SA | Cone & Cup | Special feature bearing. (Non-interchangable with bearings having same basic part numbers.) |

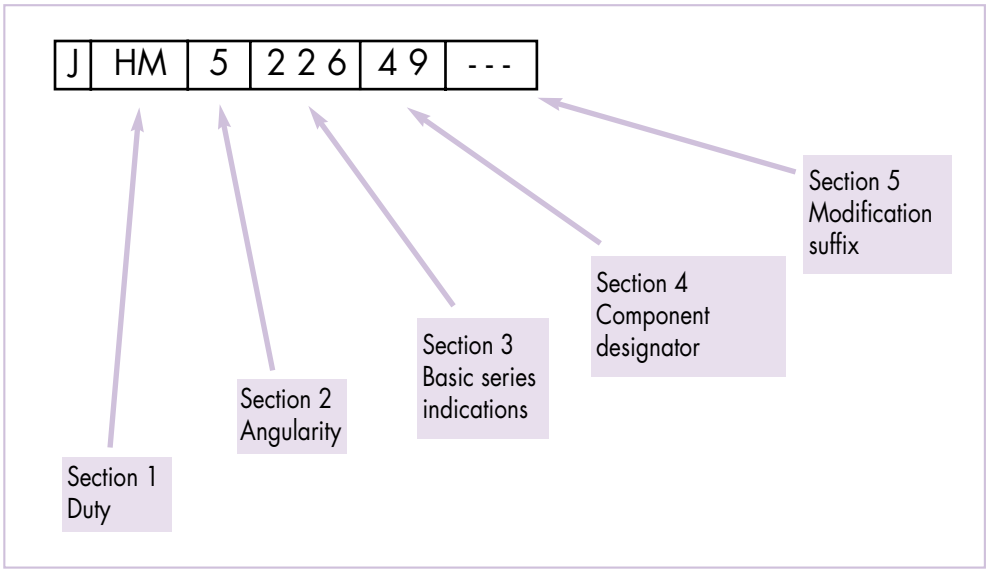
| PREFIX | SUFFIX | CONE OR CUP | EXPLANATION |
|---|---|---|---|
| | SB | Cone | Assembled with brass cage. |
| | SB | Cup | Flanged cup. |
| | SC | Cone | With square bore. |
| | SD | Cone & Cup | Double cone with square bore or double cup. |
| | SH | Cone | Special feature bearing, with special cage, rollers, and/or internal geometry. (Non-interchangeable with bearings having same basic part numbers.) |
| | SL | Thrust Bearing | Basic part number with polymer lubricant. |
| | SR | Cone | Different radius from basic part numbers. |
| | SW | Cone & Cup | Slot or keyway. (Non-interchangeable with bearings having same basic part numbers.) |
| | SWB | Cone | Slot or keyway assembled with brass cage. (Non-interchangeable with bearings having same basic part numbers.) |
| | SWV | Cone | Slot or keyway made of special steel. (Non-interchangable with bearings having same basic part numbers.) |
| | SX | Cup | Special feature bearing. (Non-interchangeable with bearings having same basic part numbers.) |
| T | | Race | Thrust bearing assemblies. |
| T | | Cup | Double cup with heavy section. May have unusual feature such as flange, tapered OD, etc. |
| | T | Cone | Tapered bore. |
| | T | Cup | Tapered OD. |
| | TA | Cone | Tapered bore 'NA' type cone. |
| | TA | Cup | Tapered OD. |
| | TB | Cone | Tapered bore cone with brass cage. |
| TC | | Race | Thrust bearing assembly. |
| | TC | Cone | Tapered bore. |
| | TD | Cone | Double with tapered bore. |
| | TDB | Cone | Double with tapered bore, assembled with brass cages. |
| | TDE | Cone | Double with tapered bore and extended rib. |
| | TDG | Cone | Double with tapered bore, pressure removal groove or spiral groove in bore. |
| | TDGV | Cone | Double with tapered bore, pressure removal groove or spiral groove in bore. Made of special steel. |
| | TDH | Cone | Double with tapered bore, special cage, rollers or internal geometry. |
| | TDL | Cone | Double with tapered bore, interlock feature. |
| | TDV | Cone | Double with tapered bore. Made of special steel. |
| | TDW | Cone | Double with tapered bore and slots or keys. |
| | TDXX | Cone | Double with tapered bore. Made of special steel. |
| | TE | Cone | Single, tapered bore, extended large rib. |
| | TEV | Cone | Single, tapered bore, extended large rib. Made of special steel. |
| | TL | Cone | Tapered bore with interlock feature. |
| | TLE | Cone | Tapered bore with interlock feature and extended rib. |
| | TP | Cone | Tapered bore cone with puller groove. |
| | TPE | Cone | Tapered bore cone with puller groove, extended cone large rib. |
| | TV | Cone & Cup | Tapered bore cone or cup OD. Made of special steel. |
| | TW | Cone & Cup | Tapered bore cone or cup OD with slots or keys. |
| | TWE | Cone & Cup | Tapered bore cone or cup OD with locking keyway in front face, extended cone large rib or cup width. |
| | TXX | Cone | Tapered bore. Made of special steel. |
| U | | Cone & Cup | Basic series part number, unitized, self-contained. |
| | U | Cone & Cup | Basic series part number, unitized, self-contained. |
| | US | Cone & Cup | Special close stand. |
| V | | Cone & Cup | Special close stand. |
| | V | Cone & Cup | Made of special steel. |
| | VC | Cone | Special internal geometry. Made of special steel. |
| | VH | Cone | Special cage, rollers, and/or internal geometry. Made of special steel. |
| | W | Cone & Cup | Slot(s) or keyway(s). |
| | W | Thrust Bearing | Oil holes in retainer. |
| | WA | Cone & Cup | Slot(s) or keyway(s). |
| | WB | Cone | Slot(s) or keyway(s) with brass cage. |
| | WC | Cone & Cup | Slot(s) or keyway(s). |
| | WD | Cone & Cup | Double cone or cup with slot(s) or keyway(s). |
| | WE | Cone & Cup | Extended face with slot(s) or keyway(s). |
| | WS | Cone & Cup | Slot(s) or keyway(s). |
| | WV | Cone & Cup | Slot(s) or keyway(s). Made of special steel. |

| PREFIX | SUFFIX | CONE OR CUP | EXPLANATION |
|---|---|---|---|
| | WXX | Cone & Cup | Slot(s) or keyway(s). Made of special steel. |
| X | | Cone | ISO part number. |
| | X | Cone | Slot(s) or keyway(s). |
| | X | Cone & Cup | Special feature bearing. (Non-interchangable with bearings having the same basic part number.) |
| | X | Cone & Cup | ISO bearing with same boundary dimensions as basic part number but with different internal geometry, yielding increased rating. |
| | XA | Cone & Cup | Special feature bearing. (Non-interchangeable with bearings having the same basic part number.) |
| XAA | | Cone | ISO single cone. (Non-interchangeable with bearings having the same basic part number.) |
| XAB | | Cone | ISO single cone. (Non-interchangeable with bearings having the same basic part number.) |
| | XB | Cone | Different bore, width, or radius, from basic part number. Assembled with brass cage. |
| | XB | Cup | Special feature flanged cup. (Non-interchangeable with bearings having the same basic part number.) |
| XC | | Cone & Cup | Limited production bearings to which standard series part numbers have not been assigned. |
| | XD | Cup | Double cup, no oil holes or groove. |
| | XD | Cone | Double cone, different bore or width from basic part numbers. |
| | XD | Cone | Double cone, oil holes in large rib. |
| | XDXP | Cup | Double cup, no oil holes or groove, special material and process. |
| | XE | Cup | Different bore, width, or radius from basic part number. |
| XGA | | Cone | ISO single cone. (Non-interchangeable with bearings having the same basic part number.) |
| XGB | | Cone | ISO single cone. (Non-interchangeable with bearings having the same basic part number.) |
| | XP | Cone | Special steel and process. |
| XR | | Cone & Cup | Crossed roller bearings. |
| | XS | Cone & Cup | Different bore, OD, width, or radius from basic part number. |
| | XV | Cone & Cup | Special feature cone or cup made of special steel. |
| | XW | Cone | Slotted. |
| | XX | Cone & Cup | Single cone or single cup. Made of special steel. |
| Y | | Cup | ISO part number. |
| | YD | Cup | Double cup with oil holes, no groove. |
| | YDA | Cup | Double cup with oil holes, no groove. (Non-interchangeable with bearings having the same basic part number.) |
| | YDV | Cup | Double cup with oil holes, no groove. made of special steel. |
| | YDW | Cone | Double cup with oil holes, no groove. Slot(s) or keyway(s) in face(s). |
| YKA | | Cup | ISO single cup. (Non-interchangeable with bearings having the same basic part number.) |
| YKB | | Cup | ISO single cup. (Non-interchangeable with bearings having the same basic part number.) |
| YSA | | Cup | ISO single cup. (Non-interchangeable with bearings having the same basic part number.) |
| | Z | Cone & Cup | Close stand part. |

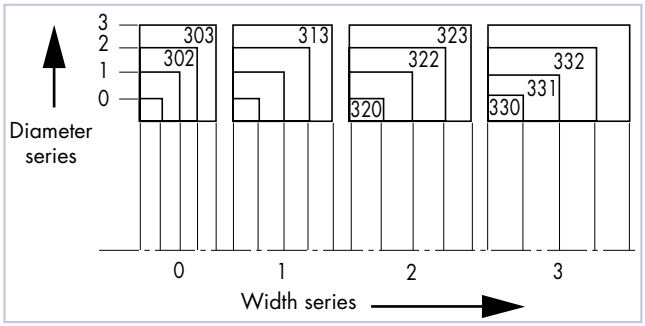
# 4. Metric part numbering systems

## 4.1. J-Line part numbers

The "J" prefix letter is used in conjunction with the ABMA part numbering system to identify metric dimensioned and toleranced cone and cups. The bearing series designation does not contain the prefix letter "J". J-Line bearings are referred to as inch bearings in metric bore, O.D. and width.




## 4.2. ISO Part Numbering System




The original metric part numbering system for tapered roller bearings was based on the ISO 15 dimensional plan for radial bearings. A 5-digit part number commencing with numeral 3 describes the bearing assembly (cone and cups).

**Section 1 -** Symbol for bearing type

3 always applies to tapered roller bearings.

**Section 2 -** Width series

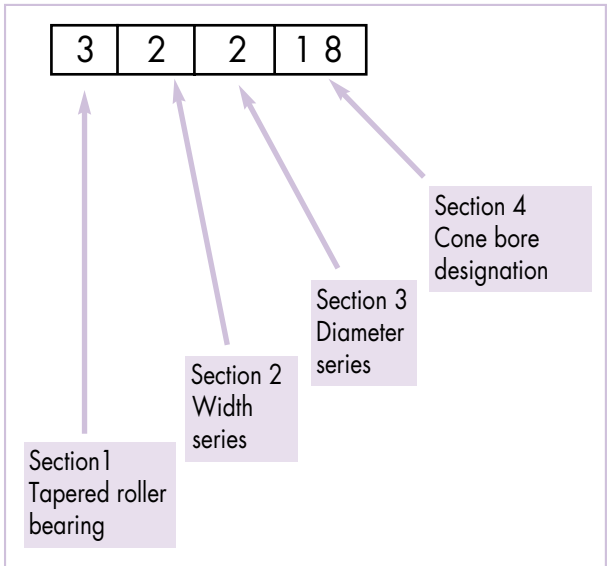
The bearing width is classified from 0 to 3 in increasing order of width.

**Section 3 -** Diameter series

The bearing section height is classified from 0 through 3 in increasing order of O.D. for a given bore size.

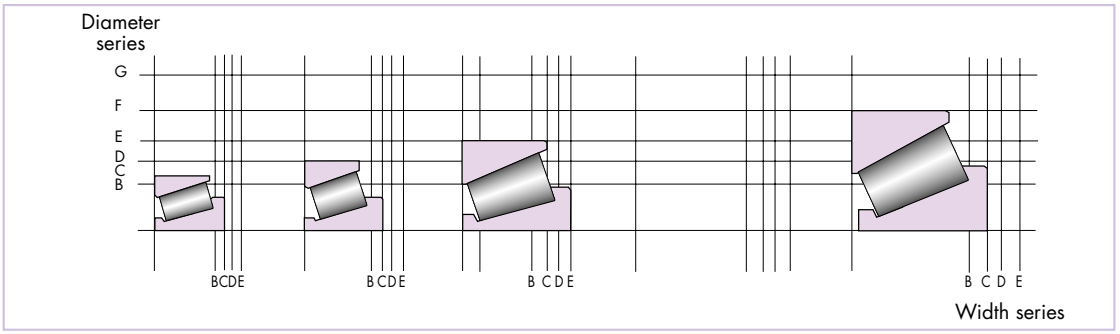
**Section 4 -** Cone bore designation

The 2 last digits relate to the cone bore diameter that can be calculated by multiplying the number indicated by 5, if the bore diameter is between 20 and 500 mm. For example, bearing 32218 has a 90 mm bore. If the bore diameter is less than 20 mm, the last two digits can interpreted as follows: 00=10 mm, 01=12 mm, 02=15 mm and 03=17 mm. If the bore diameter is greater than 500 mm, then the last 3 digits (preceded by a slash) correspond to the bore size.



## 4.3. New ISO 355 part numbering system

Finding that tapered roller bearings did not conform to the ISO 15 general plan, because dimensions given were not found to be optimal, the ISO introduced a new numbering system for tapered roller bearings in ISO 355. This system uses 3 alpha-numeric fields to define the bearing series. The bearing part number is then defined by adding the cone diameter in mm after the bearing series. Although all original metric part numbers were assigned a new designation in the ISO 355 plan, the original part number is still used.




| T | 4 | C | B | 100 |
|---|---|---|---|---|

Symbol for tapered roller bearings (optional)

Angle series designation

| Angle series designation | α | |
|---|---|---|
| | over | incl. |
| 1 | Reserved for future use | |
| 2 | 10° | 13° 52′ |
| 3 | 13° 52′ | 15° 59' |
| 4 | 15° 59' | 18° 55′ |
| 5 | 18° 55′ | 23° |
| 6 | 23° | 27° |
| 7 | 27° | 30° |

Diameter series designation

| Diameter series designation | $\frac{D}{d^{0.77}}$ | |
|---|---|---|
| | over | incl. |
| A | Reserved for future use | |
| B | 3.40 | 3.80 |
| C | 3.80 | 4.40 |
| D | 4.40 | 4.70 |
| E | 4.70 | 5.00 |
| F | 5.00 | 5.60 |
| G | 5.60 | 7.00 |

Width series designation

| Width series designation | $\frac{T}{(D-d)^{0.95}}$ | |
|---|---|---|
| | over | incl. |
| A | Reserved for future use | |
| B | 0.50 | 0.68 |
| C | 0.68 | 0.80 |
| D | 0.80 | 0.88 |
| E | 0.88 | 1.00 |

Bearing bore diameter (mm)

## 4.4. "New" metric bearings

A new range of metric bearings were also included in the ISO 355 plan. These new bearings are specifically application-oriented and are designed for optimum performance.
To easily identify these part numbers against the application type, The Timken Company introduced an alpha-numeric part number designation. The part number construction is similar to that of J-Line part numbers and separate numbers are assigned to both cone and cups.

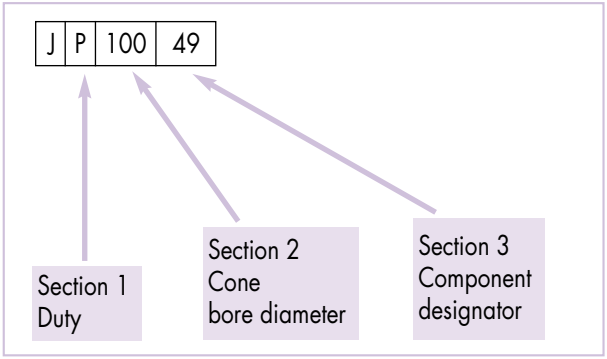
J-prefix
All of the new metric bearings are identified with a J-prefix that indicates a new metric dimensioned and toleranced bearing.

**Section 1 -** Duty
Indicates application type:
C, D & F = general purpose
N = combination of general purpose and pinion
P = high speed
S and T = pinions
W = high axial loads

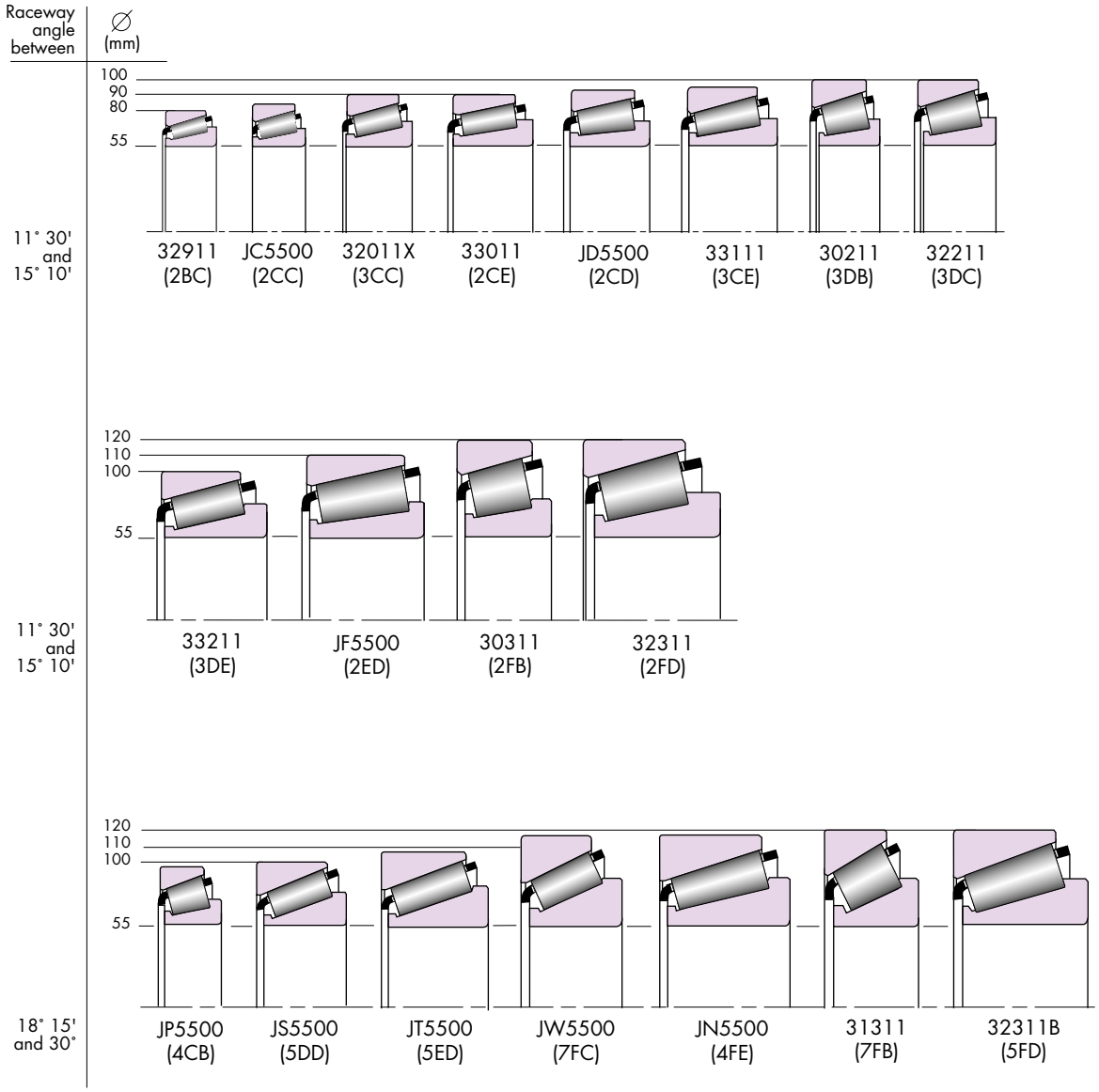
**Section 2 -** Cone bore
The cone bore metric diameter is included in the part number designation of both the cone and cups.

**Section 3 -** Component designator
Same identification as in the ABMA part numbering system.

For further explanation of prefix and suffix symbols, or proprietary part numbers of special bearings, a Timken Company sales engineer or representative should be consulted.




### Comparison table: increase in section for a 55 mm bore bearing



## 5. Optimum bearing selection: ISO 355

ISO 355 offers many application-specific bearing selection options for a given bore. Depending on application and type of load, thrust and/or radial, the bearing with the optimum angle and section can be selected. For example, pinion bearings have a steep angle, whereas bearings for machine tools are generally designed with a shallow angle and a light-section. The previous table demonstrates this feature for 55 mm bore bearings.

## 6. Bearing assembly numbers

Multiple-row bearings and matched bearing assemblies are assigned a 5-digit alpha-numeric code, in combination with the cone part number to describe the individual component parts, inspection level and the adjustment value of pre-set assemblies: e.g., LM48548-9K2A7.

An assembly number is assigned on receipt of the first order for new applications. It is very important for correct function of the bearing in a given application that the same assembly number is quoted for all subsequent orders.

The Timken Company should be consulted if additional information is required on the assembly number.

# Notes