Koyo®

JTEKT
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Ball & Roller Bearings

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JTEKT CORPORATION

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BALL & ROLLER BEARINGS

Koyo

Publication of Rolling Bearing Catalog

Today's technology-based society, in order to utilize the earth's limited resources effectively and protect the environment, must strive to develop new technologies and alternate energy sources, and in that connection it continues to pursue new targets in various fields. To achieve such targets, technically advanced and highly functional rolling bearings with significantly greater compactness, lighter weight, longer life and lower friction as well as higher reliability during use in special environments are sought.

This new-edition catalog is based on the results of wide-ranging technical studies and extensive R&D efforts and will enable the reader to select the optimal bearing for each application.

JTEKT is confident that you will find this new catalog useful in the selection and use of rolling bearings. JTEKT is grateful for your patronage and look forward to continuing to serve you in the future.

★The contents of this catalog are subject to change without prior notice. Every possible effort has been made to ensure that the data herein is correct; however, JTEKT cannot assume responsibility for any errors or omissions.

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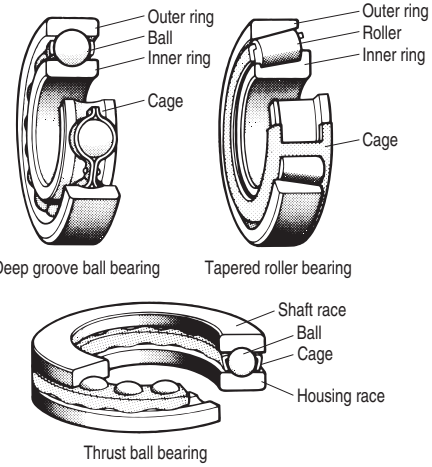
1. Rolling bearing structures and types

1-1 Structure

Rolling bearings (bearings hereinafter) normally comprise bearing rings, rolling elements and a cage. (see Fig. 1-1)

Rolling elements are arranged between inner and outer rings with a cage, which retains the rolling elements in correct relative position, so they do not touch one another. With this structure, a smooth rolling motion is realized during operation.

Bearings are classified as follows, by the number of rows of rolling elements : single-row, double-row, or multi-row (triple- or four-row) bearings.



Note) In thrust bearings inner and outer rings and also called “shaft race” and “housing race” respectively. The race indicates the washer specified in JIS.

Fig. 1-1 Bearing structure

1) Bearing rings

The path of the rolling elements is called the raceway; and, the section of the bearing rings where the elements roll is called the raceway surface. In the case of ball bearings, since grooves are provided for the balls, they are also referred to as raceway grooves.

The inner ring is normally engaged with a shaft; and, the outer ring with a housing.

2) Rolling element

Rolling elements may be either balls or rollers. Many types of bearings with various shapes of rollers are available.

- Ball
- Cylindrical roller ($L_W \leqq 3\,D_W$)*
- Long cylindrical roller ($3D_W \leqq L_W \leqq 10D_W$, $D_W > 6$ mm)*
- Needle roller ($3D_W \leqq L_W \leqq 10D_W$, $D_W \leqq 6$ mm)*
- Tapered roller (tapered trapezoid)
- Convex roller (barrel shape)

* (L_W : roller length (mm) ; D_W : roller diameter (mm))

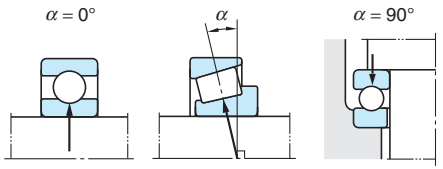
3) Cage

The cage guides the rolling elements along the bearing rings, retaining the rolling elements in correct relative position. There are various types of cages including pressed, machined, molded, and pin type cages.

Due to lower friction resistance than that found in full complement roller and ball bearings, bearings with a cage are more suitable for use under high speed rotation.

1-2 Type

The contact angle (α) is the angle formed by the direction of the load applied to the bearing rings and rolling elements, and a plan perpendicular to the shaft center, when the bearing is loaded.



Bearings are classified into two types in accordance with the contact angle (α).

· Radial bearings ($0° \leqq \alpha \leqq 45°$)
... designed to accommodate mainly radial load.
· Thrust bearings ($45° < \alpha \leqq 90°$)
... designed to accommodate mainly axial load.

Rolling bearings are classified in Fig. 1-2, and characteristics of each bearing type are described in Tables 1-1 to 1-13.

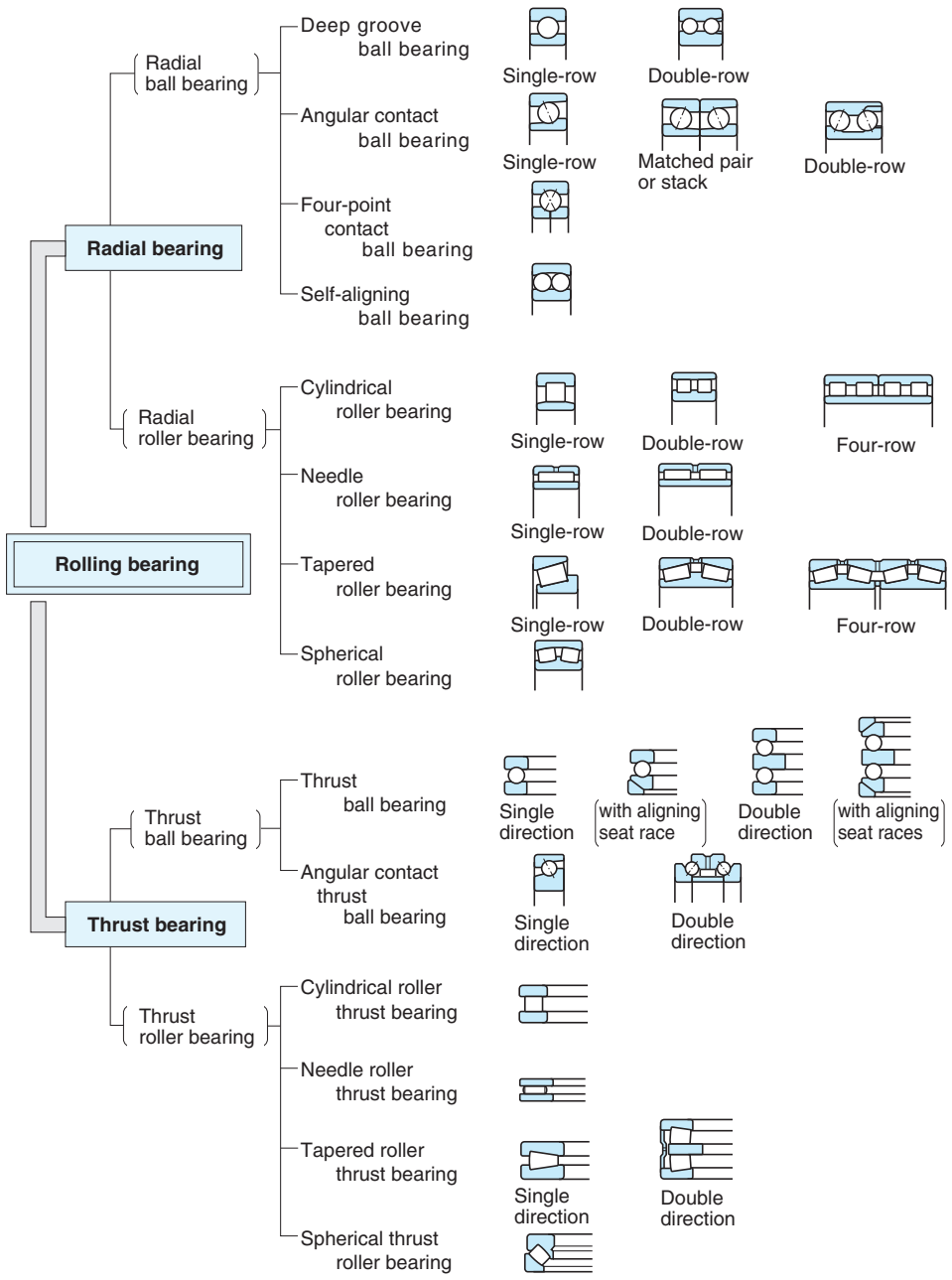
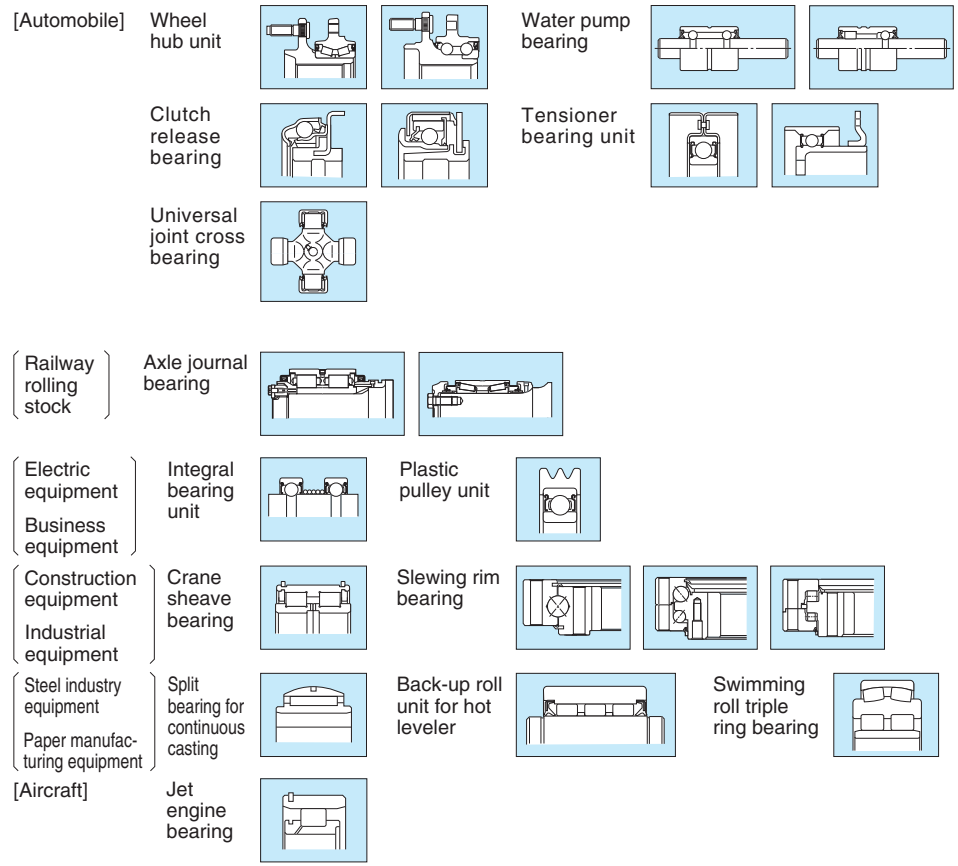


Fig. 1-2(1) Rolling bearings

Bearings classified by use



Others

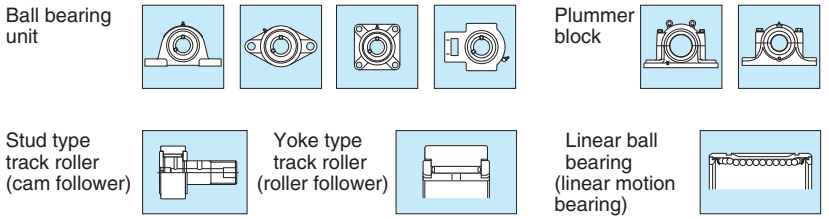
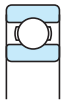
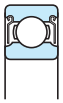
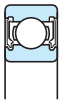
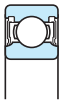
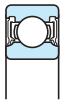
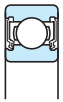
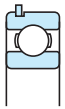


Fig. 1-2(2) Rolling bearings

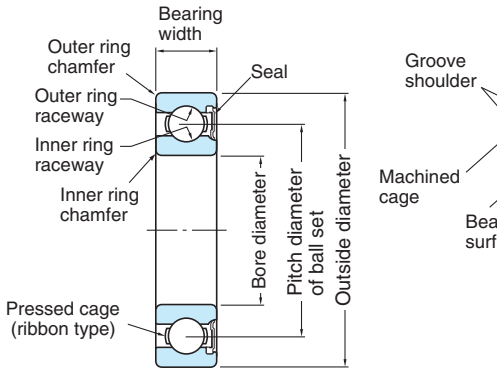
Table 1-1 Deep groove ball bearings

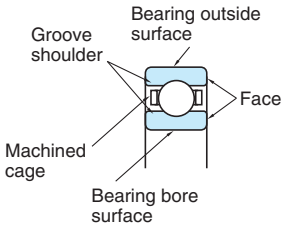
Single-row								Double-row
Open type	Shielded type	Non-contact sealed type	Contact sealed type		Extremely light contact sealed type	With locating snap ring	Flanged type	
							 Suitable for extra-small or miniature bearing	
	ZZ	2RU	2RS	2RK	2RD	NR		
680, 690, 600, 620, 630, (ML) ···Extra-small, miniature bearing								4200
6700, 6800, 6900, 16000, 6000, 6200, 6300, 6400								4300

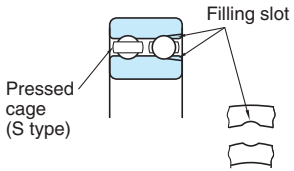
- The most popular types among rolling bearings, widely used in a variety of industries.
- Radial load and axial load in both directions can be accommodated.
- Suitable for operation at high speed, with low noise and low vibration.
- Sealed bearings employing steel shields or rubber seals are filled with the appropriate volume of grease when manufactured.
- Bearings with a flange or locating snap ring attached on the outer ring are easily mounted in housings for simple positioning of housing location.

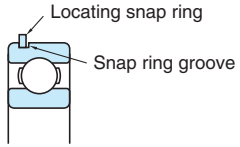
[Recommended cages] Pressed cage (ribbon type, snap type ··· single-row, S type ··· double-row), copper alloy or phenolic resin machined cage, synthetic resin molded cage

[Main applications] Automobile : front and rear wheels, transmissions, electric devices
Electric equipment : standard motors, electric appliances for domestic use
Others : measuring instruments, internal combustion engines, construction equipment, railway rolling stock, cargo transport equipment, agricultural equipment, equipment for other industrial uses





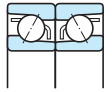
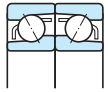
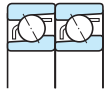




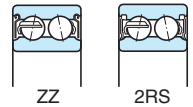
Bearing size (Reference) Unit : mm

Connotation	Bore diameter	Outside diameter
Miniature	–	Under 9
Extra-small	Under 10	9 or more
Small size	10 or more	80 or less
Medium size	–	80 – 180
Large size	–	180 – 800
Extra-large size	–	Over 800

Table 1-2 Angular contact ball bearings

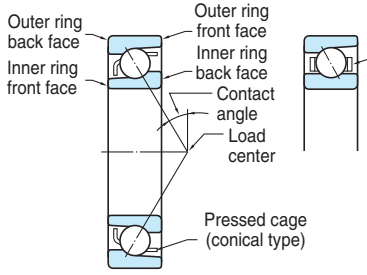
Single-row			Matched pair			Double-row	
		For high-speed use	Back-to-back arrangement	Face-to-face arrangement	Tandem arrangement		
 With pressed cage	 With machined cage	 HAR	 DB	 DF	 DT	 (With filling slot)	
7000, 7200, 7300, 7400 ····· Contact angle 30°						3200	5200
7000B, 7200B, 7300B, 7400B ····· 40°						3300	5300
7900C, 7000C, 7200C, 7300C ····· 15°						Contact angle 32°	Contact angle 24°
HAR900C, HAR000C							

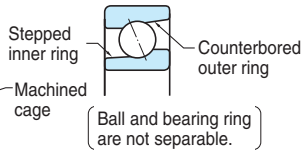
- Bearing rings and balls possess their own contact angle which is normally 15°, 30° or 40°.
  - Larger contact angle ····· higher resistance against axial load
  - Smaller contact angle ··· more advantageous for high-speed rotation
- Single-row bearings can accommodate radial load and axial load in one direction.
- DB and DF matched pair bearings and double-row bearings can accommodate radial load and axial load in both directions.
  DT matched pair bearings are used for applications where axial load in one direction is too large for one bearing to accept.
- HAR type high speed bearings were designed to contain more balls than standard bearings by minimizing the ball diameter, to offer improved performance in machine tools.
- Angular contact ball bearings are used for high accuracy and high-speed operation.
- Axial load in both directions and radial load can be accommodated by adapting a structure pairing two single-row angular contact ball bearings back to back.
- For bearings with no filling slot, the sealed type is available.

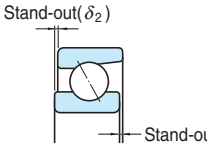

ZZ (Shielded) 2RS (Sealed)

[Recommended cages] Pressed cage (conical type ··· single-row : S type, snap type ··· double-row), copper alloy or phenolic resin machined cage, synthetic resin molded cage

[Main applications] Single-row : machine tool spindles, high frequency motors, gas turbines, centrifugal separators, front wheels of small size automobiles, differential pinion shafts
Double-row : hydraulic pumps, roots blowers, air-compressors, transmissions, fuel injection pumps, printing equipment





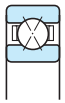
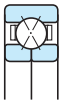
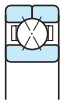


Contact angles (Reference)

Contact angle	Supplementary code
15°	C
20°	CA
25°	AC
30°	A (Omitted)
35°	E
40°	B

"G type" bearings are processed (with flush ground) such that the stand-out turns out to be $\delta_1 = \delta_2$.
The matched pair DB, DF, and DT, or stack are available.

Table 1-3 Four-point contact ball bearings

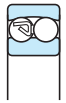
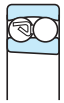
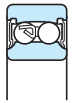
One-piece type	Two-piece inner ring	Two-piece outer ring
		
—	6200BI 6300BI	(6200BO) (6300BO)

- Radial load and axial load in both directions can be accommodated.
- A four-point contact ball bearing can substitute for a face-to-face or back-to-back arrangement of angular contact ball bearings.
- Suitable for use under pure axial load or combined radial and axial load with heavy axial load.
- This type of bearing possesses a contact angle (α) determined in accordance with the axial load direction. This means that the bearing ring and balls contact each other at two points on the lines forming the contact angle.

[Recommended cage] Copper alloy machined cage

[Main applications]
Motorcycle : Transmission, driveshaft pinion-side
Automobile : Steering, transmission

Table 1-4 Self-aligning ball bearings

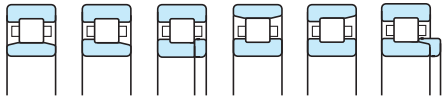
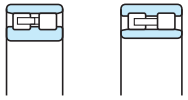
Cylindrical bore	Tapered bore	Sealed
		
	K (Taper 1 : 12)	2RS
120, 130 1200, 1300 2200, 2300	11200, 11300··· extended inner ring type	2200 2RS 2300 2RS

- Spherical outer ring raceway allows self-alignment, accommodating shaft or housing deflection and misaligned mounting conditions.
- Tapered bore design can be mounted readily using an adapter.

Pressed cage — staggered type···12, 13, 22...2RS, 23...2RS
snap type ·····22, 23

Power transmission shaft of wood working and spinning machines, plummer blocks

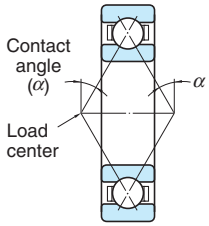
Table 1-5 Cylindrical roller bearings

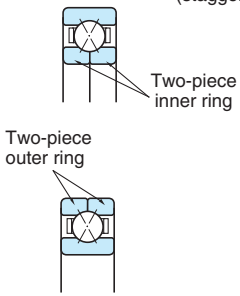
Single-row	Double-row	Four-row
		
NU NJ NUP N NF NH	NN NNU	Mainly use on rolling mill roll neck
NU1000, NU200 (R), NU300 (R), NU400 NU2200 (R), NU2300 (R) NU3200, NU3300	Cylindrical bore: NNU4900, NN3000 Tapered bore: NNU4900K, NN3000K	(FC) , (4CR)

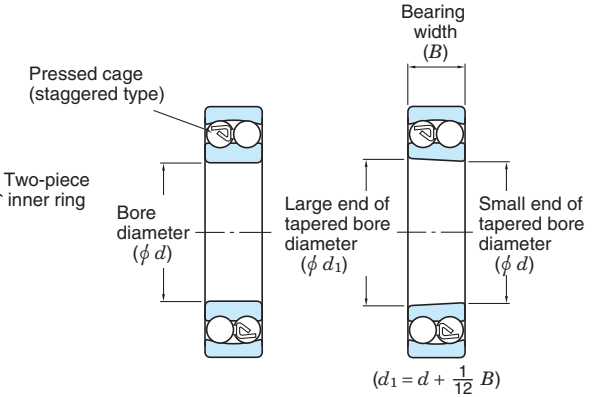
- Since the design allowing linear contact of cylindrical rollers with the raceway provides strong resistance to radial load, this type is suitable for use under heavy radial load and impact load, as well as at high speed.
- N and NU types are ideal for use on the free side: they are movable in the shaft direction in response to changes in bearing position relative to the shaft or housing, which are caused by heat expansion of the shaft or improper mounting.
- NJ and NF types can accommodate axial load in one direction; and NH and NUP types can accommodate partial axial load in both directions.
- With separable inner and outer ring, this type ensures easy mounting.
- Due to their high rigidity, NNU and NN types are widely used in machine tool spindles.

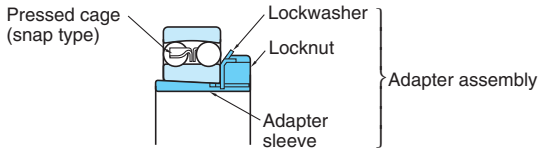
[Recommended cages] Pressed cage (Z type), copper alloy machined cage, pin type cage, synthetic resin molded cage

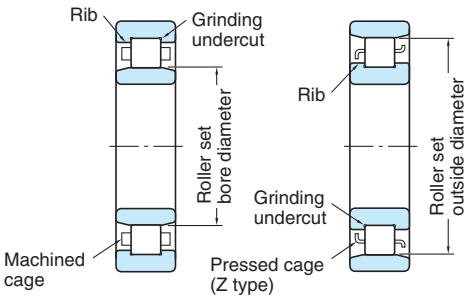
[Main applications] Large and medium size motors, traction motors, generators, internal combustion engines, gas turbines, machine tool spindles, speed reducers, cargo transport equipment, and other industrial equipment

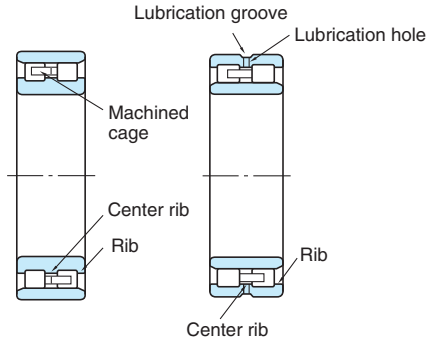


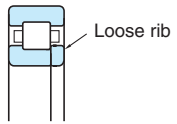


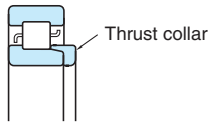












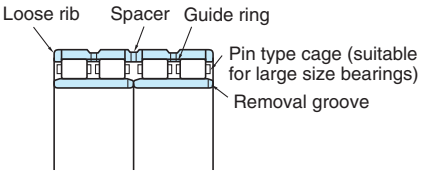
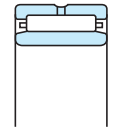
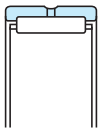
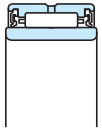
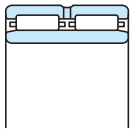
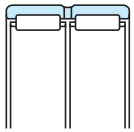


Table 1-6 Machined ring needle roller bearings

Single-row			Double-row	
 With inner ring	 Without inner ring	 Sealed	 With inner ring	 Without inner ring
NA4800 NA4900 NA6900 (NKJ, NKJS)	RNA4800 RNA4900 RNA6900 (NK, NKS, HJ)	NA49002RS – (HJ.2RS)	NA6900 (d ≧ 32)	RNA6900 (Fw ≧ 40)

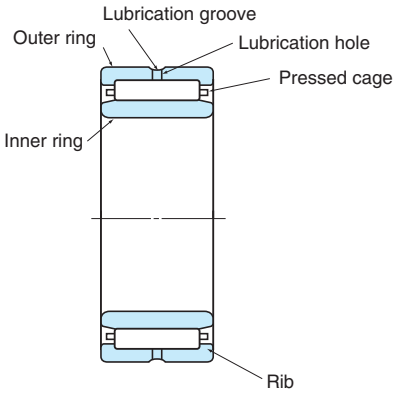
■ In spite of their basic structure, which is the same as that of NU type cylindrical roller bearings, bearings with minimum ring sections offer space savings and greater resistance to radial load, by using needle rollers.

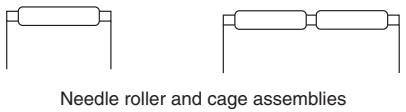
■ Bearings with no inner rings function using heat treated and ground shafts as their raceway surface.

[Recommended cage] Pressed cage

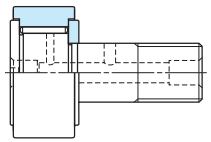
[Main applications] Automobile engines, transmissions, pumps, power shovel wheel drums, hoists, overhead traveling cranes, compressors

(Reference) Many needle roller bearings other than those with machined ring are available.
For details, refer to the pages for the needle roller bearing specification tables and the dedicated "Needle Roller Bearings" catalog (CAT No. B2020E), published separately.




Needle roller and cage assemblies


Drawn cup needle roller bearings


Stud type track roller
(cam follower)

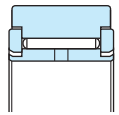
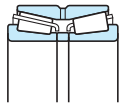
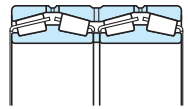

Yoke type track roller
(roller follower)

Table 1-7 Tapered roller bearings

Single-row		Double-row		Four-row
	 Flanged type	 TDO type	 TDI type	 Mainly used on rolling mill roll necks
(Standard contact angle) 32900JR 32000JR 33000JR 33100JR	(Inter mediate contact angle) 30200JR 32200JR 33200JR 30300JR 32300JR	(Steep contact angle) 30200CR 32200CR 30300CR 32300CR	30300DJ 30300DJR 31300JR	46200 46200A 46300 46300A (46T)	45200 45300 (45T)	37200 47200 47300 (47T) (4TR)

■ Tapered rollers assembled in the bearings are guided by the inner ring back face rib.

■ The raceway surfaces of inner ring and outer ring and the rolling contact surface of rollers are designed so that the respective apexes converge at a point on the bearing center line.

■ Single-row bearings can accommodate radial load and axial load in one direction, and double-row bearings can accommodate radial load and axial load in both directions.

■ This type of bearing is suitable for use under heavy load or impact load.

■ Bearings are classified into standard, intermediate and steep types, in accordance with their contact angle (α).
The larger the contact angle is, the greater the bearing resistance to axial load.

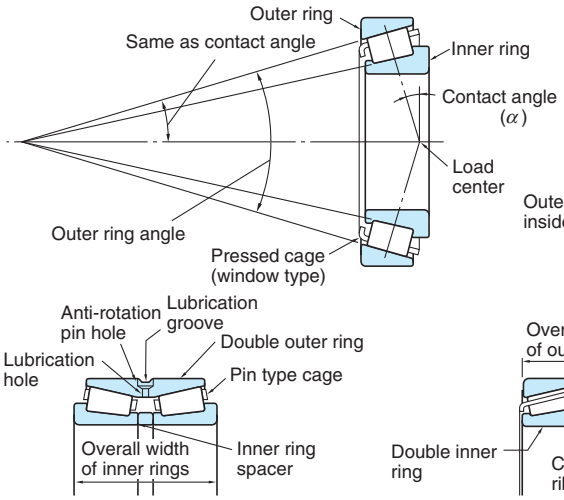
■ Since outer ring and inner ring assembly can be separated from each other, mounting is easy.

■ Bearings designated by the suffix "J" and "JR" are interchangeable internationally.

■ Items sized in inches are still widely used.

[Recommended cages] Pressed cage, synthetic resin molded cage, pin type cage

[Main applications] Automobile : front and rear wheels, transmissions, differential pinion
Others : machine tool spindles, construction equipment, large size agricultural equipment, railway rolling stock speed reduction gears, rolling mill roll necks and speed reducers, etc



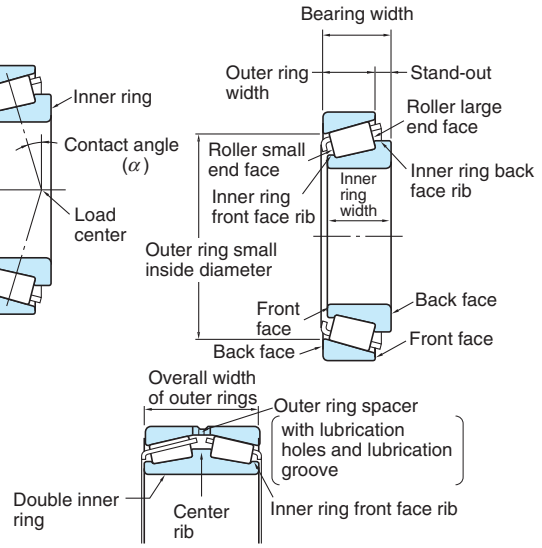
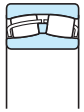
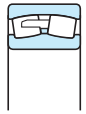


Table 1-8 Spherical roller bearings

Cylindrical bore			Tapered bore
Convex asymmetrical roller type	Convex symmetrical roller type		
			
R, RR	RZ	RHA	K or K30
23900R, 23000R (RZ, RHA), 23100R (RZ, RHA), 22200R (RZ, RHA), 21300R (RZ) 24000R (RZ, RHA), 24100R (RZ, RHA), 23200R (RZ, RHA), 22300R (RZ, RHA)			

- Spherical roller bearings comprising barrel-shaped convex rollers, double-row inner ring and outer ring are classified into three types : R(RR), RZ and RHA, according to their internal structure.
- With the bearing designed such that the circular arc center of the outer ring raceway matches with the bearing center, the bearing is self-aligning, insensitive to errors of alignment of the shaft relative to the housing, and to shaft bending.
- This type can accommodate radial load and axial load in both directions, which makes it especially suitable for applications in which heavy load or impact load is applied.
- The tapered bore type can be easily mounted/dismounted by using an adapter or withdrawal sleeve.
  There are two types of tapered bores (tapered ratio) :
  - 1 : 30 (supplementary code K30) ··· Suitable for series 240 and 241.
  - 1 : 12 (supplementary code K) ··· Suitable for series other than 240 and 241.
- Lubrication holes, a lubrication groove and anti-rotation pin hole can be provided on the outer ring. Lubrication holes and a lubrication groove can be provided on the inner ring, too.

[Recommended cages] Copper alloy machined cage, pressed cage

[Main applications] Paper manufacturing equipment, speed reducers, railway rolling stock axle journals, rolling mill pinion stands, table rollers, crushers, shaker screens, printing equipment, wood working equipment, speed reducers for various industrial uses, plummer blocks

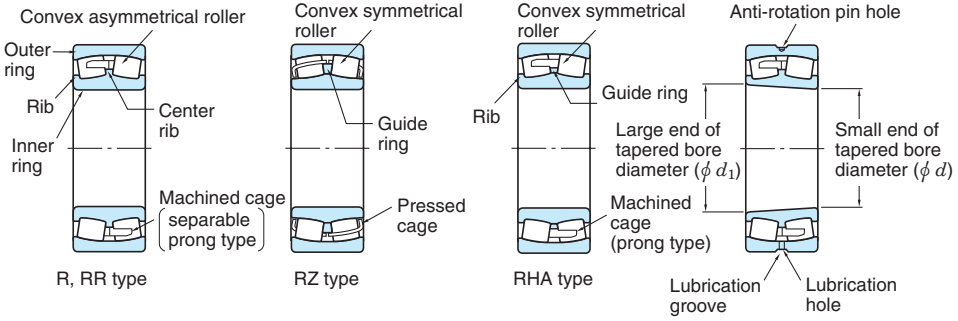
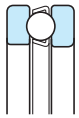
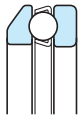
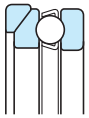
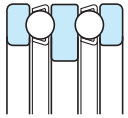
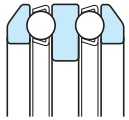
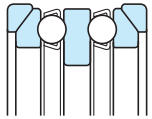


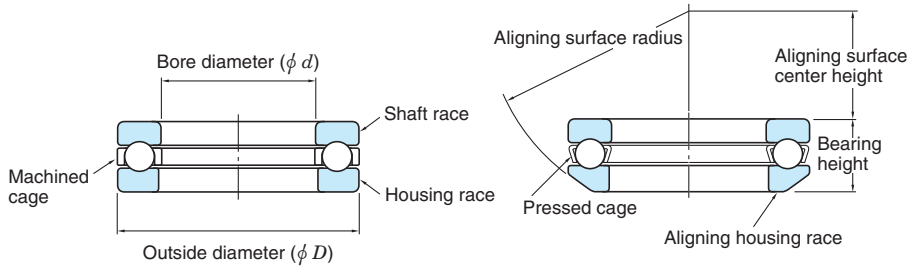
Table 1-9 Thrust ball bearings

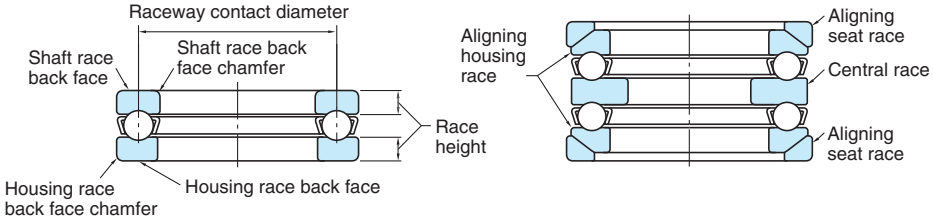
Single direction			Double direction		
With flat back faces	With spherical back face	With aligning seat race	With flat back faces	With spherical back faces	With aligning seat races
					
51100	–	–	–	–	–
51200	53200	53200U	52200	54200	54200U
51300	53300	53300U	52300	54300	54300U
51400	53400	53400U	52400	54400	54400U

- This type of bearing comprises washer-shaped rings with raceway groove and ball and cage assembly.
- Races to be mounted on shafts are called shaft races (or inner rings); and, races to be mounted into housings are housing races (or outer rings).
  Central races of double direction bearings are mounted on the shafts.
- Single direction bearings accommodate axial load in one direction, and double direction bearings accommodate axial load in both directions. (Both of these bearings cannot accommodate radial loads.)
- Since bearings with a spherical back face are self- aligning, it helps to compensate for mounting errors.

[Recommended cages] Pressed cage, copper alloy or phenolic resin machined cage, synthetic resin molded cage

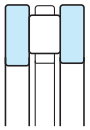
[Main applications] Automobile king pins, machine tool spindles





[Remark] The race indicates the washer specified in JIS.

Table 1-10 Cylindrical roller thrust bearings

Single direction

(811, 812, NTHA)
■ This type of bearing comprises washer-shaped rings (shaft and housing race) and cylindrical roller and cage assembly. Crowned cylindrical rollers produce uniform pressure distribution on roller/raceway contact surface. ■ Axial load can be accommodated in one direction. ■ Great axial load resistance and high axial rigidity are provided.
[Recommended cages] Copper alloy machined cage
[Main applications] Oil excavators, iron and steel equipment

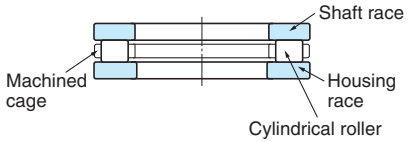
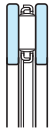
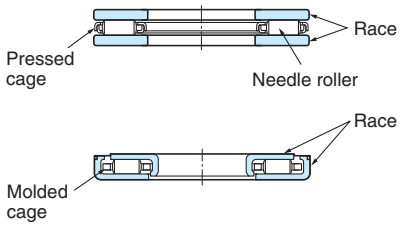


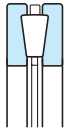
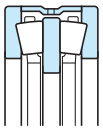
Table 1-11 Needle roller thrust bearings

Separable	Non-separable
	
(AXK, FNT, NTA)	(FNTKF)
■ The separable type, comprising needle roller and cage thrust assembly and a race, can be matched with a pressed thin race (AS) or machined thick race (LS, WS.811, GS.811). ■ The non-separable type comprises needle roller and cage thrust assembly and a precision pressed race. ■ Axial load can be accommodated in one direction. ■ Due to the very small installation space required, this type contributes greatly to size reduction of application equipment. ■ In many cases, needle roller and cage thrust assembly function by using the mounting surface of the application equipment, including shafts and housings, as its raceway surface.	
Pressed cage, synthetic resin molded cage	
Transmissions for automobiles, cultivators and machine tools	



[Remark] The race indicates the thrust washer or washer specified in JIS.

Table 1-12 Tapered roller thrust bearings

Single direction	Double direction
	
(T) (THR)	(2THR)
■ This type of bearing comprises tapered rollers (with spherical large end), which are uniformly guided by ribs of the shaft and housing races. ■ Both shaft and housing races and rollers have tapered surfaces whose apexes converge at a point on the bearing axis. ■ Single direction bearings can accommodate axial load in one direction; and, double direction bearings can accommodate axial load in both directions. ■ Double direction bearings are to be mounted such that their central race is placed on the shaft shoulder. Since this type is treated with a clearance fit, the central race must be fixed with a sleeve, etc.	
[Recommended cages] Copper alloy machined cage	
[Main applications] Single direction : crane hooks, oil excavator swivels Double direction : rolling mill roll necks	

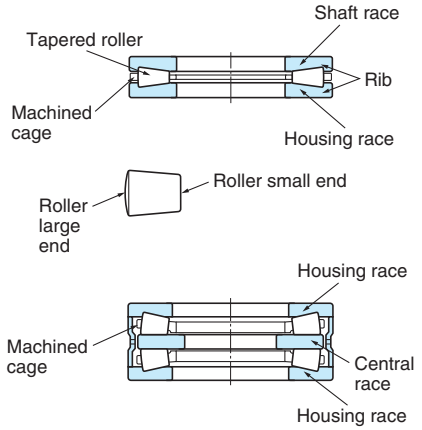
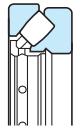
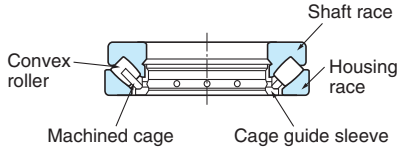


Table 1-13 Spherical thrust roller bearings


29200 29300 29400
■ This type of bearing, comprising barrel-shaped convex rollers arranged at an angle with the axis, is self-aligning due to spherical housing race raceway; therefore, shaft inclination can be compensated for to a certain degree. ■ Great axial load resistance is provided. This type can accommodate a small amount of radial load as well as heavy axial load. ■ Normally, oil lubrication is employed.
Copper alloy machined cage
Hydroelectric generators, vertical motors, propeller shafts for ships, screw down speed reducers, jib cranes, coal mills, pushing machines, molding machines



2. Outline of bearing selection

Currently, as bearing design has become diversified, their application range is being increasingly extended. In order to select the most suitable bearings for an application, it is necessary to conduct a comprehensive study on both bearings and the equipment in which the bearings will be installed, including operating conditions, the performance required of the bearings, specifications of the other components to be installed along with the bearings, marketability, and cost performance, etc.

In selecting bearings, since the shaft diameter is usually determined beforehand, the prospective bearing type is chosen based upon installation space, intended arrangement, and according to the bore diameter required.

Next, from the bearing specifications are determined the service life required when compared to that of the equipment in which it is used, along with a calculation of the actual service life from operational loads.

Internal specifications including bearing accuracy, internal clearance, cage, and lubricant are also selected, depending on the application.

For reference, general selection procedure and operating conditions are described in Fig. 2-1. There is no need to follow a specific order, since the goal is to select the right bearing to achieve optimum performance.

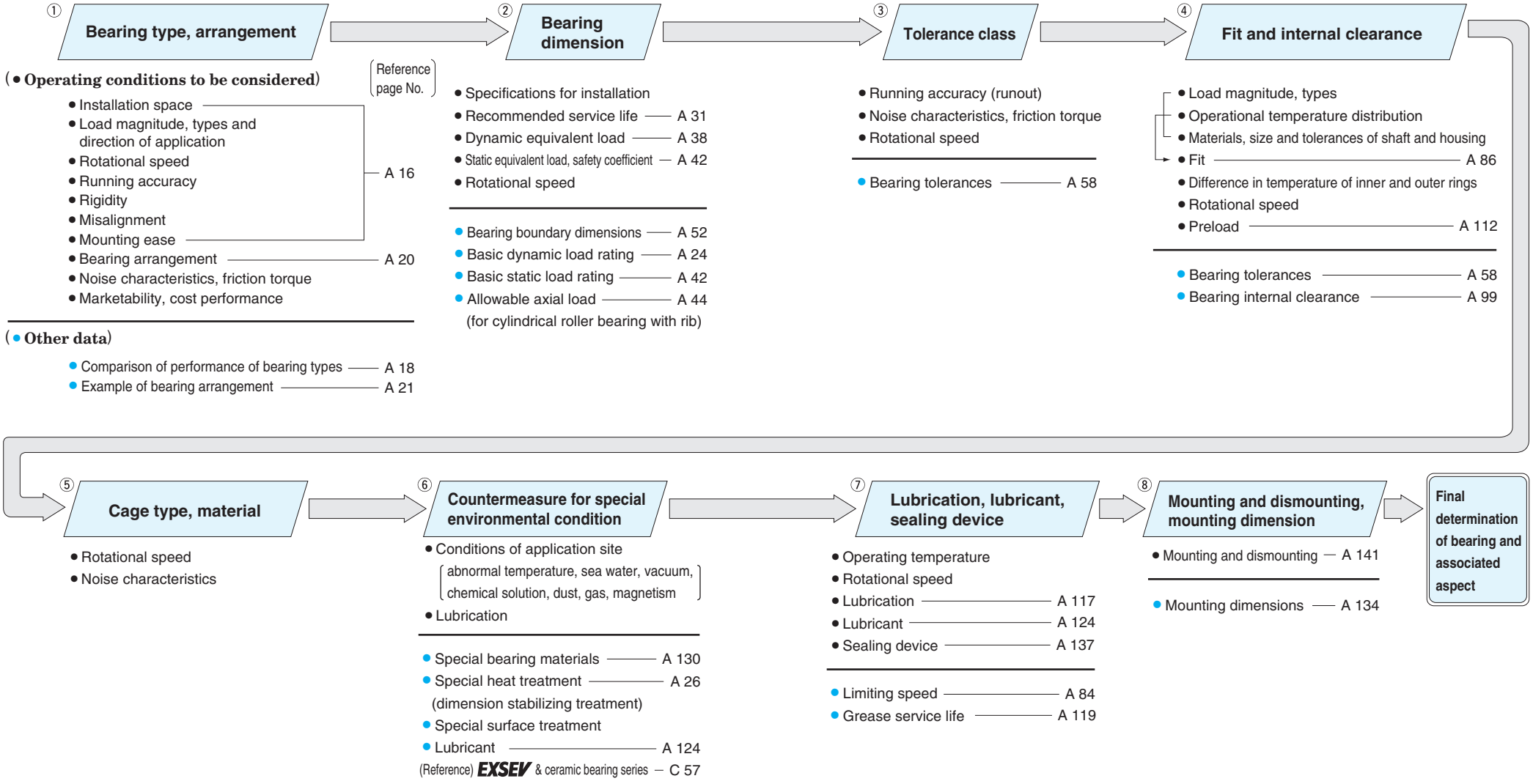


Fig. 2-1(1) Bearing selection procedure

Fig. 2-1(2) Bearing selection procedure

3. Selection of bearing type

In selecting bearings, the most important thing is to fully understand the operating conditions of the bearings.

The main factors to be considered are listed in Table 3-1, while bearing types are listed in Table 3-2.

Table 3-1 (1) Selection of bearing type

Items to be considered		Selection method	Reference page No.
1) Installation space	Bearing can be installed in target equipment	• When a shaft is designed, its rigidity and strength are considered essential; therefore, the shaft diameter, i.e., bore diameter, is determined at start. For rolling bearings, since wide variety with different dimensions are available, the most suitable bearing type should be selected. (Fig. 3-1)	A 52
2) Load	Load magnitude, type and direction which applied (Load resistance of bearing is specified in terms of the basic load rating, and its value is specified in the bearing specification table.)	• Since various types of load are applied to bearings, load magnitude, types (radial or axial) and direction of application (both directions or single direction in the case of axial load), as well as vibration and impact must be considered in order to select the proper bearing. • The following is the general order for radial resistance ; (deep groove ball bearings < angular contact ball bearings < cylindrical roller bearings < tapered roller bearings < spherical roller bearings)	A 18 (Table 3-2) A 87
3) Rotational speed	Response to rotational speed of equipment in which bearings will be installed (The limiting speed for bearing is expressed as allowable speed, and this value is specified in the bearing specification table.)	• Since the allowable speed differs greatly depend-ing not only upon bearing type but on bearing size, cage, accuracy, load and lubrication, all factors must be considered in selecting bearings. • In general, the following bearings are the most widely used for high speed operation. (deep groove ball bearings, angular contact ball bearings, cylindrical roller bearings)	A 18 (Table 3-2) A 84
4) Running accuracy	Accurate rotation delivering required performance (Dimension accuracy and running accuracy of bearings are provided by JIS, etc.)	• Performance required differs depending on equipment in which bearings are installed : for instance, machine tool spindles require high running accuracy, gas turbines require high speed rotation, and control equipment requires low friction. In such cases, bearings of tolerance class 5 or higher are required. • The following are the most widely used bearings. (deep groove ball bearings, angular contact ball bearings, cylindrical roller bearings)	A 18 (Table 3-2) A 58
5) Rigidity	Rigidity that delivers the bearing performance required (When load is applied to a bearing, elastic deformation occurs at the point where its rolling elements contact the raceway surface. The higher the rigidity that bearings possess, the better they control elastic deformation.)	• In machine tool spindles and automobile final drives, bearing rigidity as well as rigidity of equipment itself must be enhanced. • Elastic deformation occurs less in roller bearings than in ball bearings. • Rigidity can be enhanced by providing preload. This method is suitable for use with angular contact ball bearings and tapered roller bearings.	A 18 (Table 3-2) A 112

Table 3-1 (2) Selection of bearing type

Items to be considered		Selection method	Reference page No.
6) Misalignment (aligning capability)	Operating conditions which cause misalignment (shaft deflection caused by load, inaccuracy of shaft and housing, mounting errors) can affect bearing performance (Allowable misalignment (in angle) for each bearing type is described in the section before the bearing specification table, to facilitate determination of the self-aligning capability of bearings.)	• Internal load caused by excessive misalignment damages bearings. Bearings designed to absorb such misalignment should be selected. • The higher the self-aligning capability that bearings possess, the larger the angular misalignment that can be absorbed. The following is the general order of bearings when comparing allowable angular misalignment : (cylindrical roller bearings < tapered roller-bearings < deep groove ball bearings, angular contact ball bearings < spherical roller-bearings, self-aligning ball bearings	A 18 (Table 3-2)
7) Mounting and dismounting	Methods and frequency of mounting and dismounting required for periodic inspection	• Cylindrical roller bearings, needle roller bearings and tapered roller bearings, with separable inner and outer rings, are recommended for applications in which mounting and dismounting is conducted frequently. • Use of sleeve eases the mounting of self-aligning ball bearings and spherical roller bearings with tapered bore.	A 18 (Table 3-2)

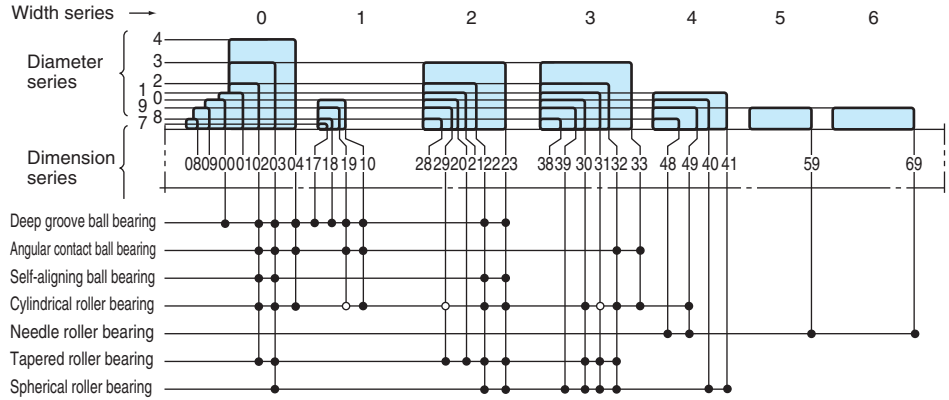


Fig. 3-1 Radial bearing dimension series

Table 3-2 Performance comparison of bearing type

		Deep groove ball bearing	Angular contact ball bearing: Single-row	Angular contact ball bearing: Matched pair or stack	Angular contact ball bearing: Double-row	Four-point contact ball bearing	Self-aligning ball bearing	Cylindrical roller bearing: NU · N	Cylindrical roller bearing: NJ · NF	Cylindrical roller bearing: NUP · NH	Cylindrical roller bearing: NN · NNU	Needle roller bearing (machined ring type)	Tapered roller bearing: Single-row	Tapered roller bearing: Double-row, four-row	Spherical roller bearing	Thrust ball bearing: With flat back faces	Thrust ball bearing: With aligning seat race	Double direction angular contact thrust ball bearing	Cylindrical roller thrust bearing	Needle roller thrust bearing	Tapered roller thrust bearing	Spherical thrust roller bearing	Reference page No.
Load resistance	Radial load	○	○	◎	◎	○	○	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×	×	×	×	△	—
	Axial load	○ ↔	◎ ←	◎ ↔ *	◎ ↔ *	◎ ↔	△ ↔	×	△ ←	△ ↔	×	×	◎ ←	◎ ↔	△ ↔	○ ← *	○ ← *	◎ ↔	◎ ←	◎ ←	◎ ←	◎ ←	—
	Combined load radial and axial	○	○	◎	◎	○	△	×	△	△	×	×	◎	◎	△	×	×	×	×	×	×	△	—
	Vibration or impact load	△	△	△	△	△	△	◎	◎	◎	◎	○	◎	◎	◎	△	△	△	○	○	◎	◎	—
High speed adaptability		◎	◎	◎	○	◎	△	◎	◎	◎	◎	○	○	○	○	△	△	○	△	△	△	△	A16 A84
High accuracy		◎	◎	◎		◎		◎			◎		○			○		◎					A16, 58 A117
Low noise level/low torque		◎						○															A16
Rigidity				○		○		○	○	○	◎	○	○	◎				○	◎	◎	◎		A16
Misalignment		○	△	×	×	×	◎	△	△	△	△	△	△	△	◎	×	◎	×	×	×	×	◎	A17 Description before specification table
Inner and outer ring separability		×	×	×	×	■ *	×	■	■	■	■	■	■	■	×	■	■	■	■	■ *	■	■	—
Arrangement	Fixed side	■ ↔	■ ←	■ ↔	■ ↔ *	■ ↔	■ ↔	×	■ ←	■ ↔	×	×	■ ←	■ ↔	■ ↔								A20
	Free side	□		□	□	□	□	■	□	□	■	■		□	□								A20
Remarks			A pair of bearings mounted facing each other.	*DT arrangement is effective for one direction only.	*Filling slot type is effective for one direction only.	*Non-separable type is also available.							A pair of bearings mounted facing each other.			*Double direction bearings are effective for both directions.				*Non-separable type is also available.			—
Reference page No.		A4 B4	A5 B54			A6 —	A6 B124	A7 B138				A8 B362	A9 B184		A10 B290	A11 B336		— —	A12 B448	A12 B444	A13 —	A13 B354	—

◎ Excellent ○ Good △ Fair Unacceptable ↔ Both directions ← One direction only ■ Acceptable □ Acceptable, but shaft shrinkage must be compensated for.

4. Selection of bearing arrangement

As bearing operational conditions vary depending on devices in which bearings are mounted, different performances are demanded of bearings. Normally, two or more bearings are used on one shaft.

In many cases, in order to locate shaft positions in the axial direction, one bearing is mounted on the fixed side first, then the other bearing is mounted on the free side.

Table 4-1 Bearings on fixed and free sides

	Features	Recommended bearing type	Example No.
Fixed side bearing	• This bearing determines shaft axial position. • This bearing can accommodate both radial and axial loads. • Since axial load in both directions is imposed on this bearing, strength must be considered in selecting the bearing for this side.	Deep groove ball bearing Matched pair or stack angular contact ball bearing Double-row angular contact ball bearing Self-aligning ball bearing Cylindrical roller bearing with rib (NUP and NH types) Double-row tapered roller bearing Spherical roller bearing	Examples 1–11
Free side bearing	• This bearing is employed to compensate for expansion or shrinkage caused by operating temperature change and to allow ajustment of bearing position. • Bearings which accommodate radial load only and whose inner and outer rings are separable are recommended as free side bearings. • In general, if non-separable bearings are used on free side, clearance fit is provided between outer ring and housing to compensate for shaft movement through bearings. In some cases, clearance fit between shaft and inner ring is utilized.	• Separable types Cylindrical roller bearing (NU and N types) Needle roller bearing (NA type, etc.) • Non-separable types Deep groove ball bearing Matched pair angular contact ball bearing (Back-to-back arrangement) Double-row angular contact ball bearing Self-aligning ball bearing Double-row tapered roller bearing (TDO type) Spherical roller bearing	
When fixed and free sides are not distinguished	• When bearing intervals are short and shaft shrinkage does not greatly affect bearing operation, a pair of angular contact ball bearings or tapered roller bearings is used in paired mounting to accommodate axial load. • After mounting, the axial clearance is adjusted using nuts or shims.	Deep groove ball bearing Angular contact ball bearing Self-aligning ball bearing Cylindrical roller bearing (NJ and NF types) Tapered roller bearing Spherical roller bearing	Examples 12–16
Bearings for vertical shafts	• Bearings which can accommodate both radial and axial loads should be used on fixed side. Heavy axial load can be accommodated using thrust bearings together with radial bearings. • Bearings which can accommodate radial load only are used on free side, compensating for shaft movement.	• Fixed side Matched pair angular contact ball bearing (Back-to-back arrangement) Double-row tapered roller bearing (TDO type) Thrust bearing + radial bearing	Examples 17 and 18

Table 4-2 (1) Example bearing arrangements

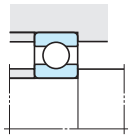
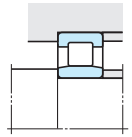
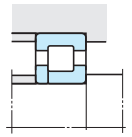
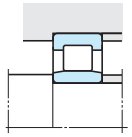
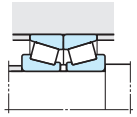
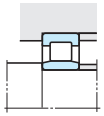
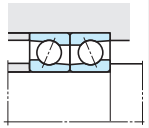
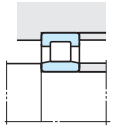
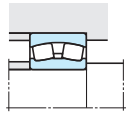
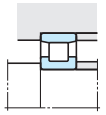
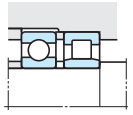
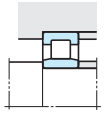
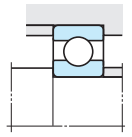
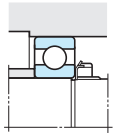
Example	Bearing arrangement: Fixed side	Bearing arrangement: Free side	Recommended application	Application example
Ex. 1			○ Suitable for high-speed operation; used for various types of applications. ○ Not recommended for applications that have center displacement between bearings or shaft deflection.	Medium size motors, air blowers
Ex. 2			○ More suitable than Ex. 1 for operation under heavy load or impact load. Suitable also for high-speed operation. ○ Due to separability, suitable for applications requiring interference of both inner and outer rings. ○ Not recommended for applications that have center displacement between bearings or shaft deflection.	Traction motors for railway rolling stock
Ex. 3			○ Recommended for applications under heavier or greater impact load than those in Ex. 2. ○ This arrangement requires high rigidity from fixed side bearings mounted back to back, with preload provided. ○ Shaft and housing of accurate dimensions should be selected and mounted properly.	Steel manufacturing table rollers, lathe spindles
Ex. 4			○ This is recommended for operation at high speed or axial load lighter than in Ex. 3. ○ This is recommended for applications requiring interference of both inner and outer rings. ○ Some applications use double-row angular contact ball bearings on fixed side instead of matched pair angular contact ball bearings.	Motors
Ex. 5			○ This is recommended for operations under relatively small axial load. ○ This is recommended for applications requiring interference of both inner and outer rings.	Paper manufacturing calender rollers, diesel locomotive axle journals
Ex. 6			○ This is recommended for operations at high speed and heavy radial load, as well as normal axial load. ○ When deep groove ball bearings are used, clearance must be provided between outside diameter and housing, to prevent application of radial load.	Diesel locomotive transmissions
Ex. 7			○ This arrangement is most widely employed. ○ This arrangement can accommodate partial axial load as well as radial load.	Pumps, automobile transmissions

Table 4-2 (2) Example bearing arrangements

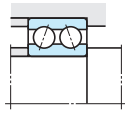
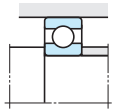
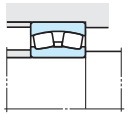
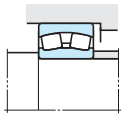
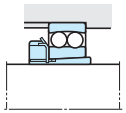
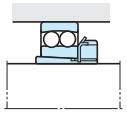
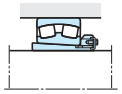
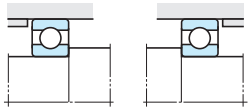
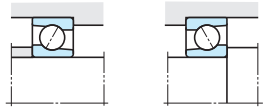
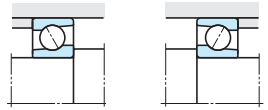
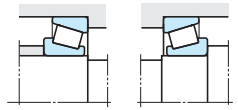
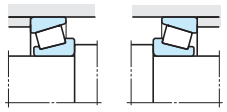
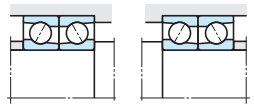
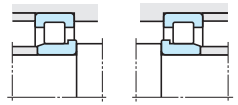
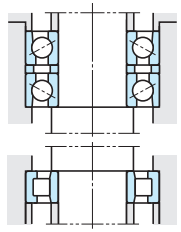
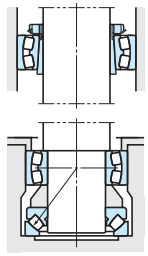
Example	Bearing arrangement		Recommended application	Application example
	Fixed side	Free side		
Ex. 8			○ This is recommended for operations with relatively heavy axial load in both directions. ○ Some applications use matched pair angular contact ball bearings on fixed side instead of double-row angular contact ball bearings.	Worm gear speed reducers
Ex. 9			○ This is the optimum arrangement for applications with possible mounting errors or shaft deflection. ○ Bearings in this arrangement can accommodate partial axial load, as well as heavy radial load.	Steel manufacturing table roller speed reducers, overhead crane wheels
Ex. 10			○ This is optimum arrangement for applications with possible mounting errors or shaft deflection. ○ Ease of mounting and dismounting, ensured by use of adaptor, makes this arrangement suitable for long shafts which are neither stepped nor threaded. ○ This arrangement is not recommended for applications requiring axial load capability.	General industrial equipment counter shafts
Ex. 11			○ This is the optimum arrangement for applications with possible mounting errors or shaft deflection. ○ This is recommended for operations under impact load or radial load heavier than that in Ex. 10. ○ This arrangement can accommodate partial axial load as well as radial load.	Steel manufacturing table rollers
Arrangement in which fixed and free sides are not distinguished			**Recommended application**	**Application example**
Ex. 12			○ This arrangement is most popular when applied to small equipment operating under light load. ○ When used with light preloading, thickness-adjusted shim or spring is mounted on one side of outer ring.	Small motors, small speed reducers, small pumps
Ex. 13	 Back-to-back  Face-to-face		○ This is suitable for applications in which rigidity is enhanced by preloading. This is frequently employed in applications requiring high speed operation under relatively large axial load. ○ Back-to-back arrangement is suitable for applications in which moment load affects operation. ○ When preloading is required, care should be taken in preload adjustment.	Machine tool spindles

Table 4-2 (3) Example bearing arrangements

Example	Arrangement in which fixed and free sides are not distinguished	Recommended application	Application example
Ex. 14	 Back-to-back  Face-to-face	○ This is recommended for operation under impact load or axial load heavier than in Ex. 13. ○ This is suitable for applications in which rigidity is enhanced by preloading. ○ Back-to-back arrangement is suitable for applications in which moment load affects operation. ○ When interference is required between inner ring and shaft, face-to-face arrangement simplifies mounting. This arrangement is effective for applications in which mounting error is possible. ○ When preloading is required, care should be taken in preload adjustment.	Speed reducers, automobile wheels
Ex. 15		○ This is recommended for applications requiring high speed and high accuracy of rotation under light load. ○ This is suitable for applications in which rigidity is enhanced by preloading. ○ Tandem arrangement and face-to-face arrangement are possible, as is back-to-back arrangement.	Machine tool spindles
Ex. 16		○ This arrangement provides resistance against heavy radial and impact loads. ○ This is applicable when both inner and outer rings require interference. ○ Care should be taken not to reduce axial internal clearance a critical amount during operation.	Construction equipment final drive
Application to vertical shafts		**Recommended application**	**Application example**
Ex. 17	 Fixed side Free side	○ This arrangement, using matched pair angular contact ball bearings on the fixed side and cylindrical roller bearings on the free side, is suitable for high speed operation.	Vertical motors, vertical pumps
Ex. 18	 Free side Fixed side	○ This is recommended for operation at low speed and heavy load, in which axial load is heavier than radial load. ○ Due to self-aligning capability, this is suitable for applications in which shaft runout or deflection occurs.	Crane center shafts, vertical pumps

5. Selection of bearing dimensions

5-1 Bearing service life

When bearings rotate under load, material flakes from the surfaces of inner and outer rings or rolling elements by fatigue arising from repeated contact stress (ref. A 152).

This phenomenon is called flaking.

The total number of bearing rotations until flaking occurs is regarded as the bearing "(fatigue) service life".

"(Fatigue) service life" differs greatly depending upon bearing structures, dimensions, materials, and processing methods.

Since this phenomenon results from fatigue distribution in bearing materials themselves, differences in bearing service life should be statistically considered.

When a group of identical bearings are rotated under the same conditions, the total number of revolutions until 90 % of the bearings are left without flaking (i.e. a service life of 90 % reliability) is defined as the basic rating life. In operation at a constant speed, the basic rating life can be expressed in terms of time.

In actual operation, a bearing fails not only because of fatigue, but other factors as well, such as wear, seizure, creeping, fretting, brinelling, cracking etc (ref. A 152, 16. Examples of bearing failures).

These bearing failures can be minimized by selecting the proper mounting method and lubricant, as well as the bearing most suitable for the application.

5-2 Calculation of service life

5-2-1 Basic dynamic load rating C

The basic dynamic load rating is either pure radial (for radial bearings) or central axial load (for thrust bearings) of constant magnitude in a constant direction, under which the basic rating life of 1 million revolutions can be obtained, when the inner ring rotates while the outer ring is stationary, or vice versa. The basic dynamic load rating, which represents the capacity of a bearing under rolling fatigue, is specified as the basic dynamic radial load rating (C_r) for radial bearings, and basic dynamic axial load rating (C_a) for thrust bearings. These load ratings are listed in the specification table.

These values are prescribed by ISO 281/1990, and are subject to change by conformance to the latest ISO standards.

5-2-2 Basic rating life L_{10}

The basic rating life L_{10} is a service life of 90 % reliability when used under normal usage conditions for bearings of high manufacturing quality where the inside of the bearing is of a standard design made from bearing steel materials specified in JIS or equivalent materials.

The relationship between the basic dynamic load rating, dynamic equivalent load, and basic rating life of a bearing can be expressed using equation (5-1). This life calculation equation does not apply to bearings that are affected by factors such as plastic deformation of the contact surfaces of raceways and rolling elements due to extremely high load conditions (when P exceeds either the basic static load rating C_0 (refer to p. A 42) or 0.5C) or, conversely, to bearings that are affected by factors such as the contact surfaces of raceways and rolling elements slipping due to extremely low load conditions.

If conditions like these may be encountered, consult with JTEKT.

It is convenient to express the basic rating life in terms of time, using equation (5-2), when a bearing is used for operation at a constant speed; and, in terms of traveling distance (km), using equation (5-3), when a bearing is used in railway rolling stock or automobiles.

(Total revolutions) $$L_{10} = \left(\frac{C}{P}\right)^p \quad \cdots\cdots (5\text{-}1)$$

(Time) $$L_{10h} = \frac{10^6}{60n}\left(\frac{C}{P}\right)^p \quad \cdots\cdots (5\text{-}2)$$

(Running distance) $$L_{10s} = \pi D L_{10} \quad \cdots\cdots (5\text{-}3)$$

where :

L_{10}	: basic rating life	10^6 revolutions
L_{10h}	: basic rating life	h
L_{10s}	: basic rating life	km
P	: dynamic equivalent load	N
	……(refer to p. A 38.)	
C	: basic dynamic load rating	N
n	: rotational speed	min^{-1}
p	: for ball bearings…… $p = 3$	
	for roller bearings…… $p = 10/3$	
D	: wheel or tire diameter	mm

Accordingly, where the dynamic equivalent load is P, and rotational speed is n, equation (5-4) can be used to calculate the basic dynamic load rating C; the bearing size most suitable for a specified purpose can then be selected, referring to the bearing specification table.

The recommended bearing service life differs depending on the machines with which the bearing is used, as shown in Table 5-5, p. A 31.

$$C = P\left(L_{10h}\times\frac{60n}{10^6}\right)^{1/p} \quad \cdots\cdots (5\text{-}4)$$

[Reference]

The equations using a service life coefficient (f_h) and rotational speed coefficient (f_n) respectively, based on equation (5-2), are as follows :

$$L_{10h} = 500 f_h^p \quad \cdots\cdots (5\text{-}5)$$

Coefficient of service life :

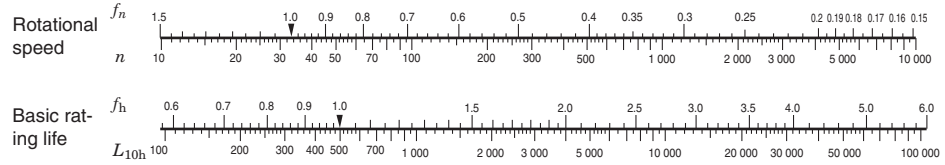
$$f_h = f_n\frac{C}{P} \quad \cdots\cdots (5\text{-}6)$$

Coefficient of rotational speed :

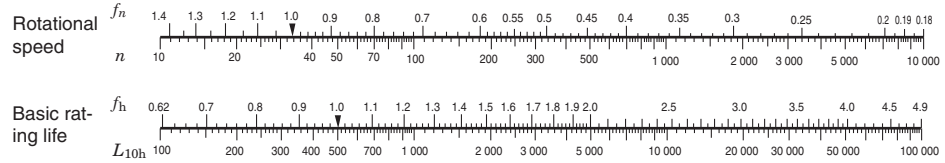
$$f_n = \left(\frac{10^6}{500\times 60n}\right)^{1/p} = (0.03n)^{-1/p} \quad \cdots\cdots (5\text{-}7)$$

For reference, the values of f_n, f_h, and L_{10h} can be easily obtained by employing the nomograph attached to this catalog, as an abbreviated method.

[Ball bearing]



[Roller bearing]



[Reference] Rotational speed (n) and its coefficients (f_n), and service life coefficient (f_h) and basic rating life (L_{10h})

5-2-3 Correction of basic dynamic load rating for high temperature use and dimension stabilizing treatment

In high temperature operation, bearing material hardness deteriorates, as material compositions are altered. As a result, the basic dynamic load rating is diminished. Once altered, material composition is not recovered, even if operating temperatures return to normal.

Therefore, for bearings used in high temperature operation, the basic dynamic load rating should be corrected by multiplying the basic dynamic load rating values specified in the bearing specification table by the temperature coefficient values in Table 5-1.

Table 5-1 Temperature coefficient values

Bearing temperature, °C	125	150	175	200	250
Temperature coefficient	1	1	0.95	0.90	0.75

Since normal heat treatment is not effective in maintaining the original bearing size in extended operation at 120 °C or higher, dimension stabilizing treatment is necessary. Dimension stabilizing treatment codes and their effective temperature ranges are described in Table 5-2.

Since dimension stabilizing treatment diminishes material hardness, the basic dynamic load rating may be reduced for some types of bearings.

Table 5-2 Dimension stabilizing treatment

Dimension stabilizing treatment code	Effective temperature range
S0	Over 100°C, up to 150°C
S1	150°C 200°C
S2	200°C 250°C

5-2-4 Modified rating life L_{nm}

The life of rolling bearings was standardized as a basic rating life in the 1960s, but in actual applications, sometimes the actual life and the basic rating life have been quite different due to the lubrication status and the influence of the usage environment. To make the calculated life closer to the actual life, a corrected rating life has been considered since the 1980s. In this corrected rating life, bearing characteristic factor a_2 (a correction factor for the case in which the characteristics related to the life are changed due to the bearing materials, manufacturing process, and design) and usage condition factor a_3 (a correction factor that takes into account usage conditions that have a direct influence on the bearing life, such as the lubrication) or factor a_{23} formed from the interdependence of these two factors, are considered with the basic rating life. These factors were handled differently by each bearing manufacturer, but they have been standardized as a modified rating life in **ISO 281** in 2007. In 2013, **JIS B 1518** (dynamic load ratings and rating life) was amended to conform to the **ISO**.

The basic rating life (L_{10}) shown in equation (5-1) is the (fatigue) life with a dependability of 90 % under normal usage conditions for rolling bearings that have standard factors such as internal design, materials, and manufacturing quality. **JIS B 1518**:2013 specifies a calculation method based on **ISO 281**:2007. To calculate accurate bearing life under a variety of operating conditions, it is necessary to consider elements such as the effect of changes in factors that can be anticipated when using different reliabilities and system approaches, and interactions between factors. Therefore, the specified calculation method considers additional stress due to the lubrication status, lubricant contamination, and fatigue load limit C_u (refer to p. A 29) on the inside of the bearing. The life that uses this life modification factor a_{ISO}, which considers the above factors, is called modified rating life L_{nm} and is calculated with the following equation (5-8).

$$L_{nm} = a_1 a_{ISO} L_{10} \quad \cdots\cdots (5\text{-}8)$$

In this equation,

L_{nm} : Modified rating life 10^6 rotations
(This rating life has been modified for one of or a combination of the following: reliability of 90 % or higher, fatigue load limit, special bearing characteristics, lubrication contamination, and special operating conditions.)

L_{10} : Basic rating life (reliability: 90 %) 10^6 rotations

a_1 : Life modification factor for reliability ····· refer to section (1)

a_{ISO} : Life modification factor ····· refer to section (2)

[Remark]
When bearing dimensions are to be selected given L_{nm} greater than 90 % in reliability, the strength of shaft and housing must be considered.

(1) Life modification factor for reliability a_1

The term "reliability" is defined as "for a group of apparently identical rolling bearings, operating under the same conditions, the percentage of the group that is expected to attain or exceed a specified life" in **ISO 281**:2007. Values of a_1 used to calculate a modified rating life with a reliability of 90 % or higher (a failure probability of 10 % or less) are shown in Table 5-3.

Table 5-3 Life modification factor for reliability a_1

Reliability, %	L_{nm}	a_1
90	L_{10m}	1
95	L_{5m}	0.64
96	L_{4m}	0.55
97	L_{3m}	0.47
98	L_{2m}	0.37
99	L_{1m}	0.25
99.2	$L_{0.8m}$	0.22
99.4	$L_{0.6m}$	0.19
99.6	$L_{0.4m}$	0.16
99.8	$L_{0.2m}$	0.12
99.9	$L_{0.1m}$	0.093
99.92	$L_{0.08m}$	0.087
99.94	$L_{0.06m}$	0.080
99.95	$L_{0.05m}$	0.077

(Citation from **JIS B 1518**:2013)

(2) Life modification factor a_{ISO}

a) System approach

The various influences on bearing life are dependent on each other. The system approach of calculating the modified life has been evaluated as a practical method for determining life modification factor a_{ISO} (ref. Fig. 5-1). Life modification factor a_{ISO} is calculated with the following equation. A diagram is available for each bearing type (radial ball bearings, radial roller bearings, thrust ball bearings, and thrust roller bearings). (Each diagram (Figs. 5-2 to 5-5) is a citation from **JIS B 1518**:2013.)

Note that in practical use, this is set so that life modification factor $a_{ISO} \leqq 50$.

$$a_{ISO} = f\left(\frac{e_c C_u}{P},\ \kappa\right) \quad \cdots\cdots (5\text{-}9)$$

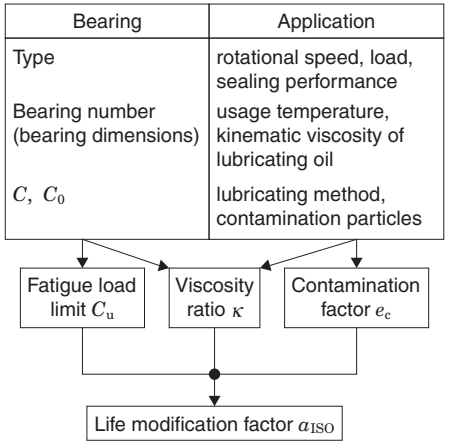


Fig. 5-1 System approach

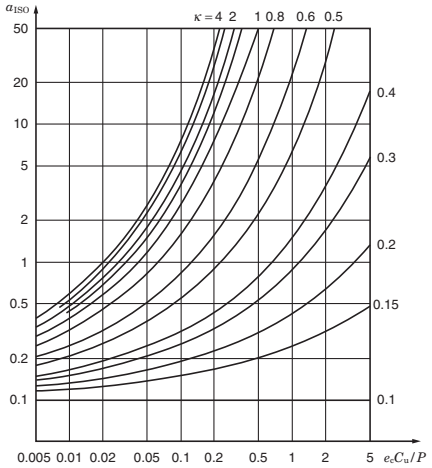


Fig. 5-2 Life modification factor a_{ISO} (Radial ball bearings)

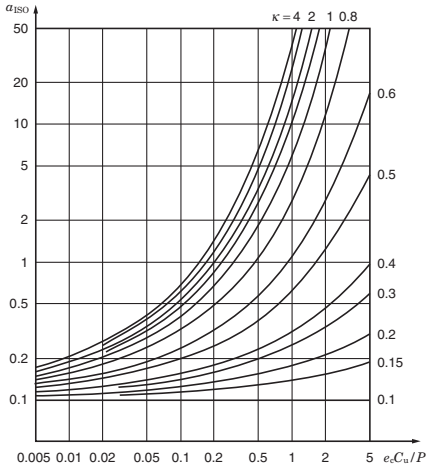


Fig. 5-3 Life modification factor a_{ISO} (Radial roller bearings)

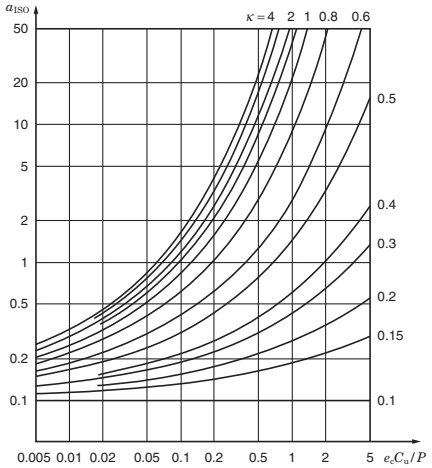


Fig. 5-4 Life modification factor a_{ISO} (Thrust ball bearings)

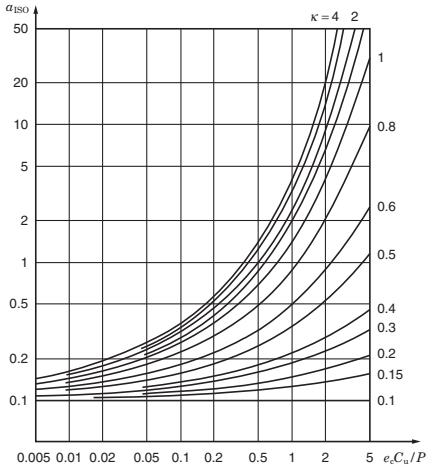


Fig. 5-5 Life modification factor a_{ISO} (Thrust roller bearings)

(Figs. 5-2 to 5-5 Citation from **JIS B 1518**:2013)

b) Fatigue load limit C_u

For regulated steel materials or alloy steel that has equivalent quality, the fatigue life is unlimited so long as the load condition does not exceed a certain value and so long as the lubrication conditions, lubrication cleanliness class, and other operating conditions are favorable. For general high-quality materials and bearings with high manufacturing quality, the fatigue stress limit is reached at a contact stress of approximately 1.5 GPa between the raceway and rolling elements. If one or both of the material quality and manufacturing quality are low, the fatigue stress limit will also be low.

The term "fatigue load limit" C_u is defined as "bearing load under which the fatigue stress limit is just reached in the most heavily loaded raceway contact" in **ISO 281**:2007. and is affected by factors such as the bearing type, size, and material.

For details on the fatigue load limits of special bearings and other bearings not listed in this catalog, contact JTEKT.

c) Contamination factor e_c

If solid particles in the contaminated lubricant are caught between the raceway and the rolling elements, indentations may form on one or both of the raceway and the rolling elements. These indentations will lead to localized increases in stress, which will decrease the life. This decrease in life attributable to the contamination of the lubricant can be calculated from the contamination level as contamination factor e_c.

D_{pw} shown in this table is the pitch diameter of ball/roller set, which is expressed simply as $D_{pw} = (D + d)/2$. (D: Outside diameter, d: Bore diameter)

For information such as details on special lubricating conditions or detailed investigations, contact JTEKT.

Table 5-4 Values of contamination factor e_c

Contamination level	e_c	
	$D_{pw} < 100$ mm	$D_{pw} \geqq 100$ mm
Extremely high cleanliness: The size of the particles is approximately equal to the thickness of the lubricant oil film, this is found in laboratory-level environments.	1	1
High cleanliness: The oil has been filtered by an extremely fine filter, this is found with standard grease-packed bearings and sealed bearings.	0.8 to 0.6	0.9 to 0.8
Standard cleanliness: The oil has been filtered by a fine filter, this is found with standard grease-packed bearings and shielded bearings.	0.6 to 0.5	0.8 to 0.6
Minimal contamination: The lubricant is slightly contaminated.	0.5 to 0.3	0.6 to 0.4
Normal contamination: This is found when no seal is used and a coarse filter is used in an environment in which wear debris and particles from the surrounding area penetrate into the lubricant.	0.3 to 0.1	0.4 to 0.2
High contamination: This is found when the surrounding environment is considerably contaminated and the bearing sealing is insufficient.	0.1 to 0	0.1 to 0
Extremely high contamination	0	0

(Table 5-4 Citation from **JIS B 1518**:2013)

d) Viscosity ratio κ

The lubricant forms an oil film on the roller contact surface, which separates the raceway and the rolling elements. The status of the lubricant oil film is expressed by viscosity ratio κ, the actual kinematic viscosity at the operating temperature ν divided by the reference kinematic viscosity ν_1 as shown in the following equation.

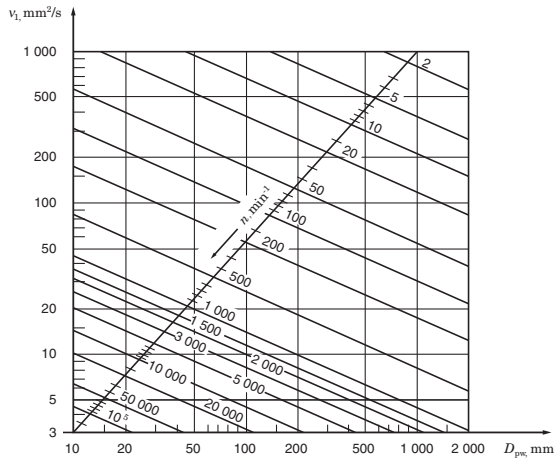
A κ greater than 4, equal to 4, or less than 0.1 is not applicable.

For details on lubricants such as grease and lubricants with extreme pressure additives, contact JTEKT.

$$\kappa = \frac{\nu}{\nu_1} \quad \cdots\cdots (5\text{-}10)$$

ν : Actual kinematic viscosity at the operating temperature; the viscosity of the lubricant at the operating temperature (refer to Fig. 12-3, p. A129)

ν_1 : Reference kinematic viscosity; determined according to the speed and pitch diameter of ball/roller set D_{pw} of the bearing (ref. Fig. 5-6)



(Fig. 5-6 Citation from **JIS B 1518**:2013)

Fig. 5-6 Reference kinematic viscosity ν_1

5-2-5 Service life of bearing system comprising two or more bearings

Even for systems which comprise two or more bearings, if one bearing is damaged, the entire system malfunctions.

Where all bearings used in an application are regarded as one system, the service life of the bearing system can be calculated using the following equation,

$$\frac{1}{L^e} = \frac{1}{L_1{}^e} + \frac{1}{L_2{}^e} + \frac{1}{L_3{}^e} + \cdots\cdots\cdots\cdots \quad (5\text{-}11)$$

where :

L : rating life of system

L_1 , L_2 , L_3 $\cdots\cdots$: rating life of each bearing

e : constant

e = 10/9$\cdots\cdots$ball bearing

e = 9/8$\cdots\cdots$roller bearing

The mean value is for a system using both ball and roller bearings.

[Example]

When a shaft is supported by two roller bearings whose service lives are 50 000 hours and 30 000 hours respectively, the rating life of the bearing system supporting this shaft is calculated as follows, using equation (5-11) :

$$\frac{1}{L^{9/8}} = \frac{1}{50\,000^{9/8}} + \frac{1}{30\,000^{9/8}}$$

$$L \fallingdotseq 20\,000 \text{ h}$$

The equation suggests that the rating life of these bearings as a system becomes shorter than that of the bearing with the shorter life.

This fact is very important in estimating bearing service life for applications using two or more bearings.

5-2-6 Applications and recommended bearing service life

Since longer service life does not always contribute to economical operation, the most suitable service life for each application and operating conditions should be determined.

For reference, Table 5-5 describes recommended service life in accordance with the application, as empirically determined.

Table 5-5 Recommended bearing service life (reference)

Operating condition	Application	Recommended service life (h)
Short or intermittent operation	Household electric appliance, electric tools, agricultural equipment, heavy cargo hoisting equipment	4 000 – 8 000
Not extended duration, but stable operation required	Household air conditioner motors, construction equipment, conveyers, elevators	8 000 – 12 000
Intermittent but extended operation	Rolling mill roll necks, small motors, cranes	8 000 – 12 000
	Motors used in factories, general gears	12 000 – 20 000
	Machine tools, shaker screens, crushers	20 000 – 30 000
	Compressors, pumps, gears for essential use	40 000 – 60 000
Daily operation more than 8 hr. or continuous extended operation	Escalators	12 000 – 20 000
	Centrifugal separators, air conditioners, air blowers, woodworking equipment, passenger coach axle journals	20 000 – 30 000
	Large motors, mine hoists, locomotive axle journals, railway rolling stock traction motors	40 000 – 60 000
	Paper manufacturing equipment	100 000 – 200 000
24 hr. operation (no failure allowed)	Water supply facilities, power stations, mine water discharge facilities	100 000 – 200 000

5-3 Calculation of loads

Loads affecting bearings includes force exerted by the weight of the object the bearings support, transmission force of devices such as gears and belts, loads generated in equipment during operation etc.

Seldom can these kinds of load be determined by simple calculation, because the load is not always constant.

In many cases, the load fluctuates, and it is difficult to determine the frequency and magnitude of the fluctuation.

Therefore, loads are normally obtained by multiplying theoretical values with various coefficients obtained empirically.

5-3-1 Load coefficient

Even if radial and axial loads are obtained through general dynamic calculation, the actual load becomes greater than the calculated value due to vibration and impact during operation.

In many cases, the load is obtained by multiplying theoretical values by the load coefficient.

Table 5-6 Values of load coefficient f_w

Operating condition	Application example	f_w
Operation with little vibration or impact	Motors Machine tools Measuring instrument	1.0 – 1.2
Normal operation (slight impact)	Railway rolling stock Automobiles Paper manufacturing equipment Air blowers Compressors Agricultural equipment	1.2 – 2.0
Operation with severe vibration or impact	Rolling mills Crushers Construction equipment Shaker screens	2.0 – 3.0

$$F = f_w \cdot F_c \quad \cdots\cdots (5\text{-}12)$$

where :

F : measured load N

F_c : calculated load N

f_w : load coefficient (ref. Table 5-6)

5-3-2 Load generated through belt or chain transmission

In the case of belt transmission, the theoretical value of the load affecting the pulley shafts can be determined by obtaining the effective transmission force of the belt.

For actual operation, the load is obtained by multiplying this effective transmission force by the load coefficient (f_w) considering vibration and impact generated during operation, and the belt coefficient (f_b) considering belt tension.

In the case of chain transmission, the load is determined using a coefficient equivalent to the belt coefficient.

This equation (5-13) is as follows ;

$$F_b = \frac{2M}{D_p} \cdot f_w \cdot f_b = \frac{19.1\times10^6 W}{D_p n} \cdot f_w \cdot f_b \quad \cdots\cdots (5\text{-}13)$$

where :

F_b : estimated load affecting pulley shaft or sprocket shaft N

M : torque affecting pulley or sprocket mN · m

W : transmission force kW

D_p : pitch circle diameter of pulley or sprocket mm

n : rotational speed min^{-1}

f_w : load coefficient (ref. Table 5-6)

f_b : belt coefficient (ref. Table 5-7)

Table 5-7 Values of belt coefficient f_b

Belt type	f_b
Timing belt (with teeth)	1.3 – 2.0
V-belt	2.0 – 2.5
Flat belt (with tension pulley)	2.5 – 3.0
Flat belt	4.0 – 5.0
Chain	1.2 – 1.5

5-3-3 Load generated under gear transmission

(1) Loads affecting gear and gear coefficient

In the case of gear transmission, loads transmitted by gearing are theoretically classified into three types: tangential load (K_t), radial load (K_r) and axial load (K_a).

Those loads can be calculated dynamically (using equations ⓐ, ⓑ and ⓒ, described in section (2)).

To determine the actual gear loads, these theoretical loads must be multiplied by coefficients considering vibration and impact during operation (f_w) (ref. Table 5-6) and the gear coefficient (f_g) (ref. Table 5-8) considering the finish treatment of gears.

Table 5-8 Values of gear coefficient f_g

Gear type	f_g
Precision gears (both pitch error and tooth shape error less than 0.02 mm)	1.0 – 1.1
Normal gears (both pitch error and tooth shape error less than 0.1 mm)	1.1 – 1.3

(2) Calculation of load on gears

ⓐ Tangential load (tangential force) K_t

(Spur gears, helical gears, double-helical gears, straight bevel gears, spiral bevel gears)

$$K_t = \frac{2M}{D_p} = \frac{19.1\times10^6\ W}{D_p n} \quad \cdots\cdots (5\text{-}14)$$

ⓐ~ⓒ where :

K_t	: gear tangential load	N
K_r	: gear radial load	N
K_a	: gear axial load	N
M	: torque affecting gears	mN · m
D_p	: gear pitch circle diameter	mm
W	: transmitting force	kW
n	: rotational speed	min^{-1}
α	: gear pressure angle	deg
β	: gear helix (spiral) angle	deg
δ	: bevel gear pitch angle	deg

		ⓑ Radial load (separating force) K_r	ⓒ Axial load (axial force) K_a
Spur gears		$K_r = K_t \tan\alpha$ ····· (5-15)	0
Helical gears		$K_r = K_t \frac{\tan\alpha}{\cos\beta}$ ····· (5-16)	$K_a = K_t \tan\beta$ ····· (5-22)
Double-helical gears		$K_r = K_t \frac{\tan\alpha}{\cos\beta}$ ····· (5-17)	0
Straight[1] bevel gears	Drive side	$K_{r1} = K_t \tan\alpha \cos\delta_1$ ····· (5-18)	$K_{a1} = K_t \tan\alpha \sin\delta_1$ ····· (5-23)
	Driven side	$K_{r2} = K_t \tan\alpha \cos\delta_2$ ····· (5-19)	$K_{a2} = K_t \tan\alpha \sin\delta_2$ ····· (5-24)
Spiral[1), 2)] bevel gears	Drive side	$K_{r1} = \frac{K_t}{\cos\beta}\left(\tan\alpha \cos\delta_1 \pm \sin\beta \sin\delta_1\right)$ ····· (5-20)	$K_{a1} = \frac{K_t}{\cos\beta}\left(\tan\alpha \sin\delta_1 \mp \sin\beta \cos\delta_1\right)$ ····· (5-25)
	Driven side	$K_{r2} = \frac{K_t}{\cos\beta}\left(\tan\alpha \cos\delta_2 \mp \sin\beta \sin\delta_2\right)$ ····· (5-21)	$K_{a2} = \frac{K_t}{\cos\beta}\left(\tan\alpha \sin\delta_2 \pm \sin\beta \cos\delta_2\right)$ ····· (5-26)

[Notes] 1) Codes with subscript 1 and 2 shown in equations are respectively applicable to drive side gears and driven side gears.

2) Symbols (+) and (–) denote the following ;

Symbols in upper row : clockwise rotation accompanied by right-handed spiral or counterclockwise rotation with left-handed spiral

Symbols in lower row : counterclockwise rotation with right-handed spiral or clockwise rotation with left-handed spiral

[Remark] Rotating directions are described as viewed at the back of the apex of the pitch angle.

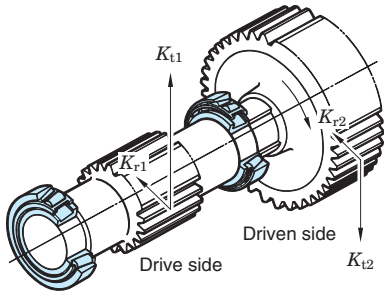


Fig. 5-7 Load on spur gears

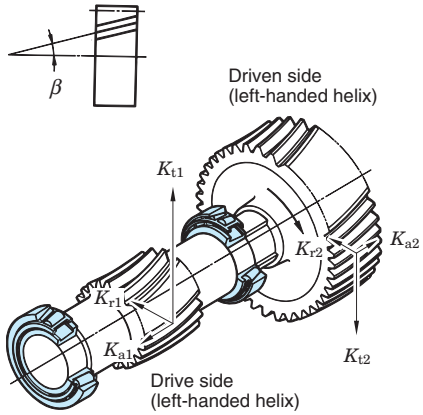


Fig. 5-8 Load on helical gears

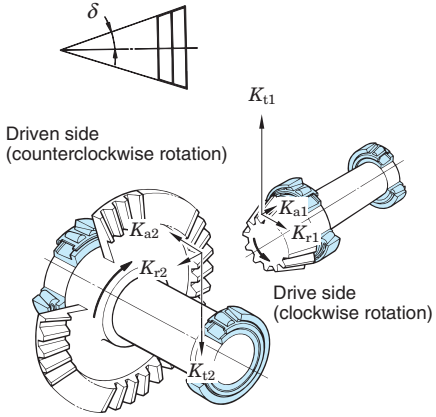


Fig. 5-9 Load on straight bevel gears

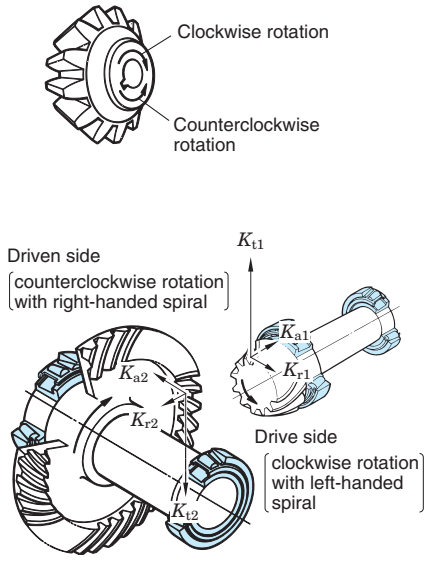


Fig. 5-10 Load on spiral bevel gears

5-3-4 Load distribution on bearings

The load distribution affecting bearings can be calculated as follows: first, radial force components are calculated, then, the sum of vectors of the components is obtained in accordance with the load direction.

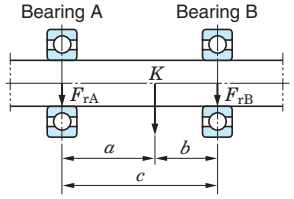
Calculation examples of radial load distribution are described in the following section.

[Remark]

Bearings shown in Exs. 3 to 5 are affected by components of axial force when these bearings accommodate radial load, and axial load (K_a) which is transferred externally, i.e. from gears.

For calculation of the axial load in this case, refer to page A 38.

Example 1 Fundamental calculation (1)

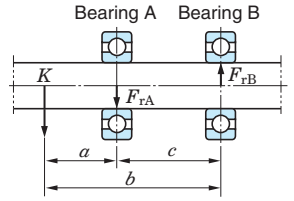


$$F_{rA} = \frac{b}{c}K$$

$$F_{rB} = \frac{a}{c}K$$

..... (5-27)

Example 2 Fundamental calculation (2)

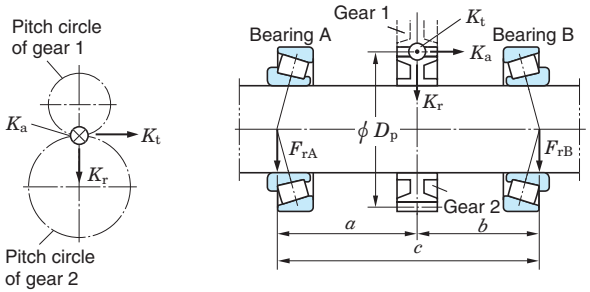


$$F_{rA} = \frac{b}{c}K$$

$$F_{rB} = \frac{a}{c}K$$

..... (5-28)

Example 3 Gear load distribution (1)

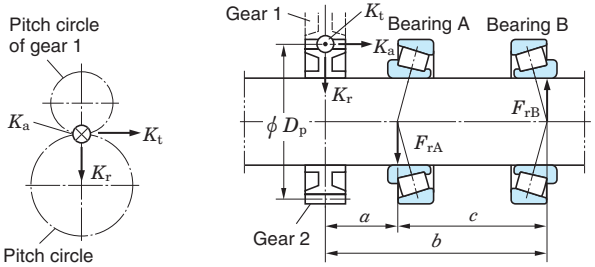


$$F_{rA} = \sqrt{\left(\frac{b}{c}K_t\right)^2 + \left(\frac{b}{c}K_r - \frac{D_p}{2c}K_a\right)^2}$$

$$F_{rB} = \sqrt{\left(\frac{a}{c}K_t\right)^2 + \left(\frac{a}{c}K_r + \frac{D_p}{2c}K_a\right)^2}$$

..... (5-29)

Example 4 Gear load distribution (2)



$$F_{rA} = \sqrt{\left(\frac{b}{c}K_t\right)^2 + \left(\frac{b}{c}K_r - \frac{D_p}{2c}K_a\right)^2}$$

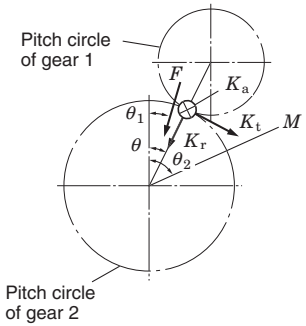
$$F_{rB} = \sqrt{\left(\frac{a}{c}K_t\right)^2 + \left(\frac{a}{c}K_r - \frac{D_p}{2c}K_a\right)^2}$$

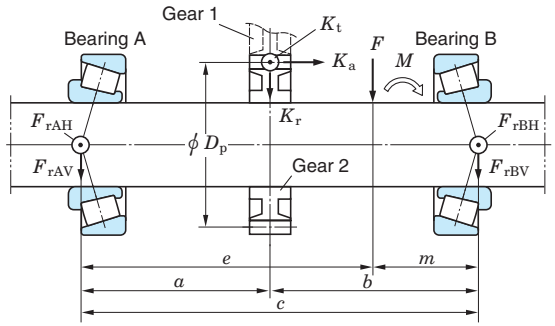
..... (5-30)

Description of signs in Examples 1 to 5

F_{rA}: radial load on bearing A	N	D_p: gear pitch circle diameter	mm
F_{rB}: radial load on bearing B	N	$\odot$: denotes load direction (upward	
K : shaft load	N	perpendicular to paper surface)	
K_t, K_r, K_a: gear load	N	$\otimes$: denotes load direction (downward	
(ref. A 34)		perpendicular to paper surface)	

Example 5 Simultaneous application of gear load and other load





(Gears 1 and 2 are engaged with each other at angle θ. External load F, moment M, are applied to these gears at angles θ_1 and θ_2.)

- Perpendicular radial component force (upward and downward along diagram)

$$F_{rAV} = \frac{b}{c}(K_r\cos\theta + K_t\sin\theta) - \frac{D_p}{2c}K_a\cos\theta + \frac{m}{c}F\cos\theta_1 - \frac{M}{c}\cos\theta_2$$

$$F_{rBV} = \frac{a}{c}(K_r\cos\theta + K_t\sin\theta) + \frac{D_p}{2c}K_a\cos\theta + \frac{e}{c}F\cos\theta_1 + \frac{M}{c}\cos\theta_2$$

- Horizontal radial component force (upward and downward perpendicular to diagram)

$$F_{rAH} = \frac{b}{c}(K_r\sin\theta - K_t\cos\theta) - \frac{D_p}{2c}K_a\sin\theta + \frac{m}{c}F\sin\theta_1 - \frac{M}{c}\sin\theta_2$$

$$F_{rBH} = \frac{a}{c}(K_r\sin\theta - K_t\cos\theta) + \frac{D_p}{2c}K_a\sin\theta + \frac{e}{c}F\sin\theta_1 + \frac{M}{c}\sin\theta_2$$

■ Combined radial force

$$F_{rA} = \sqrt{F_{rAV}{}^2 + F_{rAH}{}^2}$$

$$F_{rB} = \sqrt{F_{rBV}{}^2 + F_{rBH}{}^2}$$

..... (5-31)

(When θ, F, and M are zero, the same result as in Ex. 3 is obtained)

5-4 Dynamic equivalent load

Bearings are used under various operating conditions; however, in most cases, bearings receive radial and axial load combined, while the load magnitude fluctuates during operation.

Therefore, it is impossible to directly compare the actual load and basic dynamic load rating.

The two are compared by replacing the loads applied to the shaft center with one of a constant magnitude and in a specific direction, that yields the same bearing service life as under actual load and rotational speed.

This theoretical load is referred to as the dynamic equivalent load (P).

5-4-1 Calculation of dynamic equivalent load

Dynamic equivalent loads for radial bearings and thrust bearings ($\alpha \neq 90°$) which receive a combined load of a constant magnitude in a specific direction can be calculated using the following equation,

$$P = XF_r + YF_a \quad \cdots\cdots (5\text{-}32)$$

where :

P : dynamic equivalent load N

(for radial bearings, P_r : dynamic equivalent radial load; for thrust bearings, P_a : dynamic equivalent axial load)

F_r : radial load N

F_a : axial load N

X : radial load factor

Y : axial load factor

(values of X and Y are listed in the bearing specification table.)

■ When $F_a/F_r \leqq e$ for single-row radial bearings, it is taken that $X = 1$, and $Y = 0$. Hence, the dynamic equivalent load rating is $P_r = F_r$.

(Values of e, which designates the limit of F_a/F_r, are listed in the bearing specification table.)

■ For single-row angular contact ball bearings and tapered roller bearings, axial component forces (F_{ac}) are generated as shown in Fig. 5-11, therefore a pair of bearings is arranged face-to-face or back-to-back.

The axial component force can be calculated using the following equation.

$$F_{ac} = \frac{F_r}{2Y} \quad \cdots\cdots (5\text{-}33)$$

Table 5-9 describes the calculation of the dynamic equivalent load when radial loads and external axial loads (K_a) are applied to bearings.

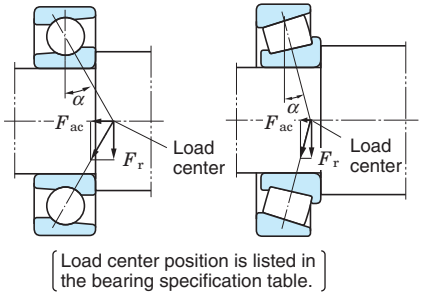


Fig. 5-11 Axial component force

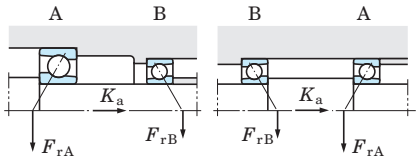
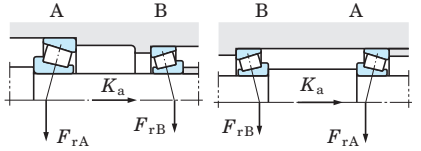
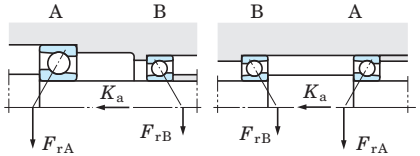
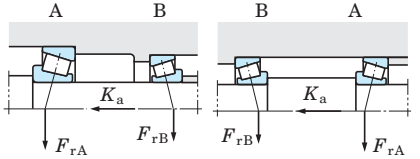
■ For thrust ball bearings with contact angle $\alpha = 90°$, to which an axial load is applied, $P_a = F_a$.

■ The dynamic equivalent load of spherical thrust roller bearing can be calculated using the following equation.

$$P_a = F_a + 1.2F_r \quad \cdots\cdots (5\text{-}34)$$

where : $F_r/F_a \leqq 0.55$

Table 5-9 Dynamic equivalent load calculation : when a pair of single-row angular contact ball bearings or tapered roller bearings is arranged face-to-face or back-to-back.

Paired mounting		Loading condition	Bearing	Axial load	Dynamic equivalent load
Back-to-back arrangement	Face-to-face arrangement				
		$\frac{F_{rB}}{2Y_B} + K_a \geqq \frac{F_{rA}}{2Y_A}$	Bearing A	$\frac{F_{rB}}{2Y_B} + K_a$	$P_A = XF_{rA} + Y_A\left(\frac{F_{rB}}{2Y_B} + K_a\right)$ $P_A = F_{rA}$, where $P_A < F_{rA}$
			Bearing B	–	$P_B = F_{rB}$
		$\frac{F_{rB}}{2Y_B} + K_a < \frac{F_{rA}}{2Y_A}$	Bearing A	–	$P_A = F_{rA}$
			Bearing B	$\frac{F_{rA}}{2Y_A} - K_a$	$P_B = XF_{rB} + Y_B\left(\frac{F_{rA}}{2Y_A} - K_a\right)$ $P_B = F_{rB}$, where $P_B < F_{rB}$
		$\frac{F_{rB}}{2Y_B} \leqq \frac{F_{rA}}{2Y_A} + K_a$	Bearing A	–	$P_A = F_{rA}$
			Bearing B	$\frac{F_{rA}}{2Y_A} + K_a$	$P_B = XF_{rB} + Y_B\left(\frac{F_{rA}}{2Y_A} + K_a\right)$ $P_B = F_{rB}$, where $P_B < F_{rB}$
		$\frac{F_{rB}}{2Y_B} > \frac{F_{rA}}{2Y_A} + K_a$	Bearing A	$\frac{F_{rB}}{2Y_B} - K_a$	$P_A = XF_{rA} + Y_A\left(\frac{F_{rB}}{2Y_B} - K_a\right)$ $P_A = F_{rA}$, where $P_A < F_{rA}$
			Bearing B	–	$P_B = F_{rB}$

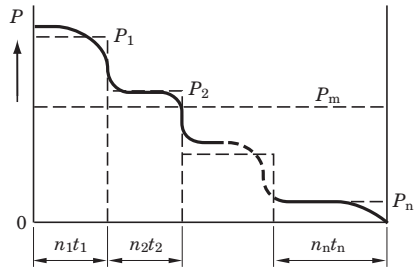
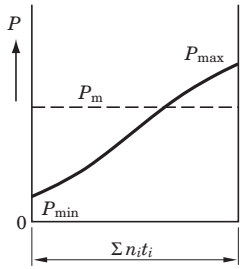
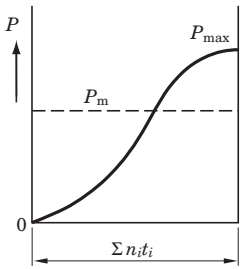
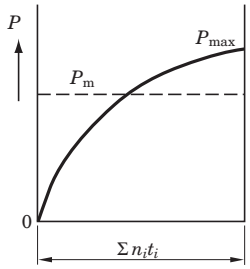
[Remarks] 1. These equations can be used when internal clearance and preload during operation are zero.
2. Radial load is treated as positive in the calculation, if it is applied in a direction opposite that shown in Fig. in Table 5-9.

5-4-2 Mean dynamic equivalent load

When load magnitude or direction varies, it is necessary to calculate the mean dynamic equivalent load, which provides the same length of bearing service life as that under the actual load fluctuation.

The mean dynamic equivalent load (P_m) under different load fluctuations is described using Graphs (1) to (4).

As shown in Graph (5), the mean dynamic equivalent load under stationary and rotating load applied simultaneously, can be obtained using equation (5-39).

(1) Staged fluctuation	(2) Stageless fluctuation	(3) Fluctuation forming sine curve	(4) Fluctuation forming sine curve (upper half of sine curve)
			
$P_m = \sqrt[p]{\dfrac{P_1{}^p n_1t_1 + P_2{}^p n_2t_2 + \cdots\cdots + P_n{}^p n_nt_n}{n_1t_1 + n_2t_2 + \cdots\cdots + n_nt_n}}$ ····· (5-35)	$P_m = \dfrac{P_{min} + 2P_{max}}{3}$ ····· (5-36)	$P_m = 0.68\,P_{max}$ ····· (5-37)	$P_m = 0.75\,P_{max}$ ····· (5-38)

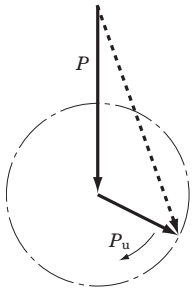
Symbols for Graphs (1) to (4)

P_m	: mean dynamic equivalent load	N
P_1	: dynamic equivalent load applied for t_1 hours at rotational speed n_1	N
P_2	: dynamic equivalent load applied for t_2 hours at rotational speed n_2	N
⋮	⋮	⋮
P_n	: dynamic equivalent load applied for t_n hours at rotational speed n_n	N
P_{min}	: minimum dynamic equivalent load	N
P_{max}	: maximum dynamic equivalent load	N
Σn_it_i	: total rotation in (t_1 to t_i) hours	
p	: for ball bearings, $p = 3$ for roller bearings, $p = 10/3$	

[Reference] Mean rotational speed n_m can be calculated using the following equation :

$$n_m = \frac{n_1t_1 + n_2t_2 + \cdots\cdots + n_nt_n}{t_1 + t_2 + \cdots\cdots + t_n}$$

(5) Stationary load and rotating load acting simultaneously



$$P_m = f_m(P + P_u) \quad \cdots\cdots (5\text{-}39)$$

where :

P_m	: mean dynamic equivalent load	N
f_m	: coefficient (refer. Fig. 5-12)	
P	: stationary load	N
P_u	: rotating load	N

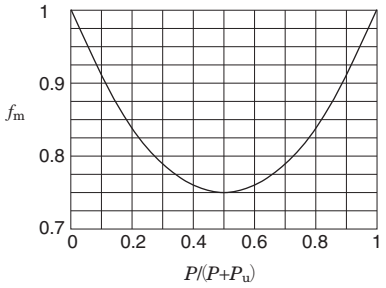


Fig. 5-12 Coefficient f_m

5-5 Basic static load rating and static equivalent load

5-5-1 Basic static load rating

Excessive static load or impact load even at very low rotation causes partial permanent deformation of the rolling element and raceway contacting surfaces. This permanent deformation increases with the load; if it exceeds a certain limit, smooth rotation will be hindered.

The basic static load rating is the static load which responds to the calculated contact stress shown below, at the contact center between the raceway and rolling elements which receive the maximum load.

- Self-aligning ball bearings ··· 4 600 MPa
- Other ball bearings ····· 4 200 MPa
- Roller bearings ····· 4 000 MPa

The total extent of contact stress-caused permanent deformation on surfaces of rolling elements and raceway will be approximately 0.000 1 times greater than the rolling element diameter.

The basic static load rating for radial bearings is specified as the basic static radial load rating, and for thrust bearings, as the basic static axial load rating. These load ratings are listed in the bearing specification table, using C_{0r} and C_{0a} respectively.

These values are prescribed by ISO 78/1987 and are subject to change by conformance to the latest ISO standards.

5-5-2 Static equivalent load

The static equivalent load is a theoretical load calculated such that, during rotation at very low speed or when bearings are stationary, the same contact stress as that imposed under actual loading condition is generated at the contact center between raceway and rolling element to which the maximum load is applied.

For radial bearings, radial load passing through the bearing center is used for the calculation; for thrust bearings, axial load in a direction along the bearing axis is used.

The static equivalent load can be calculated using the following equations.

[Radial bearings]

···The greater value obtained by the following two equations is used.

$$P_{0r} = X_0 F_r + Y_0 F_a \quad \cdots\cdots (5\text{-}40)$$

$$P_{0r} = F_r \quad \cdots\cdots (5\text{-}41)$$

[Thrust bearings]

($\alpha \neq 90°$)

$$P_{0a} = X_0 F_r + F_a \quad \cdots\cdots (5\text{-}42)$$

[When $F_a < X_0 F_r$, the solution becomes less accurate.]

($\alpha = 90°$)

$$P_{0a} = F_a \quad \cdots\cdots (5\text{-}43)$$

where :

P_{0r} : static equivalent radial load N
P_{0a} : static equivalent axial load N
F_r : radial load N
F_a : axial load N
X_0 : static radial load factor
Y_0 : static axial load factor
(values of X_0 and Y_0 are listed in the bearing specification table.)

5-5-3 Safety coefficient

The allowable static equivalent load for a bearing is determined by the basic static load rating of the bearing; however, bearing service life, which is affected by permanent deformation, differs in accordance with the performance required of the bearing and operating conditions.

Therefore, a safety coefficient is designated, based on empirical data, so as to ensure safety in relation to basic static load rating.

$$f_s = \frac{C_0}{P_0} \quad \cdots\cdots (5\text{-}44)$$

where :

f_s : safety coefficient (ref. Table 5-10)
C_0 : basic static load rating N
P_0 : static equivalent load N

Table 5-10 Values of safety coefficient f_s

Operating condition		f_s (min.)	
		Ball bearing	Roller bearing
With bearing rotation	When high accuracy is required	2	3
	Normal operation	1	1.5
	When impact load is applied	1.5	3
Without bearing rotation (occasional oscillation)	Normal operation	0.5	1
	When impact load or uneven distribution load is applied	1	2

[Remark] For spherical thrust roller bearings, $f_s \geqq 4$.

5-6 Allowable axial load for cylindrical roller bearings

Bearings whose inner and outer rings comprise either a rib or loose rib can accommodate a certain magnitude of axial load, as well as radial load. In such cases, axial load capacity is controlled by the condition of rollers, load capacity of rib or loose rib, lubrication, rotational speed etc.

For certain special uses, a design is available to accommodate very heavy axial loads. In general, axial loads allowable for cylindrical roller bearings can be calculated using the following equation, which are based on empirical data.

$$F_{ap} = 9.8 f_a \cdot f_b \cdot f_p \cdot d_m^2 \quad \cdots\cdots\cdots\cdots \text{(5-45)}$$

where :

F_{ap} : maximum allowable axial load N

f_a : coefficient determined from loading condition (Table 5-11)

f_b : coefficient determined from bearing diameter series (Table 5-12)

f_p : coefficient for rib surface pressure (Fig. 5-13)

d_m : mean value of bore diameter d and outside diameter D mm

$$\left(\frac{d+D}{2}\right)$$

Table 5-11 Values of coefficient determined from loading condition f_a

Loading condition	f_a
Continuous loading	1
Intermittent loading	2
Instantaneous loading	3

Table 5-12 Values of coefficient determined from bearing diameter series f_b

Diameter series	f_b
9	0.6
0	0.7
2	0.8
3	1.0
4	1.2

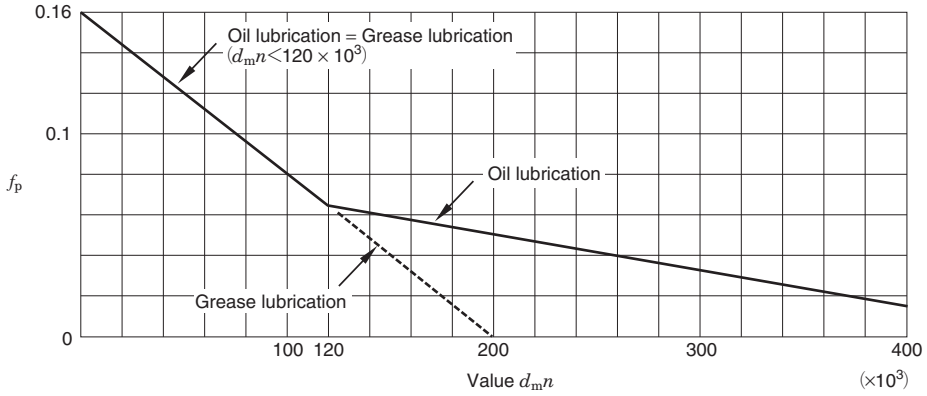
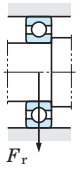


Fig. 5-13 Relationship between coefficient for rib surface pressure f_p and value $d_m n$ (n : rotational speed, $\min^{-1}$)

5-7 Applied calculation examples

[Example 1] Bearing service life (time) with 90 % reliability

(Conditions)
Deep groove ball bearing : 6308
Radial load $F_r = 3\,500$ N
Axial load not applied $(F_a = 0)$
Rotational speed $n = 800$ min^{-1}



① Basic dynamic load rating (C_r) is obtained from the bearing specification table.

$C_r = 50.9$ kN

② Dynamic equivalent radial load (P_r) is calculated using equation (5-32).

$P_r = F_r = 3\,500$ N

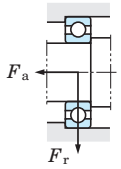
③ Bearing sevice life (L_{10h}) is calculated using equation (5-2).

$$L_{10h} = \frac{10^6}{60n}\left(\frac{C}{P}\right)^p$$

$$= \frac{10^6}{60 \times 800} \times \left(\frac{50.9 \times 10^3}{3\,500}\right)^3 \fallingdotseq \underline{64\,100 \text{ h}}$$

[Example 2] Bearing service life (time) with 96 % reliability

(Conditions)
Deep groove ball bearing : 6308
Radial load $F_r = 3\,500$ N
Axial load $F_a = 1\,000$ N
Rotational speed $n = 800$ min^{-1}



① From the bearing specification table ;

- Basic load rating (C_r , C_{0r}) f_0 factor is obtained.

$C_r = 50.9$ kN
$C_{0r} = 24.0$ kN
$f_0 = 13.2$

- Values X and Y are obtained by comparing value e, calculated from value $f_0 F_a / C_{0r}$ via proportional interpolation, with value $f_0 F_a / F_r$.

$$\frac{f_0 F_a}{C_{0r}} = \frac{13.2 \times 1\,000}{24.0 \times 10^3} = 0.550$$

$$e = 0.22 + (0.26 - 0.22) \times \frac{(0.550 - 0.345)}{(0.689 - 0.345)}$$

$$= 0.24$$

$$\frac{F_a}{F_r} = \frac{1\,000}{3\,500} = 0.29 > e$$

The result is,

$$X = 0.56$$

$$Y = 1.99 - (1.99 - 1.71) \times \frac{(0.550 - 0.345)}{(0.689 - 0.345)}$$

$$= 1.82$$

② Dynamic equivalent load (P_r) is obtained using equation (5-32).

$$P_r = XF_r + YF_a$$

$$= (0.56 \times 3\,500) + (1.82 \times 1\,000) = 3\,780 \text{ N}$$

③ Service life with 90 % reliability (L_{10h}) is obtained using equation (5-2).

$$L_{10h} = \frac{10^6}{60n}\left(\frac{C}{P}\right)^p$$

$$= \frac{10^6}{60 \times 800} \times \left(\frac{50.9 \times 10^3}{3\,780}\right)^3 \fallingdotseq \underline{50\,900 \text{ h}}$$

[Example 3] Calculation of the a_{ISO} factor with the conditions in Example 2

(Conditions)
Oil lubrication
(Oil that has been filtered by a fine filter)
Operating temperature 70 °C
96 % reliability

④ Lubricating oil selection

From the bearing specification table, the pitch diameter $D_{pw} = (40 + 90)/2 = 65$ is obtained.

$d_{mn} = 65 \times 800 = 52\,000$. Therefore, select VG 68 from Table 12-8, p. A 129.

⑤ Calculating the a_{ISO} factor

The operating temperature is 70 °C, so according to Fig. 12-3, p. A 129, the viscosity when operating is $\nu = 20$ mm^2/s

According to Fig. A, $\nu_1 = 21.7$ mm^2/s

$\kappa = \nu/\nu_1 = 20/21.7 = 0.92$

The oil has been filtered by a fine filter, so Table 5-4 shows e_c is 0.5 to 0.6.

To stringently estimate the value, $e_c = 0.5$.

$$\frac{e_c \cdot C_u}{P} = \frac{0.5 \times 1\,850}{3\,780} = 0.24$$

Therefore, according to Fig. B

$a_{ISO} = 7.7$

⑥ Service life with 96 % reliability (L_{nm}) is obtained using equation (5-8).

According to Table 5-3, $a_1 = 0.55$.

$L_{4m} = a_1 a_{ISO} L_{10} = 0.55 \times 7.7 \times 50\,900 \fallingdotseq 216\,000$ h

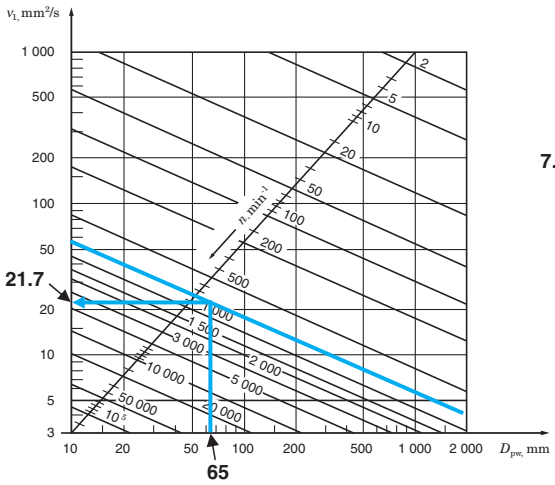


Fig. A

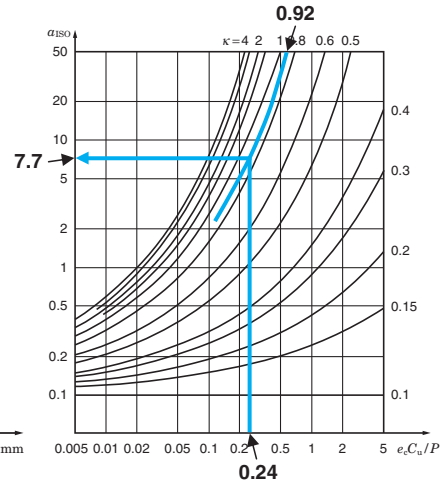
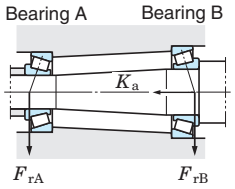


Fig. B

The a_{ISO} factor can also be calculated on our website.

[Example 4] Bearing service life (total revolution)

(Conditions)
Tapered roller bearing
Bearing A : 30207 JR
Bearing B : 30209 JR
Radial load $F_{rA} = 5\,200$ N
$F_{rB} = 6\,800$ N
Axial load $K_a = 1\,600$ N



① From the bearing specification table, the following specifications are obtained.

	Basic dynamic load rating (C_r)	e	$X^{1)}$	$Y^{1)}$
Bearing A	68.8 kN	0.37	0.4	1.60
Bearing B	83.9 kN	0.40	0.4	1.48

[Note] 1) Those values are used, where $F_a/F_r > e$.
Where $F_a/F_r \leqq e$, $X = 1$, $Y = 0$.

② Axial load applied to shafts must be calculated, considering the fact that component force in the axial direction is generated when radial load is applied to tapered roller bearings. (ref. equation 5-33, Table 5-9)

$$\frac{F_{rA}}{2\,Y_A} + K_a = \frac{5\,200}{2 \times 1.60} + 1\,600 = 3\,225 \text{ N}$$

$$\frac{F_{rB}}{2\,Y_B} = \frac{6\,800}{2 \times 1.48} = 2\,297 \text{ N}$$

Consequently, axial load $\frac{F_{rA}}{2\,Y_A} + K_a$ is applied to bearing B.

③ Dynamic equivalent load (P_r) is obtained from Table 5-9.

$$P_{rA} = F_{rA} = 5\,200 \text{ N}$$

$$P_{rB} = XF_{rB} + Y_B\left(\frac{F_{rA}}{2\,Y_A} + K_a\right)$$

$$= 0.4 \times 6\,800 + 1.48 \times 3\,225 = 7493 \text{N}$$

④ Each bearing service life (L_{10}) is calculated using equation (5-1).

$$L_{10A} = \left(\frac{C_{rA}}{P_{rA}}\right)^{10/3} = \left(\frac{68.8 \times 10^3}{5\,200}\right)^{10/3}$$

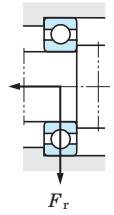
$$\fallingdotseq \underline{5\,480 \times 10^6 \text{ revolutions}}$$

$$L_{10B} = \left(\frac{C_{rB}}{P_{rB}}\right)^{10/3} = \left(\frac{83.9 \times 10^3}{7\,493}\right)^{10/3}$$

$$\fallingdotseq \underline{3\,140 \times 10^6 \text{ revolutions}}$$

[Example 5] Bearing size selection

(Conditions)
Deep groove ball bearing :
62 series
Required service life :
more than 10 000 h
Radial load $F_r = 2\,000$ N
Axial load $F_a = 300$ N
Rotational speed $n = 1\,600$ min^{-1}



① The dynamic equivalent load (P_r) is hypothetically calculated.
The resultant value, $F_a/F_r = 300/2\,000 = 0.15$, is smaller than any other values of e in the bearing specification table.
Hence, JTEKT can consider that $P_r = F_r = 2\,000$ N.

② The required basic dynamic load rating (C_r) is calculated according to equation (5-4).

$$C_r = P_r\left(L_{10h} \times \frac{60n}{10^6}\right)^{1/p}$$

$$= 2\,000 \times \left(10\,000 \times \frac{60 \times 1\,600}{10^6}\right)^{1/3}$$

$$= 19\,730 \text{ N}$$

③ Among those covered by the bearing specification table, the bearing of the 62 series with C_r exceeding 19 730 N is 6205 R, with bore diameter for 25 mm.

④ The dynamic equivalent load obtained at step ① is confirmed by obtaining value e for 6205 R.
Where C_{0r} of 6205 R is 9.3 kN, and f_0 is 12.8

$$f_0 F_a/C_{0r} = 12.8 \times 300/9\,300 = 0.413$$

Then, value e can be calculated using proportional interpolation.

$$e = 0.22 + (0.26 - 0.22) \times \frac{(0.413 - 0.345)}{(0.689 - 0.345)}$$

$$= 0.23$$

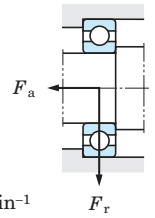
As a result, it can be confirmed that

$$F_a/F_r = 0.15 < e.$$

Hence, $P_r = F_r$.

[Example 6] Bearing size selection

(Conditions)
Deep groove ball bearing :
63 series
Required service life :
more than 15 000 h
Radial load $F_r = 4\,000$ N
Axial load $F_a = 2\,400$ N
Rotational speed $n = 1\,000$ min^{-1}



① The hypothetic dynamic equivalent load (P_r) is calculated :
Since $F_a/F_r = 2\,400/4\,000 = 0.6$ is much larger than the value e specified in the bearing specification table, it suggests that the axial load affects the dynamic equivalent load.
Hence, assuming that $X = 0.56$, $Y = 1.6$ (approximate mean value of Y), using equation (5-32),

$$P_r = XF_r + XF_a = 0.56 \times 4\,000 + 1.6 \times 2\,400$$

$$= 6\,080 \text{ N}$$

② Using equation (5-4), the required basic dynamic load rating (C_r) is :

$$C_r = P_r\left(L_{10h} \times \frac{60n}{10^6}\right)^{1/p}$$

$$= 6\,080 \times \left(15\,000 \times \frac{60 \times 1\,000}{10^6}\right)^{1/3}$$

$$= 58\,700 \text{ N}$$

③ From the bearing specification table, a 6309 with a bore diameter of 45 mm is selected as a 63 series bearing with C_r exceeding 58 700 N.

④ The dynamic equivalent load and basic rating life are confirmed, by calculating the value e for a 6309.
Values obtained using the proportional interpolation are :
where $f_0 F_a/C_{0r} = 13.3 \times 2\,400/29\,500 = 1.082$
$e = 0.283$, $Y = 1.54$.
Thus, $F_a/F_r = 0.6 > e$.
Using the resultant values, the dynamic equivalent load and basic rating life can be calculated as follows :

$$P_r = XF_r + YF_a$$

$$= 0.56 \times 4\,000 + 1.54 \times 2\,400 = 5\,940 \text{N}$$

$$L_{10h} = \frac{10^6}{60n}\left(\frac{C_r}{P_r}\right)^p$$

$$= \frac{10^6}{60 \times 1\,000} \times \left(\frac{61.1 \times 10^3}{5\,940}\right)^3 \fallingdotseq \underline{18\,100 \text{ h}}$$

⑤ The basic rating life of the 6308, using the same steps, is :
$L_{10h} \fallingdotseq 11\,500$ h, which does not satisfy the service life requirement.

[Example 7] Calculation of allowable axial load for cylindrical roller bearings

(Conditions)
Single-row cylindrical roller bearing : NUP 310
Rotational speed $n = 1\,500$ min^{-1}
Oil lubrication
Axial load is intermittently applied.

① Using the bearing specification table, the value d_m for the NUP 310 can be calculated as follows :

$$d_m = \frac{d + D}{2} = \frac{50 + 110}{2} = 80 \text{ mm}$$

② Each coefficient used in equation (5-45).
From values listed in Table 5-11, coefficient f_a related to intermittent load is : $f_a = 2$

From values listed in Table 5-12, coefficient f_b related to diameter series 3 is : $f_b = 1.0$

According to Fig. 5-13, coefficient f_p for allowable rib surface pressure, related to
$d_m n = 80 \times 1\,500 = 12 \times 10^4$, is : $f_p = 0.062$

③ Using equation (5-45), the allowable axial load F_{ap} is :

$$F_{ap} = 9.8 f_a \cdot f_b \cdot f_p \cdot d_m^2$$

$$= 9.8 \times 2 \times 1.0 \times 0.062 \times 80^2$$

$$\fallingdotseq \underline{7\,780 \text{ N}}$$

[Example 8] Calculation of service life of spur gear shaft bearings

(Conditions)

Tapered roller bearing

Bearing A : 32309 JR

Bearing B : 32310 JR

Gear type : spur gear (normally machined)

Gear pressure angle $\alpha_1 = \alpha_2 = 20°$

Gear pitch circle diameter $D_{p1} = 360$ mm

$D_{p2} = 180$ mm

Transmission power $W = 150$ kW

Rotational speed $n = 1\,000$ min^{-1}

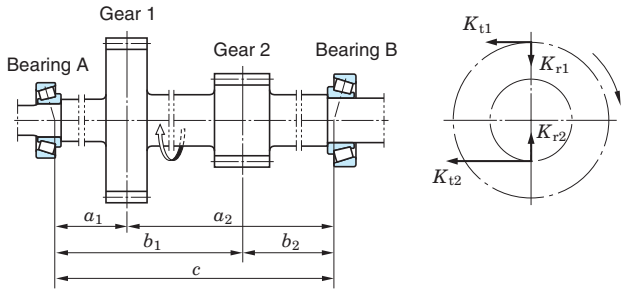
Operating condition: accompanied by impact

Installation locations

$a_1 = 95$ mm, $a_2 = 265$ mm,

$b_1 = 245$ mm, $b_2 = 115$ mm,

$c = 360$ mm



① Using equations (5-14) and (5-15), theoretical loads applied to gears (tangential load, K_t; radial load, K_r) are calculated.

[Gear 1]

$$K_{t1} = \frac{19.1 \times 10^6 W}{D_p n} = \frac{19.1 \times 10^6 \times 150}{360 \times 1\,000} = 7\,958 \text{ N}$$

$$K_{r1} = K_{t1} \tan \alpha_1 = 2\,896 \text{ N}$$

[Gear 2]

$$K_{t2} = \frac{19.1 \times 10^6 \times 150}{180 \times 1\,000} = 15\,917 \text{ N}$$

$$K_{r2} = K_{t2} \tan \alpha_2 = 5\,793 \text{ N}$$

② The radial load applied to the bearing is calculated, where the load coefficient is determined as $f_w = 1.5$ from Table 5-6, and the gear coefficient as $f_g = 1.2$ from Table 5-8.

[Bearing A]

- Load consisting of K_{t1} and K_{t2} is :

$$K_{tA} = f_w f_g \left(\frac{a_2}{c} K_{t1} + \frac{b_2}{c} K_{t2} \right)$$

$$= 1.5 \times 1.2 \times \left(\frac{265}{360} \times 7\,958 + \frac{115}{360} \times 15\,917 \right) = 19\,697 \text{ N}$$

- Load consisting of K_{r1} and K_{r2} is :

$$K_{rA} = f_w f_g \left(\frac{a_2}{c} K_{r1} - \frac{b_2}{c} K_{r2} \right)$$

$$= 1.5 \times 1.2 \times \left(\frac{265}{360} \times 2\,896 - \frac{115}{360} \times 5\,793 \right) = 506 \text{ N}$$

- Combining the loads of K_{tA} and K_{rA}, the radial load (F_{rA}) applied to bearing A can be calculated as follows :

$$F_{rA} = \sqrt{K_{tA}^2 + K_{rA}^2} = \sqrt{19\,697^2 + 506^2} = 19\,703 \text{ N}$$

[Bearing B]

- Load consisting of K_{t1} and K_{t2} is :

$$K_{tB} = f_w f_g \left(\frac{a_1}{c} K_{t1} + \frac{b_1}{c} K_{t2} \right)$$

$$= 1.5 \times 1.2 \times \left(\frac{95}{360} \times 7\,958 + \frac{245}{360} \times 15\,917 \right) = 23\,278 \text{ N}$$

- Load consisting of K_{r1} and K_{r2} is :

$$K_{rB} = f_w f_g \left(\frac{a_1}{c} K_{r1} - \frac{b_1}{c} K_{r2} \right)$$

$$= 1.5 \times 1.2 \times \left(\frac{95}{360} \times 2\,896 - \frac{245}{360} \times 5\,793 \right) = -5\,721 \text{ N}$$

- The radial load (F_{rB}) applied to bearing B can be calculated using the same steps as with bearing A.

$$F_{rB} = \sqrt{K_{tB}^2 + K_{rB}^2} = \sqrt{23\,278^2 + (-5\,721)^2} = 23\,971 \text{ N}$$

③ The following specifications can be obtained from the bearing specification table.

	Basic dynamic load rating (C_r)	e	$X^{1)}$	$Y^{1)}$
Bearing A	183 kN	0.35	0.4	1.74
Bearing B	221 kN			

[Note] 1) Those values are used, where $F_a/F_r > e$. Where $F_a/F_r \leqq e$, $X = 1$, $Y = 0$.

④ When an axial load is not applied externally, if the radial load is applied to the tapered roller bearing, an axial component force is generated.

Considering this fact, the axial load applied from the shaft and peripheral parts is to be calculated :

(Equation 5-33, Table 5-9)

$$\frac{F_{rB}}{2\,Y_B} = \frac{23\,971}{2 \times 1.74} > \frac{F_{rA}}{2\,Y_A} = \frac{19\,703}{2 \times 1.74}$$

According to the result, it is clear that the axial component force ($F_{rB}/2Y_B$) applied to bearing B is also applied to bearing A as an axial load applied from the shaft and peripheral parts.

⑤ Using the values listed in Table 5-9, the dynamic equivalent load is calculated, where $K_a = 0$:

$$P_{rA} = XF_{rA} + Y_A \frac{F_{rB}}{2\,Y_B} = 0.4 \times 19\,703 \times 1.74 \times \frac{23\,971}{2 \times 1.74} = 19\,867 \text{ N}$$

$$P_{rB} = F_{rB} = 23\,971 \text{ N}$$

⑥ Using equation (5-2), the basic rating life of each bearing is calculated :

[Bearing A]

$$L_{10hA} = \frac{10^6}{60n} \left(\frac{C_{rA}}{P_A} \right)^p = \frac{10^6}{60 \times 1\,000} \times \left(\frac{183 \times 10^3}{19\,867} \right)^{10/3} \fallingdotseq \underline{27\,300 \text{ h}}$$

[Bearing B]

$$L_{10hB} = \frac{10^6}{60n} \left(\frac{C_{rB}}{P_B} \right)^p = \frac{10^6}{60 \times 1\,000} \times \left(\frac{221 \times 10^3}{23\,971} \right)^{10/3} \fallingdotseq \underline{27\,400 \text{ h}}$$

Reference

Using equation (5-11), the system service life (L_{10hS}) using a pair of bearings is :

$$L_{10hS} = \frac{1}{\left(\frac{1}{L_{10hA}{}^e} + \frac{1}{L_{10hB}{}^e} \right)^{1/e}} = \frac{1}{\left(\frac{1}{27\,300^{9/8}} + \frac{1}{27\,400^{9/8}} \right)^{8/9}} \fallingdotseq \underline{14\,800 \text{ h}}$$

6. Boundary dimensions and bearing numbers

6-1 Boundary dimensions

Bearing boundary dimensions are dimensions required for bearing installation with shaft or housing, and as described in Fig. 6-1, include the bore diameter, outside diameter, width, height, and chamfer dimension.

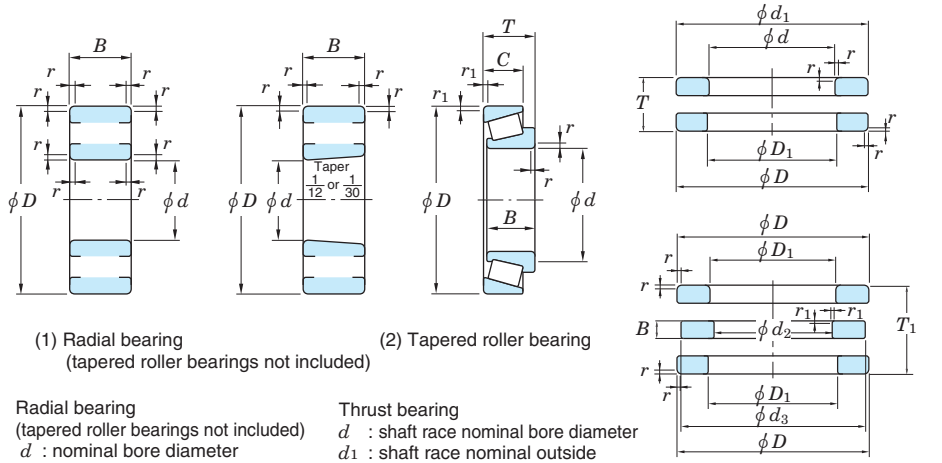
These dimensions are standardized by the International Organization for Standardization (ISO 15). JIS B 1512 "rolling bearing boundary dimensions" is based on ISO.

These boundary dimensions are provided, classified into radial bearings (tapered roller bearings are provided in other tables) and thrust bearings.

Boundary dimensions of each bearing are listed in Appendixes at the back of this catalog. In these boundary dimension tables, the outside diameter, width, height, and chamfer dimensions related to bearing bore diameter numbers and bore diameters are listed in diameter series and dimension series.

Reference

1) Diameter series is a series of nominal bearing outside diameters provided for respective ranges of bearing bore diameter; and, a dimension series includes width and height as well as diameters.
2) Tapered roller bearing boundary dimensions listed in the Appendixes are adapted to conventional dimension series (widths and diameters). Tapered roller bearing boundary dimensions provided in JIS B 1512-2000 are new dimension series based on ISO 355 (ref. descriptions before the bearing specification table); for reference, the bearing specification table covers numeric codes used in these dimension series.



(1) Radial bearing (tapered roller bearings not included)

(2) Tapered roller bearing

(3) Thrust bearing (single/double direction)

Radial bearing
(tapered roller bearings not included)
d : nominal bore diameter
D : nominal outside diameter
B : nominal assembled bearing width
r : inner/outer ring chamfer dimension[1)]

Tapered roller bearing
d : nominal bore diameter
D : nominal outside diameter
T : nominal assembled bearing width
B : nominal inner ring width
C : nominal outer ring width
r : inner ring chamfer dimension[1)]
r_1 : outer ring chamfer dimension[1)]

Thrust bearing
d : shaft race nominal bore diameter
d_1 : shaft race nominal outside diameter[2)]
d_2 : central race nominal bore diameter
d_3 : central race nominal outside diameter[2)]
D : housing race nominal outside diameter
D_1 : housing race nominal bore diameter[1)]
T : single direction nominal bearing height
T_1 : double direction nominal bearing height
B : central race nominal height
r : shaft/housing race chamfer dimension[1)]
r_1 : central race chamfer dimension[1)]

[Notes]
1) The bearing specification table includes the minimum value.
2) The bearing specification table includes the maximum value.

Fig. 6-1 Bearing boundary dimensions

Cross-section dimensions of radial bearings and thrust bearings expressed in dimension series can be compared using Figs. 6-2 and 6-3.

In this way, many dimension series are provided; however, not all dimensions are practically adapted.

Some of them were merely prescribed, given expected future use.

6-2 Dimensions of snap ring grooves and locating snap rings

JIS B 1509 "rolling bearing -radial bearing with locating snap ring-dimensions and tolerances" conforms to the dimensions of snap ring groove for fitting locating snap ring on the outside surface of bearing and the dimensions and tolerances of locating snap ring.

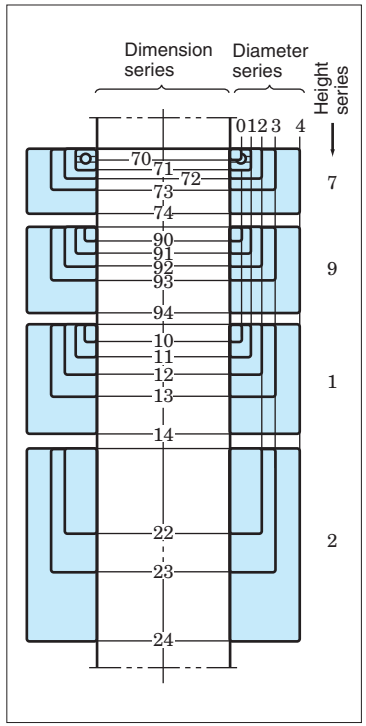


Fig. 6-3 Thrust bearing dimension series diagram (diameter series 5 omitted)

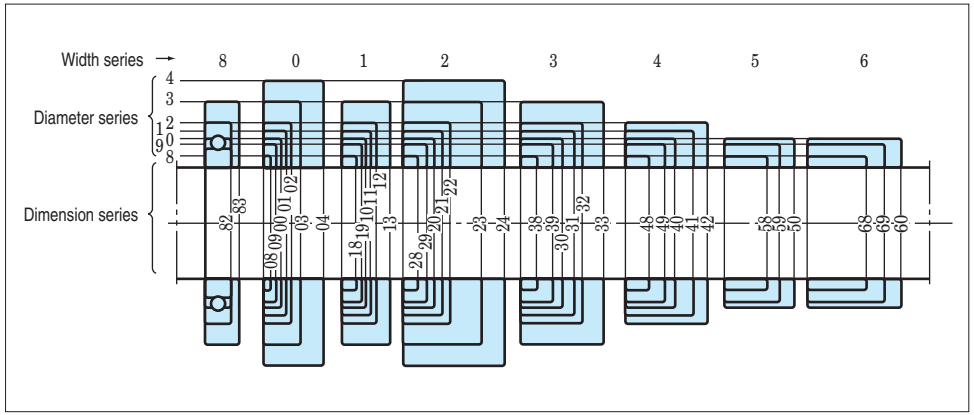


Fig. 6-2 Radial bearing dimension series diagram (diameter series 7 omitted)

6-3 Bearing number

A bearing number is composed of a basic number and a supplementary code, denoting bearing specifications including bearing type, boundary dimensions, running accuracy, and internal clearance.

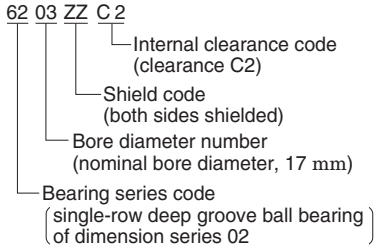
Bearing numbers of standard bearings corresponding to JIS B 1512 "rolling bearing boundary dimensions" are prescribed in JIS B 1513.

As well as these bearing numbers, JTEKT uses supplementary codes other than those provided by JIS.

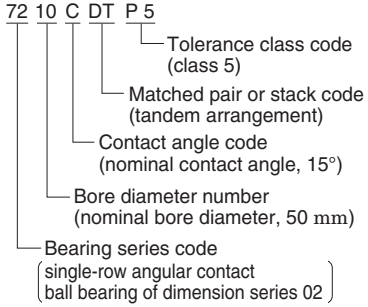
Among basic numbers, bearing series codes are listed in Table 6-1, and the composition of bearing numbers is described in Table 6-2, showing the order of arrangement of the parts.

[Examples of bearing numbers]

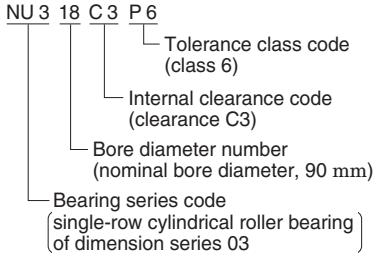
(Ex. 1)



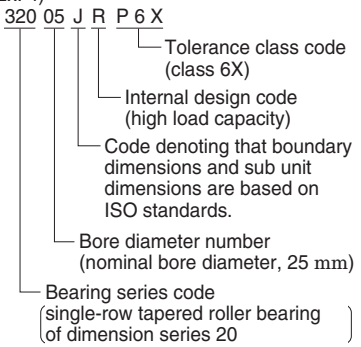
(Ex. 2)



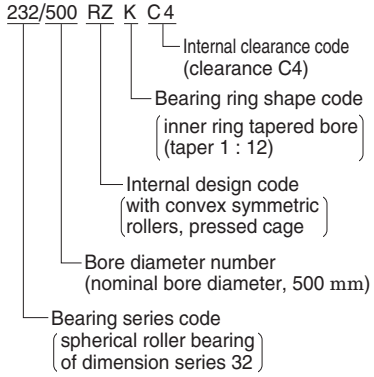
(Ex. 3)



(Ex. 4)



(Ex. 5)



(Ex. 6)

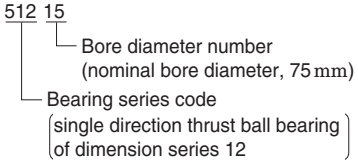


Table 6-1 Bearing series code

Bearing type	Bearing series code	Type code	Dimension series code: Width series[1]	Dimension series code: Diameter series
Single-row deep groove ball bearing	67	6	(1)	7
	68	6	(1)	8
	69	6	(1)	9
	160 [2]	6	(0)	0
	60	6	(1)	0
	62	6	(0)	2
	63	6	(0)	3
	64	6	(0)	4
Double-row deep groove ball bearing (with filling slot)	42	4	(2)	2
	43	4	(2)	3
Single-row angular contact ball bearing	79	7	(1)	9
	70	7	(1)	0
	72	7	(0)	2
	73	7	(0)	3
	74	7	(0)	4
Double-row angular contact ball bearing (with filling slot)	32	(0)	3	2
	33	(0)	3	3
Double-row angular contact ball bearing	52	5	(3)	2
	53	5	(3)	3
Self-aligning ball bearing	12	1	(0)	2
	22	2	(2)	2
	13	1	(0)	3
	23	2	(2)	3
	112 [2]	1	(0) [3]	2
	113 [2]	1	(0) [3]	3
Single-row cylindrical roller bearing	NU 10	NU [4]	1	0
	NU 2	NU [4]	(0)	2
	NU 22	NU [4]	2	2
	NU 32	NU [4]	3	2
	NU 3	NU [4]	(0)	3
	NU 23	NU [4]	2	3
	NU 4	NU [4]	(0)	4
Double-row cylindrical roller bearing	NNU 49	NNU	4	9
	NN 30	NN	3	0
Single-row needle roller bearing	NA 48	NA	4	8
	NA 49	NA	4	9
	NA 59	NA	5	9
Double-row needle roller bearing	NA 69	NA	6	9
Tapered roller bearing	329	3	2	9
	320	3	2	0
	330	3	3	0
	331	3	3	1
	302	3	0	2
	322	3	2	2
	332	3	3	2
	303	3	0	3
	313	3	1	3
	323	3	2	3
Spherical roller bearing	239	2	3	9
	230	2	3	0
	240	2	4	0
	231	2	3	1
	241	2	4	1
	222	2	2	2
	232	2	3	2
	213 [2]	2	0	3
	223	2	2	3
Single direction thrust ball bearing	511	5	1	1
	512	5	1	2
	513	5	1	3
	514	5	1	4
Single direction thrust ball bearing with spherical back face	532	5	3	2
	533	5	3	3
	534	5	3	4
Double direction thrust ball bearing	522	5	2	2
	523	5	2	3
	524	5	2	4
Double direction thrust ball bearing with spherical back faces	542	5	4	2
	543	5	4	3
	544	5	4	4
Spherical thrust roller bearing	292	2	9	2
	293	2	9	3
	294	2	9	4

[Notes]
1) Width series codes in parentheses are omitted in bearing series codes.
2) These are bearing series codes customarily used.
3) Nominal outer ring width series (inner rings only are wide).
4) Besides NU type, NJ, NUP, N, NF, and NH are provided.

Table 6-2 Bearing number configuration

Order of arrengement	Basic number: Bearing series code	Basic number: Bore diameter No.	Basic number: Contact angle code	Supplementary code: Internal design code, cage guide code	Supplementary code: Shield/seal code	Supplementary code: Ring shape code, lubrication hole/groove code	Supplementary code: Material code, special treatment code	Supplementary code: Matched pair or stack code	Supplementary code: Internal clearance code, preload code	Supplementary code: Spacer code	Supplementary code: Cage material/ shape code	Supplementary code: Tolerance code	Supplementary code: Grease code

(Codes and descriptions)

Bearing series code

68 Deep groove ball bearing
69 ⋮
60 ⋮
⋮

(For standard bearing code, refer to Table 6-1)

Bore diameter No.

/0.6	0.6 mm (Bore diameter)
1	1
/1.5	1.5
⋮	⋮
9	9
00	10
01	12
02	15
03	17
04	20
/22	22
05	25
⋮	⋮
96	480
/500	500
/2500	2500

· Bore diameters (mm) of bearing in the bore diameter range 04 to 96 can be obtained by multiplying their bore diameter number by five.

Contact angle code

A	(omitted) 30°	Angular contact ball bearing
AC	25°	
B	40°	
C	15°	
CA	20°	
E	35°	
B	(omitted) Less than 17°	Tapered roller bearing
C	20°	
D	28° 30'	
DJ	28° 48' 39"	

Internal design code

R High load capacity
(Deep groove ball bearing, cylindrical roller bearing, tapered roller bearing)

G Equal stand-out is provided on both sides of the ring of angular contact ball bearing (In general, C2 clearance is used)
GST Angular contact ball bearing described above with standard internal clearance provided
J Tapered roller bearing, whose outer ring width, contact angle and outer ring small inside diameter conform to ISO standards
R With convex asymmetric rollers and machined cage
RZ With convex symmetric rollers and pressed cage
RHA With convex symmetric rollers and one-piece machined cage
(R, RZ, RHA: Spherical roller bearings)
V Full complement type ball or roller bearing (with no cage)

Shield/seal code

one side	both sides	
Z	**ZZ**	Fixed shield
ZX	**ZZX**	Removable shield
ZU	**2ZU**	Non-contact seal
RU	**2RU**	
RS	**2RS**	Contact seal
RK	**2RK**	
U	**UU**	
RD	**2RD**	Extremely light contact seal

Ring shape code, lubrication hole/groove code

K Inner ring tapered bore provided (1 : 12)
K30 Inner ring tapered bore provided (1 : 30)
N Snap ring groove on outer ring outside surface provided
NR Snap ring groove and locating snap ring on outer ring outside surface provided

(Codes and descriptions)

NY Creep prevention synthetic resin ring on outer ring outside surface provided
SG Spiral groove on inner ring bore surface provided
W Lubrication hole and lubrication groove on cylindrical roller bearing outer ring outside surface provided
W33 Lubrication hole and lubrication groove on spherical roller bearing outer ring outside surface provided

Material code, special treatment code

Code not given: High carbon chrome bearing steel
E, **F**, **H**, **Y**: Case carburizing steel
ST Stainless steel
SH Special heat treatment
S0 Up to 150 °C
S1 Up to 200 °C
S2 Up to 250 °C
(S0, S1, S2: Dimension stabilizing treatment)

Matched pair or stack code, cage guide code

DB Back-to-back arrangement
DF Face-to-face arrangement
DT Tandem arrangement
(DB, DF, DT: Angular contact ball bearing)
PA With outer ring guide cage (Ball bearing)
Q3 With roller guide cage (Roller bearing)

Internal clearance code, preload code

C1 Smaller than C2
C2 Smaller than standard clearance
CN Standard clearance
C3 Greater than standard clearance
C4 Greater than C3
C5 Greater than C4
(C1, C2, CN, C3, C4, C5: Radial internal clearance for radial bearing)
M1 to M6 Radial internal clearance for extra-small/ miniature ball bearing
CD2 Smaller than standard clearance
CDN Standard clearance
CD3 Greater than standard clearance
(CD2, CDN, CD3: Radial internal clearance for double-row angular contact ball bearing)
CM Radial internal clearance for electric motor bearing (Deep groove ball bearing)
CT (Cylindrical roller bearing)
NA Non-interchangeable cylindrical roller bearing radial internal clearance (C1NA to C5NA)
S Slight preload
L Light preload
M Medium preload
H Heavy preload
(S, L, M, H: Preload for angular contact ball bearing)

Spacer code (Spacer width (mm) is affixed to the end of each code.)

+	Inner and outer ring spacers provided	Deep groove ball bearing
/	Inner and outer ring spacers provided	Angular contact ball bearing
/P	Outer ring spacer provided	
/S	Inner ring spacer provided	
+DP	Inner and outer ring spacers provided	Cylindrical roller bearing, spherical roller bearing
+IDP	Inner ring spacer provided	
+ODP	Outer ring spacer provided	

Cage material/type code

/ /	Steel sheet	Pressed cage
YS	Stainless steel sheet	
FT	Phenol resin	Machined cage
FY	High-tensile brass casting	
FW	High-tensile brass casting (separable type)	
MG	Polyamide	(Molded cage)
FG		
FP	Carbon steel	(Pin type cage)

Tolerance code (JIS)

Omitted	Class 0
P6	Class 6
P6X	Class 6X
P5	Class 5
P4	Class 4
P2	Class 2

Grease code

A2	Alvania 2
AC	Andok C
B5	Beacon 325
SR	Multemp SRL

7. Bearing tolerances

7-1 Tolerances and tolerance classes for bearings

Bearing tolerances and permissible values for the boundary dimensions and running accuracy of bearings are specified.

These tolerances are prescribed in JIS B 1514-1, JIS B 1514-2, and JIS B 1514-3 (roller bearings - bearing tolerances part 1: radial bearings, part 2: thrust bearings, and part 3: permissible values for chamfer dimensions). (These JIS standards are based on ISO standards.)

Bearing tolerances are standardized by classifying bearings into the following six classes (accuracy in tolerances becomes higher in the order described): 0, 6X, 6, 5, 4 and 2.

Class 0 bearings offer adequate performance for general applications; and, bearings of class 5 or higher are required for demanding applications and operating conditions including those described in Table 7-1.

These tolerances follow ISO standards, but some countries use different names for them. Tolerances for each bearing class, and organizations concerning bearings are listed in Table 7-2.

■ Boundary dimension accuracy
(items on shaft and housing mounting dimensions)
- Tolerances for bore diameter, outside diameter, ring width, assembled bearing width
- Tolerances for set bore diameter and set outside diameter of rollers
- Tolerance limits for chamfer dimensions
- Permissible values for width variation
- Tolerance and permissible values for tapered bore

■ Running accuracy
(items on runout of rotating elements)
- Permissible values for radial and axial runout of inner and outer rings
- Permissible values for perpendicularity of inner ring face
- Permissible values for perpendicularity of outer ring outside surface
- Permissible values for thrust bearing raceway thickness

Accuracies for dimensions and running of each bearing type are listed in Tables 7-3 through 7-10; and, tolerances for tapered bore and limit values for chamfer dimensions of radial bearings are in Tables 7-11 and 7-12.

Table 7-1 High precision bearing applications

Required performance	Applications	Tolerance class
High accuracy in runout is required for rolling elements.	Acoustic / visual equipment spindles (VTR, tape recorders)	P 5, P 4
	Radar / parabola antenna slewing shafts	P 4
	Machine tool spindles	P 5, P 4, P 2, ABEC 9
	Computers, magnetic disc spindles	P 5, P 4, P 2, ABEC 9
	Aluminum foil roll necks	P 5
	Multi-stage mill backing bearings	P 4
High speed rotation	Dental spindles	P 2, ABMA 5P, ABMA 7P
	Superchargers	P 5, P 4
	Jet engine spindles and accessories	P 5, P 4
	Centrifugal separators	P 5, P 4
	LNG pumps	P 5
	Turbo molecular pump spindles and touch-down	P 5, P 4
	Machine tool spindles	P 5, P 4, P 2, ABEC 9
	Tension reels	P 5, P 4
Low friction or low friction variation is required.	Control equipment (synchronous motors, servomotors, gyro gimbals)	P 4, ABMA 7P
	Measuring instruments	P 5
	Machine tool spindles	P 5, P 4, P 2, ABEC 9

Table 7-2 Bearing type and tolerance class

Bearing type			Applied standards	Applied tolerance class						Tolerance table
Deep groove ball bearing			JIS B 1514-1	Class 0	–	Class 6	Class 5	Class 4	Class 2	Table 7-3
Angular contact ball bearing				Class 0	–	Class 6	Class 5	Class 4	Class 2	
Self-aligning ball bearing				Class 0	–	–	–	–	–	
Cylindrical roller bearing				Class 0	–	Class 6	Class 5	Class 4	Class 2	
Needle roller bearing (machined ring type)			JIS B 1536-1	Class 0	–	–	–	–	–	
Tapered roller bearing	Metric series (single-row)		JIS B 1514-1	Class 0	Class 6X	(Class 6)	Class 5	Class 4	Class 2	Table 7-5
	Metric series (double or four-row)		BAS 1002	Class 0	–	–	–	–	–	Table 7-6
	Inch series		ANSI/ABMA	Class 4	–	Class 2	Class 3	Class 0	Class 00	Table 7-7
	Metric series (J-series)			Class PK	–	Class PN	Class PC	Class PB	–	Table 7-8
Spherical roller bearing			JIS B 1514-1	Class 0	–	–	–	–	–	Table 7-3
Thrust ball bearing			JIS B 1514-2	Class 0	–	Class 6	Class 5	Class 4	–	Table 7-9
Spherical thrust roller bearing				Class 0	–	–	–	–	–	Table 7-10
Precision ball screw support bearing			JTEKT standards	–	–	–	Class P5Z	Class P4Z	–	–
Double direction angular contact thrust ball bearing				–	–	–	Equivalent to class 5	Equivalent to class 4	–	–
(Reference) Class comparison	ISO	Radial bearing	ISO 492	Normal Class	Class 6X	Class 6	Class 5	Class 4	Class 2	–
		Thrust bearing	ISO 199	Normal Class	–	Class 6	Class 5	Class 4	–	–
	DIN BS NF	Radial and thrust bearings	DIN 620 BS 6107 NF E 22-335	Normal Class	Class 6X	Class 6	Class 5	Class 4	Class 2	–
	ANSI ABMA	Radial bearing	ABMA std. 20	ABEC 1 RBEC 1	– –	ABEC 3 RBEC 3	ABEC 5 RBEC 5	ABEC 7 –	ABEC 9 –	–
		Instrument ball bearing	ABMA std. 12	–	–	Class 3P	Class 5P Class 5T	Class 7P Class 7T	Class 9P	Table 7-4
		Tapered roller bearing	ABMA std. 19	Class 4 Class K	– –	Class 2 Class N	Class 3 Class C	Class 0 Class B	Class 00 Class A	Table 7-7

(Reference) Standards and organizations concerned with bearings

JIS : Japanese Industrial Standard
BAS : The Japan Bearing Industrial Association Standard
ISO : International Organization for Standardization
ANSI : American National Standards Institute, Inc.
ABMA : American Bearing Manufactures Association
DIN : Deutsches Institut für Normung
BS : British Standards Institution
NF : Association Francaise de Normalisation

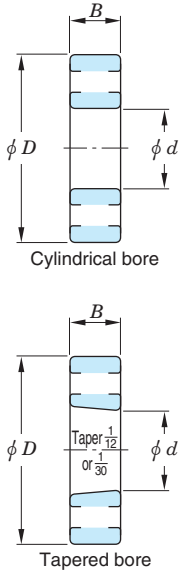
Table 7-3 (1) Radial bearing tolerances (tapered roller bearings excluded)

= JIS B 1514-1 =

(1) Inner ring (bore diameter)

Unit : μm

Nominal bore diameter d mm		Single plane mean bore diameter deviation Δ_{dmp}										Single bore diameter deviation Δ_{ds} 1)				Single plane bore diameter variation V_{dsp}											Mean bore diameter variation V_{dmp}					Nominal bore diameter d mm	
		class 0		class 6		class 5		class 4		class 2		class 4		class 2		Diameter series 7, 8, 9				Diameter series 0, 1				Diameter series 2, 3, 4				Dia. series 1)	class 0	class 6	class 5	class 4	class 2		
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	class 0	class 6	class 5	class 4	class 0	class 6	class 5	class 4	class 0	class 6	class 5	class 4	class 2	max.						
–	0.6	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5	10	9	5	4	8	7	4	3	6	5	4	3	2.5	6	5	3	2	1.5	–	0.6
0.6	2.5	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5	10	9	5	4	8	7	4	3	6	5	4	3	2.5	6	5	3	2	1.5	0.6	2.5
2.5	10	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5	10	9	5	4	8	7	4	3	6	5	4	3	2.5	6	5	3	2	1.5	2.5	10
10	18	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5	10	9	5	4	8	7	4	3	6	5	4	3	2.5	6	5	3	2	1.5	10	18
18	30	0	– 10	0	– 8	0	– 6	0	– 5	0	– 2.5	0	– 5	0	– 2.5	13	10	6	5	10	8	5	4	8	6	5	4	2.5	8	6	3	2.5	1.5	18	30
30	50	0	– 12	0	– 10	0	– 8	0	– 6	0	– 2.5	0	– 6	0	– 2.5	15	13	8	6	12	10	6	5	9	8	6	5	2.5	9	8	4	3	1.5	30	50
50	80	0	– 15	0	– 12	0	– 9	0	– 7	0	– 4	0	– 7	0	– 4	19	15	9	7	19	15	7	5	11	9	7	5	4	11	9	5	3.5	2	50	80
80	120	0	– 20	0	– 15	0	– 10	0	– 8	0	– 5	0	– 8	0	– 5	25	19	10	8	25	19	8	6	15	11	8	6	5	15	11	5	4	2.5	80	120
120	150	0	– 25	0	– 18	0	– 13	0	– 10	0	– 7	0	– 10	0	– 7	31	23	13	10	31	23	10	8	19	14	10	8	7	19	14	7	5	3.5	120	150
150	180	0	– 25	0	– 18	0	– 13	0	– 10	0	– 7	0	– 10	0	– 7	31	23	13	10	31	23	10	8	19	14	10	8	7	19	14	7	5	3.5	150	180
180	250	0	– 30	0	– 22	0	– 15	0	– 12	0	– 8	0	– 12	0	– 8	38	28	15	12	38	28	12	9	23	17	12	9	8	23	17	8	6	4	180	250
250	315	0	– 35	0	– 25	0	– 18	*0*	*– 15*	–	–	*0*	*– 15*	–	–	44	31	18	*15*	44	31	14	*11*	26	19	14	*11*	–	26	19	9	*8*	–	250	315
315	400	0	– 40	0	– 30	0	– 23	*0*	*– 18*	–	–	*0*	*– 18*	–	–	50	38	23	*18*	50	38	18	*14*	30	23	18	*14*	–	30	23	12	*9*	–	315	400
400	500	0	– 45	0	– 35	*0*	*– 28*	*0*	*– 23*	–	–	*0*	*– 23*	–	–	56	44	*28*	*23*	56	44	*21*	*17*	34	26	*21*	*17*	–	34	26	*14*	*12*	–	400	500
500	630	0	– 50	0	– 40	*0*	*– 35*	–	–	–	–	–	–	–	–	63	50	*35*	–	63	50	*26*	–	38	30	*26*	–	–	38	30	*18*	–	–	500	630
630	800	0	– 75	*0*	*– 50*	*0*	*– 45*	–	–	–	–	–	–	–	–	*94*	*63*	*45*	–	*94*	*63*	*34*	–	*56*	*38*	*34*	–	–	*56*	*38*	*23*	–	–	630	800
800	1 000	0	– 100	*0*	*– 60*	*0*	*– 60*	–	–	–	–	–	–	–	–	*125*	*75*	*60*	–	*125*	*75*	*45*	–	*75*	*45*	*45*	–	–	*75*	*45*	*30*	–	–	800	1 000
1 000	1 250	0	– 125	*0*	*– 75*	*0*	*– 75*	–	–	–	–	–	–	–	–	*156*	*94*	*75*	–	*156*	*94*	*56*	–	*94*	*56*	*56*	–	–	*94*	*56*	*38*	–	–	1 000	1 250
1 250	1 600	0	– 160	–	–	–	–	–	–	–	–	–	–	–	–	*200*	–	–	–	*200*	–	–	–	*120*	–	–	–	–	*120*	–	–	–	–	1 250	1 600
1 600	2 000	0	– 200	–	–	–	–	–	–	–	–	–	–	–	–	*250*	–	–	–	*250*	–	–	–	*150*	–	–	–	–	*150*	–	–	–	–	1 600	2 000



(2) Inner ring (running accuracy and width)

Unit : μm

Nominal bore diameter d mm		Radial runout of assembled bearing inner ring K_{ia}					S_d			S_{ia} 2)			Single inner ring width deviation Δ_{Bs}								Single inner ring width deviation Δ_{Bs} 3)								Inner ring width variation V_{Bs}					Nominal bore diameter d mm	
		class 0	class 6	class 5	class 4	class 2	class 5	class 4	class 2	class 5	class 4	class 2	class 0		class 6		class 5		class 4		class 2		class 0 4)		class 6 4)		class 5 4)		classes 4, 2		class 0	class 6	class 5	class 4	class 2		
over	up to	max.					max.			max.			upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	max.						
–	0.6	10	5	4	2.5	1.5	7	3	1.5	7	3	1.5	0	– 40	0	– 40	0	– 40	0	– 40	0	– 40	–	–	–	–	0	– 250	0	– 250	12	12	5	2.5	1.5	–	0.6
0.6	2.5	10	5	4	2.5	1.5	7	3	1.5	7	3	1.5	0	– 40	0	– 40	0	– 40	0	– 40	0	– 40	–	–	–	–	0	– 250	0	– 250	12	12	5	2.5	1.5	0.6	2.5
2.5	10	10	6	4	2.5	1.5	7	3	1.5	7	3	1.5	0	– 120	0	– 120	0	– 40	0	– 40	0	– 40	0	– 250	0	– 250	0	– 250	0	– 250	15	15	5	2.5	1.5	2.5	10
10	18	10	7	4	2.5	1.5	7	3	1.5	7	3	1.5	0	– 120	0	– 120	0	– 80	0	– 80	0	– 250	0	– 250	0	– 250	0	– 250	0	– 250	20	20	5	2.5	1.5	10	18
18	30	13	8	4	3	2.5	8	4	1.5	8	4	2.5	0	– 120	0	– 120	0	– 120	0	– 120	0	– 120	0	– 250	0	– 250	0	– 250	0	– 250	20	20	5	2.5	1.5	18	30
30	50	15	10	5	4	2.5	8	4	1.5	8	4	2.5	0	– 120	0	– 120	0	– 120	0	– 120	0	– 120	0	– 250	0	– 250	0	– 250	0	– 250	20	20	5	3	1.5	30	50
50	80	20	10	5	4	2.5	8	5	1.5	8	5	2.5	0	– 150	0	– 150	0	– 150	0	– 150	0	– 150	0	– 380	0	– 380	0	– 250	0	– 250	25	25	6	4	1.5	50	80
80	120	25	13	6	5	2.5	9	5	2.5	9	5	2.5	0	– 200	0	– 200	0	– 200	0	– 200	0	– 200	0	– 380	0	– 380	0	– 380	0	– 380	25	25	7	4	2.5	80	120
120	150	30	18	8	6	2.5	10	6	2.5	10	7	2.5	0	– 250	0	– 250	0	– 250	0	– 250	0	– 250	0	– 500	0	– 500	0	– 380	0	– 380	30	30	8	5	2.5	120	150
150	180	30	18	8	6	5	10	6	4	10	7	5	0	– 250	0	– 250	0	– 250	0	– 250	0	– 250	0	– 500	0	– 500	0	– 380	0	– 380	30	30	8	5	4	150	180
180	250	40	20	10	8	5	11	7	5	13	8	5	0	– 300	0	– 300	0	– 300	0	– 300	0	– 300	0	– 500	0	– 500	0	– 500	0	– 500	30	30	10	6	5	180	250
250	315	50	25	13	*10*	–	13	*8*	–	15	*9*	–	0	– 350	0	– 350	0	– 350	*0*	*– 350*	–	–	0	– 500	0	– 500	0	– 500	–	–	35	35	13	*8*	–	250	315
315	400	60	30	15	*13*	–	15	*9*	–	20	*12*	–	0	– 400	0	– 400	0	– 400	*0*	*– 400*	–	–	0	– 630	0	– 630	0	– 630	–	–	40	40	15	*9*	–	315	400
400	500	65	35	*20*	*15*	–	*18*	*11*	–	*25*	*15*	–	0	– 450	0	– 450	*0*	*– 450*	*0*	*– 450*	–	–	–	–	–	–	–	–	–	–	50	45	*18*	*11*	–	400	500
500	630	70	40	*25*	–	–	*25*	–	–	*30*	–	–	0	– 500	0	– 500	*0*	*– 500*	–	–	–	–	–	–	–	–	–	–	–	–	60	50	*20*	–	–	500	630
630	800	80	*50*	*30*	–	–	*30*	–	–	*35*	–	–	0	– 750	*0*	*– 750*	*0*	*– 750*	–	–	–	–	–	–	–	–	–	–	–	–	70	*60*	*23*	–	–	630	800
800	1 000	90	*60*	*40*	–	–	*40*	–	–	*45*	–	–	0	– 1 000	*0*	*– 1 000*	*0*	*– 1 000*	–	–	–	–	–	–	–	–	–	–	–	–	80	*60*	*35*	–	–	800	1 000
1 000	1 250	100	*70*	*50*	–	–	*50*	–	–	*60*	–	–	0	– 1 250	*0*	*– 1 250*	*0*	*– 1 250*	–	–	–	–	–	–	–	–	–	–	–	–	100	*60*	*45*	–	–	1 000	1 250
1 250	1 600	120	–	–	–	–	–	–	–	–	–	–	0	– 1 600	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	120	–	–	–	–	1 250	1 600
1 600	2 000	140	–	–	–	–	–	–	–	–	–	–	0	– 2 000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	140	–	–	–	–	1 600	2 000

S_d : perpendicularity of inner ring face with respect to the bore S_{ia} : axial runout of assembled bearing inner ring

[Notes] 1) These shall be applied to bearings of diameter series 0, 1, 2, 3 and 4.

2) These shall be applied to deep groove ball bearings and angular contact ball bearings.

3) These shall be appplied to individual bearing rings manufactured for matched pair or stack bearings.

4) Also applicable to the inner ring with tapered bore of $d \geqq 50$ mm.

[Remark] Values in Italics are prescribed in JTEKT standards.

Table 7-3 (2) Radial bearing tolerances (tapered roller bearings excluded)

(3) Outer ring (outside diameter)

Unit : μm

Nominal outside dia. D mm		Single plane mean outside diameter deviation Δ_{Dmp}										Single outside diameter deviation Δ_{Ds} 1)			
		class 0		class 6		class 5		class 4		class 2		class 4 5)		class 2	
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower
–	2.5	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5
2.5	6	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5
6	18	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5
18	30	0	– 9	0	– 8	0	– 6	0	– 5	0	– 4	0	– 5	0	– 4
30	50	0	– 11	0	– 9	0	– 7	0	– 6	0	– 4	0	– 6	0	– 4
50	80	0	– 13	0	– 11	0	– 9	0	– 7	0	– 4	0	– 7	0	– 4
80	120	0	– 15	0	– 13	0	– 10	0	– 8	0	– 5	0	– 8	0	– 5
120	150	0	– 18	0	– 15	0	– 11	0	– 9	0	– 5	0	– 9	0	– 5
150	180	0	– 25	0	– 18	0	– 13	0	– 10	0	– 7	0	– 10	0	– 7
180	250	0	– 30	0	– 20	0	– 15	0	– 11	0	– 8	0	– 11	0	– 8
250	315	0	– 35	0	– 25	0	– 18	0	– 13	0	– 8	0	– 13	0	– 8
315	400	0	– 40	0	– 28	0	– 20	0	– 15	0	– 10	0	– 15	0	– 10
400	500	0	– 45	0	– 33	0	– 23	*0*	*– 17*	–	–	*0*	*– 17*	–	–
500	630	0	– 50	0	– 38	0	– 28	*0*	*– 20*	–	–	*0*	*– 20*	–	–
630	800	0	– 75	0	– 45	0	– 35	–	–	–	–	–	–	–	–
800	1 000	0	– 100	0	– 60	*0*	*– 50*	–	–	–	–	–	–	–	–
1 000	1 250	0	– 125	*0*	*– 75*	*0*	*– 63*	–	–	–	–	–	–	–	–
1 250	1 600	0	– 160	*0*	*– 90*	*0*	*– 80*	–	–	–	–	–	–	–	–
1 600	2 000	0	– 200	*0*	*– 120*	–	–	–	–	–	–	–	–	–	–
2 000	2 500	0	– 250	–	–	–	–	–	–	–	–	–	–	–	–

Nominal outside dia. D mm		Single plane outside diameter variation V_{Dsp}																Mean outside diameter variation V_{Dmp}					Nominal outside dia. D mm	
		Diameter series 7, 8, 9				Diameter series 0, 1				Diameter series 2, 3, 4				Dia. series 1)	Shielded/sealed type Diameter series 2, 3, 4	Shielded/sealed type Diameter series 0, 1, 2, 3, 4								
		class 0 3)	class 6 2)	class 5 5)	class 4 5)	class 0 3)	class 6 2)	class 5 5)	class 4 5)	class 0 3)	class 6 2)	class 5 5)	class 4 5)	class 2	class 0 2)	class 6 2)	class 0 3)	class 6 2)	class 5	class 4	class 2		
over	up to	max.				max.				max.				max.	max.		max.					over	up to
–	2.5	10	9	5	4	8	7	4	3	6	5	4	3	2.5	10	9	6	5	3	2	1.5	–	2.5
2.5	6	10	9	5	4	8	7	4	3	6	5	4	3	2.5	10	9	6	5	3	2	1.5	2.5	6
6	18	10	9	5	4	8	7	4	3	6	5	4	3	2.5	10	9	6	5	3	2	1.5	6	18
18	30	12	10	6	5	9	8	5	4	7	6	5	4	4	12	10	7	6	3	2.5	2	18	30
30	50	14	11	7	6	11	9	5	5	8	7	5	5	4	16	13	8	7	4	3	2	30	50
50	80	16	14	9	7	13	11	7	5	10	8	7	5	4	20	16	10	8	5	3.5	2	50	80
80	120	19	16	10	8	19	16	8	6	11	10	8	6	5	26	20	11	10	5	4	2.5	80	120
120	150	23	19	11	9	23	19	8	7	14	11	8	7	5	30	25	14	11	6	5	2.5	120	150
150	180	31	23	13	10	31	23	10	8	19	14	10	8	7	38	30	19	14	7	5	3.5	150	180
180	250	38	25	15	11	38	25	11	8	23	15	11	8	8	–	–	23	15	8	6	4	180	250
250	315	44	31	18	13	44	31	14	10	26	19	14	10	8	–	–	26	19	9	7	4	250	315
315	400	50	35	20	15	50	35	15	11	30	21	15	11	10	–	–	30	21	10	8	5	315	400
400	500	56	41	23	*17*	56	41	17	*13*	34	25	17	*13*	–	–	–	34	25	12	*9*	–	400	500
500	630	63	48	28	*20*	63	48	21	*15*	38	29	21	*15*	–	–	–	38	29	14	*10*	–	500	630
630	800	94	56	35	–	94	56	26	–	55	34	26	–	–	–	–	55	34	18	–	–	630	800
800	1 000	125	75	*50*	–	125	75	*38*	–	75	45	*38*	–	–	–	–	75	45	*25*	–	–	800	1 000
1 000	1 250	*156*	*94*	*63*	–	*156*	*94*	*47*	–	*94*	*56*	*47*	–	–	–	–	*94*	*56*	*31*	–	–	1 000	1 250
1 250	1 600	*200*	*113*	*80*	–	*200*	*113*	*60*	–	*120*	*68*	*60*	–	–	–	–	*120*	*68*	*40*	–	–	1 250	1 600
1 600	2 000	*250*	*150*	–	–	*250*	*150*	–	–	*150*	*90*	–	–	–	–	–	*150*	*90*	–	–	–	1 600	2 000
2 000	2 500	*313*	–	–	–	*313*	–	–	–	*188*	–	–	–	–	–	–	*188*	–	–	–	–	2 000	2 500

(4) Outer ring (running accuracy and width)

Unit : μm

Nominal outside dia. D mm		Radial runout of assembled bearing outer ring K_{ea}					S_D 4)			S_{ea} 3) 4)			Δ_{Cs} 3)	Ring width variation V_{Cs} 3)			
		class 0	class 6	class 5	class 4	class 2	class 5	class 4	class 2	class 5	class 4	class 2	classes 0, 6, 5, 4, 2	classes 0, 6	class 5	class 4	class 2
over	up to	max.					max.			max.			upper lower	max.			
–	2.5	15	8	5	3	1.5	8	4	1.5	8	5	1.5			5	2.5	1.5
2.5	6	15	8	5	3	1.5	8	4	1.5	8	5	1.5			5	2.5	1.5
6	18	15	8	5	3	1.5	8	4	1.5	8	5	1.5			5	2.5	1.5
18	30	15	9	6	4	2.5	8	4	1.5	8	5	2.5			5	2.5	1.5
30	50	20	10	7	5	2.5	8	4	1.5	8	5	2.5			5	2.5	1.5
50	80	25	13	8	5	4	8	4	1.5	10	5	4	Shall conform to the tolerance Δ_{Bs} on d of the same bearing	Shall conform to the tolerance V_{Bs} on d of the same bearing	6	3	1.5
80	120	35	18	10	6	5	9	5	2.5	11	6	5			8	4	2.5
120	150	40	20	11	7	5	10	5	2.5	13	7	5			8	5	2.5
150	180	45	23	13	8	5	10	5	2.5	14	8	5			8	5	2.5
180	250	50	25	15	10	7	11	7	4	15	10	7			10	7	4
250	315	60	30	18	11	7	13	8	5	18	10	7			11	7	5
315	400	70	35	20	13	8	13	10	7	20	13	8			13	8	7
400	500	80	40	23	*15*	–	15	*12*	–	23	*15*	–			15	*9*	–
500	630	100	50	25	*18*	–	18	*13*	–	25	*18*	–			18	*11*	–
630	800	120	60	30	–	–	20	–	–	30	–	–			20	–	–
800	1 000	140	75	*40*	–	–	*23*	–	–	*40*	–	–			*23*	–	–
1 000	1 250	160	*85*	*45*	–	–	*30*	–	–	*45*	–	–			*30*	–	–
1 250	1 600	190	*95*	*60*	–	–	*45*	–	–	*60*	–	–			*45*	–	–
1 600	2 000	220	*110*	–	–	–	–	–	–	–	–	–			–	–	–
2 000	2 500	250	–	–	–	–	–	–	–	–	–	–			–	–	–

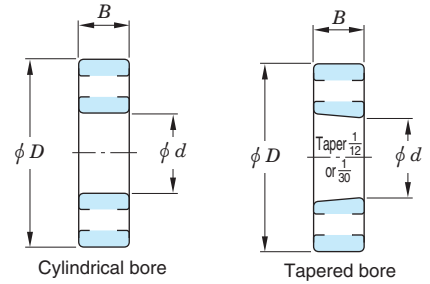
S_D : perpendicularity of outer ring outside surface with respect to the face
S_{ea} : axial runout of assembled bearing outer ring
Δ_{Cs} : deviation of a single outer ring width

[Notes]

1) These shall be applied to bearings of diameter series 0, 1, 2, 3 and 4.
2) Shall be applied when locating snap ring is not fitted.
3) These shall be applied to deep groove ball bearings and angular contact ball bearings.
4) These shall not be applied to flanged bearings.
5) These shall not be applied to shielded bearings and sealed bearings.

[Remark]

Values in Italics are prescribed in JTEKT standards.



d : nominal bore diameter
D : nominal outside diameter
B : nominal assembled bearing width

(Refer.) Table 7-4 Tolerances for measuring instrument ball bearings (inch series)

= ANSI/ABMA standards = (reference)

(1) Inner ring and outer ring width

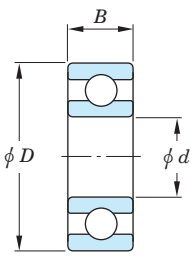
Unit : μm

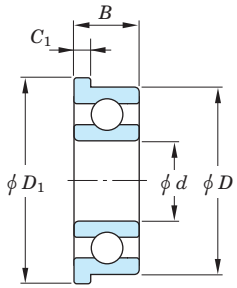
Nominal bore dia. d mm		Single plane mean bore diameter deviation Δ_{dmp}				Single bore diameter deviation Δ_{ds}				Single plane bore diameter variation V_{dsp}		Mean bore diameter variation V_{dmp}		Radial runout of assembled bearing inner ring K_{ia}			Axial runout of assembled bearing inner ring S_{ia}			Perpendicularity of inner ring face with respect to the bore S_d			Single inner or outer ring width deviation Δ_{Bs} , Δ_{Cs}		Inner or outer ring width variation V_{Bs} , V_{Cs}		
		classes 5P, 7P		class 9P		classes 5P, 7P		class 9P		classes 5P, 7P	class 9P	classes 5P, 7P	class 9P	class 5P	class 7P	class 9P	class 5P	class 7P	class 9P	class 5P	class 7P	class 9P	classes 5P, 7P, 9P		class 5P	class 7P	class 9P
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	max.		max.		max.			max.			max.			upper	lower	max.		
–	10	0	– 5.1	0	– 2.5	0	– 5.1	0	– 2.5	2.5	1.3	2.5	1.3	3.8	2.5	1.3	7.6	2.5	1.3	7.6	2.5	1.3	0	– 25.4	5.1	2.5	1.3
10	18	0	– 5.1	0	– 2.5	0	– 5.1	0	– 2.5	2.5	1.3	2.5	1.3	3.8	2.5	1.3	7.6	2.5	1.3	7.6	2.5	1.3	0	– 25.4	5.1	2.5	1.3
18	30	0	– 5.1	0	– 2.5	0	– 5.1	0	– 2.5	2.5	1.3	2.5	1.3	3.8	3.8	2.5	7.6	3.8	1.3	7.6	3.8	1.3	0	– 25.4	5.1	2.5	1.3

(2) Outer ring

Unit : μm

Nominal outside dia. D mm		Single plane mean outside diameter deviation Δ_{Dmp}				Single outside diameter deviation Δ_{Ds}						Single plane outside diameter variation V_{Dsp}			Mean outside diameter variation V_{Dmp}			Radial runout of assembled bearing outer ring K_{ea}			Axial runout of assembled bearing outer ring S_{ea}			Perpendicularity of outer ring outside surface with respect to the face S_D			Single outer ring flange outside diameter deviation Δ_{D1s}		Single outer ring flange width deviation Δ_{C1s}	
		classes 5P, 7P		class 9P		classes 5P, 7P				class 9P		classes 5P, 7P		class 9P	classes 5P, 7P		class 9P	class 5P	class 7P	class 9P	class 5P	class 7P	class 9P	class 5P	class 7P	class 9P	classes 5P, 7P		classes 5P, 7P	
						Open type		Shielded/ sealed type		Open type		Open type	Shielded/ sealed type	Open type	Open type	Shielded/ sealed type	Open type													
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	max.			max.			max.			max.			max.			upper	lower	upper	lower
–	18	0	– 5.1	0	– 2.5	0	– 5.1	+ 1	– 6.1	0	– 2.5	2.5	5.1	1.3	2.5	5.1	1.3	5.1	3.8	1.3	7.6	5.1	1.3	7.6	3.8	1.3	0	– 25.4	0	– 50.8
18	30	0	– 5.1	0	– 3.8	0	– 5.1	+ 1	– 6.1	0	– 3.8	2.5	5.1	2	2.5	5.1	2	5.1	3.8	2.5	7.6	5.1	2.5	7.6	3.8	1.3	0	– 25.4	0	– 50.8
30	50	0	– 5.1	0	– 3.8	0	– 5.1	+ 1	– 6.1	0	– 3.8	2.5	5.1	2	2.5	5.1	2	5.1	5.1	2.5	7.6	5.1	2.5	7.6	3.8	1.3	0	– 25.4	0	– 50.8





d : nominal bore diameter
D : nominal outside diameter
B : nominal assembled bearing width
D_1 : nominal outer ring flange outside diameter
C_1 : nominal outer ring flange width

Table 7-5 (1) Tolerances for metric series tapered roller bearings

= JIS B 1514-1 =

(1) Inner ring

Unit : μm

Nominal bore diameter d mm		Single plane mean bore diameter deviation Δ_{dmp}								Single bore diameter deviation Δ_{ds}				Single plane bore diameter variation V_{dsp}						Mean bore diameter variation V_{dmp}						Radial runout of assembled bearing inner ring K_{ia}						S_d			S_{ia}		Single inner ring width deviation Δ_{Bs}										Nominal bore diameter d mm	
		classes 0, 6X		classes 6, 5		class 4		class 2		class 4		class 2		classes 0, 6X	class 6	class 5	class 4	class 2		classes 0, 6X	class 6	class 5	class 4	class 2		classes 0, 6X	class 6	class 5	class 4	class 2		class 5	class 4	class 2	class 4	class 2	class 0		class 6X		class 6		classes 5, 4		class 2			
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	max.						max.						max.						max.			max.		upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	over	up to
–	10	0	– 12	0	– 7 [1]	0	– 5	0	– 4	0	– 5	0	– 4	12	–	5	4	2.5		9	–	5	4	1.5		15	–	5	3	2		7	3	1.5	3	2	0	– 120	0	– 50	–	–	0	– 200	0	– 200	–	10
10	18	0	– 12	0	– 7	0	– 5	0	– 4	0	– 5	0	– 4	12	7	5	4	2.5		9	5	5	4	1.5		15	7	5	3	2		7	3	1.5	3	2	0	– 120	0	– 50	0	– 120	0	– 200	0	– 200	10	18
18	30	0	– 12	0	– 8	0	– 6	0	– 4	0	– 6	0	– 4	12	8	6	5	2.5		9	6	5	4	1.5		18	8	5	3	2.5		8	4	1.5	4	2.5	0	– 120	0	– 50	0	– 120	0	– 200	0	– 200	18	30
30	50	0	– 12	0	– 10	0	– 8	0	– 5	0	– 8	0	– 5	12	10	8	6	3		9	8	5	5	2		20	10	6	4	2.5		8	4	2	4	2.5	0	– 120	0	– 50	0	– 120	0	– 240	0	– 240	30	50
50	80	0	– 15	0	– 12	0	– 9	0	– 5	0	– 9	0	– 5	15	12	9	7	4		11	9	6	5	2		25	10	7	4	3		8	5	2	4	3	0	– 150	0	– 50	0	– 150	0	– 300	0	– 300	50	80
80	120	0	– 20	0	– 15	0	– 10	0	– 6	0	– 10	0	– 6	20	15	11	8	5		15	11	8	5	2.5		30	13	8	5	3		9	5	2.5	5	3	0	– 200	0	– 50	0	– 200	0	– 400	0	– 400	80	120
120	180	0	– 25	0	– 18	0	– 13	0	– 7	0	– 13	0	– 7	25	18	14	10	7		19	14	9	7	3.5		35	18	11	6	4		10	6	3.5	7	4	0	– 250	0	– 50	0	– 250	0	– 500	0	– 500	120	180
180	250	0	– 30	0	– 22	0	– 15	0	– 8	0	– 15	0	– 8	30	22	17	11	7		23	16	11	8	4		50	20	13	8	5		11	7	5	8	5	0	– 300	0	– 50	0	– 300	0	– 600	0	– 600	180	250
250	315	0	– 35	0	– 25 [1]	0	– 18	0	– 8	0	– 18	0	– 8	35	*25*	19	12	8		26	*19*	13	9	5		60	*30*	13	9	6		13	8	5.5	9	6	0	– 350	0	– 50	*0*	*– 350*	0	– 700	0	– 700	250	315
315	400	0	– 40	0	– 30 [1]	–	–	–	–	–	–	–	–	40	*30*	23	–	–		30	*23*	15	–	–		70	*35*	15	–	–		15	–	–	–	–	0	– 400	0	– 50	*0*	*– 400*	0	– 800 [2]	–	–	315	400
400	500	0	– 45	0	– 35 [1]	–	–	–	–	–	–	–	–	45	*35*	28	–	–		34	*26*	17	–	–		80	*40*	20	–	–		17	–	–	–	–	0	– 450	0	– 50	*0*	*– 450*	0	– 900 [2]	–	–	400	500
500	630	0	– 60	0	– 40 [1]	–	–	–	–	–	–	–	–	60	*40*	35	–	–		40	*30*	20	–	–		90	*50*	25	–	–		20	–	–	–	–	0	– 500	–	–	*0*	*– 500*	0	– 1 100 [2]	–	–	500	630
630	800	0	– 75	0	– 50 [1]	–	–	–	–	–	–	–	–	75	*50*	45	–	–		45	*38*	25	–	–		100	*60*	30	–	–		25	–	–	–	–	0	– 750	–	–	*0*	*– 750*	0	– 1 600 [2]	–	–	630	800
800	1 000	0	– 100	0	– 60 [1]	–	–	–	–	–	–	–	–	100	*60*	60	–	–		55	*45*	30	–	–		115	*75*	37	–	–		30	–	–	–	–	0	– 1 000	–	–	*0*	*– 1 000*	0	– 2 000 [2]	–	–	800	1 000

S_d : perpendicularity of inner ring face with respect to the bore
S_{ia} : axial runout of assembled bearing inner ring

(2-1) Outer ring

Unit : μm

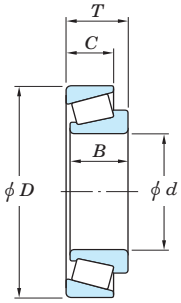
Nominal outside diameter D mm		Single plane mean outside diameter deviation Δ_{Dmp}								Single outside diameter deviation Δ_{Ds}				Single plane outside diameter variation V_{Dsp}						Mean outside diameter variation V_{Dmp}						Radial runout of assembled bearing outer ring K_{ea}						S_D [3]			S_{ea} [3]		Nominal outside diameter D mm	
		classes 0, 6X		classes 6, 5		class 4		class 2		class 4		class 2		classes 0, 6X	class 6	class 5	class 4	class 2		classes 0, 6X	class 6	class 5	class 4	class 2		classes 0, 6X	class 6	class 5	class 4	class 2		class 5	class 4	class 2	class 4	class 2		
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	max.						max.						max.						max.			max.		over	up to
–	18	0	– 12	0	– 8 [1]	0	– 6	0	– 5	0	– 6	0	– 5	12	–	6	5	4		9	–	5	4	2.5		18	–	6	4	2.5		8	4	1.5	5	2.5	–	18
18	30	0	– 12	0	– 8	0	– 6	0	– 5	0	– 6	0	– 5	12	8	6	5	4		9	6	5	4	2.5		18	9	6	4	2.5		8	4	1.5	5	2.5	18	30
30	50	0	– 14	0	– 9	0	– 7	0	– 5	0	– 7	0	– 5	14	9	7	5	4		11	7	5	5	2.5		20	10	7	5	2.5		8	4	2	5	2.5	30	50
50	80	0	– 16	0	– 11	0	– 9	0	– 6	0	– 9	0	– 6	16	11	8	7	4		12	8	6	5	2.5		25	13	8	5	4		8	4	2.5	5	4	50	80
80	120	0	– 18	0	– 13	0	– 10	0	– 6	0	– 10	0	– 6	18	13	10	8	5		14	10	7	5	3		35	18	10	6	5		9	5	3	6	5	80	120
120	150	0	– 20	0	– 15	0	– 11	0	– 7	0	– 11	0	– 7	20	15	11	8	5		15	11	8	6	3.5		40	20	11	7	5		10	5	3.5	7	5	120	150
150	180	0	– 25	0	– 18	0	– 13	0	– 7	0	– 13	0	– 7	25	18	14	10	7		19	14	9	7	4		45	23	13	8	5		10	5	4	8	5	150	180
180	250	0	– 30	0	– 20	0	– 15	0	– 8	0	– 15	0	– 8	30	20	15	11	8		23	15	10	8	5		50	25	15	10	7		11	7	5	10	7	180	250
250	315	0	– 35	0	– 25	0	– 18	0	– 9	0	– 18	0	– 9	35	25	19	14	8		26	19	13	9	5		60	30	18	11	7		13	8	6	10	7	250	315
315	400	0	– 40	0	– 28	0	– 20	0	– 10	0	– 20	0	– 10	40	28	22	15	10		30	21	14	10	6		70	35	20	13	8		13	10	7	13	8	315	400
400	500	0	– 45	0	– 33 [1]	–	–	–	–	–	–	–	–	45	*33*	26	–	–		34	*25*	17	–	–		80	*40*	24	–	–		17	–	–	–	–	400	500
500	630	0	– 50	0	– 38 [1]	–	–	–	–	–	–	–	–	60	*38*	30	–	–		38	*29*	20	–	–		100	*50*	30	–	–		20	–	–	–	–	500	630
630	800	0	– 75	0	– 45 [1]	–	–	–	–	–	–	–	–	80	*45*	38	–	–		55	*34*	25	–	–		120	*60*	36	–	–		25	–	–	–	–	630	800
800	1 000	0	– 100	0	– 60 [1]	–	–	–	–	–	–	–	–	100	*60*	50	–	–		75	*45*	30	–	–		140	*75*	43	–	–		30	–	–	–	–	800	1 000
1 000	1 250	0	– 125	0	– 80 [1]	–	–	–	–	–	–	–	–	130	*75*	65	–	–		90	*56*	38	–	–		160	*85*	52	–	–		38	–	–	–	–	1 000	1 250
1 250	1 600	0	– 160	0	– 100 [1]	–	–	–	–	–	–	–	–	170	*90*	90	–	–		100	*68*	50	–	–		180	*95*	62	–	–		50	–	–	–	–	1 250	1 600

(2-2) Outer ring

Unit : μm

Nominal bore diameter d mm		Single outer ring width deviation Δ_{Cs}			
		class 6X		classes 0, 6, 5, 4, 2	
over	up to	upper	lower	upper	lower
–	10	0	– 100		
10	18	0	– 100		
18	30	0	– 100		
30	50	0	– 100		
50	80	0	– 100		
80	120	0	– 100		
120	150	0	– 100		
150	180	0	– 100		
180	250	0	– 100		
250	315	0	– 100		
315	400	0	– 100		
400	500	0	– 100		
500	630	–	–		
630	800	–	–		
800	1 000	–	–		

Shall comform to the tolerance Δ_{Bs} on d of the same bearing



d : nominal bore diameter
D : nominal outside diameter
B : nominal inner ring width
C : nominal outer ring width
T : nominal assembled bearing width

S_D : perpendicularity of outer ring outside surface with respect to the face
S_{ea} : axial runout of assembled bearing outer ring

[Notes] 1) Class 6 values are prescribed in JTEKT standards.
2) These shall be applied to bearings of tolerance class 5.
3) These shall not be applied to flanged bearings.
[Remark] Values in Italics are prescribed in JTEKT standards.

Table 7-5 (2) Tolerances for metric series tapered roller bearings

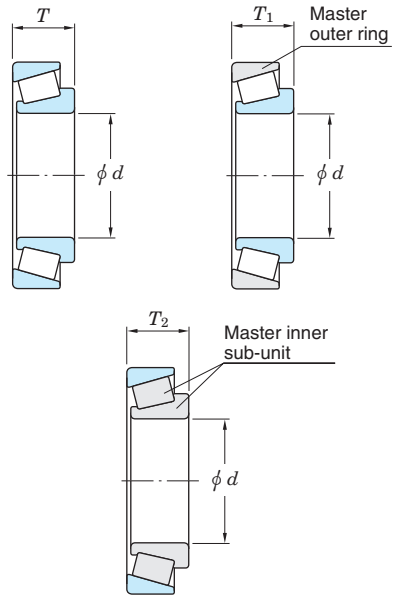
(3) Assembled bearing width and effective width

Unit : μm

Nominal bore diameter d mm		Actual bearing width deviation Δ_{Ts}										Actual effective inner sub-unit width deviation Δ_{T1s}							
		class 0		class 6X		class 6		classes 5, 4		class 2		class 0		class 6X		classes 5, 4		class 2	
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower
–	10	+ 200	0	+ 100	0	–	–	+ 200	– 200	+ 200	– 200	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
10	18	+ 200	0	+ 100	0	+ 200	0	+ 200	– 200	+ 200	– 200	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
18	30	+ 200	0	+ 100	0	+ 200	0	+ 200	– 200	+ 200	– 200	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
30	50	+ 200	0	+ 100	0	+ 200	0	+ 200	– 200	+ 200	– 200	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
50	80	+ 200	0	+ 100	0	+ 200	0	+ 200	– 200	+ 200	– 200	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
80	120	+ 200	– 200	+ 100	0	+ 200	– 200	+ 200	– 200	+ 200	– 200	+ 100	– 100	+ 50	0	+ 100	– 100	+ 100	– 100
120	180	+ 350	– 250	+ 150	0	+ 350	– 250	+ 350	– 250	+ 200	– 250	+ 150	– 150	+ 50	0	+ 150	– 150	+ 100	– 100
180	250	+ 350	– 250	+ 150	0	+ 350	– 250	+ 350	– 250	+ 200	– 300	+ 150	– 150	+ 50	0	+ 150	– 150	+ 100	– 150
250	315	+ 350	– 250	+ 200	0	*+ 350*	*– 250*	+ 350	– 250	+ 200	– 300	+ 150	– 150	+ 100	0	+ 150	– 150	+ 100	– 150
315	400	+ 400	– 400	+ 200	0	*+ 400*	*– 400*	+ 400	– 400 [1]	–	–	+ 200	– 200	+ 100	0	+ 200	– 200 [1]	–	–
400	500	+ 450	– 450	+ 200	0	*+ 400*	*– 400*	+ 450	– 450 [1]	–	–	+ 225	– 225	+ 100	0	+ 225	– 225 [1]	–	–
500	630	+ 500	– 500	–	–	*+ 500*	*– 500*	+ 500	– 500 [1]	–	–	–	–	–	–	–	–	–	–
630	800	+ 600	– 600	–	–	*+ 600*	*– 600*	+ 600	– 600 [1]	–	–	–	–	–	–	–	–	–	–
800	1 000	+ 750	– 750	–	–	*+ 750*	*– 750*	+ 750	– 750 [1]	–	–	–	–	–	–	–	–	–	–

Nominal bore diameter d mm		Actual effective outer ring width deviation Δ_{T2s}							
		class 0		class 6X		classes 5, 4		class 2	
over	up to	upper	lower	upper	lower	upper	lower	upper	lower
–	10	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
10	18	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
18	30	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
30	50	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
50	80	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
80	120	+ 100	– 100	+ 50	0	+ 100	– 100	+ 100	– 100
120	180	+ 200	– 100	+ 100	0	+ 200	– 100	+ 100	– 150
180	250	+ 200	– 100	+ 100	0	+ 200	– 100	+ 100	– 150
250	315	+ 200	– 100	+ 100	0	+ 200	– 100	+ 100	– 150
315	400	+ 200	– 200	+ 100	0	+ 200	– 200 [1]	–	–
400	500	+ 225	– 225	+ 100	0	+ 225	– 225 [1]	–	–
500	630	–	–	–	–	–	–	–	–
630	800	–	–	–	–	–	–	–	–
800	1 000	–	–	–	–	–	–	–	–

[Note] 1) These shall be applied to bearings of tolerance class 5.
[Remark] Values in Italics are prescribed in JTEKT standards.



d : nominal bore diameter
T : nominal assembled bearing width
T_1 : nominal effective width of inner sub-unit
T_2 : nominal effective width of outer ring

Table 7-6 Tolerances for metric series double-row and four-row tapered roller bearings (class 0) = BAS 1002 =

(1) Inner ring, outer ring width and overall width

Unit : μm

Nominal bore diameter d mm		Single plane mean bore diameter deviation Δ_{dmp}		Single plane bore diameter variation V_{dsp}	Mean bore diameter variation V_{dmp}	K_{ia}	Single outer ring or inner ring width deviation Δ_{Bs}, Δ_{Cs}		Actual overall inner rings/ outer rings width deviation			
									Double-row Δ_{Ts}		Four-row Δ_{Ts}, Δ_{Ws}	
over	up to	upper	lower	max.	max.	max.	upper	lower	upper	lower	upper	lower
30	50	0	– 12	12	9	20	0	– 120	+ 240	– 240	–	–
50	80	0	– 15	15	11	25	0	– 150	+ 300	– 300	–	–
80	120	0	– 20	20	15	30	0	– 200	+ 400	– 400	+ 500	– 500
120	180	0	– 25	25	19	35	0	– 250	+ 500	– 500	+ 600	– 600
180	250	0	– 30	30	23	50	0	– 300	+ 600	– 600	+ 750	– 750
250	315	0	– 35	35	26	60	0	– 350	+ 700	– 700	+ 900	– 900
315	400	0	– 40	40	30	70	0	– 400	+ 800	– 800	+ 1 000	– 1 000
400	500	0	– 45	45	34	80	0	– 450	+ 900	– 900	+ 1 200	– 1 200
500	630	0	– 60	60	40	90	0	– 500	+ 1 000	– 1 000	+ 1 200	– 1 200
630	800	0	– 75	75	45	100	0	– 750	+ 1 500	– 1 500	–	–
800	1 000	0	– 100	100	55	115	0	– 1 000	+ 1 500	– 1 500	–	–

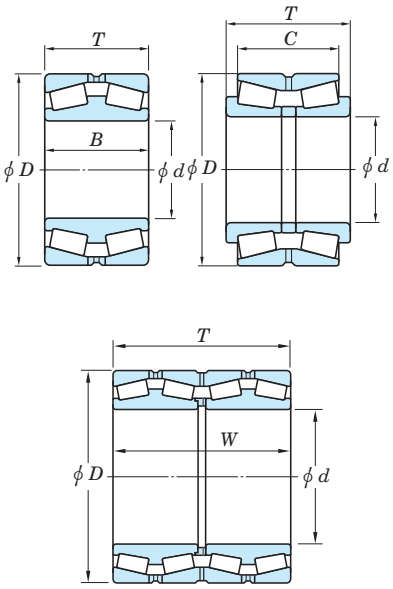
K_{ia} : radial runout of assembled bearing inner ring

(2) Outer ring

Unit : μm

Nominal outside diameter D mm		Single plane mean outside diameter deviation Δ_{Dmp}		Single plane outside diameter variation V_{Dsp}	Mean outside diameter variation V_{Dmp}	K_{ea}
over	up to	upper	lower	max.	max.	max.
50	80	0	– 16	16	12	25
80	120	0	– 18	18	14	35
120	150	0	– 20	20	15	40
150	180	0	– 25	25	19	45
180	250	0	– 30	30	23	50
250	315	0	– 35	35	26	60
315	400	0	– 40	40	30	70
400	500	0	– 45	45	34	80
500	630	0	– 50	60	38	100
630	800	0	– 75	80	55	120
800	1 000	0	– 100	100	75	140
1 000	1 250	0	– 125	130	90	160
1 250	1 600	0	– 160	170	100	180

K_{ea} : radial runout of assembled bearing outer ring



d : nominal bore diameter
D : nominal outside diameter
B : nominal double inner ring width
C : nominal double outer ring width
T, W : nominal overall width of outer rings (inner rings)

Table 7-7 Tolerances and permissible values for inch series tapered roller bearings

= ANSI/ABMA 19 =

(1) Inner ring

Unit : μm

Applied bearing type	Nominal bore diameter d, mm (1/25.4) over	up to	Deviation of a single bore diameter Δ_{ds} class 4 upper	class 4 lower	class 2 upper	class 2 lower	class 3 upper	class 3 lower	class 0 upper	class 0 lower	class 00 upper	class 00 lower
All types	–	**76.2** (3.0)	+ 13	0	+ 13	0	+ 13	0	+ 13	0	+ 8	0
	76.2 (3.0)	**266.7** (10.5)	+ 25	0	+ 25	0	+ 13	0	+ 13	0	+ 8	0
	266.7 (10.5)	**304.8** (12.0)	+ 25	0	+ 25	0	+ 13	0	+ 13	0	+ 8	0
	304.8 (12.0)	**609.6** (24.0)	+ 51	0	+ 51	0	+ 25	0	–	–	–	–
	609.6 (24.0)	**914.4** (36.0)	+ 76	0	–	–	+ 38	0	–	–	–	–
	914.4 (36.0)	**1 219.2** (48.0)	+ 102	0	–	–	+ 51	0	–	–	–	–
	1 219.2 (48.0)	–	+ 127	0	–	–	+ 76	0	–	–	–	–

(2) Outer ring

Unit : μm

Applied bearing type	Nominal outside diameter D, mm (1/25.4) over	up to	Deviation of a single outside diameter Δ_{Ds} class 4 upper	class 4 lower	class 2 upper	class 2 lower	class 3 upper	class 3 lower	class 0 upper	class 0 lower	class 00 upper	class 00 lower
All types	–	**266.7** (10.5)	+ 25	0	+ 25	0	+ 13	0	+ 13	0	+ 8	0
	266.7 (10.5)	**304.8** (12.0)	+ 25	0	+ 25	0	+ 13	0	+ 13	0	+ 8	0
	304.8 (12.0)	**609.6** (24.0)	+ 51	0	+ 51	0	+ 25	0	–	–	–	–
	609.6 (24.0)	**914.4** (36.0)	+ 76	0	+ 76	0	+ 38	0	–	–	–	–
	914.4 (36.0)	**1 219.2** (48.0)	+ 102	0	–	–	+ 51	0	–	–	–	–
	1 219.2 (48.0)	–	+ 127	0	–	–	+ 76	0	–	–	–	–

(3) Radial runout of assembled bearing inner ring/outer ring

Unit : μm

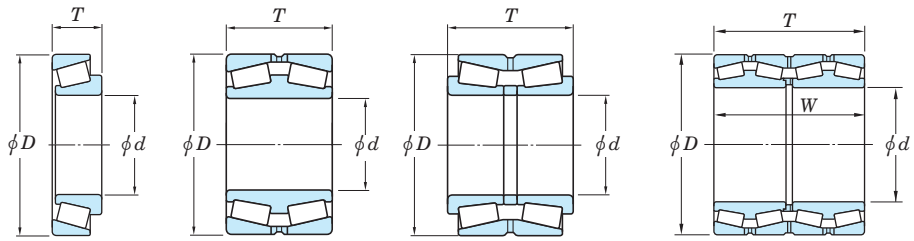
Applied bearing type	Nominal outside diameter D, mm (1/25.4) over	up to	Radial runout of inner ring/outer ring K_{ia}, K_{ea} class 4 max.	class 2 max.	class 3 max.	class 0 max.	class 00 max.
All types	–	**266.7** (10.5)	51	38	8	4	2
	266.7 (10.5)	**304.8** (12.0)	51	38	8	4	2
	304.8 (12.0)	**609.6** (24.0)	51	38	18	–	–
	609.6 (24.0)	**914.4** (36.0)	76	51	51	–	–
	914.4 (36.0)	**1 219.2** (48.0)	76	–	76	–	–
	1 219.2 (48.0)	–	76	–	76	–	–

(4) Assembled bearing width and overall width

Unit : μm

Applied bearing type	Nominal bore diameter d, mm (1/25.4) over	up to	Nominal outside diameter D, mm (1/25.4) over	up to	Deviation of the actual bearing width and overall width of inner rings/outer rings Δ_{Ts}, Δ_{Ws} class 4 upper	class 4 lower	class 2 upper	class 2 lower	class 3 upper	class 3 lower	classes 0,00 upper	classes 0,00 lower
Single-row	–	**101.6** (4.0)	–	–	+ 203	0	+ 203	0	+ 203	– 203	+ 203	– 203
	101.6 (4.0)	**266.7** (10.5)			+ 356	– 254	+ 203	0	+ 203	– 203	+ 203	– 203
	266.7 (10.5)	**304.8** (12.0)	–	–	+ 356	– 254	+ 203	0	+ 203	– 203	+ 203	– 203[1)]
	304.8 (12.0)	**609.6** (24.0)	–	**508.0** (20.0)	–	–	+ 381	– 381	+ 203	– 203	–	–
	304.8 (12.0)	**609.6** (24.0)	**508.0** (20.0)	–	–	–	+ 381	– 381	+ 381	– 381	–	–
	609.6 (24.0)		–	–	+ 381	– 381	–	–	+ 381	– 381	–	–
Double-row	–	**101.6** (4.0)	–	–	+ 406	0	+ 406	0	+ 406	– 406	+ 406	– 406
	101.6 (4.0)	**266.7** (10.5)	–	–	+ 711	– 508	+ 406	– 203	+ 406	– 406	+ 406	– 406
	266.7 (10.5)	**304.8** (12.0)	–	–	+ 711	– 508	+ 406	– 203	+ 406	– 406	+ 406	– 406[1)]
	304.8 (12.0)	**609.6** (24.0)	–	**508.0** (20.0)	–	–	+ 762	– 762	+ 406	– 406	–	–
	304.8 (12.0)	**609.6** (24.0)	**508.0** (20.0)	–	–	–	+ 762	– 762	+ 762	– 762	–	–
	609.6 (24.0)		–	–	+ 762	– 762	–	–	+ 762	– 762	–	–
Double-row (TNA type)	–	**127.0** (5.0)	–	–	–	–	+ 254	0	+ 254	0	–	–
	127.0 (5.0)		–	–	–	–	+ 762	0	+ 762	0	–	–
Four-row	Total dimensional range		–	–	+1 524	–1 524	+1 524	–1 524	+1 524	–1 524	+1 524	–1 524

[Note] 1) These shall be applied to bearings of class 0.



d : nominal bore diameter

D : nominal outside diameter

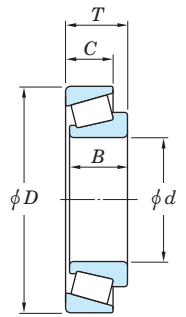
T, W : nominal assembled bearing width and nominal overall width of outer rings (inner rings)

Table 7-8 Tolerances for metric J series tapered roller bearings [1)]

(1) Bore diameter and width of inner ring and assembled bearing width

Unit : μm

Nominal bore diameter d mm		Deviation of a single bore diameter Δ_{ds}								Deviation of a single inner ring width Δ_{Bs}								Deviation of the actual bearing width Δ_{Ts}								Nominal bore diameter d mm	
		class PK		class PN		class PC		class PB		class PK		class PN		class PC		class PB		class PK		class PN		class PC		class PB			
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	over	up to
10	18	0	− 12	0	− 12	0	− 7	0	− 5	0	− 100	0	− 50	0	− 200	0	− 200	+ 200	0	+ 100	0	+ 200	− 200	+ 200	− 200	10	18
18	30	0	− 12	0	− 12	0	− 8	0	− 6	0	− 100	0	− 50	0	− 200	0	− 200	+ 200	0	+ 100	0	+ 200	− 200	+ 200	− 200	18	30
30	50	0	− 12	0	− 12	0	− 10	0	− 8	0	− 100	0	− 50	0	− 200	0	− 200	+ 200	0	+ 100	0	+ 200	− 200	+ 200	− 200	30	50
50	80	0	− 15	0	− 15	0	− 12	0	− 9	0	− 150	0	− 50	0	− 300	0	− 300	+ 200	0	+ 100	0	+ 200	− 200	+ 200	− 200	50	80
80	120	0	− 20	0	− 20	0	− 15	0	− 10	0	− 150	0	− 50	0	− 300	0	− 300	+ 200	− 200	+ 100	0	+ 200	− 200	+ 200	− 200	80	120
120	180	0	− 25	0	− 25	0	− 18	0	− 13	0	− 200	0	− 50	0	− 300	0	− 300	+ 350	− 250	+ 150	0	+ 350	− 250	+ 200	− 250	120	180
180	250	0	− 30	0	− 30	0	− 22	0	− 15	0	− 200	0	− 50	0	− 350	0	− 350	+ 350	− 250	+ 150	0	+ 350	− 250	+ 200	− 300	180	250
250	315	0	− 35	0	− 35	0	− 22	0	− 15	0	− 200	0	− 50	0	− 350	0	− 350	+ 350	− 250	+ 200	0	+ 350	− 300	+ 200	− 300	250	315



d : nominal bore diameter
D : nominal outside diameter
B : nominal inner ring width
C : nominal outer ring width
T : nominal assembled bearing width

(2) Outside diameter and width of outer ring and radial runout of assembled bearing inner ring/ outer ring

Unit : μm

Nominal outside diameter D mm		Deviation of a single outside diameter Δ_{Ds}								Deviation of a single outer ring width Δ_{Cs}								Radial runout of inner ring/outer ring K_{ia}, K_{ea}				Nominal outside diameter D mm	
		class PK		class PN		class PC		class PB		class PK		class PN		class PC		class PB		class PK	class PN	class PC	class PB		
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	max.	max.	max.	max.	over	up to
18	30	0	− 12	0	− 12	0	− 8	0	− 6	0	− 150	0	− 100	0	− 150	0	− 150	18	18	5	3	18	30
30	50	0	− 14	0	− 14	0	− 9	0	− 7	0	− 150	0	− 100	0	− 150	0	− 150	20	20	6	3	30	50
50	80	0	− 16	0	− 16	0	− 11	0	− 9	0	− 150	0	− 100	0	− 150	0	− 150	25	25	6	4	50	80
80	120	0	− 18	0	− 18	0	− 13	0	− 10	0	− 200	0	− 100	0	− 200	0	− 200	35	35	6	4	80	120
120	150	0	− 20	0	− 20	0	− 15	0	− 11	0	− 200	0	− 100	0	− 200	0	− 200	40	40	7	4	120	150
150	180	0	− 25	0	− 25	0	− 18	0	− 13	0	− 200	0	− 100	0	− 250	0	− 250	45	45	8	4	150	180
180	250	0	− 30	0	− 30	0	− 20	0	− 15	0	− 250	0	− 100	0	− 250	0	− 250	50	50	10	5	180	250
250	315	0	− 35	0	− 35	0	− 25	0	− 18	0	− 250	0	− 100	0	− 300	0	− 300	60	60	11	5	250	315
315	400	0	− 40	0	− 40	0	− 28	−	−	0	− 250	0	− 100	0	− 300	−	−	70	70	13	−	315	400

[Note] 1) Bearings with supplementary code “J” attached at the front of bearing number
Ex. JHM720249/JHM720210, and the like

Table 7-9 Tolerances for thrust ball bearings = JIS B 1514-2 =

(1) Shaft race and central race

Unit : μm

Nominal bore diameter of shaft or central race d or d_2, mm		Single plane mean bore diameter deviation Δ_{dmp} or Δ_{d2mp}				Single plane bore diameter variation V_{dsp} or V_{d2sp}		Race raceway to back face thickness variation S_i [1) 2)]			
		classes 0, 6, 5		class 4		classes 0, 6, 5	class 4	class 0	class 6	class 5	class 4
over	up to	upper	lower	upper	lower	max.		max.			
–	18	0	– 8	0	– 7	6	5	10	5	3	2
18	30	0	– 10	0	– 8	8	6	10	5	3	2
30	50	0	– 12	0	– 10	9	8	10	6	3	2
50	80	0	– 15	0	– 12	11	9	10	7	4	3
80	120	0	– 20	0	– 15	15	11	15	8	4	3
120	180	0	– 25	0	– 18	19	14	15	9	5	4
180	250	0	– 30	0	– 22	23	17	20	10	5	4
250	315	0	– 35	0	– 25	26	19	25	13	7	5
315	400	0	– 40	0	– 30	30	23	30	15	7	5
400	500	0	– 45	0	– 35	34	26	30	18	9	6
500	630	0	– 50	0	– 40	38	30	35	21	11	7
630	800	0	– 75	0	– 50	55	40	40	25	13	8
800	1 000	0	– 100	–	–	75	–	45	30	15	–
1 000	1 250	0	– 125	–	–	95	–	50	35	18	–

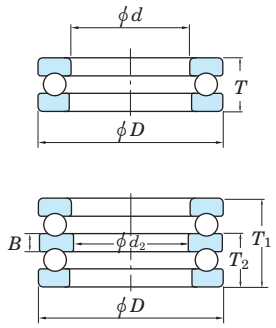
[Notes] 1) Double direction thrust ball bearings shall be included in d of single direction thrust ball bearings of the same diameter series and nominal outside diameter.
2) Applies only to thrust ball bearings and cylindrical roller thrust bearings with 90° contact angle.

(2) Housing race

Unit : μm

Nominal outside diameter D mm		Single plane mean outside diameter deviation Δ_{Dmp}				Single plane outside diameter variation V_{Dsp}		Race raceway to back face thickness variation S_e [1) 2)]
		classes 0, 6, 5		class 4		classes 0, 6, 5	class 4	classes 0, 6, 5, 4
over	up to	upper	lower	upper	lower	max.		max.
10	18	0	– 11	0	– 7	8	5	
18	30	0	– 13	0	– 8	10	6	
30	50	0	– 16	0	– 9	12	7	
50	80	0	– 19	0	– 11	14	8	
80	120	0	– 22	0	– 13	17	10	
120	180	0	– 25	0	– 15	19	11	
180	250	0	– 30	0	– 20	23	15	Shall conform to the tolerance S_i on d or d_2 of the same bearing
250	315	0	– 35	0	– 25	26	19	
315	400	0	– 40	0	– 28	30	21	
400	500	0	– 45	0	– 33	34	25	
500	630	0	– 50	0	– 38	38	29	
630	800	0	– 75	0	– 45	55	34	
800	1 000	0	– 100	0	– 60	75	45	
1 000	1 250	0	– 125	–	–	95	–	
1 250	1 600	0	– 160	–	–	120	–	

[Notes] 1) These shall be applied to race with flat back face only.
2) Applies only to thrust ball bearings and cylindrical roller thrust bearings with 90° contact angle.



d : shaft race nominal bore diameter
d_2 : central race nominal bore diameter
D : housing race nominal outside diameter
B : central race nominal height
T : nominal bearing height (single direction)
T_1, T_2 : nominal bearing height (double direction)

(3) Bearing height and central race height

Unit : μm

Nominal bore diameter d mm		Single direction		Double direction					
		Deviation of the actual bearing height Δ_{Ts}		Deviation of the actual bearing height Δ_{T1s} [1)]		Deviation of the actual bearing height Δ_{T2s} [1)]		Deviation of a single central race height B Δ_{Bs} [1)]	
		class 0		class 0		class 0		class 0	
over	up to	upper	lower	upper	lower	upper	lower	upper	lower
–	30	*0*	*– 75*	*+ 50*	*– 150*	*0*	*– 75*	*0*	*– 50*
30	50	*0*	*– 100*	*+ 75*	*– 200*	*0*	*– 100*	*0*	*– 75*
50	80	*0*	*– 125*	*+ 100*	*– 250*	*0*	*– 125*	*0*	*– 100*
80	120	*0*	*– 150*	*+ 125*	*– 300*	*0*	*– 150*	*0*	*– 125*
120	180	*0*	*– 175*	*+ 150*	*– 350*	*0*	*– 175*	*0*	*– 150*
180	250	*0*	*– 200*	*+ 175*	*– 400*	*0*	*– 200*	*0*	*– 175*
250	315	*0*	*– 225*	*+ 200*	*– 450*	*0*	*– 225*	*0*	*– 200*
315	400	*0*	*– 300*	*+ 250*	*– 600*	*0*	*– 300*	*0*	*– 250*

[Note] 1) Double direction thrust ball bearings shall be included in d of single direction thrust ball bearings of the same diameter series and nominal outside diameter.

[Remark] Values in Italics are prescribed in JTEKT standards.

Table 7-10 Tolerances for spherical thrust roller bearings (class 0) = JIS B 1514-2 =

(1) Shaft race

Unit : μm

Nominal bore diameter d mm		Single plane mean bore diameter deviation Δ_{dmp}		Single plane bore diameter variation V_{dsp}	Refer.		
						Actual bearing height deviation Δ_{Ts}	
over	up to	upper	lower	max.	S_d max.	upper	lower
50	80	0	– 15	11	*25*	*+ 150*	*– 150*
80	120	0	– 20	15	*25*	*+ 200*	*– 200*
120	180	0	– 25	19	*30*	*+ 250*	*– 250*
180	250	0	– 30	23	*30*	*+ 300*	*– 300*
250	315	0	– 35	26	*35*	*+ 350*	*– 350*
315	400	0	– 40	30	*40*	*+ 400*	*– 400*
400	500	0	– 45	34	*45*	*+ 450*	*– 450*

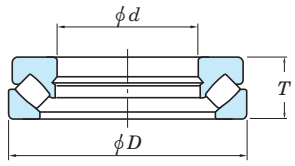
S_d : perpendicularity of inner ring face with respect to the bore

[Remark] Values in Italics are prescribed in JTEKT standards.

(2) Housing race

Unit : μm

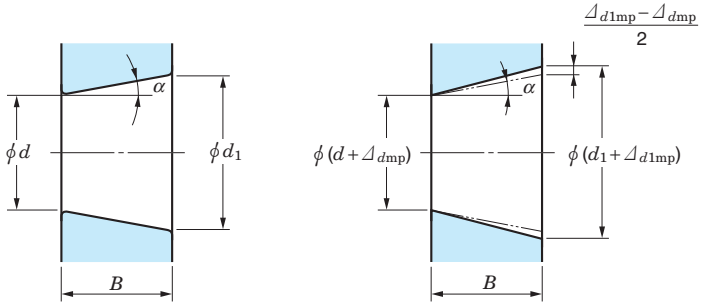
Nominal outside diameter D, mm		Single plane mean outside diameter deviation Δ_{Dmp}	
over	up to	upper	lower
120	180	0	– 25
180	250	0	– 30
250	315	0	– 35
315	400	0	– 40
400	500	0	– 45
500	630	0	– 50
630	800	0	– 75
800	1 000	0	– 100



d : shaft race nominal bore diameter
D : housing race nominal outside diameter
T : nominal bearing height

Table 7-11 Tolerances and permissible values for tapered bores of radial bearings

(class 0 ··· JIS B 1514-1)



Theoretical tapered bore

Tapered bore with single plane mean bore diameter deviation

(1) Basically tapered bore (taper 1:12) Unit : μm

Nominal bore diameter d, mm		Δ_{dmp}		$\Delta_{d1mp}-\Delta_{dmp}$		V_{dsp} [1]
over	up to	upper	lower	upper	lower	max.
–	10	+ 22	0	+ 15	0	9
10	18	+ 27	0	+ 18	0	11
18	30	+ 33	0	+ 21	0	13
30	50	+ 39	0	+ 25	0	16
50	80	+ 46	0	+ 30	0	19
80	120	+ 54	0	+ 35	0	22
120	180	+ 63	0	+ 40	0	40
180	250	+ 72	0	+ 46	0	46
250	315	+ 81	0	+ 52	0	52
315	400	+ 89	0	+ 57	0	57
400	500	+ 97	0	+ 63	0	63
500	630	+ 110	0	+ 70	0	70
630	800	+ 125	0	+ 80	0	–
800	1 000	+ 140	0	+ 90	0	–
1 000	1 250	+ 165	0	+ 105	0	–
1 250	1 600	+ 195	0	+ 125	0	–

(2) Basically tapered bore (taper 1:30) Unit : μm

Nominal bore diameter d, mm		Δ_{dmp}		$\Delta_{d1mp}-\Delta_{dmp}$		V_{dsp} [1]
over	up to	upper	lower	upper	lower	max.
–	50	+ 15	0	+ 30	0	19
50	80	+ 15	0	+ 30	0	19
80	120	+ 20	0	+ 35	0	22
120	180	+ 25	0	+ 40	0	40
180	250	+ 30	0	+ 46	0	46
250	315	+ 35	0	+ 52	0	52
315	400	+ 40	0	+ 57	0	57
400	500	+ 45	0	+ 63	0	63
500	630	+ 50	0	+ 70	0	70

[Note] 1) These shall be applied to all radial planes with tapered bore, not be applied to bearings of diameter series 7, 8.

[Remark] 1) Symbols of quantity d_1 : reference diameter at theoretical large end of tapered bore

$$d_1 = d + \frac{1}{12}B \text{ or } d_1 = d + \frac{1}{30}B$$

Δ_{dmp} : single plane mean bore diameter deviation at theoretical small end of tapered bore

Δ_{d1mp} : single plane mean bore diameter deviation at theoretical large end of tapered bore

V_{dsp} : single plane bore diameter variation (a tolerance for the diameter variation given by a maximum value applying in any radial plane of the bore)

B : nominal inner ring width

α : $\frac{1}{2}$ of nominal tapered angle of tapered bore

(tapered ratio 1/12)	(tapered ratio 1/30)
$\alpha = 2°23'9.4''$	$\alpha = 0°57'17.4''$
$= 2.385\ 94°$	$= 0.954\ 84°$
$= 0.041\ 643$ rad	$= 0.016\ 665$ rad

Table 7-12 Tolerances and permissible values for flanged radial ball bearings

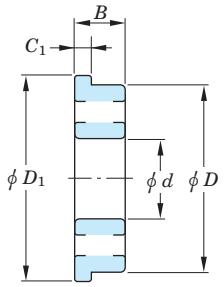
(1) Tolerances on flange outside diameters Unit : μm

Nominal outer ring flange outside diameter D_1 (mm)		Deviation of single outer ring flange outside diameter, Δ_{D1s}			
		Locating flange		Non-locating flange	
over	up to	upper	lower	upper	lower
–	6	0	– 36	+ 220	– 36
6	10	0	– 36	+ 220	– 36
10	18	0	– 43	+ 270	– 43
18	30	0	– 52	+ 330	– 52
30	50	0	– 62	+ 390	– 62
50	80	0	– 74	+ 460	– 74

(2) Tolerances and permissible values on flange widths and permissible values of running accuracies relating to flanges Unit : μm

Nominal outside diameter D (mm)		Deviation of single outer ring flange width Δ_{C1s} [1]	Variation of outer ring flange width V_{C1s} [1]				Perpendicularity of outer ring outside surface with respect to the flange back face S_{D1}						Axial runout of assembled bearing outer ring flange back face S_{ea1}				
							Deep groove ball bearings and angular contact ball bearings			Tapered roller bearings			Deep groove ball bearings and angular contact ball bearings			Tapered roller bearings	
		classes 0, 6, 5, 4, 2	classes 0, 6	class 5	class 4	class 2	class 5	class 4	class 2	class 5	class 4	class 2	class 5	class 4	class 2	class 4	class 2
over	up to	upper lower	max.				max.			max.			max.			max.	
–	2.5	Shall conform to the tolerance Δ_{Bs} on d of the same class and the bearing	Shall conform to the tolerance V_{Bs} on d of the same class and the bearing	5	2.5	1.5	8	4	1.5	8	4	1.5	11	7	3	7	4
2.5	6			5	2.5	1.5	8	4	1.5	8	4	1.5	11	7	3	7	4
6	18			5	2.5	1.5	8	4	1.5	8	4	1.5	11	7	3	7	4
18	30			5	2.5	1.5	8	4	1.5	8	4	1.5	11	7	4	7	4
30	50			5	2.5	1.5	8	4	1.5	8	4	2	11	7	4	7	4
50	80			6	3	1.5	8	4	1.5	8	4	2.5	14	7	6	7	6

[Note] 1) These shall be applied to groove ball bearings, i.e. deep groove ball bearing and angular contact ball bearing etc.



d : nominal bore diameter

D : nominal outside diameter

B : nominal assembled bearing width

D_1 : nominal outer ring flange outside diameter

C_1 : nominal outer ring flange width

Table 7-13 Permissible values for chamfer dimensions = JIS B 1514-3 =

(1) Radial bearing (tapered roller bearings excluded)

Unit : mm

$r_{\min}$ or $r_{1\min}$	Nominal bore diameter d mm		$r_{\max}$ or $r_{1\max}$	
	over	up to	Radial direction	Axial direction
0.05	–	–	0.1	0.2
0.08	–	–	0.16	0.3
0.1	–	–	0.2	0.4
0.15	–	–	0.3	0.6
0.2	–	–	0.5	0.8
0.3	–	40	0.6	1
	40	–	0.8	1
0.6	–	40	1	2
	40	–	1.3	2
1	–	50	1.5	3
	50	–	1.9	3
1.1	–	120	2	3.5
	120	–	2.5	4
1.5	–	120	2.3	4
	120	–	3	5
2	–	80	3	4.5
	80	220	3.5	5
	220	–	3.8	6
2.1	–	280	4	6.5
	280	–	4.5	7
2.5	–	100	3.8	6
	100	280	4.5	6
	280	–	5	7
3	–	280	5	8
	280	–	5.5	8
4	–	–	6.5	9
5	–	–	8	10
6	–	–	10	13
7.5	–	–	12.5	17
9.5	–	–	15	19
12	–	–	18	24
15	–	–	21	30
19	–	–	25	38

[Remarks]

1. Value of $r_{\max}$ or $r_{1\max}$ in the axial direction of bearings with nominal width lower than 2 mm shall be the same as the value in radial direction.
2. There shall be no specification for the accuracy of the shape of the chamfer surface, but its outline in the axial plane shall not be situated outside of the imaginary circle arc with a radius of $r_{\min}$ or $r_{1\min}$ which contacts the inner ring side face and bore, or the outer ring side face and outside surface.

(2) Radial bearings with locating snap ring (snap ring groove side) and cylindrical roller bearings (separete thrust collar and loose rib side)

Unit : mm

$r_{1\min}$	Nominal bore dia. or nominal outside dia. d or D		$r_{1\max}$	
	over	up to	Radial direction	Axial direction
0.2	–	–	0.5	0.5
0.3	–	40	0.6	0.8
	40	–	0.8	0.8
0.5	–	40	1	1.5
	40	–	1.3	1.5
0.6	–	40	1	1.5
	40	–	1.3	1.5
1	–	50	1.5	2.2
	50	–	1.9	2.2
1.1	–	120	2	2.7
	120	–	2.5	2.7
1.5	–	120	2.3	3.5
	120	–	3	3.5
2	–	80	3	4
	80	220	3.5	4
	220	–	3.8	4
2.1	–	280	4	4.5
	280	–	4.5	4.5
2.5	–	100	3.8	5
	100	280	4.5	5
	280	–	5	5
3	–	280	5	5.5
	280	–	5.5	5.5
4	–	–	6.5	6.5
5	–	–	8	8
6	–	–	10	10

[Remark] There shall be no specification for the accuracy of the shape of the chamfer surface, but its outline in the axial plane shall not be situated outside of the imaginary circle arc with a radius of $r_{1\min}$ which contacts the inner ring side face and bore, or the outer ring side face and outside surface.

(3) Cylindrical roller bearings (non-rib side) and angular contact ball bearings (front face side)

Unit : mm

$r_{1\min}$	Nominal bore dia. or nominal outside dia. d or D		$r_{1\max}$	
	over	up to	Radial direction	Axial direction
0.1	–	–	0.2	0.4
0.15	–	–	0.3	0.6
0.2	–	–	0.5	0.8
0.3	–	40	0.6	1
	40	–	0.8	1
0.6	–	40	1	2
	40	–	1.3	2
1	–	50	1.5	3
	50	–	1.9	3
1.1	–	120	2	3.5
	120	–	2.5	4
1.5	–	120	2.3	4
	120	–	3	5
2	–	80	3	4.5
	80	220	3.5	5
	220	–	3.8	6

[Remark] There shall be no specification for the accuracy of the shape of the chamfer surface, but its outline in the axial plane shall not be situated outside of the imaginary circle arc with a radius of $r_{1\min}$ which contacts the inner ring side face and bore, or the outer ring side face and outside surface.

(4) Metric series tapered roller bearing

Unit : mm

$r_{\min}$ or $r_{1\min}$	Nominal bore dia. or nominal outside dia.[1] d or D, mm		$r_{\max}$ or $r_{1\max}$	
	over	up to	Radial direction	Axial direction
0.3	–	40	0.7	1.4
	40	–	0.9	1.6
0.6	–	40	1.1	1.7
	40	–	1.3	2
1	–	50	1.6	2.5
	50	–	1.9	3
1.5	–	120	2.3	3
	120	250	2.8	3.5
	250	–	3.5	4
2	–	120	2.8	4
	120	250	3.5	4.5
	250	–	4	5
2.5	–	120	3.5	5
	120	250	4	5.5
	250	–	4.5	6
3	–	120	4	5.5
	120	250	4.5	6.5
	250	400	5	7
	400	–	5.5	7.5
4	–	120	5	7
	120	250	5.5	7.5
	250	400	6	8
	400	–	6.5	8.5
5	–	180	6.5	8
	180	–	7.5	9
6	–	180	7.5	10
	180	–	9	11
7.5	–	–	*12.5*	*17*
9.5	–	–	*15*	*19*

[Note] 1) Inner ring shall be included in division d, and outer ring, in division D.

[Remarks]

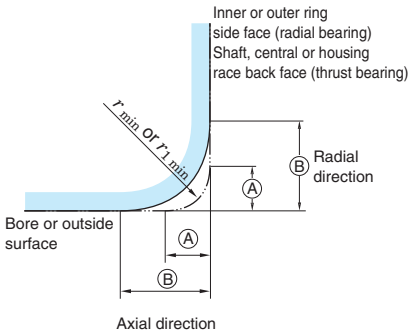
1. There shall be no specification for the accuracy of the shape of the chamfer surface, but its outline in the axial plane shall not be situated outside of the imaginary circle arc with a radius of $r_{\min}$ or $r_{1\min}$ which contacts the inner ring back face and bore, or the outer ring back face and outside surface.
2. Values in Italics are provided in JTEKT standards.

(5) Thrust bearing

Unit : mm

$r_{\min}$ or $r_{1\min}$	$r_{\max}$ or $r_{1\max}$
	Radial and axial direction
0.05	0.1
0.08	0.16
0.1	0.2
0.15	0.3
0.2	0.5
0.3	0.8
0.6	1.5
1	2.2
1.1	2.7
1.5	3.5
2	4
2.1	4.5
3	5.5
4	6.5
5	8
6	10
7.5	12.5
9.5	15
12	18
15	21
19	25

[Remark] There shall be no specification for the accuracy of the shape of the chamfer surface, but its outline in the axial plane shall not be situated outside of the imaginary circle arc with a radius of $r_{\min}$ or $r_{1\min}$ which contacts with the shaft or central race back face and bore, or the housing race back face and outside surface.



(Ⓐ : $r_{\min}$ or $r_{1\min}$
Ⓑ : $r_{\max}$ or $r_{1\max}$)

7-2 Tolerance measuring method (reference)

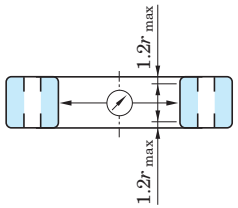
The details on measuring methods for bearings are prescribed in JIS B 1515-2.

This section outlines measuring methods for dimensional and running accuracy.

Dimensional accuracy (1)

Bore diameter (d) Cylindrical bore bearings

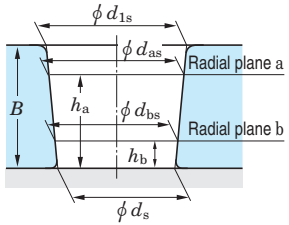
Obtain the maximum value ($d_{sp\,max}$) and the minimum value ($d_{sp\,min}$) of the bore diameter (d_s) acquired in a single radial plane.
Obtain the single plane mean bore diameter (d_{mp}) as the arithmetic mean value of the maximum value ($d_{sp\,max}$) and minimum values ($d_{sp\,min}$).



$$d_{mp} = \frac{d_{sp\,max} + d_{sp\,min}}{2}$$

Single plane mean bore diameter deviation ;
$\Delta_{dmp} = d_{mp} - d$
Bore diameter variation in a single plane ;
$V_{dsp} = d_{sp\,max} - d_{sp\,min}$
Mean bore diameter variation ;
$V_{dmp} = d_{mp\,max} - d_{mp\,min}$
Deviation of a single bore diameter ;
$\Delta_{ds} = d_s - d$

Bore diameter (d) Tapered bore bearings



Bore diameter at the theoretical small end and bore diameter at the theoretical large end ;

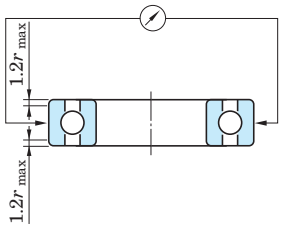
$$d_s = \frac{d_{bs} \cdot h_a - d_{as} \cdot h_b}{h_a - h_b}$$

$$d_{1s} = \frac{d_{as}\,(B - h_b) - d_{bs}\,(B - h_a)}{h_a - h_b}$$

Single plane mean bore diameter deviation at the theoretical small end ;
$\Delta_{dmp} = d_{mp} - d$
Deviation on taper ;
$(\Delta_{d1mp} - \Delta_{dmp}) = (d_{1mp} - d_1) - (d_{mp} - d)$
Bore diameter variation in a single plane ;
$V_{dsp} = d_{sp\,max} - d_{sp\,min}$

Outside diameter (D)

Obtain the single plane mean outside diameter (D_{mp}) as the arithmetical mean value of the maximum value ($D_{sp\,max}$) and the minimum value ($D_{sp\,min}$) of the outside diameters (D_s) acquired in a single radial plane.

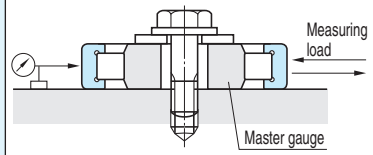


$$D_{mp} = \frac{D_{sp\,max} + D_{sp\,min}}{2}$$

Single plane mean outside diameter deviation ;
$\Delta_{Dmp} = D_{mp} - D$
Outside diameter variation in a single plane ;
$V_{Dsp} = D_{sp\,max} - D_{sp\,min}$
Mean outside diameter variation ;
$V_{Dmp} = D_{mp\,max} - D_{mp\,min}$
Deviation of a single outside diameter ;
$\Delta_{Ds} = D_s - D$

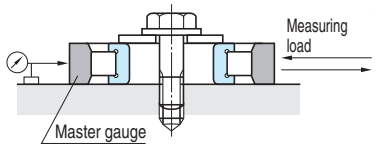
Dimensional accuracy (2)

Roller set bore diameter (F_w)



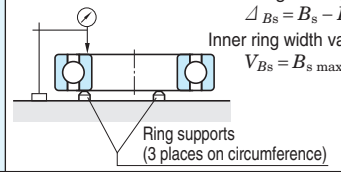
Deviation of the roller set bore diameter ;
$\Delta_{Fw} = (d_G + \delta_{1m}) - F_w$
Deviation of the minimum diameter of the roller set bore diameter ;
$\Delta_{Fw\,min} = (d_G + \delta_{1min}) - F_w$
(d_G) outside diameter of the master gauge
(δ_{1m}) arithmetical mean value of the amount of movement of the outer ring
(δ_{1min}) minimum value of the amount of movement of the outer ring

Roller set outside diameter (E_w)

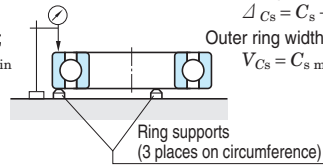


Deviation of the roller set outside diameter ;
$\Delta_{Ew} = (D_G + \delta_{2m}) - E_w$
(D_G) bore diameter of the master gauge
(δ_{2m}) arithmetical mean value of the amount of movement of the master gauge

Inner ring width (B) Outer ring width (C)

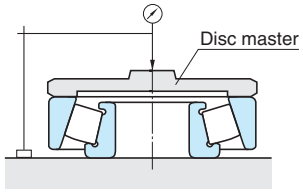


Deviation of a single inner ring width ;
$\Delta_{Bs} = B_s - B$
Inner ring width variation ;
$V_{Bs} = B_{s\,max} - B_{s\,min}$



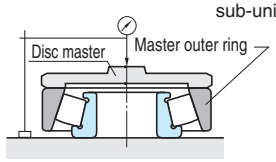
Deviation of a single outer ring width ;
$\Delta_{Cs} = C_s - C$
Outer ring width variation ;
$V_{Cs} = C_{s\,max} - C_{s\,min}$

Assembled bearing width of tapered roller bearing (T)

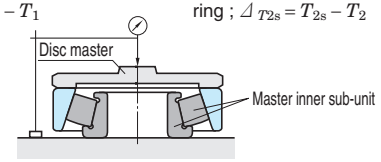


Deviation of the actual bearing width ; $\Delta_{Ts} = T_s - T$

Nominal effective width of tapered roller bearing (T_1, T_2)

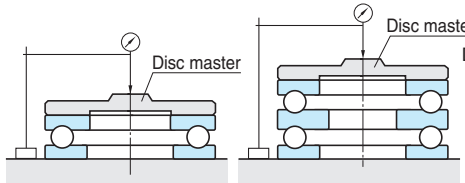


Deviation of the actual effective width of inner sub-unit ; $\Delta_{T1s} = T_{1s} - T_1$



Deviation of the actual effective width of outer ring ; $\Delta_{T2s} = T_{2s} - T_2$

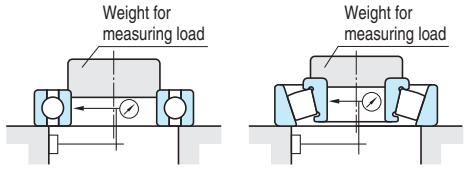
Nominal height of thrust ball bearing with flat back face (T, T_1)



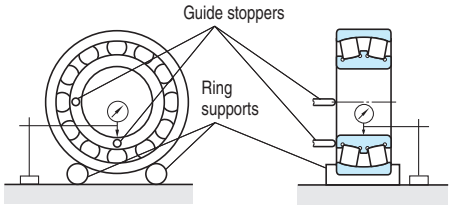
Deviation of the actual bearing height ;
$\Delta_{Ts} = T_s - T$ (single direction)
$\Delta_{T1s} = T_{1s} - T_1$ (double direction)

Running accuracy (1)

Radial runout of assembled bearing inner ring (K_{ia})

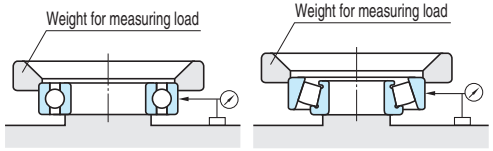


The radial runout of the inner ring (K_{ia}) shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the inner ring has been rotated through one rotation.

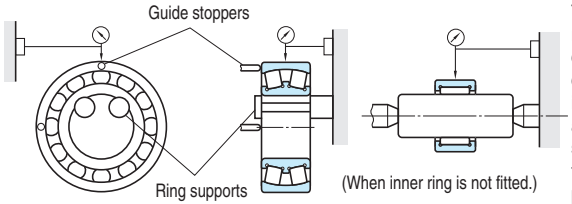


[Note]
The measurement of the radial runout of the inner ring of cylindrical roller bearings, machined ring needle roller bearings, self-aligning ball bearings and spherical roller bearings shall be carried out by fixing the outer ring with ring supports.

Radial runout of assembled bearing outer ring (K_{ea})

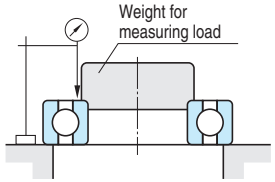


The measurement of outer ring runout (K_{ea}) shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the outer ring has been rotated through one rotation.



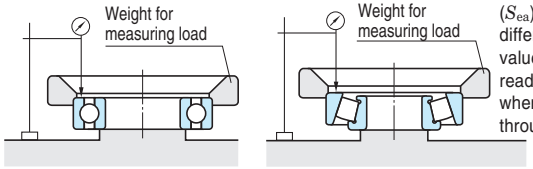
[Note]
The measurement of the radial runout of the outer ring of cylindrical roller bearings, machined ring needle roller bearings, self-aligning ball bearings and spherical roller bearings shall be carried out by fixing the inner ring with ring supports.

Axial runout of assembled bearing inner ring (S_{ia})



The axial runout of the inner ring (S_{ia}) shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the inner ring has been rotated through one rotation.

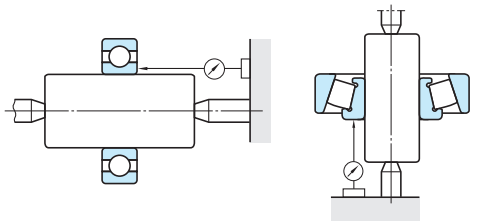
Axial runout of assembled bearing outer ring (S_{ea})



The axial runout of the outer ring (S_{ea}) shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the outer ring has been rotated through one rotation.

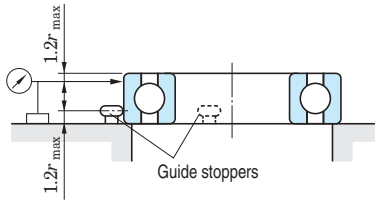
Running accuracy (2)

Perpendicularity of inner ring face with respect to the bore (S_d)



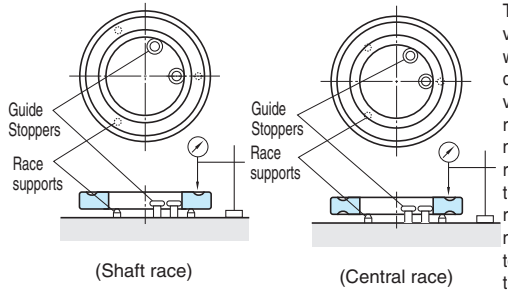
Perpendicularity of inner ring face (S_d) shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the inner ring has been rotated through one rotation with the tapered arbor.

Perpendicularity of outer ring outside surface with respect to the face (S_D)



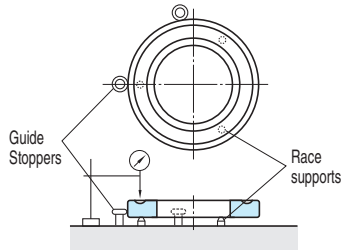
Perpendicularity of outer ring outside surface (S_D) shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the outer ring has been rotated through one rotation along the guide stopper.

Shaft/central race raceway to back face thickness variation of thrust ball bearing with flat back face (S_i)



The measurement of the thickness variation (S_i) of shaft race raceway track shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the shaft race has been rotated through one rotation along the guide stopper. For the central race, carry out the same measurement for the two raceway grooves to obtain the thickness variation of the raceway track (S_i).

Housing race raceway to back face thickness variation of thrust ball bearing with flat back face (S_e)



The measurement of the thickness variation (S_e) of housing race raceway track shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the housing race has been rotated through one rotation along the guide stopper.

8. Limiting speed

The rotational speed of a bearing is normally affected by friction heat generated in the bearing. If the heat exceeds a certain amount, seizure or other failures occur, thus causing rotation to be discontinued.

The limiting speed is the highest speed at which a bearing can continuously operate without generating such critical heat.

The limiting speed differs depending on various factors including bearing type, dimensions and their accuracy, lubrication, lubricant type and amount, shapes of cages and materials and load conditions, etc.

The limiting speed determined under grease lubrication and oil lubrication (oil bath) for each bearing type are listed in the bearing specification table.

These speeds are applied when bearings of standard design are rotated under normal load conditions (approximately, $C/P \geqq 16^*$, $F_a/F_r \leqq 0.25$).

Each lubricant has superior performance in use, according to type.

Some are not suitable for high speed ; when bearing rotational speed exceeds 80 % of catalog specification, consult with JTEKT.

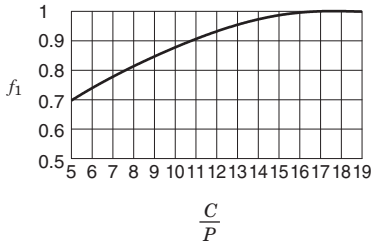


Fig. 8-1a Values of correction coefficient f_1 of load magnitude (Excludes K type bearings and railway rolling stock axle journals)

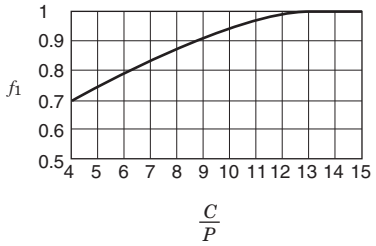


Fig. 8-1b Values of correction coefficient f_1 of load magnitude (K type bearings and railway rolling stock axle journals)

8-1 Correction of limiting speed

When the load condition is $C/P < 16^*$, i.e. the dynamic equivalent load P exceeds approximately 6* % of basic dynamic load rating C, or when a combined load in which the axial load is greater than 25 % of radial load is applied, the limiting speed should be corrected by using equation (8-1) :

$$n_a = f_1 \cdot f_2 \cdot n \quad \cdots\cdots (8\text{-}1)$$

where :

n_a	: corrected limiting speed	$\min^{-1}$
f_1	: correction coefficient determined from the load magnitude (Fig. 8-1)	
f_2	: correction coefficient determined from combined load (Fig. 8-2)	
n	: limiting speed under normal load condition (values in the bearing specification table)	$\min^{-1}$
C	: basic dynamic load rating	N
P	: dynamic equivalent load	N
F_r	: radial load	N
F_a	: axial load	N

* 13 (8 %) for K type bearings and railway rolling stock axle journals

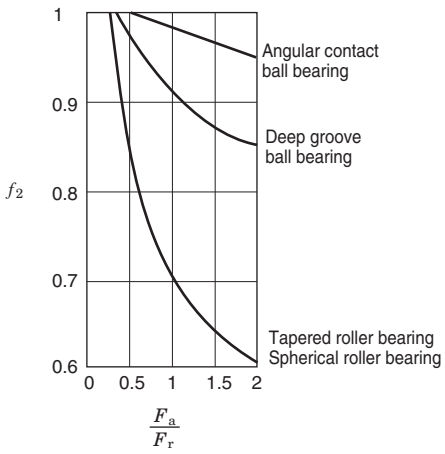


Fig. 8-2 Values of correction coefficient f_2 of combined load

8-2 Limiting speed for sealed ball bearings

The limiting speed of ball bearings with a contact seal (RS, RK type) are determined by the rubbing speed at which the seal contacts the inner ring. These allowable rubbing speeds differ depending on seal rubber materials; and, for ball bearings with the Koyo standard contact type seal (NBR), a rubbing speed of 15 m/s is utilized.

8-3 Considerations for high speed

When bearings are used for high speed, especially when the rotation speed approaches the limiting speed or exceeds it, the following should be considered :
(for further information on high speed, consult with JTEKT)

(1) Use of high precision bearings
(2) Study of proper internal clearance
  (Reduction in internal clearance caused by temperature increase should be considered.)
(3) Selection of proper cage type and materials
  (For high speed, copper alloy or phenolic resin machined cages are suitable. Synthetic resin molded cages for high speed are also available.)
(4) Selection of proper lubrication
  (Suitable lubrication for high speed should be selected jet lubrication, oil mist lubrication and oil air lubrication, etc.)

8-4 Frictional coefficient (reference)

The frictional moment of rolling bearings can be easily compared with that of plain bearings. The frictional moment of rolling bearings can be obtained from their bore diameter, using the following equation :

$$M = \mu P \frac{d}{2} \quad \cdots\cdots (8\text{-}2)$$

where :

M	: frictional moment	mN · m
μ	: frictional coefficient	
P	: load on the bearing	N
d	: nominal bore diameter	mm

The friction coefficient is greatly dependent on bearing type, bearing load, rotation speed and lubrication, etc.

Reference values for the friction coefficient during stable operation under normal operating conditions are listed in Table 8-1.

For plain bearings, the value is normally 0.01 to 0.02 ; but, for certain cases, it is 0.1 to 0.2.

Table 8-1 Friction coefficient μ

Bearing type	Friction coefficient μ
Deep groove ball bearing	0.001 0 – 0.001 5
Angular contact ball bearing	0.001 2 – 0.002 0
Self-aligning ball bearing	0.000 8 – 0.001 2
Cylindrical roller bearing	0.000 8 – 0.001 2
Full complement type needle roller bearing	0.002 5 – 0.003 5
Needle roller and cage assembly	0.002 0 – 0.003 0
Tapered roller bearing	0.001 7 – 0.002 5
Spherical roller bearing	0.002 0 – 0.002 5
Thrust ball bearing	0.001 0 – 0.001 5
Spherical thrust roller bearing	0.002 0 – 0.002 5

9. Bearing fits

9-1 Purpose of fit

The purpose of fit is to securely fix the inner or outer ring to the shaft or housing, to preclude detrimental circumferential sliding on the fitting surface.

Such detrimental sliding (referred to as "creep") will cause abnormal heat generation, wear of the fitting surface, infiltration of abrasion metal particles into the bearing, vibration, and many other harmful effects, which cause a deterioration of bearing functions.

Therefore, it is necessary to fix the bearing ring which is rotating under load to the shaft or housing with interference.

9-2 Tolerance and fit for shaft & housing

For metric series bearings, tolerances for the shaft diameter and housing bore diameter are standardized in JIS B 0401-1 and 0401-2 "ISO system of limits and fits - Part 1 and Part 2" (based on ISO 286; shown in Appendixes at the back of this catalogue). Bearing fits on the shaft and housing are determined based on the tolerances specified in the above standard.

Fig. 9-1 shows the relationship between tolerances for shaft and housing bore diameters and fits for bearings of class 0 tolerance.

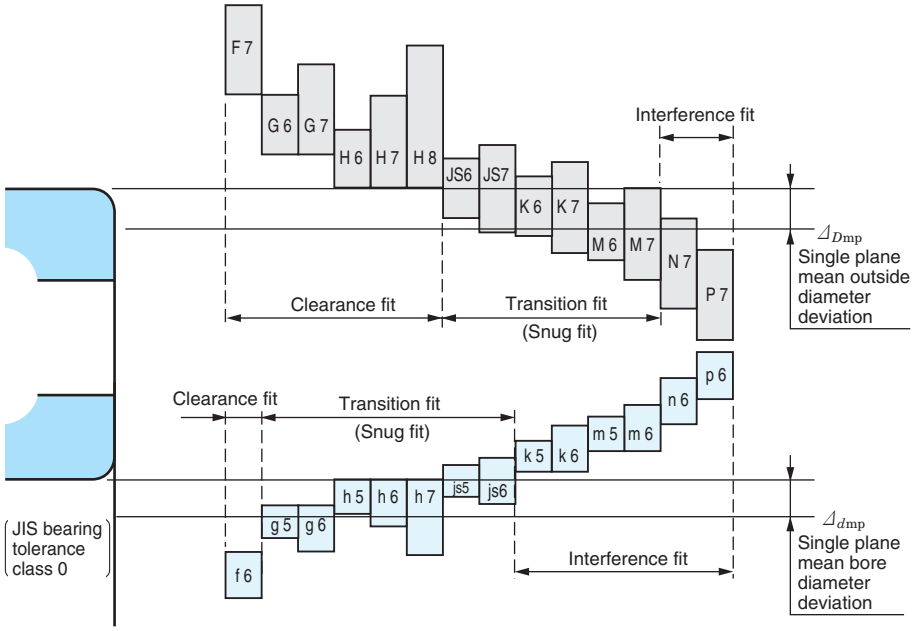


Fig. 9-1 Relationship between tolerances for shaft/housing bore diameters and fits (bearings of class 0 tolerance)

9-3 Fit selection

In selecting the proper fit, careful consideration should be given to bearing operating conditions.

Major specific considerations are :

- Load characteristics and magnitude
- Temperature distribution in operating
- Bearing internal clearance
- Surface finish, material and thickness of shaft and housing
- Mounting and dismounting methods
- Necessity to compensate for shaft thermal expansion at the fitting surface
- Bearing type and size

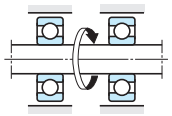
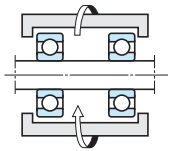
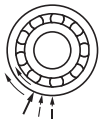
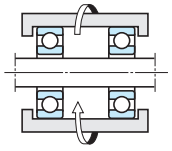
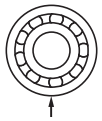
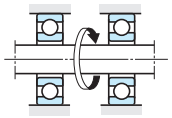
In view of these considerations, the following paragraphs explain the details of the important factors in fit selection.

1) Load characteristics

Load characteristics are classified into three types : rotating inner ring load; rotating outer ring load and indeterminate direction load.

Table 9-1 tabulates the relationship between these characteristics and fit.

Table 9-1 Load characteristics and fits

Rotation pattern	Direction of load	Loading conditions	Fit		Typical application
			Inner ring & shaft	Outer ring & housing	
 Inner ring : rotating Outer ring : stationary	 Stationary	Rotating inner ring load Stationary outer ring load	Interference fit necessary (k, m, n, p, r)	Clearance fit acceptable (F, G, H, JS)	Spur gear boxes, motors
 Inner ring : stationary Outer ring : rotating	 Rotating (with outer ring)				Greatly unbalanced wheels
 Inner ring : stationary Outer ring : rotating	 Stationary	Stationary inner ring load Rotating outer ring load	Clearance fit acceptable (f, g, h, js)	Interference fit necessary (K, M, N, P)	Running wheels & pulleys with stationary shaft
 Inner ring : rotating Outer ring : stationary	 Rotating (with inner ring)				Shaker screens (unbalanced vibration)
Indeterminate	Rotating or stationary	Indeterminate direction load	Interference fit	Interference fit	Cranks

2) Effect of load magnitude

When a radial load is applied, the inner ring will expand slightly. Since this expansion enlarges the circumference of the bore minutely, the initial interference is reduced.

The reduction can be calculated by the following equations :

[In the case of $F_r \leqq 0.25\ C_0$]

$$\Delta_{dF} = 0.08 \sqrt{\frac{d}{B} \cdot F_r} \times 10^{-3} \quad \cdots\cdots (9\text{-}1)$$

[In the case of $F_r > 0.25\ C_0$]

$$\Delta_{dF} = 0.02 \frac{F_r}{B} \times 10^{-3} \quad \cdots\cdots (9\text{-}2)$$

where:

Δ_{dF}	: reduction of inner ring interference	mm
d	: nominal bore diameter of bearing	mm
B	: nominal inner ring width	mm
F_r	: radial load	N
C_0	: basic static load rating	N

Consequently, when the radial load, exceeds the C_0 value by more than 25 %, greater interference is needed.

Much greater interference is needed, when impact loads are expected.

3) Effect of fitting surface roughness

The effective interference obtained after fitting differs from calculated interference due to plastic deformation of the ring fitting surface. When the inner ring is fitted, the effective interference, subject to the effect of the fitting surface finish, can be approximated by the following equations :

[In the case of a ground shaft]

$$\Delta_{deff} \fallingdotseq \frac{d}{d+2} \Delta_d \quad \cdots\cdots (9\text{-}3)$$

[In the case of a turned shaft]

$$\Delta_{deff} \fallingdotseq \frac{d}{d+3} \Delta_d \quad \cdots\cdots (9\text{-}4)$$

where:

Δ_{deff}	: effective interference	mm
Δ_d	: calculated interference	mm
d	: nominal bore diameter of bearing	mm

4) Effect of temperature

A bearing generally has an operating temperature, higher than the ambient temperature. When the inner ring operates under load, its temperature generally becomes higher than that of the shaft and the effective interference decreases due to the greater thermal expansion of the inner ring.

If the assumed temperature difference between the bearing inside and surrounding housing is Δ_t, the temperature difference at the fitting surfaces of the inner ring and shaft will be approximately (0.10 to 0.15) $\times \Delta_t$.

The reduction of interference (Δ_{dt}) due to temperature difference is then expressed as follows :

$$\Delta_{dt} = (0.10 \text{ to } 0.15)\ \Delta_t \cdot \alpha \cdot d \fallingdotseq 0.001\ 5\ \Delta_t \cdot d \times 10^{-3} \quad \cdots\cdots (9\text{-}5)$$

where:

Δ_{dt}	: reduction of interference due to temperature difference	mm
Δ_t	: temperature difference between the inside of the bearing and the surrounding housing	°C
α	: linear expansion coefficient of bearing steel ($\fallingdotseq 12.5 \times 10^{-6}$)	1/°C
d	: nominal bore diameter of bearing	mm

Consequently, when a bearing is higher in temperature than the shaft, greater interference is required.

However, a difference in temperature or in the coefficient of expansion may sometimes increase the interference between outer ring and housing. Therefore, when clearance is provided to accommodate shaft thermal expansion, care should be taken.

5) Maximum stress due to fit

When a bearing is fitted with interference, the bearing ring will expand or contract, generating internal stress.

Should this stress be excessive, the bearing ring may fracture.

The maximum bearing fitting-generated stress is determined by the equation in Table 9-2.

In general, to avoid fracture, it is best to adjust the maximum interference to less than 1/1 000 of the shaft diameter, or the maximum stress (σ), determined by the equation in Table 9-2, should be less than 120 MPa.

6) Other considerations

When a high degree of accuracy is required, the tolerance of the shaft and housing must be improved. Since the housing is generally less easy to machine precisely than the shaft, it is advisable to use a clearance fit on the outer ring.

With hollow shafts or thin section housings, greater than normal interference is needed.

With split housings, on the other hand, smaller interference with outer ring is needed.

When the housing is made of aluminum or other light metal alloy, relatively greater than normal interference is needed.

In such a case, consult with JTEKT.

Table 9-2 Maximum fitting-generated stress in bearings

Shaft & inner ring	Housing bore & outer ring
(In the case of hollow shaft) $\sigma = \frac{E}{2} \cdot \frac{\Delta_{deff}}{d} \cdot \frac{\left(1 - \frac{d_0^2}{d^2}\right)\left(1 + \frac{d^2}{D_i^2}\right)}{\left(1 - \frac{d_0^2}{D_i^2}\right)}$	(In the case of $D_h \neq \infty$) $\sigma = E \cdot \frac{\Delta_{Deff}}{D} \cdot \frac{\left(1 - \frac{D^2}{D_h^2}\right)}{\left(1 - \frac{D_e^2}{D_h^2}\right)}$
(In the case of solid shaft) $\sigma = \frac{E}{2} \cdot \frac{\Delta_{deff}}{d} \cdot \left(1 + \frac{d^2}{D_i^2}\right)$	(In the case of $D_h = \infty$) $\sigma = E \cdot \frac{\Delta_{Deff}}{D}$

where :

σ	: maximum stress	MPa	D_e	: raceway contact diameter of outer ring	mm
d	: nominal bore diameter (shaft diameter)	mm		ball bearing ····· $D_e \fallingdotseq 0.2\ (4D + d)$ roller bearing ··· $D_e \fallingdotseq 0.25\ (3D + d)$	
D_i	: raceway contact diameter of inner ring	mm	D	: nominal outside diameter (bore diameter of housing)	mm
	ball bearing ····· $D_i \fallingdotseq 0.2\ (D + 4d)$ roller bearing ··· $D_i \fallingdotseq 0.25\ (D + 3d)$		Δ_{Deff}	: effective interference of outer ring	mm
Δ_{deff}	: effective interference of inner ring	mm	D_h	: outside diameter of housing	mm
d_0	: bore diameter of hollow shaft	mm	E	: young's modulus	2.08×10^5 MPa

[Remark] The above equations are applicable when the shaft and housing are steel. When other materials are used, JTEKT should be consulted.

9-4 Recommended fits

As described in Section 9-3, the characteristics / magnitude of the bearing load, temperature, mounting / dismounting methods and other conditions must be considered to choose proper fits.

Past experience is also valuable.

Table 9-3 shows standard fits for the metric series bearings; Tables 9-4 to 9-8 tabulate the most typical and recommended fits for different bearings types.

Table 9-3 Standard fits for metric series bearings [1)]

(1) Fits for bore diameter [2)] of radial bearings

Class of bearing	Rotating inner ring load or indeterminate direction load							Stationary inner ring load	
	Class of shaft tolerance range								
Classes 0, 6X, 6	r 6	p 6	n 6	m 6 m 5	k 6 k 5	js 6 js 5	h 5	h 6 h 5	g 6 g 5	f 6
Class 5	–	–	–	m 5	k 4	js 4	h 4	h 5	–	–
Fit	Interference fit					Transition fit				Clearance fit

(2) Fits for outside diameter [2)] of radial bearings

Class of bearing	Stationary outer ring load				Indeterminate direction load or rotating outer ring load				
	Class of housing bore tolerance range								
Classes 0, 6X, 6	G 7	H 7 H 6	JS 7 JS 6	–	JS 7 JS 6	K 7 K 6	M 7 M 6	N 7 N 6	P 7
Class 5	–	H 5	JS 5	K 5	–	K 5	M 5	–	–
Fit	Clearance fit		Transition fit						Interference fit

(3) Fits for bore diameter [2)] of thrust bearings

Class of bearing	Central axial load (generally for thrust bearings)		Combined load (in the case of spherical thrust roller bearing)			
			Rotating shaft race load or indeterminate direction load			Stationary shaft race load
	Class of shaft tolerance range					
Classes 0, 6	js 6	h 6	n 6	m 6	k 6	js 6
Fit	Transition fit		Interference fit			Transition fit

(4) Fits for outside diameter [2)] of thrust bearings

Class of bearing	Central axial load (generally for thrust bearings)	Combined load (in the case of spherical thrust roller bearing)				
		Stationary housing race load or indeterminate direction load			Rotating housing race load	
	Class of housing bore tolerance range					
Classes 0, 6	–	H 8	G 7	H 7	JS 7	K 7	M 7
Fit	Clearance fit				Transition fit		

[Notes] 1) Bearings specified in JIS B 1512
2) Follow JIS B 1514-1 and 1514-2 for tolerance.

Table 9-4 (1) Recommended shaft fits for radial bearings (classes 0, 6X, 6)

Conditions [1)]		Ball bearing		Cylindrical roller bearing Tapered roller bearing		Spherical roller bearing		Class of shaft tolerance range	Remarks	Applications (for reference)
		Shaft diameter (mm)								
		over	up to	over	up to	over	up to			
Cylindrical bore bearing (classes 0, 6X, 6)										
Rotating inner ring load or indeterminate direction load	Light load or fluctuating load $\left(\frac{P_r}{C_r} \leqq 0.05\right)$	–	18	–	–	–	–	h 5	For applications requiring high accuracy, js 5,k 5 and m 5 should be used in place of js 6, k 6 and m 6.	Electric appliances, machine tools, pumps, blowers, carriers etc.
		18	100	–	40	–	–	js 6		
		100	200	40	140	–	–	k 6		
		–	–	140	200	–	–	m 6		
	Normal load $\left(0.05 < \frac{P_r}{C_r} \leqq 0.10\right)$	–	18	–	–	–	–	js 5	For single-row tapered roller bearings and angular contact ball bearings, k 5 and m 5 may be replaced by k 6 and m 6, because internal clearance reduction due to fit need not be considered.	Electric motors, turbines, internal combustion engines, wood-working machines etc.
		18	100	–	40	–	40	k 5		
		100	140	40	100	40	65	m 5		
		140	200	100	140	65	100	m 6		
		200	280	140	200	100	140	n 6		
		–	–	200	400	140	280	p 6		
		–	–	–	–	280	500	r 6		
	Heavy load or impact load $\left(\frac{P_r}{C_r} > 0.10\right)$	–	–	50	140	50	100	n 6	Bearings with larger internal clearance than standard are required.	Railway rolling stock axle journals, traction motors
		–	–	140	200	100	140	p 6		
		–	–	200	–	140	200	r 6		
Stationary inner ring load	Inner ring needs to move smoothly on shaft.	All shaft diameters						g 6	For applications requiring high accuracy, g 5 should be used. For large size bearing, f 6 may be used for easier movement.	Stationary shaft wheels
	Inner ring does not need to move smoothly on shaft.	All shaft diameters						h 6	For applications requiring high accuracy, h 5 should be used.	Tension pulleys, rope sheaves etc.
Central axial load only		All shaft diameters						js 6	–	–
Tapered bore bearing (class 0) (with adapter or withdrawal sleeve)										
All loads		All shaft diameters						h 9/IT 5 [2)]	For transmission shafts, h 10/IT 7 [2)] may be applied.	–

[Notes] 1) Light, normal, and heavy loads refer to those with dynamic equivalent radial loads (P_r) of 5 % or lower, over 5 % up to 10 % inclusive, and over 10 % respectively in relation to the basic dynamic radial load rating (C_r) of the bearing concerned.
2) IT 5 and IT 7 mean that shaft roundness tolerance, cylindricity tolerance, and other errors in terms of shape should be within the tolerance range of IT 5 and IT 7, respectively. For numerical values for standard tolerance grades IT 5 and IT 7, refer to supplementary table at end of this catalog.

[Remark] This table is applicable to solid steel shafts.

Table 9-4 (2) Recommended housing fits for radial bearings (classes 0, 6X, 6)

Conditions				Class of housing bore tolerance range	Remarks	Applications (for reference)
Housing	Load type etc.[1]		Outer ring axial displacement[2]			
One-piece or split type	Stationary outer ring load	All load types	Easily displaceable	H 7	G 7 may be applied when a large size bearing is used, or if the temperature difference is large between the outer ring and housing.	Ordinary bearing devices, railway rolling stock axle boxes, power transmission equipment etc.
		Light or normal load		H 8	–	
		High temperature at shaft and inner ring		G 7	F 7 may be applied when a large size bearing is used, or if the temperature difference is large between the outer ring and housing.	Drying cylinders etc.
One-piece type		Light or normal load, requiring high running accuracy	Not displaceable in principle	K 6	Mainly applied to roller bearings.	
			Displaceable	JS 6	Mainly applied to ball bearings.	
		Requiring low-noise rotation	Easily displaceable	H 6	–	
	Indeterminate direction load	Light or normal load	Normally displaceable	JS 7	For applications requiring high accuracy, JS 6 and K 6 should be used in place of JS 7 and K 7.	Electric motors, pumps, crankshaft main bearings etc.
		Normal or heavy load	Not displaceable in principle	K 7		
		High impact load	Not displaceable	M 7	–	Traction motors etc.
	Rotating outer ring load	Light or fluctuating load	Not displaceable	M 7	–	Conveyor rollers, ropeways, tension pulleys etc.
		Normal or heavy load		N 7	Mainly applied to ball bearings.	Wheel hubs with ball bearings etc.
		Thin section housing, heavy or high impact load		P 7	Mainly applied to roller bearings.	Wheel hubs with roller bearings, bearings for large end of connecting rods etc.

[Notes] 1) Loads are classified as stated in Note 1) to Table 9-4 (1).
2) Indicating distinction between applications of non-separable bearings permitting and not permitting axial displacement of the outer rings.

[Remarks] 1. This table is applicable to cast iron or steel housings.
2. If only central axial load is applied to the bearing, select such tolerance range class as to provide clearance in the radial direction for outer ring.

Table 9-5 (1) Recommended shaft fits for precision extra-small/miniature ball bearings ($d < 10$ mm)

Unit : μm

Load type		Bearing tolerance class	Single plane mean bore diameter deviation Δ_{dmp}		Shaft diameter dimensional tolerance		Fit[1]	Applications
			upper	lower	upper	lower		
Rotating inner ring load	Middle/high speed Light or normal load	ABMA 5P JIS class 5	0 0	– 5.1 – 5	+ 2.5	– 2.5	7.6T – 2.5L 7.5T – 2.5L	Gyro rotors, air cleaners, electric tools, encoders
		ABMA 7P JIS class 4	0 0	– 5.1 – 4	+ 2.5	– 2.5	7.6T – 2.5L 6.5T – 2.5L	
	Low speed Light load	ABMA 5P JIS class 5	0 0	– 5.1 – 5	– 2.5	– 7.5	2.6T – 7.5L 2.5T – 7.5L	Gyro gimbals, synchronizers, servomotors, floppy disc spindles
		ABMA 7P JIS class 4	0 0	– 5.1 – 4	– 2.5	– 7.5	2.6T – 7.5L 1.5T – 7.5L	
Rotating outer ring load	Low to high speed Light load	ABMA 5P JIS class 5	0 0	– 5.1 – 5	– 2.5	– 7.5	2.6T – 7.5L 2.5T – 7.5L	Pinch rolls, tape guide rollers, linear actuators
		ABMA 7P JIS class 4	0 0	– 5.1 – 4	– 2.5	– 7.5	2.6T – 7.5L 1.5T – 7.5L	

[Note] 1) Symbols T and L means interference and clearance respectively.

Table 9-5 (2) Recommended housing fits for precision extra-small/miniature ball bearings ($D \leqq 30$ mm)

Unit : μm

Load type		Bearing tolerance class	Single plane mean outside diameter deviation Δ_{Dmp}		Housing bore diameter dimensional tolerance		Fit[1]	Applications
			upper	lower	upper	lower		
Rotating inner ring load	Middle/high speed Light or normal load	ABMA 5P ABMA 7P	0	– 5.1	+ 5	0	0 – 10.1L	Gyro rotors, air cleaners, electric tools, encoders
		JIS class 5[2]	0 0	– 5 – 6	+ 5	0	0 – 10 L 0 – 11 L	
		JIS class 4[2]	0 0	– 4 – 5	+ 5	0	0 – 9 L 0 – 10 L	
	Low speed Light load	ABMA 5P ABMA 7P	0	– 5.1	+ 2.5	– 2.5	2.5T – 7.6L	Gyro gimbals, synchronizers, servomotors, floppy disc spindles
		JIS class 5[2]	0 0	– 5 – 6	+ 2.5	– 2.5	2.5T – 7.5L 2.5T – 8.5L	
		JIS class 4[2]	0 0	– 4 – 5	+ 2.5	– 2.5	2.5T – 6.5L 2.5T – 7.5L	
Rotating outer ring load	Low to high speed Light load	ABMA 5P ABMA 7P	0	– 5.1	+ 2.5	– 2.5	2.5T – 7.6L	Pinch rolls, tape guide rollers
		JIS class 5[2]	0 0	– 5 – 6	+ 2.5	– 2.5	2.5T – 7.5L 2.5T – 8.5L	
		JIS class 4[2]	0 0	– 4 – 5	+ 2.5	– 2.5	2.5T – 6.5L 2.5T – 7.5L	

[Notes] 1) Symbols T and L means interference and clearance respectively.
2) In the columns "single plane mean outside diameter deviation" and "fit" upper row values are applied in the case of $D \leqq 18$ mm, lower row values in the case of $18 < D \leqq 30$ mm.

Table 9-6 (1) Recommended shaft fits for metric J series tapered roller bearings

■ Bearing tolerance : class PK, class PN

Load type		Nominal bore diameter d mm over	up to	Class of shaft tolerance range	Remarks
Rotating inner ring load	Normal load	10	120	m 6	
		120	500	n 6	
	Heavy load Impact load High speed rotation	10	120	n 6	Generally, bearing internal clearance should be larger than standard.
		120	180	p 6	
		180	250	r 6	
		250	500	r 7	
Rotating outer ring load	Normal load without impact	80	315	h 6 or g 6	
	Heavy load Impact load High speed rotation	10	120	n 6	Generally, bearing internal clearance should be larger than standard.
		120	180	p 6	
		180	250	r 6	
		250	500	r 7	

■ Bearing tolerance : class PC, class PB

Load type		Nominal bore diameter d mm over	up to	Class of shaft tolerance range (bearing tolerance class) PC	PB	Remarks
Rotating inner ring load	Spindles of precision machine tools	10	315	k 5	k 5	
		315	500	k 5	–	
	Heavy load Impact load High speed rotation	10	18	m 6	m 5	Generally, bearing internal clearance should be larger than standard.
		18	50	m 5	m 5	
		50	80	n 5	n 5	
		80	120	n 5	n 4	
		120	180	p 4	p 4	
		180	250	r 4	r 4	
		250	315	r 5	r 4	
		315	500	r 5	–	
Rotating outer ring load	Spindles of precision machine tools	10	315	k 5	k 5	
		315	500	k 5	–	

Table 9-6 (2) Recommended housing fits for metric J series tapered roller bearings

■ Bearing tolerance : class PK, class PN

Load type		Nominal outside diameter D mm over	up to	Class of housing bore diameter tolerance range	Remarks
Rotating inner ring load	Used for free or fixed side	18	315	G 7	Outer ring is easily displaceable in axial direction.
		315	400	F 6	
	Position of outer ring is adjustable (in axial direction)	18	400	J 7	Outer ring is displaceable in axial direction.
	Position of outer ring is not adjustable (in axial direction)	18	400	P 7	Outer ring is fixed in axial direction.
Rotating outer ring load	Position of outer ring is not adjustable (in axial direction)	18	120	R 7	Outer ring is fixed in axial direction.
		120	180		
		180	400		

■ Bearing tolerance : class PC, class PB

Load type		Nominal outside diameter D mm over	up to	Class of housing bore diameter tolerance range (bearing tolerance class) PC	PB	Remarks
Rotating inner ring load	Used for free side	18	315	G 5	G 5	Outer ring is easily displaceable in axial direction.
		315	500	G 5	–	
	Used for fixed side	18	315	H 5	H 4	Outer ring is displaceable in axial direction.
		315	500	H 5	–	
	Position of outer ring is adjustable (in axial direction)	18	120	K 5	K 5	Outer ring is fixed in axial direction.
		120	180	JS 6	JS 6	
		180	250	JS 6	JS 5	
		250	315	K 5	JS 5	
		315	500	K 5	–	
	Position of outer ring is not adjustable (in axial direction)	18	315	N 5	M 5	
		315	500	N 5	–	
Rotating outer ring load	Position of outer ring is not adjustable (in axial direction)	18	250	N 6	N 5	Outer ring is fixed in axial direction.
		250	315	N 5	N 5	
		315	500	N 5	–	

Table 9-7 (1) Recommended shaft fits for inch series tapered roller bearings

■ Bearing tolerance : class 4, class 2

Load type		Nominal bore diameter d mm (1/25.4) over	up to	Deviation of a single bore diameter Δ_{ds}, μm upper	lower	Dimensional tolerance of shaft diameter μm upper	lower	Remarks
Rotating inner ring load	Normal load	–	76.2 (3.0)	+13	0	+ 38	+ 25	
		76.2 (3.0)	304.8 (12.0)	+25	0	+ 64	+ 38	
		304.8 (12.0)	609.6 (24.0)	+51	0	+127	+ 76	
		609.6 (24.0)	914.4 (36.0)	+76	0	+190	+114	
	Heavy load Impact load High speed rotation	–	76.2 (3.0)	+13	0	Should be such that average interference stands at $0.000\,5 \times d$ (mm)		Generally, bearing internal clearance should be larger than standard.
		76.2 (3.0)	304.8 (12.0)	+25	0			
		304.8 (12.0)	609.6 (24.0)	+51	0			
		609.6 (24.0)	914.4 (36.0)	+76	0			
Rotating outer ring load	Normal load without impact	–	76.2 (3.0)	+13	0	+ 13	0	
		76.2 (3.0)	304.8 (12.0)	+25	0	+ 25	0	
		304.8 (12.0)	609.6 (24.0)	+51	0	+ 51	0	
		609.6 (24.0)	914.4 (36.0)	+76	0	+ 76	0	
	Normal load without impact	–	76.2 (3.0)	+13	0	0	– 13	Inner ring is displaceable in axial direction.
		76.2 (3.0)	304.8 (12.0)	+25	0	0	– 25	
		304.8 (12.0)	609.6 (24.0)	+51	0	0	– 51	
		609.6 (24.0)	914.4 (36.0)	+76	0	0	– 76	
	Heavy load Impact load High speed rotation	–	76.2 (3.0)	+13	0	Should be such that average interference stands at $0.000\,5 \times d$ (mm)		Generally, bearing internal clearance should be larger than standard.
		76.2 (3.0)	304.8 (12.0)	+25	0			
		304.8 (12.0)	609.6 (24.0)	+51	0			
		609.6 (24.0)	914.4 (36.0)	+76	0			

■ Bearing tolerance : class 3, class 0[1)]

Load type		Nominal bore diameter d mm (1/25.4) over	up to	Deviation of a single bore diameter Δ_{ds}, μm upper	lower	Dimensional tolerance of shaft diameter μm upper	lower	Remarks
Rotating inner ring load	Spindles of precision machine tools	–	76.2 (3.0)	+13	0	+ 30	+ 18	
		76.2 (3.0)	304.8 (12.0)	+13	0	+ 30	+ 18	
		304.8 (12.0)	609.6 (24.0)	+25	0	+ 64	+ 38	
		609.6 (24.0)	914.4 (36.0)	+38	0	+102	+ 64	
	Heavy load Impact load High speed rotation	–	76.2 (3.0)	+13	0	Should be such that average interference stands at $0.000\,5 \times d$ (mm)		Generally, bearing internal clearance should be larger than standard.
		76.2 (3.0)	304.8 (12.0)	+13	0			
		304.8 (12.0)	609.6 (24.0)	+25	0			
		609.6 (24.0)	914.4 (36.0)	+38	0			
Rotating outer ring load	Spindles of precision machine tools	–	76.2 (3.0)	+13	0	+ 30	+ 18	
		76.2 (3.0)	304.8 (12.0)	+13	0	+ 30	+ 18	
		304.8 (12.0)	609.6 (24.0)	+25	0	+ 64	+ 38	
		609.6 (24.0)	914.4 (36.0)	+38	0	+102	+ 64	

[Note] 1) Class 0 bearing : $d \leqq 304.8$ mm

Table 9-7 (2) Recommended housing fits for inch series tapered roller bearings

■ Bearing tolerance : class 4, class 2

Load type		Nominal outside diameter D mm (1/25.4) over	up to	Deviation of a single outside diameter Δ_{Ds}, μm upper	lower	Dimensional tolerance of housing bore diameter μm upper	lower	Remarks
Rotating inner ring load	Used for free or fixed side.	–	76.2 (3.0)	+ 25	0	+ 76	+ 51	Outer ring is easily displaceable in axial direction.
		76.2 (3.0)	127.0 (5.0)	+ 25	0	+ 76	+ 51	
		127.0 (5.0)	304.8 (12.0)	+ 25	0	+ 76	+ 51	
		304.8 (12.0)	609.6 (24.0)	+ 51	0	+152	+102	
		609.6 (24.0)	914.4 (36.0)	+ 76	0	+229	+152	
	Position of outer ring is adjustable (in axial direction).	–	76.2 (3.0)	+ 25	0	+ 25	0	Outer ring is displaceable in axial direction.
		76.2 (3.0)	127.0 (5.0)	+ 25	0	+ 25	0	
		127.0 (5.0)	304.8 (12.0)	+ 25	0	+ 51	0	
		304.8 (12.0)	609.6 (24.0)	+ 51	0	+ 76	+ 25	
		609.6 (24.0)	914.4 (36.0)	+ 76	0	+127	+ 51	
	Position of outer ring is not adjustable (in axial direction).	–	76.2 (3.0)	+ 25	0	– 13	– 38	Outer ring is fixed in axial direction.
		76.2 (3.0)	127.0 (5.0)	+ 25	0	– 25	– 51	
		127.0 (5.0)	304.8 (12.0)	+ 25	0	– 25	– 51	
		304.8 (12.0)	609.6 (24.0)	+ 51	0	– 25	– 76	
		609.6 (24.0)	914.4 (36.0)	+ 76	0	– 25	–102	
Rotating outer ring load	Position of outer ring is not adjustable (in axial direction).	–	76.2 (3.0)	+ 25	0	– 13	– 38	Outer ring is fixed in axial direction.
		76.2 (3.0)	127.0 (5.0)	+ 25	0	– 25	– 51	
		127.0 (5.0)	304.8 (12.0)	+ 25	0	– 25	– 51	
		304.8 (12.0)	609.6 (24.0)	+ 51	0	– 25	– 76	
		609.6 (24.0)	914.4 (36.0)	+ 76	0	– 25	–102	

■ Bearing tolerance : class 3, class 0[1)]

Load type		Nominal outside diameter D mm (1/25.4) over	up to	Deviation of a single outside diameter Δ_{Ds}, μm upper	lower	Dimensional tolerance of housing bore diameter μm upper	lower	Remarks
Rotating inner ring load	Used for free side.	–	152.4 (6.0)	+ 13	0	+ 38	+ 25	Outer ring is easily displaceable in axial direction.
		152.4 (6.0)	304.8 (12.0)	+ 13	0	+ 38	+ 25	
		304.8 (12.0)	609.6 (24.0)	+ 25	0	+ 64	+ 38	
		609.6 (24.0)	914.4 (36.0)	+ 38	0	+ 89	+ 51	
	Used for fixed side.	–	152.4 (6.0)	+ 13	0	+ 25	+ 13	Outer ring is displaceable in axial direction.
		152.4 (6.0)	304.8 (12.0)	+ 13	0	+ 25	+ 13	
		304.8 (12.0)	609.6 (24.0)	+ 25	0	+ 51	+ 25	
		609.6 (24.0)	914.4 (36.0)	+ 38	0	+ 76	+ 38	
	Position of outer ring is adjustable (in axial direction).	–	152.4 (6.0)	+ 13	0	+ 13	0	Outer ring is fixed in axial direction.
		152.4 (6.0)	304.8 (12.0)	+ 13	0	+ 25	0	
		304.8 (12.0)	609.6 (24.0)	+ 25	0	+ 25	0	
		609.6 (24.0)	914.4 (36.0)	+ 38	0	+ 38	0	
	Position of outer ring is not adjustable (in axial direction).	–	152.4 (6.0)	+ 13	0	0	– 13	
		152.4 (6.0)	304.8 (12.0)	+ 13	0	0	– 25	
		304.8 (12.0)	609.6 (24.0)	+ 25	0	0	– 25	
		609.6 (24.0)	914.4 (36.0)	+ 38	0	0	– 38	
Rotating outer ring load	Position of outer ring is not adjustable (in axial direction).	–	152.4 (6.0)	+ 13	0	– 13	– 25	Outer ring is fixed in axial direction.
		152.4 (6.0)	304.8 (12.0)	+ 13	0	– 13	– 38	
		304.8 (12.0)	609.6 (24.0)	+ 25	0	– 13	– 38	
		609.6 (24.0)	914.4 (36.0)	+ 38	0	– 13	– 51	

[Note] 1) Class 0 bearing : $D \leqq 304.8$ mm

Table 9-8 (1) Recommended shaft fits for thrust bearings (classes 0, 6)

Load type		Shaft diameter, mm over	Shaft diameter, mm up to	Class of shaft tolerance range	Remarks
Central axial load (generally for thrust bearings)		All shaft diameters		js 6	h 6 may also be used.
Combined load spherical thrust roller bearing	Stationary shaft race load	All shaft diameters		js 6	–
	Rotating shaft race load or indeterminate direction load	– 200 400	200 400 –	k 6 m 6 n 6	js 6, k 6 and m 6 may be used in place of k 6, m 6 and n 6, respectively.

Table 9-8 (2) Recommended housing fits for thrust bearings (classes 0, 6)

Load type		Class of housing bore diameter tolerance range	Remarks
Central axial load (generally for thrust bearings)		–	Select such tolerance range class as provides clearance in the radial direction for housing race.
		H 8	In case of thrust ball bearings requiring high accuracy.
Combined load spherical thrust roller bearing	Stationary housing race load	H 7	–
	Indeterminate direction load or rotating housing race load	K 7	In case of application under normal operating conditions.
		M 7	In case of comparably large radial load.

[Remark] This table is applicable to cast iron or steel housings.

10. Bearing internal clearance

Bearing internal clearance is defined as the total distance either inner or outer ring can be moved when the other ring is fixed.

If movement is in the radial direction, it is called radial internal clearance; if in the axial direction, axial internal clearance. (Fig. 10-1)

Bearing performance depends greatly upon internal clearance during operation (also referred to as operating clearance); inappropriate clearance results in short rolling fatigue life and generation of heat, noise or vibration.

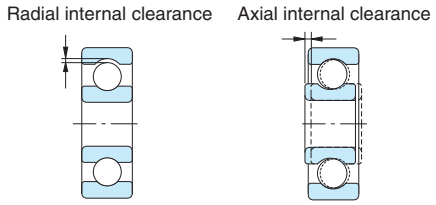


Fig. 10-1 Bearing internal clearance

In measuring internal clearance, a specified load is generally applied in order to obtain stable measurement values.

Consequently, measured clearance values will be larger than the original clearance by the amount of elastic deformation due to the load applied for measurement.

As far as roller bearings are concerned, however, the amount of elastic deformation is negligible.

Clearance prior to mounting is generally defined as the original clearance.

10-1 Selection of internal clearance

The term "residual clearance" is defined as the original clearance decreased owing to expansion or contraction of a raceway due to fitting, when the bearing is mounted in the shaft and housing.

The term "effective clearance" is defined as the residual clearance decreased owing to dimensional change arising from temperature differentials within the bearing.

The term "operating clearance" is defined as the internal clearance present while a bearing mounted in a machine is rotating under a certain load, or, the effective clearance increased due to elastic deformation arising from bearing loads.

As illustrated in Fig. 10-2, bearing fatigue life is longest when the operating clearance is slightly negative.

However, as the operating clearance becomes more negative, the fatigue life shortens remarkably.

Thus it is recommended that bearing internal clearance be selected such that the operating clearance is slightly positive.

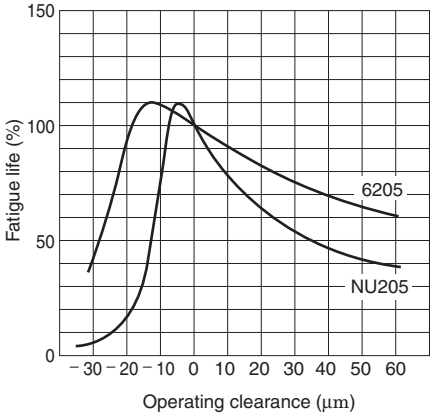


Fig. 10-2 Relationship between operating clearance and fatigue life

It is important to take specific operating conditions into consideration and select a clearance suitable for the conditions.

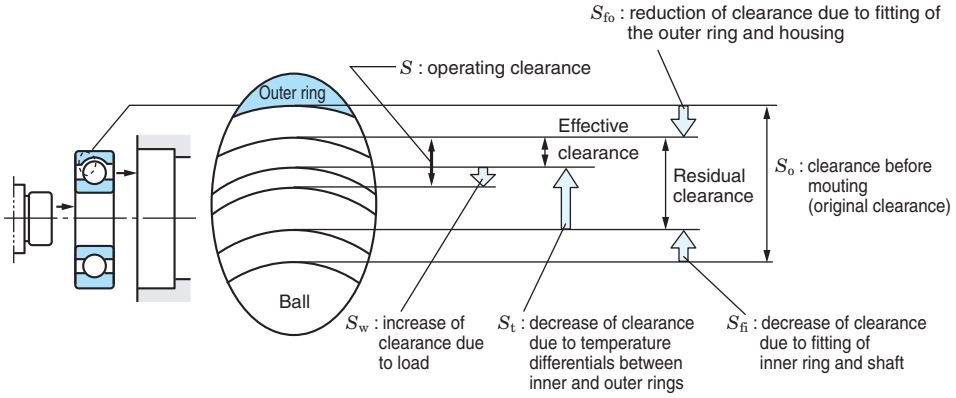
For example, when high rigidity is required, or when the noise must be minimized, the operating clearance must be reduced. On the other hand, when high operating temperature is expected, the operating clearance must be increased.

10-2 Operating clearance

Table 10-1 shows how to determine the operating clearance when the shaft and housing are made of steel.

Tables 10-2 to 10-10 show standard values for bearing internal clearance before mounting.
Table 10-11 shows examples of clearance selection excluding CN clearance.

Table 10-1 How to determine operating clearance



Operating clearance (S)	$S = S_o - (S_f + S_{t1} + S_{t2}) + S_w$ *	* S_w (increase of clearance due to load) is generally small, and thus may be ignored, although there is an equation for determining the value.
Decrease of clearance due to fitting (S_f)	(In the case of hollow shaft) $S_{fi} = \Delta_{deff} \frac{d}{D_i} \cdot \frac{\left(1 - \frac{d_0^2}{d^2}\right)}{\left(1 - \frac{d_0^2}{D_i^2}\right)}$ (In the case of solid shaft) $S_{fi} = \Delta_{deff} \frac{d}{D_i}$	(In the case of $D_h \neq \infty$) $S_{fo} = \Delta_{Deff} \frac{D_e}{D} \cdot \frac{\left(1 - \frac{D^2}{D_h^2}\right)}{\left(1 - \frac{D_e^2}{D_h^2}\right)}$ (In the case of $D_h = \infty$) $S_{fo} = \Delta_{Deff} \frac{D_e}{D}$
Decrease of clearance due to temperature differentials between inner and outer rings (S_{t1})	The amount of decrease varies depending on the state of housing; however, generally the amount can be approximated by the following equation on the assumption that the outer ring will not expand : $S_{t1} = \alpha (D_i \cdot t_i - D_e \cdot t_e)$	where : $D_e = D_i + 2D_w$ Consequently, $S_{t1} + S_{t2}$ will be determined by the following equation : $S_{t1} + S_{t2} = \alpha \cdot D_i \cdot t_1 + 2\,\alpha \cdot D_w \cdot t_2$ Temperature differential between the inner and outer rings, t_1, can be expressed as follows : $t_1 = t_i - t_e$ Temperature differential between the rolling element and outer ring, t_2, can be expressed as follows : $t_2 = t_w - t_e$
Decrease of clearance due to temperature rise of rolling element (S_{t2})	$S_{t2} = 2\,\alpha \cdot D_w \cdot t_w$	

In Table 10-1,

S	: operating clearance	mm	Δ_{Deff}	: effective interference of outer ring	mm
S_o	: clearance before mounting	mm	D_h	: outside diameter of housing	mm
S_f	: decrease of clearance due to fitting	mm	D_e	: outer ring raceway contact diameter	mm
S_{fi}	: expansion of inner ring raceway contact diameter	mm		(ball bearing ····· $D_e \fallingdotseq 0.2(4\,D + d)$ roller bearing ··· $D_e \fallingdotseq 0.25(3\,D + d)$)	
S_{fo}	: contraction of outer ring raceway contact diameter	mm	D	: nominal outside diameter	mm
S_{t1}	: decrease of clearance due to temperature differentials between inner and outer rings	mm	α	: linear expansion coefficient of bearing steel (12.5×10^{-6})	1/°C
S_{t2}	: decrease of clearance due to temperature rise of the rolling elements	mm	D_w	: average diameter of rolling elements	mm
S_w	: increase of clearance due to load	mm		(ball bearing ····· $D_w \fallingdotseq 0.3(D - d)$ roller bearing ··· $D_w \fallingdotseq 0.25(D - d)$)	
Δ_{deff}	: effective interference of inner ring	mm	t_i	: temperature rise of the inner ring	°C
d	: nominal bore diameter (shaft diameter)	mm	t_e	: temperature rise of the outer ring	°C
d_0	: bore diameter of hollow shaft	mm	t_w	: temperature rise of rolling elements	°C
D_i	: inner ring raceway contact diameter	mm			
	(ball bearing ····· $D_i \fallingdotseq 0.2(D + 4\,d)$ roller bearing ··· $D_i \fallingdotseq 0.25(D + 3\,d)$)				

■ Bearings are sometimes used with a non-steel shaft or housing.
In the automotive industry, a statistical method is often incorporated for selection of clearance.
In these cases, or when other special operating conditions are involved, JTEKT should be consulted.

Table 10-2 Radial internal clearance of deep groove ball bearings (cylindrical bore)

Unit : μm

Nominal bore diameter d, mm		Clearance									
		C 2		C N		C 3		C 4		C 5	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2.5	6	0	7	2	13	8	23	*14*	*29*	*20*	*37*
6	10	0	7	2	13	8	23	14	29	20	37
10	18	0	9	3	18	11	25	18	33	25	45
18	24	0	10	5	20	13	28	20	36	28	48
24	30	1	11	5	20	13	28	23	41	30	53
30	40	1	11	6	20	15	33	28	46	40	64
40	50	1	11	6	23	18	36	30	51	45	73
50	65	1	15	8	28	23	43	38	61	55	90
65	80	1	15	10	30	25	51	46	71	65	105
80	100	1	18	12	36	30	58	53	84	75	120
100	120	2	20	15	41	36	66	61	97	90	140
120	140	2	23	18	48	41	81	71	114	105	160
140	160	2	23	18	53	46	91	81	130	120	180
160	180	2	25	20	61	53	102	91	147	135	200
180	200	2	30	25	71	63	117	107	163	150	230
200	225	2	35	25	85	75	140	125	195	175	265
225	250	2	40	30	95	85	160	145	225	205	300
250	280	2	45	35	105	90	170	155	245	225	340
280	315	2	55	40	115	100	190	175	270	245	370
315	355	3	60	45	125	110	210	195	300	275	410
355	400	3	70	55	145	130	240	225	340	315	460

[Remarks] 1. For measured clearance, the increase of radial internal clearance caused by the measurement load should be added to the values in the above table for correction. Amounts for correction are as shown below.
Of the amounts for clearance correction in the C 2 column, the smaller is applied to the minimum clearance, the larger to the maximum clearance.
2. Values in Italics are prescribed in JTEKT standards.

Nominal bore diameter d, mm		Measurement load	Amounts of clearance correction, μm				
			C 2	C N	C 3	C 4	C 5
over	up to	N					
2.5	18	24.5	3 – 4	4	4	4	4
18	50	49	4 – 5	5	6	6	6
50	280	147	6 – 8	8	9	9	9

Table 10-3 Radial internal clearance of extra-small/miniature ball bearings

Unit : μm

Clearance code	M 1		M 2		M 3		M 4		M 5		M 6	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
Clearance	0	5	3	8	5	10	8	13	13	20	20	28

[Remark] For measured clearance, the following amounts should be added for correction.

Measurement load, N		Amounts of clearance correction, μm					
Extra-small ball bearing	Miniature ball bearing	M1	M2	M3	M4	M5	M6
2.3		1	1	1	1	1	1

Extra-small ball bearing : 9 mm or larger in outside diameter and under 10 mm in bore diameter
Miniature ball bearing : under 9 mm in outside diameter

Table 10-4 Axial internal clearance of matched pair angular contact ball bearings (measurement clearance) [1)]

Unit : μm

Nominal bore diameter d, mm		Contact angle : 15°				Contact angle : 30°							
		C 2		C N		C 2		C N		C 3		C 4	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
–	10	13	33	33	53	3	14	10	30	30	50	50	70
10	18	15	35	35	55	3	16	10	30	30	50	50	70
18	24	20	40	45	65	3	20	20	40	40	60	60	80
24	30	20	40	45	65	3	20	20	40	40	60	60	80
30	40	20	40	45	65	3	20	25	45	45	65	70	90
40	50	20	40	50	70	3	20	30	50	50	70	75	95
50	65	30	55	65	90	9	27	35	60	60	85	90	115
65	80	30	55	70	95	10	28	40	65	70	95	110	135
80	100	35	60	85	110	10	30	50	75	80	105	130	155
100	120	40	65	100	125	12	37	65	90	100	125	150	175
120	140	45	75	110	140	15	40	75	105	120	150	180	210
140	160	45	75	125	155	15	40	80	110	130	160	210	240
160	180	50	80	140	170	15	45	95	125	140	170	235	265
180	200	50	80	160	190	20	50	110	140	170	200	275	305

Nominal bore diameter d, mm		Contact angle : 40°							
		C 2		C N		C 3		C 4	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.
–	10	2	10	6	18	16	30	26	40
10	18	2	12	7	21	18	32	28	44
18	24	2	12	12	26	20	40	30	50
24	30	2	14	12	26	20	40	40	60
30	40	2	14	12	26	25	45	45	65
40	50	2	14	12	30	30	50	50	70
50	65	5	17	17	35	35	60	60	85
65	80	6	18	18	40	40	65	70	95
80	100	6	20	20	45	55	80	85	110
100	120	6	25	25	50	60	85	100	125
120	140	7	30	30	60	75	105	125	155
140	160	7	30	35	65	85	115	140	170
160	180	7	31	45	75	100	130	155	185
180	200	7	37	60	90	110	140	170	200

[Note] 1) Including increase of clearance caused by measurement load.

Table 10-5 Radial internal clearance of double-row angular contact ball bearings

Unit : μm

Nominal bore diameter d, mm		Clearance					
		CD2		CDN		CD3	
over	up to	min.	max.	min.	max.	min.	max.
2.5	10	0	7	2	10	8	18
10	18	0	7	2	11	9	19
18	24	0	8	2	11	10	21
24	30	0	8	2	13	10	23
30	40	0	9	3	14	11	24
40	50	0	10	4	16	13	27
50	65	0	11	6	20	15	30
65	80	0	12	7	22	18	33
80	100	0	12	8	24	22	38
100	120	0	13	9	25	24	42
120	140	0	15	10	26	25	44
140	160	0	16	11	28	26	46
160	180	0	17	12	30	27	47
180	200	0	18	14	32	28	48

[Remark]
Regarding deep groove ball bearings and matched pair and double-row angular contact ball bearings, equations of the relationship between radial internal clearance and axial internal clearance are shown on page A 111.

Table 10-6 Radial internal clearance of self-aligning ball bearings

Unit : μm

Nominal bore diameter d, mm		Cylindrical bore bearing clearance										Tapered bore bearing clearance									
		C 2		C N		C 3		C 4		C 5		C 2		C N		C 3		C 4		C 5	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2.5	6	1	8	5	15	10	20	15	25	21	33	–	–	–	–	–	–	–	–	–	–
6	10	2	9	6	17	12	25	19	33	27	42	–	–	–	–	–	–	–	–	–	–
10	14	2	10	6	19	13	26	21	35	30	48	–	–	–	–	–	–	–	–	–	–
14	18	3	12	8	21	15	28	23	37	32	50	–	–	–	–	–	–	–	–	–	–
18	24	4	14	10	23	17	30	25	39	34	52	7	17	13	26	20	33	28	42	37	55
24	30	5	16	11	24	19	35	29	46	40	58	9	20	15	28	23	39	33	50	44	62
30	40	6	18	13	29	23	40	34	53	46	66	12	24	19	35	29	46	40	59	52	72
40	50	6	19	14	31	25	44	37	57	50	71	14	27	22	39	33	52	45	65	58	79
50	65	7	21	16	36	30	50	45	69	62	88	18	32	27	47	41	61	56	80	73	99
65	80	8	24	18	40	35	60	54	83	76	108	23	39	35	57	50	75	69	98	91	123
80	100	9	27	22	48	42	70	64	96	89	124	29	47	42	68	62	90	84	116	109	144
100	120	10	31	25	56	50	83	75	114	105	145	35	56	50	81	75	108	100	139	130	170
120	140	10	38	30	68	60	100	90	135	125	175	40	68	60	98	90	130	120	165	155	205
140	160	15	44	35	80	70	120	110	161	150	210	45	74	65	110	100	150	140	191	180	240

Table 10-7 Radial internal clearance of electric motor bearings

1) Deep groove ball bearing Unit : μm

Nominal bore diameter d, mm		Clearance	
		CM	
over	up to	min.	max.
10[1)]	18	4	11
18	30	5	12
30	50	9	17
50	80	12	22
80	120	18	30
120	160	24	38

[Note] 1) 10 mm is included.
[Remark] To adjust for change of clearance due to measuring load, use correction values shown in Table 10-2.

2) Cylindrical roller bearing Unit : μm

Nominal bore diameter d, mm		Clearance			
		Interchangeability CT		Non-interchangeability CM	
over	up to	min.	max.	min.	max.
24	40	15	35	15	30
40	50	20	40	20	35
50	65	25	45	25	40
65	80	30	50	30	45
80	100	35	60	35	55
100	120	35	65	35	60
120	140	40	70	40	65
140	160	50	85	50	80
160	180	60	95	60	90
180	200	65	105	65	100

[Note] "Interchangeability" means interchangeable only among products (sub-units) of the same manufacturer ; not with others.

Table 10-8 Radial internal clearance of cylindrical roller bearings and machined ring needle roller bearings

(1) Cylindrical bore bearing

Unit : μm

Nominal bore diameter d, mm		Clearance									
		C 2		C N		C 3		C 4		C 5	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
–	10	0	25	20	45	35	60	50	75	–	–
10	24	0	25	20	45	35	60	50	75	65	90
24	30	0	25	20	45	35	60	50	75	70	95
30	40	5	30	25	50	45	70	60	85	80	105
40	50	5	35	30	60	50	80	70	100	95	125
50	65	10	40	40	70	60	90	80	110	110	140
65	80	10	45	40	75	65	100	90	125	130	165
80	100	15	50	50	85	75	110	105	140	155	190
100	120	15	55	50	90	85	125	125	165	180	220
120	140	15	60	60	105	100	145	145	190	200	245
140	160	20	70	70	120	115	165	165	215	225	275
160	180	25	75	75	125	120	170	170	220	250	300
180	200	35	90	90	145	140	195	195	250	275	330
200	225	45	105	105	165	160	220	220	280	305	365
225	250	45	110	110	175	170	235	235	300	330	395
250	280	55	125	125	195	190	260	260	330	370	440
280	315	55	130	130	205	200	275	275	350	410	485
315	355	65	145	145	225	225	305	305	385	455	535
355	400	100	190	190	280	280	370	370	460	510	600
400	450	110	210	210	310	310	410	410	510	565	665
450	500	110	220	220	330	330	440	440	550	625	735

(2) Tapered bore bearing

Unit : μm

Nominal bore diameter d, mm		Non-interchangeable clearance													
		C 9 NA[1)]		C 1 NA		C 2 NA		C N NA		C 3 NA		C 4 NA		C 5 NA	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
12	14	5	10	–	–	–	–	–	–	–	–	–	–	–	–
14	24	5	10	10	20	20	30	35	45	45	55	55	65	75	85
24	30	5	10	10	25	25	35	40	50	50	60	60	70	80	95
30	40	5	12	12	25	25	40	45	55	55	70	70	80	95	110
40	50	5	15	15	30	30	45	50	65	65	80	80	95	110	125
50	65	5	15	15	35	35	50	55	75	75	90	90	110	130	150
65	80	10	20	20	40	40	60	70	90	90	110	110	130	150	170
80	100	10	25	25	45	45	70	80	105	105	125	125	150	180	205
100	120	10	25	25	50	50	80	95	120	120	145	145	170	205	230
120	140	15	30	30	60	60	90	105	135	135	160	160	190	230	260
140	160	15	35	35	65	65	100	115	150	150	180	180	215	260	295
160	180	15	35	35	75	75	110	125	165	165	200	200	240	285	320
180	200	20	40	40	80	80	120	140	180	180	220	220	260	315	355
200	225	20	45	45	90	90	135	155	200	200	240	240	285	350	395
225	250	25	50	50	100	100	150	170	215	215	265	265	315	380	430
250	280	25	55	55	110	110	165	185	240	240	295	295	350	420	475
280	315	30	60	60	120	120	180	205	265	265	325	325	385	470	530
315	355	30	65	65	135	135	200	225	295	295	360	360	430	520	585
355	400	35	75	75	150	150	225	255	330	330	405	405	480	585	660
400	450	45	85	85	170	170	255	285	370	370	455	455	540	650	735
450	500	50	95	95	190	190	285	315	410	410	505	505	600	720	815

[Note] 1) Clearance C 9 NA is applied to tapered bore cylindrical roller bearings of JIS tolerance classes 5 and 4.

Table 10-9 Radial internal clearance of spherical roller bearings

(1) Cylindrical bore bearing

Unit : μm

Nominal bore diameter d, mm		Clearance									
		C 2		C N		C 3		C 4		C 5	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
14	18	10	20	20	35	35	45	45	60	60	75
18	24	10	20	20	35	35	45	45	60	60	75
24	30	15	25	25	40	40	55	55	75	75	95
30	40	15	30	30	45	45	60	60	80	80	100
40	50	20	35	35	55	55	75	75	100	100	125
50	65	20	40	40	65	65	90	90	120	120	150
65	80	30	50	50	80	80	110	110	145	145	180
80	100	35	60	60	100	100	135	135	180	180	225
100	120	40	75	75	120	120	160	160	210	210	260
120	140	50	95	95	145	145	190	190	240	240	300
140	160	60	110	110	170	170	220	220	280	280	350
160	180	65	120	120	180	180	240	240	310	310	390
180	200	70	130	130	200	200	260	260	340	340	430
200	225	80	140	140	220	220	290	290	380	380	470
225	250	90	150	150	240	240	320	320	420	420	520
250	280	100	170	170	260	260	350	350	460	460	570
280	315	110	190	190	280	280	370	370	500	500	630
315	355	120	200	200	310	310	410	410	550	550	690
355	400	130	220	220	340	340	450	450	600	600	750
400	450	140	240	240	370	370	500	500	660	660	820
450	500	140	260	260	410	410	550	550	720	720	900
500	560	150	280	280	440	440	600	600	780	780	1 000
560	630	170	310	310	480	480	650	650	850	850	1 100
630	710	190	350	350	530	530	700	700	920	920	1 190
710	800	210	390	390	580	580	770	770	1 010	1 010	1 300
800	900	230	430	430	650	650	860	860	1 120	1 120	1 440
900	1 000	260	480	480	710	710	930	930	1 220	1 220	1 570

(2) Tapered bore bearing

Unit : μm

Nominal bore diameter d, mm		Clearance									
		C 2		C N		C 3		C 4		C 5	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
18	24	15	25	25	35	35	45	45	60	60	75
24	30	20	30	30	40	40	55	55	75	75	95
30	40	25	35	35	50	50	65	65	85	85	105
40	50	30	45	45	60	60	80	80	100	100	130
50	65	40	55	55	75	75	95	95	120	120	160
65	80	50	70	70	95	95	120	120	150	150	200
80	100	55	80	80	110	110	140	140	180	180	230
100	120	65	100	100	135	135	170	170	220	220	280
120	140	80	120	120	160	160	200	200	260	260	330
140	160	90	130	130	180	180	230	230	300	300	380
160	180	100	140	140	200	200	260	260	340	340	430
180	200	110	160	160	220	220	290	290	370	370	470
200	225	120	180	180	250	250	320	320	410	410	520
225	250	140	200	200	270	270	350	350	450	450	570
250	280	150	220	220	300	300	390	390	490	490	620
280	315	170	240	240	330	330	430	430	540	540	680
315	355	190	270	270	360	360	470	470	590	590	740
355	400	210	300	300	400	400	520	520	650	650	820
400	450	230	330	330	440	440	570	570	720	720	910
450	500	260	370	370	490	490	630	630	790	790	1 000
500	560	290	410	410	540	540	680	680	870	870	1 100
560	630	320	460	460	600	600	760	760	980	980	1 230
630	710	350	510	510	670	670	850	850	1 090	1 090	1 360
710	800	390	570	570	750	750	960	960	1 220	1 220	1 500
800	900	440	640	640	840	840	1 070	1 070	1 370	1 370	1 690
900	1 000	490	710	710	930	930	1 190	1 190	1 520	1 520	1 860

Table 10-10 Radial internal clearance of double/four-row and matched pair tapered roller bearings (cylindrical bore)

Unit : μm

Nominal bore diameter d, mm		Clearance									
		C 1		C 2		C N		C 3		C 4	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
14	18	0	10	10	20	20	30	30	40	40	50
18	24	0	10	10	20	20	30	30	40	40	55
24	30	0	10	10	20	20	30	30	45	45	60
30	40	0	12	12	25	25	40	40	55	55	75
40	50	0	15	15	30	30	45	45	60	60	80
50	65	0	15	15	30	30	50	50	70	70	90
65	80	0	20	20	40	40	60	60	80	80	110
80	100	0	20	20	45	45	70	70	100	100	130
100	120	0	25	25	50	50	80	80	110	110	150
120	140	0	30	30	60	60	90	90	120	120	170
140	160	0	30	30	65	65	100	100	140	140	190
160	180	0	35	35	70	70	110	110	150	150	210
180	200	0	40	40	80	80	120	120	170	170	230
200	225	0	40	40	90	90	140	140	190	190	260
225	250	0	50	50	100	100	150	150	210	210	290
250	280	0	50	50	110	110	170	170	230	230	320
280	315	0	60	60	120	120	180	180	250	250	350
315	355	0	70	70	140	140	210	210	280	280	390
355	400	0	70	70	150	150	230	230	310	310	440
400	450	0	80	80	170	170	260	260	350	350	490
450	500	0	90	90	190	190	290	290	390	390	540
500	560	0	100	100	210	210	320	320	430	430	590
560	630	0	110	110	230	230	350	350	480	480	660
630	710	0	130	130	260	260	400	400	540	540	740
710	800	0	140	140	290	290	450	450	610	610	830
800	900	0	160	160	330	330	500	500	670	670	920

Table 10-11 Examples of non-standard clearance selection

Service conditions	Applications	Examples of clearance selection
In the case of heavy/impact load, large interference	Railway rolling stock axle journals	C 3
In the case of vibration/impact load, interference fit both for inner/outer rings	Shaker screens, railway rolling stock traction motors, tractor final reduction gears	C 3, C 4 C 4 C 4
When shaft deflection is large	Automobile rear wheels	C 5
When shaft and inner ring are heated	Dryers of paper making machines, table rollers of rolling mills	C 3, C 4 C 3
When clearance fit both for inner/outer rings	Roll necks of rolling mills	C 2
When noise/vibration during rotation is to be lowered	Micro-motors	C 1, C 2, CM
When clearance after mounting is to be adjusted in order to reduce shaft runout	Lathe spindles	C 9 NA, C 1 NA

[Reference] Relationship between radial internal clearance and axial internal clearance

[Deep groove ball bearing]

$$\Delta_a = \sqrt{\Delta_r (4m_o - \Delta_r)} \quad \cdots\cdots (10\text{-}1)$$

[Double-row angular contact ball bearing]

$$\Delta_a = 2\sqrt{m_o^2 - \left(m_o \cos\alpha - \frac{\Delta_r}{2}\right)^2} - 2m_o \sin\alpha \quad \cdots\cdots (10\text{-}2)$$

[Matched pair angular contact ball bearing]

$$\Delta_a = 2m_o \sin\alpha - 2\sqrt{m_o^2 - \left(m_o \cos\alpha + \frac{\Delta_r}{2}\right)^2} \quad \cdots\cdots (10\text{-}3)$$

[Double/four-row and matched pair tapered roller bearing]

$$\Delta_a = \Delta_r \cot\alpha \fallingdotseq \frac{1.5}{e}\Delta_r \quad \cdots\cdots (10\text{-}4)$$

where :

Δ_a : axial internal clearance mm

Δ_r : radial internal clearance mm

$m_o = r_e + r_i - D_w$

- r_e : outer ring raceway groove radius mm
- r_i : inner ring raceway groove radius mm
- D_w : ball diameter mm

α : nominal contact angle

e : limit value of F_a/F_r (shown in the bearing specification table.)

11. Preload

Generally, bearings are operated with a certain amount of proper clearance allowed. For some applications, however, bearings are mounted with axial load of such magnitude that the clearance will be negative.

The axial load, referred to as "preload," is often applied to angular contact ball bearings and tapered roller bearings.

11-1 Purpose of preload

- To improve running accuracy by reducing runout of shaft, as well as to heighten position accuracy in radial and axial directions.
  (Bearings for machine tool spindles and measuring instruments)
- To improve gear engagement accuracy by increasing bearing rigidity.
  (Bearings for automobile final reduction gears)
- To reduce smearing by eliminating sliding in irregular rotation, self-rotation, and around-the-raceway revolution of rolling elements.
  (For high rotation-speed angular contact ball bearings)
- To minimize abnormal noise due to vibration or resonance.
  (For small electric motor bearings)
- To keep rolling elements in the right position relative to the raceway.
  (For thrust ball bearings and spherical thrust roller bearings used on horizontal shafts)

11-2 Method of preloading

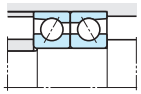
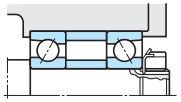
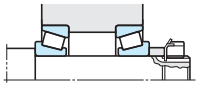
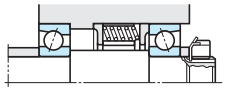
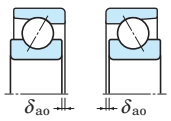
The preload can be done either by the position preloading or the constant pressure preloading; typical examples are given in Table 11-1.

(Comparison between position and constant pressure preloadings)

- With the same amount of preloading, the position preloading produces smaller displacement in the axial direction, and thus is liable to bring about higher rigidity.
- The constant pressure preloading produces stable preloading, or little fluctuation in the amount of preload, since the spring can absorb the load fluctuation and shaft expansion/contraction caused by temperature difference between the shaft and housing during operation.
- The position preloading can apply a larger preload.

Consequently, the position preloading is more suitable for applications requiring high rigidity, while the constant pressure preloading is more suitable for high rotational speed, vibration prevention in the axial direction, and thrust bearings used on horizontal shafts.

Table 11-1 Method of preloading

Position preloading			Constant pressure preloading
			
• Method using matched pair bearing with stand-out adjusted for preloading (see below). 	• Method using spacer with dimensions adjusted for preloading.	• Method using nut or bolt capable of adjusting preload in axial direction. (In this case, starting friction moment during adjustment should be measured so that proper preload will be applied.)	• Method using coil spring or diaphragm spring.

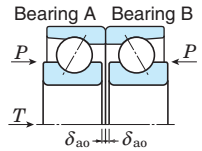
11-3 Preload and rigidity

For angular contact ball bearings and tapered roller bearings, the "back-to-back" arrangement is generally used to apply preload for higher rigidity.

This is because shaft rigidity is improved by the longer distance between load centers in the back-to-back arrangement.

Fig. 11-1 shows the relationship between preload given via position preloading and rigidity expressed by displacement in the axial direction of the back-to-back bearing.

P : amount of preload (load)
T : axial load from outside
T_A : axial load applied to Bearing A
T_B : axial load applied to Bearing B
δ_a : displacement of matched pair bearing
δ_{aA} : displacement of Bearing A
δ_{aB} : displacement of Bearing B
$2\,\delta_{ao}$: clearance between inner rings before preloading



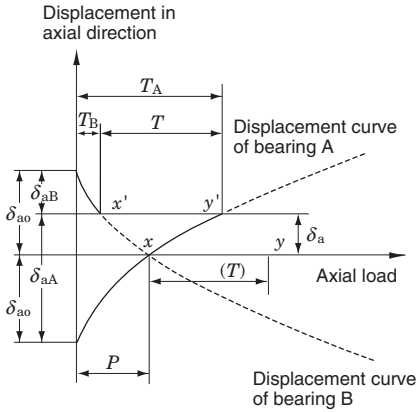


Fig. 11-1 Preloading diagram in position preloading

In Fig. 11-1, when preload P is applied (inner ring is tightened toward the axial direction), bearings A and B are displaced by δ_{ao} respectively, and the clearance between inner rings diminishes from $2\delta_{ao}$ to zero.

The displacement when axial load T is applied to these matched pair bearings from the outside can be determined as δ_a .

[For reference]
How to determine δ_a in Fig. 11-1
①Determine the displacement curve of bearing A.
②Determine the displacement curve of bearing B. ...Symmetrical curve in relation to horizontal axis intersecting vertical line of preload P at point x.
③With the load from outside defined as T, determine line segment $x-y$ on the horizontal line passing through point x.
Displace segment $x-y$ in parallel along the displacement curve of bearing B.
Determine point y' at which to intersect displacement curve of bearing A.
④δ_a can be determined as the distance between line segments $x'-y'$ and $x-y$.

Fig. 11-2 shows the relationship between preload and rigidity in the constant pressure preloading using the same matched pair bearings as in Fig. 11-1.

In this case, since the spring rigidity can be ignored, the matched pair bearing shows almost the same rigidity as a separate bearing with preload P applied in advance.

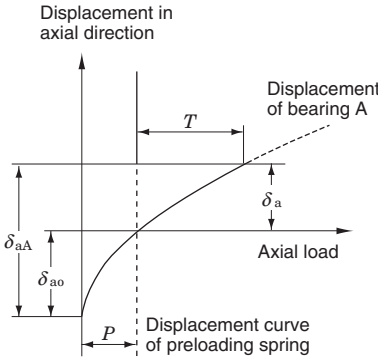


Fig. 11-2 Preloading diagram in constant pressure preloading

11-4 Amount of preload

The amount of preload should be determined, to avoid an adverse effect on bearing life, temperature rise, friction torque, or other performance characteristic, in view of the bearing application.

Decrease of preload due to wear-in, accuracy of the shaft and housing, mounting conditions, and lubrication should also be fully considered in determining preload.

11-4-1 Preload amount of matched pair angular contact ball bearings

Table 11-2 shows recommended preload for matched pair angular contact ball bearings of JIS class 5 or higher used for machine tool spindles or other higher precision applications.

JTEKT offers four types of standard preload: slight preload (S), light preload (L), medium preload (M), and heavy preload (H), so that preload can be selected properly and easily for various applications.

Generally, light or medium preload is recommended for grinder spindles, and medium or heavy preload for spindles of lathes and milling machines.

Table 11-3 shows recommended fits of high-precision matched pair angular contact ball bearings used with light or medium preload applied.

Table 11-3 Recommended fits for high-precision matched pair angular contact ball bearings with preload applied

(1) Dimensional tolerance of shaft Unit : μm

Shaft diameter mm		Inner ring rotation		Outer ring rotation
over	up to	Tolerance of shaft diameter	Interference between shaft and inner ring (matching adjustment)[1]	Tolerance of shaft diameter
6	10	−2 −6	0 – 2	0 −4
10	18	−2 −7	0 – 2	0 −5
18	30	−2 −8	0 – 2.5	0 −6
30	50	−2 −9	0 – 2.5	0 −7
50	80	−2 −10	0 – 3	0 −8
80	120	−2 −12	0 – 4	0 −10
120	180	−2 −14	0 – 5	0 −12

[Note] 1) Matching adjustment means to measure of bore diameter the bearing and match it to the measured shaft diameter.

(2) Dimensional tolerance of housing bore Unit : μm

Housing bore diameter mm		Inner ring rotation			Outer ring rotation
		Tolerance of housing bore diameter		Clearance[1] between housing and outer ring	Tolerance of housing bore diameter
over	up to	Fixed-side bearing	Free-side bearing		
18	30	± 4.5	+9 0	2 – 6	−6 −12
30	50	± 5.5	+11 0	2 – 6	−6 −13
50	80	± 6.5	+13 0	3 – 8	−8 −16
80	120	± 7.5	+15 0	3 – 9	−9 −19
120	180	± 9	+18 0	4 – 12	−11 −23
180	250	± 10	+20 0	5 – 15	−13 −27
250	315	± 11.5	+23 0	6 – 18	−16 −32

[Note] 1) Lower value is desirable for fixed side; higher value for free side.

Table 11-2 Standard preload of high-precision matched pair angular contact ball bearings

[S : slight preload, L : light preload, M : medium preload, H : heavy preload] Unit : N

Bore diameter No.	7900 C			7000			7000 C				7200			7200 C				ACT 000		ACT 000 B		Bore diameter No.
	S	L	M	L	M	H	S	L	M	H	L	M	H	S	L	M	H	L	M	L	M	
00	5	15	30	30	80	145	6	20	50	100	50	145	245	10	30	80	145	–	–	–	–	00
01	7	20	40	30	80	145	6	20	50	100	60	145	295	15	40	100	195	–	–	–	–	01
02	8	25	50	50	145	245	10	30	80	145	80	245	390	15	50	145	245	–	–	–	–	02
03	8	25	50	60	145	295	15	40	100	165	100	245	540	25	70	145	345	–	–	–	–	03
04	15	40	80	60	145	295	15	40	100	245	145	295	635	25	80	195	390	–	–	–	–	04
05	15	50	100	100	245	490	20	60	145	295	145	390	785	35	100	245	490	–	–	–	–	05
06	15	50	100	145	295	635	25	80	195	390	145	590	930	35	100	295	590	195	345	295	685	06
07	25	70	140	145	390	785	35	100	245	490	245	785	1 270	50	145	390	785	195	390	390	735	07
08	25	80	155	145	390	785	35	100	295	590	390	880	1 570	65	195	440	880	245	440	440	835	08
09	35	100	195	245	540	980	50	145	345	635	490	1 080	1 770	85	245	540	1 080	245	490	490	930	09
10	35	100	195	245	635	1 180	50	145	390	735	540	1 180	2 060	85	245	590	1 180	295	540	540	1 030	10
11	40	120	235	295	785	1 370	65	195	440	880	635	1 370	2 450	100	295	735	1 470	390	685	685	1 270	11
12	40	120	235	390	880	1 570	65	195	490	980	785	1 470	2 940	115	345	785	1 670	390	735	735	1 420	12
13	50	145	295	440	980	1 770	85	245	540	1 090	835	1 670	3 330	130	390	930	1 860	440	835	785	1 520	13
14	65	195	390	490	1 080	2 060	85	245	635	1 270	930	1 860	3 720	160	490	980	2 060	590	1 130	1 030	2 010	14
15	65	195	390	590	1 180	2 150	100	295	685	1 370	980	2 150	3 920	195	590	1 180	2 350	590	1 130	1 080	2 110	15
16	65	195	390	635	1 370	2 350	100	295	735	1 470	1 080	2 450	4 310	225	685	1 370	2 750	685	1 370	1 270	2 500	16
17	85	245	490	735	1 570	2 550	130	390	880	1 770	1 270	2 940	4 900	260	785	1 570	2 940	735	1 420	1 320	2 600	17
18	100	295	590	785	1 670	2 840	145	440	980	1 960	1 470	3 230	5 390	260	785	1 770	3 430	980	1 860	1 770	3 380	18
19	100	295	590	880	1 770	3 140	160	490	1 080	2 060	1 670	3 430	5 880	290	880	1 960	3 920	980	1 960	1 860	3 530	19
20	100	345	685	880	1 960	3 530	175	540	1 180	2 150	1 860	3 920	6 370	325	980	2 150	4 410	1 030	2 010	1 910	3 680	20
21	100	345	685	980	2 150	3 920	195	590	1 270	2 350	2 060	4 310	7 060	360	1 080	2 350	4 900	1 180	2 250	2 150	3 770	21
22	145	390	785	1 080	2 380	4 410	210	635	1 470	2 550	2 250	4 900	7 840	385	1 180	2 450	5 290	1 320	2 600	2 450	4 760	22
24	145	490	980	1 180	2 650	4 900	225	685	1 670	2 840	2 450	5 390	8 820	420	1 270	2 840	5 490	1 420	2 800	2 550	5 100	24
26	195	590	1 180	1 370	3 140	5 390	245	735	1 770	3 140	2 750	5 880	9 310	485	1 470	3 140	5 880	1 770	3 380	3 230	6 230	26
28	195	635	1 270	1 470	3 430	5 880	260	785	1 960	3 920	2 940	6 370	9 800	520	1 570	3 430	6 370	2 010	3 920	3 720	7 210	28
30	245	735	1 470	1 770	3 920	6 860	275	835	2 150	4 410	3 330	6 860	10 300	585	1 770	3 720	6 860	2 500	4 850	4 660	8 920	30
32	245	785	1 570	2 150	4 410	7 840	290	880	2 350	4 900	3 630	7 350	10 800	645	1 960	4 120	7 840	2 500	4 850	4 660	8 920	32
34	345	880	1 810	2 450	4 900	8 820	325	980	2 450	5 390	3 920	7 840	11 800	645	2 150	4 410	8 330	3 090	6 030	5 730	11 100	34

11-4-2 Amount of preload for thrust ball bearings

When a thrust ball bearing is rotated at high speed, balls slide on raceway due to centrifugal force and the gyro moment, which often causes the raceway to suffer from smearing or other defects.

To eliminate such sliding, it is necessary to mount the bearing without clearance, and apply an axial load (preload) larger than the minimum necessary axial load determined by the following equation.

When an axial load from the outside is lower than 0.001 3 C_{0a}, there is no adverse effect on the bearing, as long as lubrication is satisfactory.

Generally, deep groove and angular contact ball bearings are recommended for applications when a portion of rotation under axial load is present at high speed.

11-4-3 Amount of preload for spherical thrust roller bearings

Spherical thrust roller bearings sometimes suffer from scuffing, smearing, or other defects due to sliding which occurs between the roller and raceway surface in operation.

To eliminate such sliding, it is necessary to mount the bearing without clearance, and apply an axial load (preload) larger than the minimum necessary axial load.

Of the two values determined by the two equations below, the higher should be defined as the minimum necessary axial load.

- Thrust ball bearing (contact angle : 90°)

$$F_{a\,min} = 5.1 \left(\frac{n}{1\,000}\right)^2 \cdot \left(\frac{C_{0a}}{1\,000}\right)^2 \times 10^{-3} \quad \text{(11-1)}$$

- Spherical thrust roller bearing (the higher value determined by the two equations should be taken.)

$$F_{a\,min} = \frac{C_{0a}}{2\,000} \quad \text{(11-2)}$$

$$F_{a\,min} = 1.8F_r + 1.33 \left(\frac{n}{1\,000}\right)^2 \cdot \left(\frac{C_{0a}}{1\,000}\right)^2 \times 10^{-4} \quad \text{(11-3)}$$

---

where :

$F_{a\,min}$	: minimum necessary axial load	N
n	: rotational speed	min^{-1}
C_{0a}	: static axial load rating	N
F_r	: radial load	N

12. Bearing lubrication

12-1 Purpose and method of lubrication

Lubrication is one of the most important factors determining bearing performance. The suitability of the lubricant and lubrication method have a dominant influence on bearing life.

Functions of lubrication :

- To lubricate each part of the bearing, and to reduce friction and wear
- To carry away heat generated inside bearing due to friction and other causes
- To cover rolling contact surface with the proper oil film in order to prolong bearing fatigue life
- To prevent corrosion and contamination by dirt

Bearing lubrication is classified broadly into two categories: grease lubrication and oil lubrication. Table 12-1 makes a general comparison between the two.

Table 12-1 Comparison between grease and oil lubrication

Item	Grease	Oil
· Sealing device	Easy	Slightly complicated and special care required for maintenance
· Lubricating ability	Good	Excellent
· Rotation speed	Low/medium speed	Applicable at high speed as well
· Replacement of lubricant	Slightly troublesome	Easy
· Life of lubricant	Relatively short	Long
· Cooling effect	No cooling effect	Good (circulation is necessary)
· Filtration of dirt	Difficult	Easy

12-1-1 Grease lubrication

Grease lubrication is widely applied since there is no need for replenishment over a long period once grease is filled, and a relatively simple structure can suffice for the lubricant sealing device.

There are two methods of grease lubrication. One is the closed lubrication method, in which grease is filled in advance into shielded/sealed bearing; the other is the feeding method, in which the bearing and housing are filled with grease in proper quantities at first, and refilled at a regular interval via replenishment or replacement.

Devices with numerous grease inlets sometimes employ the centralized lubricating method, in which the inlets are connected via piping and supplied with grease collectively.

1) Amount of grease

In general, grease should fill approximately one-third to one-half the inside space, though this varies according to structure and inside space of housing.

It must be borne in mind that excessive grease will generate heat when churned, and will consequently alter, deteriorate, or soften.

When the bearing is operated at low speed, however, the inside space is sometimes filled with grease to two-thirds to full, in order to preclude infiltration of contaminants.

2) Replenishment/replacement of grease

The method of replenishing/replacing grease depends largely on the lubrication method. Whichever method may be utilized, care should be taken to use clean grease and to keep dirt or other foreign matter out of the housing.

In addition, it is desirable to refill with grease of the same brand as that filled at the start.

When grease is refilled, new grease must be injected inside bearing.

Fig. 12-1 gives one example of a feeding method.

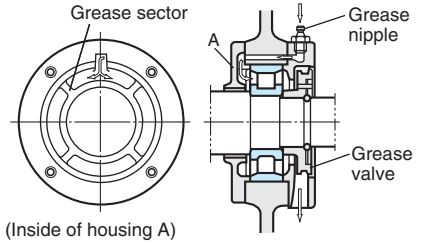


Fig. 12-1 Example of grease feeding method (using grease sector)

In the example, the inside of the housing is divided by grease sectors. Grease fills one sector, then flows into the bearing.

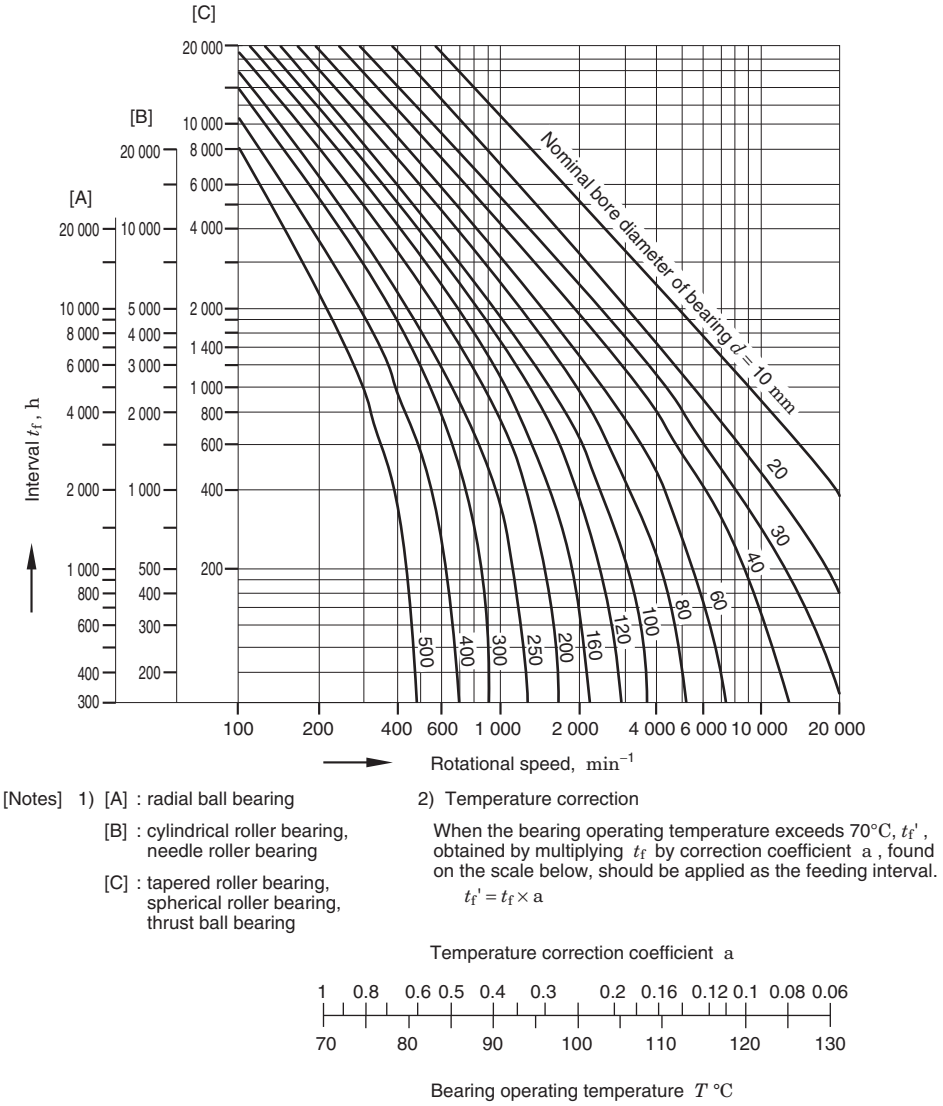
On the other hand, grease flowing back from the inside is forced out of the bearing by the centrifugal force of the grease valve.

When the grease valve is not used, it is necessary to enlarge the housing space on the discharge side to store old grease.

The housing is uncovered and the stored old grease is removed at regular intervals.

3) Grease feeding interval

In normal operation, grease life should be regarded roughly as shown in Fig. 12-2, and replenishment/replacement should be carried out accordingly.



[Notes] 1) [A] : radial ball bearing
[B] : cylindrical roller bearing, needle roller bearing
[C] : tapered roller bearing, spherical roller bearing, thrust ball bearing

2) Temperature correction

When the bearing operating temperature exceeds 70°C, t_f', obtained by multiplying t_f by correction coefficient a, found on the scale below, should be applied as the feeding interval.

$$t_f' = t_f \times a$$

Fig. 12-2 Grease feeding interval

4) Grease life in shielded/sealed ball bearing

Grease life can be estimated by the following equation when a single-row deep groove ball bearing is filled with grease and sealed with shields or seals.

$$\log L = 6.10 - 4.40 \times 10^{-6} d_m n - 3.125\left(\frac{P_r}{C_r} - 0.04\right) - (0.021 - 1.80 \times 10^{-8} d_m n)\, T \quad (12\text{-}1)$$

where :

L	: grease life	h
d_m	$= \frac{D+d}{2}$ (D : outside diameter, d : bore diameter)	mm
n	: rotational speed	min^{-1}
P_r	: dynamic equivalent radial load	N
C_r	: basic dynamic radial load rating	N
T	: operating temperature of bearing	°C

The conditions for applying equation (12-1) are as follows :

a) Operating temperature of bearing : T °C

Applicable when $T \leqq 120$

(when $T < 50$, $T = 50$)

When $T > 120$, please contact with JTEKT.

b) Value of $d_m n$

Applicable when $d_m n \leqq 500 \times 10^3$

(when $d_m n < 125 \times 10^3$, $d_m n = 125 \times 10^3$)

When $d_m n > 500 \times 10^3$, please contact with JTEKT.

c) Load condition : $\frac{P_r}{C_r}$

Applicable when $\frac{P_r}{C_r} \leqq 0.16$

(when $\frac{P_r}{C_r} < 0.04$, $\frac{P_r}{C_r} = 0.04$)

When $\frac{P_r}{C_r} > 0.16$, please contact with JTEKT.

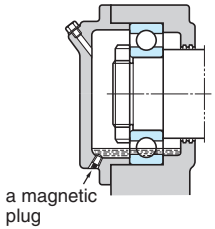
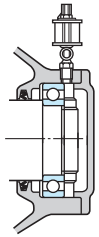
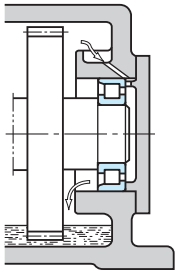
12-1-2 Oil lubrication

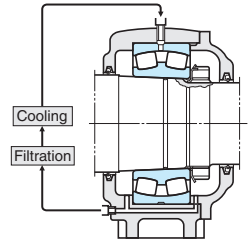
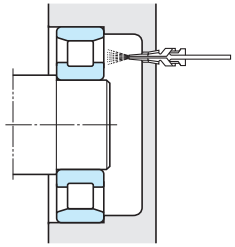
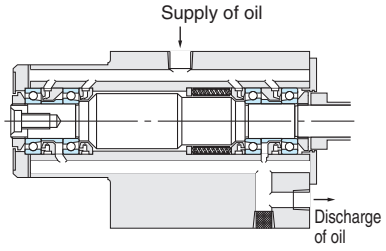
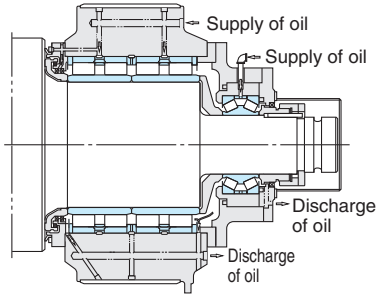
Oil lubrication is usable even at high speed rotation and somewhat high temperature, and is effective in reducing bearing vibration and noise.

Thus oil lubrication is used in many cases where grease lubrication does not work.

Table 12-2 shows major types and methods of oil lubrication.

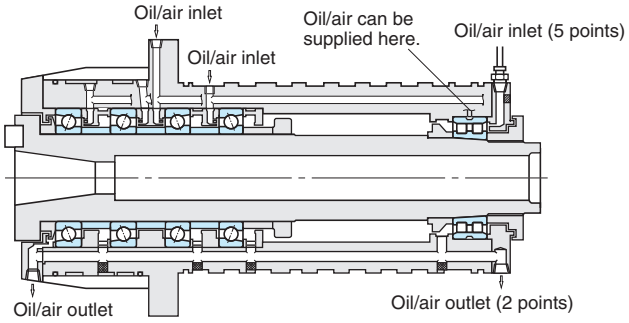
Table 12-2 Type and method of oil lubrication

① **Oil bath**	• Simplest method of bearing immersion in oil for operation. • Suitable for low/medium speed. • Oil level gauge should be furnished to adjust the amount of oil. (In the case of horizontal shaft) About 50 % of the lowest rolling element should be immersed. (In the case of vertical shaft) About 70 to 80 % of the bearing should be immersed. • It is better to use a magnetic plug to prevent wear iron particles from dispersing in oil.	
② **Oil drip**	• Oil is dripped with an oiling device, and the inside of the housing is filled with oil mist by the action of rotating parts. This method has a cooling effect. • Applicable at relatively high speed and up to medium load. • In general, 5 to 6 drops of oil are utilized per minute. (It is difficult to adjust the dripping in 1mL/h or smaller amounts.) • It is necessary to prevent too much oil from being accumulated at the bottom of housing.	
③ **Oil splash**	• This type of lubrication method makes use of a gear or simple flinger attached to shaft in order to splash oil. This method can supply oil for bearings located away from the oil tank. • Usable up to relatively high speed. • It is necessary to keep oil level within a certain range. • It is better to use a magnetic plug to prevent wear iron particles from dispersing in oil. It is also advisable to set up a shield or baffle board to prevent contaminants from entering the bearing.	

④ **Forced oil circulation**	• This method employs a circulation-type oil supply system. Supplied oil lubricates inside of the bearing, is cooled and sent back to the tank through an oil escape pipe. The oil, after filtering and cooling, is pumped back. • Widely used at high speeds and high temperature conditions. • It is better to use an oil escape pipe approximately twice as thick as the oil supply pipe in order to prevent too much lubricant from gathering in housing. • Required amount of oil : see Remark 1.	
⑤ **Oil jet lubrication**	• This method uses a nozzle to jet oil at a constant pressure (0.1 to 0.5MPa), and is highly effective in cooling. • Suitable for high speed and heavy load. • Generally, the nozzle (diameter 0.5 to 2 mm) is located 5 to 10 mm from the side of a bearing. When a large amount of heat is generated, 2 to 4 nozzles should be used. • Since a large amount of oil is supplied in the jet lubrication method, old should be discharged with an oil pump to prevent excessive residual oil. • Required amount of oil : see Remark 1.	
⑥ **Oil mist lubrication (spray lubrication)**	• This method employs an oil mist generator to produce dry mist (air containing oil in the form of mist). The dry mist is continuously sent to the oil supplier, where the mist is turned into a wet mist (sticky oil drops) by a nozzle set up on the housing or bearing, and is then sprayed onto bearing. • Required amount of mist : see Remark 2. • This method provides and sustains the smallest amount of oil film necessary for lubrication, and has the advantages of preventing oil contamination, simplifying bearing maintenance, prolonging bearing fatigue life, reducing oil consumption etc.	(Example of grinding machine)  (Example of rolling mill) 

⑦ **Oil/air lubrication**

- A proportioning pump sends forth a small quantity of oil, which is mixed with compressed air by a mixing valve. The admixture is supplied continuously and stably to the bearing.
- This method enables quantitative control of oil in extremely small amounts, always supplying new lubricating oil. It is thus suitable for machine tools and other applications requiring high speed.
- Compressed air and lubricating oil are supplied to the spindle, increasing the internal pressure and helping prevent dirt, cutting-liquid, etc. from entering. As well, this method allows the lubricating oil to flow through a feeding pipe, minimizing atmospheric pollution.
- JTEKT produces an oil/air lubricator and, air cleaner, as well as a spindle unit incorporating the oil/air lubrication system. Please refer to brochure "oil/air lubricator & air clean unit".



(Example of spindle unit incorporating oil/air lubrication system)

Remark 1 **Required oil supply in forced oil circulation ; oil jet lubrication methods**

$$G = \frac{1.88 \times 10^{-4} \mu \cdot d \cdot n \cdot P}{60\ c \cdot r \cdot \Delta T}$$

where :

G	: required oil supply	L/min
μ	: friction coefficient (see table at right)	
d	: nominal bore diameter	mm
n	: rotational speed	min^{-1}
P	: dynamic equivalent load of bearing	N
c	: specific heat of oil	1.88-2.09kJ/kg·K
r	: density of oil	g/cm^3
ΔT	: temperature rise of oil	K

Values of friction coefficient μ

Bearing type	μ
Deep groove ball bearing	0.001 0 – 0.001 5
Angular contact ball bearing	0.001 2 – 0.002 0
Cylindrical roller bearing	0.000 8 – 0.001 2
Tapered roller bearing	0.001 7 – 0.002 5
Spherical roller bearing	0.002 0 – 0.002 5

The values obtained by the above equation show quantities of oil required to carry away all the generated heat, with heat release not taken into consideration.

In reality, the oil supplied is generally half to two-thirds of the calculated value.

Heat release varies widely according to the application and operating conditions.

To determine the optimum oil supply, it is advised to start operating with two-thirds of the calculated value, and then reduce the oil gradually while measuring the operating temperature of bearing, as well as the supplied and discharged oil.

Remark 2 **Notes on oil mist lubrication**

1) Required amount of mist
(mist pressure : 5 kPa)

(In the case of a bearing)	$Q = 0.11dR$
(In the case of two oil seals combined)	$Q = 0.028d_1$

where :

Q	: required amount of mist	L/min
d	: nominal bore diameter	mm
R	: number of rolling element rows	
d_1	: inside diameter of oil seal	mm

In the case of high speed ($d_m n \geqq 400 \times 10^3$), it is necessary to increase the amount of oil and heighten the mist pressure.

2) Piping diameter and design of lubrication hole/groove

When the flow rate of mist in piping exceeds 5 m/s, oil mist suddenly condenses into an oil liquid.

Consequently, the piping diameter and dimensions of the lubrication hole/groove in the housing should be designed to keep the flow rate of mist, obtained by the following equation, from exceeding 5 m/s.

$$V = \frac{0.167Q}{A} \leqq 5$$

where :

V	: flow rate of mist	m/s
Q	: amount of mist	L/min
A	: sectional area of piping or lubrication groove	cm^2

3) Mist oil

Oil used in oil mist lubrication should meet the following requirements.

- ability to turn into mist
- has high extreme pressure resistance
- good heat/oxidation stability
- rust-resistant
- unlikely to generate sludge
- superior demulsifier

Oil mist lubrication has a number of advantages for high speed rotation bearings. Its performance, however, is largely affected by surrounding structures and bearing operating conditions.

If contemplating the use of this method, please contact with JTEKT for advice based on JTEKT long experience with oil mist lubrication.

12-2 Lubricant

12-2-1 Grease

Grease is made by mixing and dispersing a solid of high oil-affinity (called a thickener) with lubricant oil (as a base), and transforming it into a semi-solid state.

As well, a variety of additives can be added to improve specific performance.

(1) Base oil

Mineral oil is usually used as the base oil for grease. When low temperature fluidity, high temperature stability, or other special performance is required, diester oil, silicon oil, polyglycolic oil, fluorinated oil, or other synthetic oil is often used.

Generally, grease with a low viscosity base oil is suitable for applications at low temperature or high rotation speed; grease with high viscosity base oils are suitable for applications at high temperature or under heavy load.

(2) Thickener

Most greases use a metallic soap base such as lithium, sodium, or calcium as thickeners. For some applications, however, non-soap base thickeners (inorganic substances such as bentone, silica gel, and organic substances such as urea compounds, fluorine compounds) are also used.

In general, the mechanical stability, bearing operating temperature range, water resistance, and other characteristics of grease are determined by the thickener.

(Lithium soap base grease)
Superior in heat resistance, water resistance and mechanical stability.

(Calcium soap base grease)
Superior in water resistance; inferior in heat resistance.

(Sodium soap base grease)
Superior in heat resistance; inferior in water resistance.

(Non-soap base grease)
Superior in heat resistance.

(3) Additives

Various additives are selectively used to serve the respective purposes of grease applications.

- Extreme pressure agents
  When bearings must tolerate heavy or impact loads.
- Oxidation inhibitors
  When grease is not refilled for a long period.
  Structure stabilizers, rust preventives, and corrosion inhibitors are also used.

(4) Consistency

Consistency, which indicates grease hardness, is expressed as a figure obtained, in accordance with ASTM (JIS), by multiplication by 10 the depth (in mm) to which the cone-shaped metallic plunger penetrates into the grease at 25°C by deadweight in 5 seconds. The softer the grease, the higher the figure.

Table 12-4 shows the relationships between the NLGI scales and ASTM (JIS) penetration indexes, service conditions of grease.
(NLGI : National Lubricating Grease Institute)

Table 12-4 Grease consistency

NLGI scale	ASTM (JIS) penetration index (25°C, 60 mixing operations)	Service conditions/ applications
0	355 – 385	For centralized lubricating
1	310 – 340	For centralized lubricating, at low temperature
2	265 – 295	For general use
3	220 – 250	For general use, at high temperature
4	175 – 205	For special applications

(5) Mixing of different greases

Since mixing of different greases changes their properties, greases of different brands should not be mixed.

If mixing cannot be avoided, greases containing the same thickener should be used. Even if the mixed greases contain the same thickener, however, mixing may still produce adverse effects, due to difference in additives or other factors.

Thus it is necessary to check the effects of a mixture in advance, through testing or other methods.

Table 12-3 Characteristics of respective greases

	Lithium grease			Calcium grease (cup grease)	Sodium grease (fiber grease)	Complex base grease		Non-soap base grease			
Thickener	Lithium soap			Calcium soap	Sodium soap	Lithium complex soap	Calcium complex soap	Bentone	Urea compounds	Fluorine compounds	Thickener
Base oil	Mineral oil	Synthetic oil (diester oil)	Synthetic oil (silicon oil)	Mineral oil	Mineral oil	Mineral oil	Mineral oil	Mineral oil	Mineral/ synthetic oil	Synthetic oil	Base oil
Dropping point (°C)	170 to 190	170 to 230	220 to 260	80 to 100	160 to 180	250 or higher	200 to 280	–	240 or higher	250 or higher	Dropping point (°C)
Operating temperature range (°C)	– 30 to + 120	– 50 to + 130	– 50 to + 180	– 10 to + 70	0 to + 110	– 30 to + 150	– 10 to + 130	– 10 to + 150	– 30 to + 150	– 40 to + 250	Operating temperature range (°C)
Rotation speed range	Medium to high	High	Low to medium	Low to medium	Low to high	Low to high	Low to medium	Medium to high	Low to high	Low to medium	Rotation speed range
Mechanical stability	Excellent	Good to excellent	Good	Fair to good	Good to excellent	Good to excellent	Good	Good	Good to excellent	Good	Mechanical stability
Water resistance	Good	Good	Good	Good	Bad	Good to excellent	Good	Good	Good to excellent	Good	Water resistance
Pressure resistance	Good	Fair	Bad to fair	Fair	Good to excellent	Good	Good	Good to excellent	Good to excellent	Good	Pressure resistance
Remarks	Most widely usable for various rolling bearings.	Superior low temperature and friction characteristics. Suitable for bearings for measuring instruments and extra-small ball bearings for small electric motors.	Superior high and low temperature characteristics.	Suitable for applications at low rotation speed and under light load. Not applicable at high temperature.	Liable to emulsify in the presence of water. Used at relatively high temperature.	Superior mechanical stability and heat resistance. Used at relatively high temperature.	Superior pressure resistance when extreme pressure agent is added. Used in bearings for rolling mills.	Suitable for applications at high temperature and under relatively heavy load.	Superior water resistance, oxidation stability, and heat stability. Suitable for applications at high temperature and high speed.	Superior chemical resistance and solvent resistance. Usable at up to 250 °C.	Remarks

Table 12-5 Typical examples of standard grease for JTEKT bearings

Grease name	Thickener	Base oil	Appearance	Consistency 60W		NLGI scale	Operating temperature range (°C)	Application examples	
				Unworked	Worked				
Alvania 2	Lithium	Mineral oil	Grayish brown	276	275	2	–10 – 100	Automobile	Steering column
Raremax AF-I	Urea	Mineral oil	Pale yellow, viscous	–	300	1 – 2[2)]	0 – 150		Wheel (hub unit)
FS841	Fluororesin	Fluorosilicone oil	White	–	290	2	–40 – 220		Fan coupling
Sunlight 2	Lithium	Mineral oil	Yellowish brown	–	280	2	–10 – 100		Universal joint (shell type), steering joint
Unirex N3	Lithium complex	Mineral oil	Green	–	235	3	–10 – 130		Clutch release
W191	Urea	PAO[1)], mineral oil	Pale yellow	247	275	2	–30 – 130		Water pump bearing
Darina 2	Microgel	Mineral oil	Amber	–	280	2	0 – 150	Steel production	Conveyor
Emalube L	Urea	Mineral oil	Light brown, viscous	–	350	0 – 1[2)]	–10 – 200		Continuous casting machine
Palmax RBG	Special lithium complex	Mineral oil	Yellow, viscous	–	300	1 – 2[2)]	–10 – 150		Rolling mill roll neck
4B grease	Carbon black	Ethyl oil	Black	–	260	2 – 3[2)]	–30 – 250	Extra-small/miniature ball bearings	Photocopier (high temperature/conductive), printer (high temperature/conductive)
KRYTOX GPL 226	Fluororesin	Fluorinated oil		–	280	2	0 – 250		Photocopier (high temperature), printer (high temperature)
Multemp PSNo.2	Lithium	Mineral oil, ester oil	Pinkish white, viscous	–	275	2	–40 – 100		Motor (for low temperatures)
KVC grease	Urea	PAO[1)], ester oil	Milkish pink	–	244	3	–30 – 150		Motor (for high temperatures), rotary encoder, fan motor (for high temperatures)
SR grease	Lithium	Ester oil	Light brown, viscous	–	250	3	–40 – 130	Extra-small/miniature ball bearings, automobile	Motor, stepping motor, fan motor Center bearing (for propeller shafts), steering column
KDL grease	Fluororesin (PTFE)	Fluorinated oil	White	–	260	2 – 3[2)]	–30 – 200	Semiconductor manufacturing equipment	For high temperatures, for clean environment, for vacuum environment
KHD	Lithium	PAO[1)]	White	–	199	4	–30 – 120		For room temperature, for atmosphere
Nerita 2858	Lithium	Mineral oil (XHVI)	Yellowish brown	–	279	2	–30 – 100	Railway rolling stock	Axle journal (ABU)
Arapen RB 320	Lithium, calcium	Mineral oil	Yellowish brown	–	315	1	–30 – 90		Axle journal (general)
Isoflex NBU 15	Barium complex	Ester oil	Beige	270	280	2	–40 – 100	Machine tool spindle	
Shell Cassida grease RLS2	Aluminum complex	PAO[1)]	Transparent	–	280	2	–20 – 100	For food machinery	
Alvania EP2	Lithium	Mineral oil	Brown	282	276	2	–10 – 80	Slewing rim, automobile	Universal joint, king pin thrust bearing
Alvania 3	Lithium	Mineral oil	Brown	240	225	3	–10 – 100	Agricultural machinery	

[Notes] 1) PAO: Polyalphaolefin oil
2) The value is within the range specified by the consistency numbers.

12-2-2 Lubricating oil

For lubrication, bearings usually employ highly refined mineral oils, which have superior oxidation stability, rust-preventive effect, and high film strength.

With bearing diversification, however, various synthetic oils have been put into use.

These synthetic oils contain various additives (oxidation inhibitors, rust preventives, antifoaming agents, etc.) to improve specific properties. Table 12-6 shows the characteristics of lubricating oils.

Mineral lubricating oils are classified by applications in JIS and MIL.

Table 12-6 Characteristics of lubricating oils

Type of lubricating oil	Highly refined mineral oil	Major synthetic oils				
		Diester oil	Silicon oil	Polyglycolic oil	Polyphenyl ether oil	Fluorinated oil
Operating temperature range (°C)	− 40 to + 220	− 55 to + 150	− 70 to + 350	− 30 to + 150	0 to + 330	− 20 to + 300
Lubricity	Excellent	Excellent	Fair	Good	Good	Excellent
Oxidation stability	Good	Good	Fair	Fair	Excellent	Excellent
Radioactivity resistance	Bad	Bad	Bad to fair	Bad	Excellent	–

[Selection of lubricating oil]

The most important criterion in selecting a lubricating oil is whether the oil provides proper viscosity at the bearing operating temperature.

Standard values of proper kinematic viscosity can be obtained through selection by bearing type according to Table 12-7 first, then through selection by bearing operating conditions according to Table 12-8.

When lubricating oil viscosity is too low, the oil film will be insufficient. On the other hand, when the viscosity is too high, heat will be generated due to viscous resistance.

In general, the heavier the load and the higher the operating temperature, the higher the lubricating oil viscosity should be ; whereas, the higher the rotation speed, the lower the viscosity should be.

Fig. 12-3 illustrates the relationship between lubricating oil viscosity and temperature.

Table 12-7 Proper kinematic viscosity by bearing type

Bearing type	Proper kinematic viscosity at operating temperature
Ball bearing Cylindrical roller bearing	13mm²/s or higher
Tapered roller bearing Spherical roller bearing	20mm²/s or higher
Spherical thrust roller bearing	32mm²/s or higher

Table 12-8 Proper kinematic viscosities by bearing operating conditions

Operating temperature	$d_m n$ value	Proper kinematic viscosity (expressed in the ISO viscosity grade or the SAE No.)	
		Light/normal load	Heavy/impact load
− 30 to 0°C	All rotation speeds	ISO VG 15, 22, 46 (Refrigerating machine oil)	—
0 to 60°C	300 000 or lower	ISO VG 46 (Bearing oil, Turbine oil)	ISO VG 68, SAE 30 (Bearing oil, Turbine oil)
	300 000 to 600 000	ISO VG 32 (Bearing oil, Turbine oil)	ISO VG 68 (Bearing oil, Turbine oil)
	600 000 or higher	ISO VG 7, 10, 22 (Bearing oil)	—
60 to 100°C	300 000 or lower	ISO VG 68 (Bearing oil)	ISO VG 68, 100, SAE 30 (Bearing oil)
	300 000 to 600 000	ISO VG 32, 46 (Bearing oil, Turbine oil)	ISO VG 68 (Bearing oil, Turbine oil)
	600 000 or higher	ISO VG 22, 32, 46 (Bearing oil, Turbine oil, Machine oil)	—
100 to 150°C	300 000 or lower	ISO VG 68, 100, SAE 30, 40 (Bearing oil)	ISO VG 100 to 460 (Bearing oil, Gear oil)
	300 000 to 600 000	ISO VG 68, SAE 30 (Bearing oil, Turbine oil)	ISO VG 68, 100, SAE 30, 40 (Bearing oil)

[Remarks] 1. $d_m n = \frac{D+d}{2} \times n \cdots \{D$: nominal outside diameter (mm), d : nominal bore diameter (mm), n : rotational speed (min^{-1})$\}$

2. Refer to refrigerating machine oil (JIS K 2211), turbine oil (JIS K 2213), gear oil (JIS K 2219), machine oil (JIS K 2238) and bearing oil (JIS K 2239).
3. Please contact with JTEKT if the bearing operating temperature is under −30°C or over 150°C .

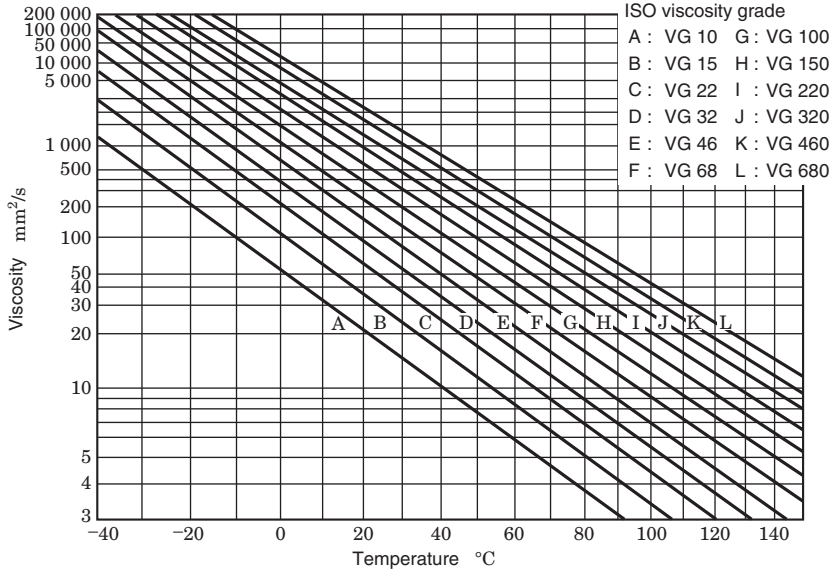


Fig. 12-3 Relationship between lubricating oil viscosity and temperature (viscosity index :100)

13. Bearing materials

Bearing materials include steel for bearing rings and rolling elements, as well as steel sheet, steel, copper alloy and synthetic resins for cages.

These bearing materials should possess the following characteristics :

1) High elasticity, durable under high partial contact stress. — Bearing rings
2) High strength against rolling contact fatigue due to large repetitive contact load. — Rolling elements
3) Strong hardness
4) High abrasion resistance — Bearing rings
5) High toughness against impact load — Rolling elements
6) Excellent dimensional stability — Cages

13-1 Bearing rings and rolling elements materials

1) High carbon chromium bearing steel

High carbon chromium bearing steel specified in JIS is used as a general material in bearing rings (inner rings, outer rings) and rolling elements (balls, rollers).

Their chemical composition classified by steel type is given in Table 13-1.

Among these steel types, SUJ 2 is generally used. SUJ 3, which contains additional Mn and Si, possesses high hardenability and is commonly used for thick section bearings.

SUJ 5 has increased hardenability, because it was developed by adding Mo to SUJ 3.

For small and medium size bearings, SUJ 2 and SUJ 3 are used, and for large size and extra-large size bearings with thick sections, SUJ 5 is widely used.

Generally, these materials are processed into the specified shape and then undergo hardening and annealing treatment until they attain a hardness of 57 to 64 HRC.

2) Case carburizing bearing steel (case hardened steel)

When a bearing receives heavy impact loads, the surface of the bearing should be hard and the inside soft.

Such materials should possess a proper amount of carbon, dense structure, and carburizing case depth on their surface, while having proper hardness and fine structure internally.

For this purpose, chromium steel and nickel-chromium-molybdenum steel are used as materials.

Typical steel materials are shown in Table 13-2.

3) Steel for Standard JTEKT Specification Bearings

In general terms, it is known that the non-metallic inclusions contained in materials are harmful to the rolling contact fatigue life.

At JTEKT, to reduce the amount of non-metallic inclusions, which are harmful to the fatigue life, we set the chemical compounds of the bearing steel in a proprietary manner. As a result, JTEKT standard bearings have a life that is approximately twice as long as the general bearings that are targeted by JIS B 1518 (and ISO 281).

Therefore, the basic dynamic load ratings of JTEKT standard bearings are 1.25 times the dynamic load ratings established in JIS B 1518 (and ISO 281).

This steel for standard JTEKT specification bearings is not applied to the special application bearings in this general catalog. If you require special application bearings with long lives, contact JTEKT.

Table 13-1 Chemical composition of high carbon chromium bearing steel

Standard	Code	Chemical composition (%)						
		C	Si	Mn	P	S	Cr	Mo
JIS G 4805	SUJ 2	0.95 – 1.10	0.15 – 0.35	Not more than 0.50	Not more than 0.025	Not more than 0.025	1.30 – 1.60	Not more than 0.08
	SUJ 3	0.95 – 1.10	0.40 – 0.70	0.90 – 1.15			0.90 – 1.20	Not more than 0.08
	SUJ 5	0.95 – 1.10	0.40 – 0.70	0.90 – 1.15			0.90 – 1.20	0.10 – 0.25
SAE J 404	52100	0.98 – 1.10	0.15 – 0.35	0.25 – 0.45	Not more than 0.025	Not more than 0.025	1.30 – 1.60	Not more than 0.06

[Remark] As for bearings which are induction hardened, carbon steel with a high carbon content of 0.55 to 0.65 % is used in addition to those listed in this table.

4) Other

For special applications, the special heat treatment shown below can be used according to various usage conditions.

[Extremely high reliability]

· SH bearings [1]
····· By using the heat treatment technology developed by JTEKT to perform special heat treatment on high carbon chromium bearing steel, we have improved the surface hardness of these products and provided them with compressive residual stress, which has led to high reliability especially in terms of resistance to foreign matter.

· KE bearings [2]
····· By using the heat treatment technology developed by JTEKT to perform special heat treatment on carburized bearing steel, we have improved the surface hardness of these products and adjusted their amount of residual austenite, which has led to high reliability especially in terms of resistance to foreign matter.

1) Acronym of Special Heat treatment
2) Acronym of Koyo EXTRA-LIFE Bearing

Table 13-2 Chemical composition of case carburizing bearing steel

Standard	Code	Chemical composition (%)							
		C	Si	Mn	P	S	Ni	Cr	Mo
JIS G 4053	SCr 415	0.13 – 0.18	0.15 – 0.35	0.60 – 0.85	Not more than 0.030	Not more than 0.030	–	0.90 – 1.20	–
	SCr 420	0.18 – 0.23	0.15 – 0.35	0.60 – 0.85			–	0.90 – 1.20	–
	SCM 420	0.18 – 0.23	0.15 – 0.35	0.60 – 0.85	Not more than 0.030	Not more than 0.030	–	0.90 – 1.20	0.15 – 0.30
	SNCM 220	0.17 – 0.23	0.15 – 0.35	0.60 – 0.90	Not more than 0.030	Not more than 0.030	0.40 – 0.70	0.40 – 0.65	0.15 – 0.30
	SNCM 420	0.17 – 0.23	0.15 – 0.35	0.40 – 0.70			1.60 – 2.00	0.40 – 0.65	0.15 – 0.30
	SNCM 815	0.12 – 0.18	0.15 – 0.35	0.30 – 0.60	Not more than 0.030	Not more than 0.030	4.00 – 4.50	0.70 – 1.00	0.15 – 0.30
SAE J 404	5120	0.17 – 0.22	0.15 – 0.35	0.70 – 0.90	Not more than 0.035	Not more than 0.040	–	0.70 – 0.90	–
	8620	0.18 – 0.23	0.15 – 0.35	0.70 – 0.90	Not more than 0.035	Not more than 0.040	0.40 – 0.70	0.40 – 0.60	0.15 – 0.25
	4320	0.17 – 0.22	0.15 – 0.30	0.45 – 0.65	Not more than 0.025	Not more than 0.025	1.65 – 2.00	0.40 – 0.60	0.20 – 0.30

13-2 Materials used for cages

Since the characteristics of materials used for cages greatly influence the performance and reliability of rolling bearings, the choice of materials is of great importance.

It is necessary to select cage materials in accordance with required shape, ease of lubrication, strength, and abrasion resistance.

Typical materials used for metallic cages are shown in Tables 13-3 and 13-4.

In addition, phenolic resin machined cages and other synthetic resin molded cages are often used.

Materials typically used for molded cages are polyacetal, polyamide (Nylon 6.6, Nylon 4.6), and polymer containing fluorine, which are strengthened with glass and carbon fibers.

Table 13-3 Chemical compositions of pressed cage steel sheet (A) and machined cage carbon steel (B)

	Standard	Code	Chemical composition (%)						
			C	Si	Mn	P	S	Ni	Cr
(A)	JIS G 3141	SPCC	Not more than 0.12	–	Not more than 0.50	Not more than 0.040	Not more than 0.045	–	–
	JIS G 3131	SPHC	Not more than 0.15	–	Not more than 0.60	Not more than 0.050	Not more than 0.050	–	–
	BAS 361	SPB 2	0.13 – 0.20	Not more than 0.04	0.25 – 0.60	Not more than 0.030	Not more than 0.030	–	–
	JIS G 4305	SUS 304	Not more than 0.08	Not more than 1.00	Not more than 2.00	Not more than 0.045	Not more than 0.030	8.00 – 10.50	18.00 – 20.00
(B)	JIS G 4051	S 25 C	0.22 – 0.28	0.15 – 0.35	0.30 – 0.60	Not more than 0.030	Not more than 0.035	–	–

Table 13-4 Chemical composition of high-tensile brass casting of machined cages (%)

Standard	Code	Cu	Zn	Mn	Fe	Al	Sn	Ni	Impurity	
									Pb	Si
JIS H 5120	CAC 301 (HBsC*)	55 – 60	33 – 42	0.1 – 1.5	0.5 – 1.5	0.5 – 1.5	Not more than 1.0	Not more than 1.0	Not more than 0.4	Not more than 0.1

* : Material with HBsC is used.

14. Shaft and housing design

In designing the shaft and housing, the following should be taken into consideration.

1) Shafts should be thick and short. (in order to reduce distortion including bending)

2) Housings should possess sufficient rigidity. (in order to reduce distortion caused by load)
[Note] · For light alloy housings, rigidity may be provided by inserting a steel bushing.

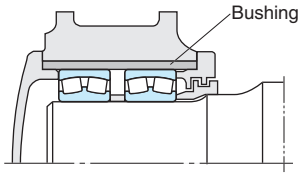


Fig. 14-1 Example of light alloy housing

3) The fitting surface of the shaft and housing should be finished in order to acquire the required accuracy and roughness. The shoulder end-face should be finished in order to be perpendicular to the shaft center or housing bore surface. (refer to Table 14-1)

4) The fillet radius (r_a) should be smaller than chamfer dimension of the bearing. (refer to Tables 14-2, 14-3)
[Notes] · Generally it should be finished so as to form a simple circular arc. (refer to Fig. 14-2)
· When the shaft is given a ground finish, a recess may be provided. (Fig. 14-3)

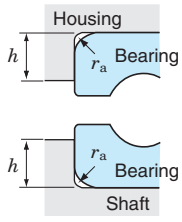


Fig. 14-2 Fillet radius

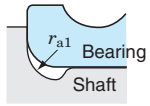


Fig. 14-3 Grinding undercut

5) The shoulder height (h) should be smaller than the outside diameter of inner ring and larger than bore diameter of outer ring so that the bearing is easily dismounted. (refer to Fig. 14-2 and Table 14-2)

6) If the fillet radius must be larger than the bearing chamfer, or if the shaft/housing shoulder must be low/high, insert a spacer between the inner ring and shaft shoulder as shown in Fig. 14-4, or between the outer ring and the housing shoulder.

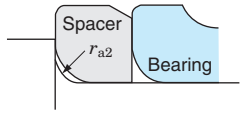


Fig. 14-4 Example of shaft with spacer

7) Screw threads and lock nuts should be completely perpendicular to shaft axis. It is desirable that the tightening direction of threads and lock nuts be opposite to the shaft rotating direction.

8) When split housings are used, the surfaces where the housings meet should be finished smoothly and provided with a recess at the inner ends of the surfaces that meet.

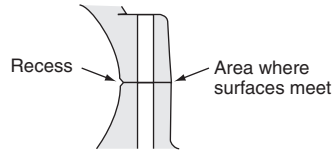


Fig. 14-5 Recesses on meeting surfaces

14-1 Accuracy and roughness of shafts and housings

The fitting surface of the shaft and housing may be finished by turning or fine boring when the bearing is used under general operating conditions. However, if the conditions require minimum vibration and noise, or if the bearing is used under severe operating conditions, a ground finish is required.

Recommended accuracy and roughness of shafts and housings under general conditions are given in Table 14-1.

Table 14-1 Recommended accuracy and roughness of shafts and housings

Item	Bearing class	Shaft	Housing bore
Roundness tolerance	classes 0, 6	IT 3 – IT 4	IT 4 – IT 5
	classes 5, 4	IT 2 – IT 3	IT 2 – IT 3
Cylindrical form tolerance	classes 0, 6	IT 3 – IT 4	IT 4 – IT 5
	classes 5, 4	IT 2 – IT 3	IT 2 – IT 3
Shoulder runout tolerance	classes 0, 6	IT 3	IT 3 – IT 4
	classes 5, 4	IT 3	IT 3
Roughness of fitting surfaces Ra	Small size bearings Large size bearings	0.8 a 1.6 a	1.6 a 3.2 a

[Remark] Refer to the figures listed in the attached table when the basic tolerance IT is required.

14-2 Mounting dimensions

Mounting dimensions mean the necessary dimensions to mount bearings on shafts or housings, which include the fillet radius or shoulder diameters.

Standard values are shown in Table 14-2. (The mounting related dimensions of each bearing are given in the bearing specification table.)

The grinding undercut dimensions for ground shafts are given in Table 14-3.

For thrust bearings, the mounting dimensions should be carefully determined such that bearing race will be perpendicular to the support and the supporting area will be wide enough.

For thrust ball bearings, the shaft shoulder diameter d_a should be larger than pitch diameter of ball set, while the shoulder diameter of housing D_a should be smaller than the pitch diameter of ball set. (Fig. 14-6)

For thrust roller bearings, the housing/shaft diameter D_a/d_a should cover the lengths of both rollers. (Fig. 14-7)

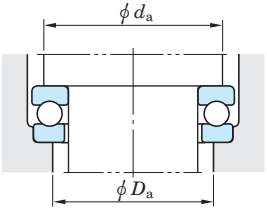


Fig. 14-6 Thrust ball bearings

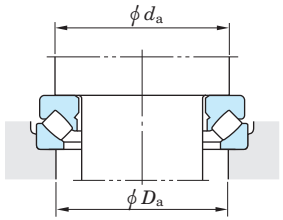
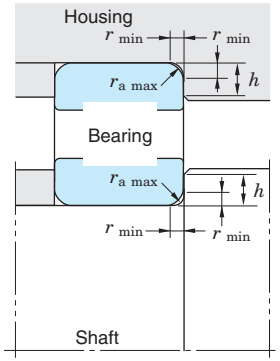


Fig. 14-7 Spherical thrust roller bearings

Table 14-2 Shaft/housing fillet radius and shoulder height of radial bearings

Unit : mm

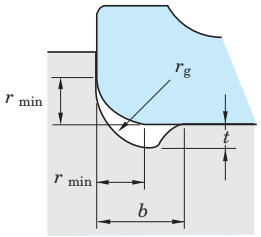


[Notes]
1) Shoulder heights greater than those specified in the Table are required to accommodate heavy axial loads.
2) Used when an axial load is small. These values are not recommended for tapered roller bearings, angular contact ball bearings, or spherical roller bearings.

[Remark]
Fillet radius can be applied to thrust bearings.

Chamfer dimension of inner ring or outer ring	Shaft and housing		
	Fillet radius	Shoulder height h min	
r min	$r_{a\,max}$	General [1] cases	Special [2] cases
0.05	0.05	0.3	0.3
0.08	0.08	0.3	0.3
0.1	0.1	0.4	0.4
0.15	0.15	0.6	0.6
0.2	0.2	0.8	0.8
0.3	0.3	1.25	1
0.5	0.5	1.75	1.5
0.6	0.6	2.25	2
0.8	0.8	2.75	2.5
1	1	2.75	2.5
1.1	1	3.5	3.25
1.5	1.5	4.25	4
2	2	5	4.5
2.1	2	6	5.5
2.5	2	6	5.5
3	2.5	7	6.5
4	3	9	8
5	4	11	10
6	5	14	12
7.5	6	18	16
9.5	8	22	20
12	10	27	24
15	12	32	29
19	15	42	38

Table 14-3 Grinding undercut dimensions for ground shafts



Unit : mm

Chamfer dimension of inner ring	Grinding undercut dimensions		
r min	t	r_g	b
1	0.2	1.3	2
1.1	0.3	1.5	2.4
1.5	0.4	2	3.2
2	0.5	2.5	4
2.1	0.5	2.5	4
3	0.5	3	4.7
4	0.5	4	5.9
5	0.6	5	7.4
6	0.6	6	8.6
7.5	0.6	7	10

14-3 Shaft design

When bearings are mounted on shafts, locating method should be carefully determined. Shaft design examples for cylindrical bore bearings are given in Table 14-4, and those for bearings with a tapered bore in Table 14-5.

Table 14-4 Mounting designs for cylindrical bore bearings

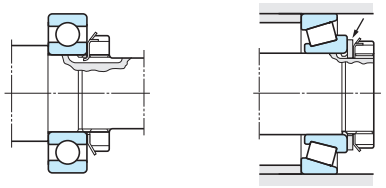
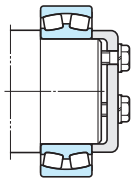
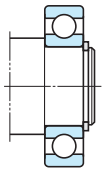
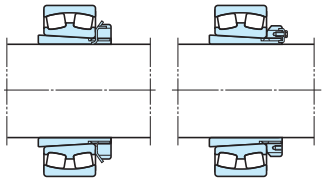
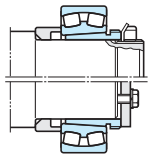
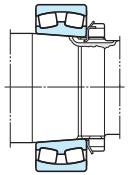
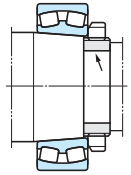
(a) Shaft locknut	(b) End plate	(c) Locating snap ring
		
Lockwashers are used to prevent loosening of locknuts. When tapered roller bearings or angular contact ball bearings are transition-fitted to shafts, plain washers several mm thick as shown above (at right) should be added and tightened with nut.	End of shaft should have bolt holes.	Used when the housing inside is limited, or to simplify shaft machining.

Table 14-5 Mounting designs for bearings with tapered bore

(d) Adapter assembly	(e) Withdrawal sleeve	(f) Shaft locknut	(g) Split ring
			
The simplest method for axial positioning is just to attach an adapter sleeve to the shaft and tighten the locknuts. To prevent locknut loosening, lock-washer (not more than 180 mm in shaft diameter) or lock plate (not less than 200 mm in shaft diameter) are used.	The locknut (above) or end plate (below) fixes the bearing with a withdrawal sleeve, which makes it easy to dismount the bearing.	The shaft is threaded in the same way as shown in Fig. (a). The bearing is located by tightening locknut.	A split ring with threaded outside diameter is inserted into groove on the tapered shaft. A key is often used to prevent the locknut and split ring from loosening.

14-4 Sealing devices

Sealing devices not only prevent foreign matter (dirt, water, metal powder) from entering, but prevent lubricant inside from leaking. If the sealing device fails to function satisfactorily, foreign matter or leakage will cause bearing damage as a result of malfunction or seizure.

Therefore, it is necessary to design or choose the most suitable sealing devices as well as to choose the proper lubricating measures according to operating conditions.

Sealing devices may be divided into non-contact and contact types according to their structure.

They should satisfy the following conditions :

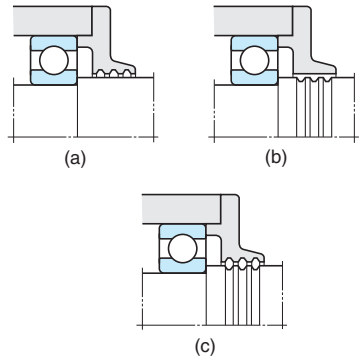
- Free from excessive friction (heat generation)
- Easy maintenance (especially ease of mounting and dismounting)
- As low cost as possible

14-4-1 Non-contact type sealing devices

A non-contact type sealing device, which includes oil groove, flinger (slinger), and labyrinth, eliminates friction because it does not have a contact point with the shaft.

These devices utilize narrow clearance and centrifugal force and are especially suitable for operation at high rotation speed and high temperature.

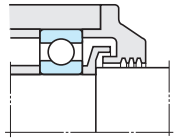
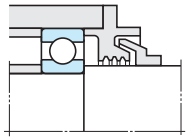
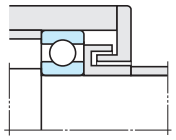
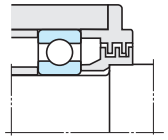
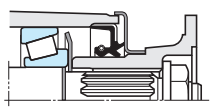
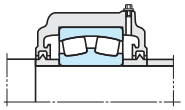
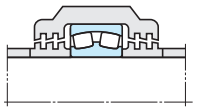
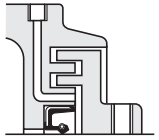
Table 14-6 (1) Non-contact type sealing devices

(1) Oil groove


(a) (b) (c)

- This kind of seal having more than three grooves at the narrow clearance between the shaft and housing cover, is usually accompanied by other sealing devices except when it is used with grease lubrication at low rotation speed.
- Preventing entrance of contaminants can be improved by filling the groove with calcium grease (cup grease) having a consistency of 150 to 200.
- The clearance between the shaft and housing cover should be as narrow as possible. Recommended clearances are as follows.
  - Shaft diameter of less than 50mm ····· 0.25 – 0.4mm
  - Shaft diameter of over 50mm ····· 0.5 – 1 mm
- Recommended dimensions for the oil groove are as follows.
  - Width ····· 2 – 5mm
  - Depth ····· 4 – 5mm

Table 14-6 (2) Non-contact type sealing devices

(2) Flinger (slinger)		(3) Labyrinth	
 (d) Flinger attached inside	 (e) Flinger attached outside	 (h) Axial labyrinth	 (i) Radial labyrinth
 (f) Cover type flinger	 (g) Oil thrower	 (j) Aligning labyrinth	 (k) Axial labyrinth with greasing feature

- A flinger utilizes centrifugal force to splash away the oil and dirt. It produces an air stream which prevents oil leakage and dirt by a pumping action. In many cases, this device is used together with other sealing devices.
- A flinger installed inside the housing (Fig. d) provides an inward pumping action, preventing lubricant leakage; and, when installed outside (Fig. e), the outward pumping action prevents lubricant contamination.
- A cover type flinger (Fig. f) splashes away dirt and dust by centrifugal force.
- The oil thrower, shown in (Fig. g), is a kind of flinger. An annular ridge on the shaft or a ring fitted onto the shaft utilizes centrifugal force to prevent the lubricant from flowing out.

- A labyrinth provides clearance in the shape of engagements between the shaft and housing. It is the most suitable for prevention of lubricant leakage at high rotation speed.
- Though an axial labyrinth, shown in (Fig. h), is popular because of its ease of mounting, the sealing effect is better in a radial labyrinth, shown in (Fig. i).
- An aligning labyrinth (Fig. j) is used with self-aligning type bearings.
- In the cases of (Fig. i) and (Fig. j), the housing or the housing cover should be split.
- Recommended labyrinth clearances are given in the following table.

Shaft diameter	Radial clearance	Axial clearance
50mm or less	0.25 – 0.4mm	1 – 2mm
Over 50mm	0.5 – 1 mm	3 – 5mm

- To improve sealing effect, fill the labyrinth clearance with grease, shown in (Fig. k).

14-4-2 Contact type sealing devices

This type provides a sealing effect by means of the contact of its end with the shaft and are manufactured from synthetic rubber, synthetic resin, or felt.

The synthetic rubber oil seal is most popular.

1) Oil seals

Many types and sizes of oil seals, as a finished part, have been standardized.

JTEKT produces various oil seals.

The names and functions of each oil seal part are shown in Fig. 14-8 and Table 14-7. Table 14-8 provides a representative example.

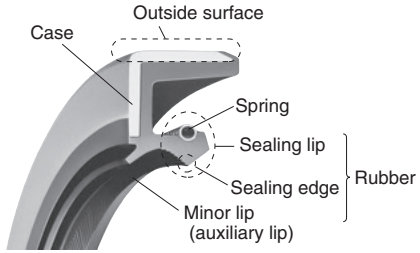


Fig. 14-8 Names of oil seal parts

Table 14-7 Complete list of oil seal part functions

Names	Functions
Sealing edge	Prevents fluid leakage by making contact with rotating shaft. (The contact surface of the sealing edge with the shaft should always filled with lubricant, so as to maintain an oil film therein.)
Sealing lip and spring	Provides proper pressure on the sealing edge to maintain stable contact. Spring provides proper pressure on the lip and maintains such pressure for a long time.
Outside surface	Fixes the oil seal to the housing and prevents fluid leakage through the fitting surface. (Comes encased in metal cased type or rubber covered type.)
Case	Strengthens seal.
Minor lip (auxiliary lip)	Prevents entry of contaminants. (In many cases, the space between the sealing lip and minor lip is filled with grease.)

Table 14-8 Typical oil seal types

With case				With inner case	Without case
Without spring		With spring			With spring
 HM (JIS GM) MH (JIS G)		 HMS (JIS SM) MHS (JIS S) CRS		 HMSH (JIS SA)	 MS
 HMA	MHA	 HMSA (JIS DM)	MHSA (JIS D) CRSA	 HMSAH (JIS DA)	–

- The oil seals shown in the lower row contain the minor lip (auxiliary lip).
- Special types of seals such as the mud resistance seal, pressure resistance seal and outer seal for rotating housings can be provided to serve under various operating conditions.
- By providing a slit on the oil seals, it is possible to attach them from other points than the shaft ends.

Oil seals without minor lips are mounted in different directions according to their operating conditions (shown in Fig. 14-9).

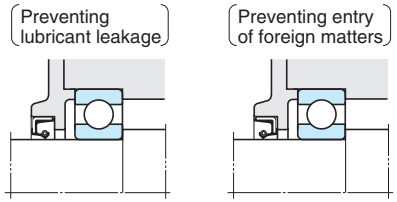


Fig. 14-9 Direction of sealing lips and their purpose

When the seal is used in a dirty operating environment, or penetration of water is expected, it is advisable to have two oil seals combined or to have the space between the two sealing lips be filled with grease. (shown in Fig. 14-10)

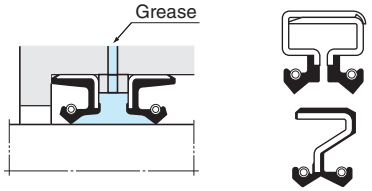


Fig. 14-10 Seals used in a dirty operating environment

Respective seal materials possess different properties. Accordingly, as shown in Table 14-9, allowable lip speed and operating temperature differ depending on the materials. Therefore, by selecting proper materials, oil seals can be used for sealing not only lubricants but also chemicals including alcohol, acids, alkali, etc.

Table 14-9 Allowable lip speed and operating temperature range of oil seals

Seal material	Allowable lip speed (m/s)	Operating temperature range (℃)
NBR	15	– 40 to + 120
Acrylic rubber	25	– 30 to + 150
Silicone rubber	32	– 50 to + 170
Fluoro rubber	32	– 20 to + 180

To ensure the maximum sealing effect of the oil seal, the shaft materials, surface roughness and hardness should be carefully chosen.

Table 14-10 shows the recommended shaft conditions.

Table 14-10 Recommended shaft conditions

Material	Machine structure steel, low alloy steel and stainless steel
Surface hardness	For low speed : harder than 30 HRC For high speed : harder than 50 HRC
Surface roughness (Ra)	0.2 – 0.6a A surface which is excessively rough may cause oil leakage or abrasion ; whereas an excessively fine surface may cause sealing lip seizure, preventing the oil film from forming. Surface must also be free of spiral grinding marks.

2) Felt seals and others

Although felt seals have been used conventionally, it is recommended to replace them with rubber oil seals because the use of felt seals are limited to the following conditions.

- Light dust protection
- Allowable lip speed : not higher than 5m/s

Contact type sealing devices include mechanical seals, O-rings and packings other than those described herein.

JTEKT manufactures various oil seals ranging from those illustrated in Table14-8 to special seals for automobiles, large seals for rolling mills, mud resistance seals, pressure resistance seals, outer seals for rotating housings and O-rings.

For details, refer to JTEKT separate catalog "Oil seals & O-rings" (CAT. NO. R2001E).

15. Handling of bearings

15-1 General instructions

Since rolling bearings are more precisely made than other machine parts, careful handling is absolutely necessary.

1) Keep bearings and the operating environment clean.
2) Handle carefully.
   Bearings can be cracked and brinelled easily by strong impact if handled roughly.
3) Handle using the proper tools.
4) Keep bearings well protected from rust.
   Do not handle bearings in high humidity.
   Operators should wear gloves in order not to soil bearings with perspiration from their hands.
5) Bearings should be handled by experienced or well trained operators.
6) Set bearing operation standards and follow them.
   - Storage of bearings
   - Cleaning of bearings and their adjoining parts.
   - Inspection of dimensions of adjoining parts and finish conditions
   - Mounting
   - Inspection after mounting
   - Dismounting
   - Maintenance and inspection (periodical inspection)
   - Replenishment of lubricants

15-2 Storage of bearings

In shipping bearings, since they are covered with proper anti-corrosion oil and are wrapped in antitarnish paper, the quality of the bearings is guaranteed as long as the wrapping paper is not damaged.

If bearings are to be stored for a long time, it is advisable that the bearings be stored on shelves set higher than 30 cm from the floor, at a humidity less than 65 %, and at a temperature around 20°C.

Avoid storage in places exposed directly to the sun's rays or placing boxes of bearings against cold walls.

15-3 Bearing mounting

15-3-1 Recommended preparation prior to mounting

1) Preparation of bearings

Wait until just before mounting before removing the bearings from their packaging to prevent contamination and rust.

Since the anti-corrosion oil covering bearings is a highly capable lubricant, the oil should not be cleaned off if the bearings are pre-lubricated, or when the bearings are used for normal operation. However, if the bearings are used in measuring instruments or at high rotation speed, the anti-corrosion oil should be removed using a clean detergent oil. After removal of the anti-corrosion oil, bearings should not be left for a long time because they rust easily.

2) Inspection of shafts and housings

Clean up the shaft and housing to check whether it has flaws or burrs as a result of machining.

Be very careful to completely remove lapping agents (SiC, Al_2O_3, etc.), casting sands, and chips from inside the housing.

Next, check that the dimensions, forms, and finish conditions of the shaft and the housing are accurate to those specified on the drawing.

The shaft diameter and housing bore diameter should be measured at the several points as shown in Figs. 15-1 and 15-2.

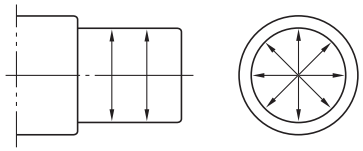


Fig. 15-1 Measuring points on shaft diameter

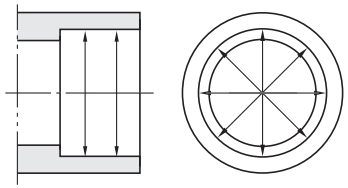


Fig. 15-2 Measuring points on housing bore diameter

Furthermore, fillet radius of shaft and housing, and the squareness of shoulders should be checked.

When using shaft and housing which have passed inspection, it is advisable to apply machine oil to each fitting surface just before mounting.

15-3-2 Bearing mounting

Mounting procedures depend on the type and fitting conditions of bearings.

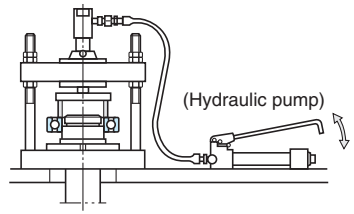
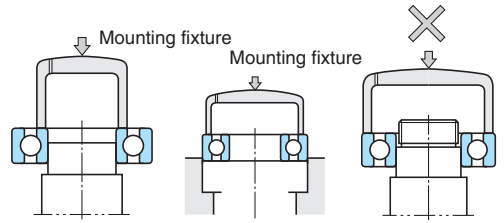
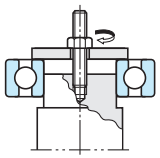
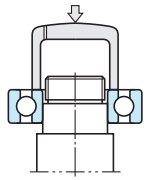
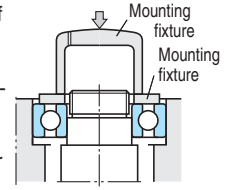
For general bearings in which the shaft rotates, an interference fit is applied to inner rings, while a clearance fit is applied to outer rings.

For bearings in which the outer rings rotate, an interference fit is applied to the outer rings.

Interference fitting is roughly classified as shown here. The detailed mounting processes are described in Tables 15-1 to 15-3.

- Interference fit of inner rings
  - Bearings with cylindrical bore
    - Press fit ··· Applied to small size bearings with restricted interference. (Table 15-1)
    - Shrink fit ··· Applied to bearings which allow heavy interference or to large size bearings. (Table 15-2)
  - Bearings with tapered bore
    - Mounting on tapered shafts ····· (Table 15-3)
    - Mounting using sleeves ····· (Table 15-3)
- Interference fit of outer rings
  - Press fit ··· Most widely used method (Table 15-1)
  - Cooling fit ··· Bearings are fit into housings by cooling them with dry ice, etc. In this method, proper rust-preventive treatment is required, since moisture in the atmosphere adheres to bearings.

Table 15-1 Press fit of bearings with cylindrical bores

Mounting methods	Descriptions
 (a) Using press fit (the most widely used method)	■ As shown in the Fig., a bearing should be mounted slowly with care, by using a fixture to apply force evenly to the bearing. When mounting the inner ring, apply pressure to the inner ring only. Similarly, in mounting the outer ring, press only the outer ring.  (Inner ring press fit) (Outer ring press fit) (Inner ring press fit)
 (b) Using bolts and nuts (screw hole should be provided at the shaft end)  (c) Using hammers (only when there is no alternative measure)	■ If interference is required on both the inner and outer ring of non-separable bearings, use two kinds of fixtures as shown in the Fig. and apply force carefully, as rolling elements are easily damaged. Be sure never to use a hammer in such cases.  Simultaneous press fit of inner ring and outer ring

Reference **Force is necessary to press fit or remove bearings.**

The force necessary to press fit or remove inner rings of bearings differs depending on the finish of shafts and how much interference the bearings allow.

The standard values can be obtained by using the following equations.

(Solid shafts)
$$K_a = 9.8 f_k \cdot \Delta_{deff} \cdot B \left(1 - \frac{d^2}{D_i^2}\right) \times 10^3 \quad \cdots\cdots (15\text{-}1)$$

(Hollow shafts)
$$K_a = 9.8 f_k \cdot \Delta_{deff} \cdot B \frac{\left(1 - \frac{d^2}{D_i^2}\right)\left(1 - \frac{d_0^2}{d^2}\right)}{\left(1 - \frac{d_0^2}{D_i^2}\right)} \times 10^3 \quad \cdots\cdots (15\text{-}2)$$

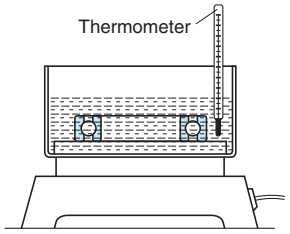
In equations (15-1) and (15-2),

K_a : force necessary for press fit or removal N
Δ_{deff} : effective interference mm
f_k : resistance coefficient (Coefficient taking into consideration friction between shafts and inner rings ··· refer to the table on the right)
B : nominal inner ring width mm
d : nominal inner ring bore diameter mm
D_i : average outside diameter of inner ring mm
d_0 : hollow shaft bore diameter mm

Value of resistance coefficient f_k

Conditions	f_k
· Press fitting bearings on to cylindrical shafts	4
· Removing bearings from cylindrical shafts	6
· Press fitting bearings on to tapered shafts or tapered sleeves	5.5
· Removing bearings from tapered shafts or tapered sleeves	4.5
· Press fitting tapered sleeves between shafts and bearings	10
· Removing tapered sleeves from the space between shafts and bearings	11

Table 15-2 Shrink fit of cylindrical bore bearings

Shrink fit	Descriptions
 (a) Heating in an oil bath  (b) Induction heater	■ This method, which expands bearings by heating them in oil, has the advantage of not applying too much force to bearings and taking only a short time.  [Notes] ● Oil temperature should not be higher than 100 °C, because bearings heated at higher than 120 °C lose hardness. ● Heating temperature can be determined from the bore diameter of a bearing and the interference by referring to Fig. 15-3. ● Use nets or a lifting device to prevent the bearing from resting directly on the bottom of the oil container. ● Since bearings shrink in the radial direction as well as the axial direction while cooling down, fix the inner ring and shaft shoulder tightly with the shaft nut before shrinking, so that no space is left between them. ■ Shrink fit proves to be clean and effective since, by this method, the ring can be provided with even heat in a short time using neither fire nor oil. When electricity is being conducted, the bearing itself generates heat by its electrical resistance, aided by the built-in exciting coil.

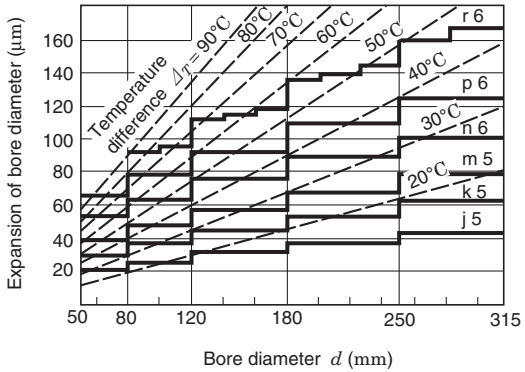


Fig. 15-3 Heating temperature and expansion of inner rings

[Remarks]

1. Thick solid lines show the maximum interference value between bearings (class 0) and shafts (r 6, p 6, n 6, m 5, k 5, j 5) at normal temperature.

2. Therefore, the heating temperature should be selected to gain a larger "expansion of the bore diameter" than the maximum interference values.
When fitting class 0 bearings having a 90 mm bore diameter to m 5 shafts, this figure shows that heating temperature should be 40 °C higher than room temperature to produce expansion larger than the maximum interference value of 48 μm.
However, taking cooling during mounting into consideration, the temperature should be set 20 to 30 °C higher than the temperature initially required.

Table 15-3 Mounting bearings with tapered bores

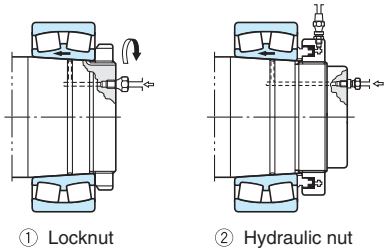
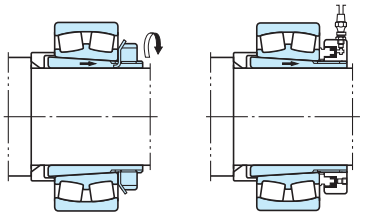
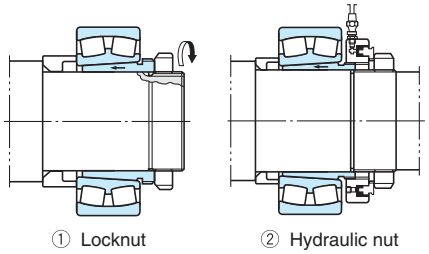
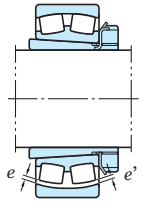
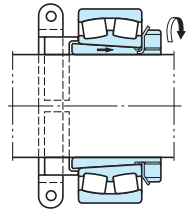
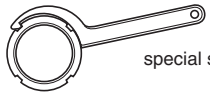
Mounting methods	Descriptions
 (a) Mounting on tapered shafts  (b) Mounting by use of an adapter sleeve  (c) Mounting by use of a withdrawal sleeve  (d) Measuring clearances	■ When mounting bearings directly on tapered shafts, provide oil holes and grooves on the shaft and inject high pressure oil into the space between the fitting surfaces (oil injection). Such oil injection can reduce tightening torque of locknut by lessening friction between the fitting surfaces. ■ When exact positioning is required in mounting a bearing on a shaft with no shoulder, use a clamp to help determine the position of the bearing.  Locating bearing by use of a clamp ■ When mounting bearings on shafts, locknuts are generally used. Special spanners are used to tighten them. Bearings can also be mounted using hydraulic nuts.  special spanner ■ When mounting tapered bore spherical roller bearings, the reduction in the radial internal clearance which gradually occurs during operation should be taken into consideration as well as the push-in depth described in Table 15-4. Clearance reduction can be measured by a thickness gage. First, stabilize the roller in the proper position and then insert the gage into the space between the rollers and the outer ring. Be careful that the clearance between both roller rows and the outer rings is roughly the same ($e \fallingdotseq e'$). Since the clearance may differ at different measuring points, take measurements at several positions. ■ When mounting self-aligning ball bearings, leave enough clearance to allow easy aligning of the outer ring.

Table 15-4 Mounting tapered bore spherical roller bearings

Nominal bore diameter d mm		Reduction of radial internal clearance μm		Axial displacement, mm				Minimum required residual clearance, μm		
				1/12 taper		1/30 taper		C N clearance	C 3 clearance	C 4 clearance
over	up to	min.	max.	min.	max.	min.	max.			
24	30	15	20	0.27	0.35	–	–	10	20	35
30	40	20	25	0.32	0.4	–	–	15	25	40
40	50	25	35	0.4	0.5	–	–	20	30	45
50	65	30	40	0.45	0.6	–	–	25	35	55
65	80	35	50	0.55	0.75	–	–	35	40	70
80	100	40	55	0.65	0.85	–	–	40	50	85
100	120	55	70	0.85	1.05	2.15	2.65	45	65	100
120	140	65	90	1.0	1.2	2.5	3.0	55	80	110
140	160	75	100	1.1	1.35	2.75	3.4	55	90	130
160	180	80	110	1.2	1.5	3.0	3.8	60	100	150
180	200	90	120	1.4	1.7	3.5	4.3	70	110	170
200	225	100	130	1.55	1.85	3.85	4.6	80	120	190
225	250	110	140	1.7	2.05	4.25	5.1	90	130	210
250	280	120	160	1.8	2.3	4.5	5.75	100	140	230
280	315	130	180	2.0	2.5	5.0	6.25	110	150	250
315	355	150	200	2.3	2.8	5.75	7.0	120	170	270
355	400	170	220	2.5	3.1	6.25	7.75	130	190	300
400	450	190	240	2.8	3.4	7.0	8.5	140	210	330
450	500	210	270	3.1	3.8	7.75	9.5	160	230	360
500	560	240	310	3.5	4.3	8.75	10.8	170	260	370
560	630	260	350	3.9	4.8	9.75	12.0	200	300	410
630	710	300	390	4.3	5.3	10.8	13.3	210	320	460
710	800	340	430	4.8	6.0	12.0	15.0	230	370	530
800	900	370	500	5.3	6.7	13.3	16.8	270	410	570
900	1000	410	550	5.9	7.4	14.8	18.5	300	450	640

[Remark] The values for reduction of radial internal clearance listed above are values obtained when mounting bearings with CN clearance on solid shafts. In mounting bearings with C 3 clearance, the maximum value listed above should be taken as the standard.

15-4 Test run

A trial operation is conducted to insure that the bearings are properly mounted.

In the case of compact machines, rotation may be checked by manual operation at first.

If no abnormalities, such as those described below, are observed, then further trial operation proceeds using a power source.

- Knocking ···
  due to flaws or insertion of foreign matter on rolling contact surfaces.
- Excessive torque (heavy) ···
  due to friction on sealing devices, too small clearances, and mounting errors.
- Uneven running torque ···
  due to improper mounting and mounting errors.

For machines too large to allow manual operation, idle running is performed by turning off the power source immediately after turning it on. Before starting power operation, it must be confirmed that bearings rotate smoothly without any abnormal vibration and noise.

Power operation should be started under no load and at low speed, then the speed is gradually increased until the designed speed is reached.

During power operation, check the noise, increase in temperature and vibration.

If any of the abnormalities listed in Tables 15-5 and 15-6 are found, operation must be stopped, and inspection for defects immediately conducted.

The bearings should be dismounted if necessary.

Table 15-5 Bearing noises, causes, and countermeasures

Noise types		Causes	Countermeasures
Cyclic	Flaw noise / Rust noise (similar to noise when punching a rivet) / Brinelling noise (Unclear siren-like noise)	Flaw on raceway Rust on raceway Brinelling on raceway	Improve mounting procedure, cleaning method and rust preventive method. Replace bearing.
	Flaking noise (similar to a large hammering noise)	Flaking on raceway	Replace bearing.
Not cyclic	Dirt noise (an irregular sandy noise.)	Insertion of foreign matter	Improve cleaning method, sealing device. Use clean lubricant. Replace bearing.
	Fitting noise (drumming or hammering noise)	Improper fitting or excessive bearing clearance	Review fitting and clearance conditions. Provide preload. Improve mounting accuracy.
	Flaw noise, rust noise, flaking noise	Flaws, rust and flaking on rolling elements	Replace bearing.
	Squeak noise (often heard in cylindrical roller bearings with grease lubrication, especially in winter or at low temperatures)	If noise is caused by improper lubrication, a proper lubricant should be selected. In general, however, serious damage will not be caused by an improper lubricant if used continuously.	
Others	Abnormally large metallic sound	Abnormal load Incorrect mounting Insufficient amount of or improper lubricant	Review fitting, clearance. Adjust preload. Improve accuracy in processing and mounting shafts and housings. Improve sealing device. Refill lubricant. Select proper lubricant.

Table 15-6 Causes and countermeasures for abnormal temperature rise

Causes	Countermeasures
Too much lubricant	Reduce lubricant amount. Use grease of lower consistency.
Insufficient lubricant	Refill lubricant.
Improper lubricant	Select proper lubricant.
Abnormal load	Review fitting and clearance conditions and adjust preload.
Improper mounting	Improve accuracy in processing and mounting shaft and housing. Review fitting.
(excessive friction)	Improve sealing device.

Normally, listening rods are employed for bearing noise inspections.

The instrument detecting abnormalities through sound vibration and the Diagnosis System utilizing acoustic emission for abnormality detection are also applicable.

In general, bearing temperature can be estimated from housing temperature, but the most accurate method is to measure the temperature of outer rings directly via lubrication holes.

Normally, bearing temperature begins to rise gradually when operation is just starting; and, unless the bearing has some abnormality, the temperature stabilizes within one or two hours.

Therefore, a rapid rise in temperature or unusually high temperature indicates some abnormality.

15-5 Bearing dismounting

After dismounting bearings, handling of the bearings and the various methods available for this should be considered.

If the bearing is to be disposed of, any simple method such as torch cutting can be employed. If the bearing is to be reused or checked for the causes of its failure, the same amount of care as in mounting should be taken in dismounting so as not to damage the bearing and other parts.

Since bearings with interference fits are easily damaged during dismounting, measures to prevent damage during dismounting must be incorporated into the design.

It is recommended that dismounting devices be designed and manufactured, if necessary.

It is useful for discovering the causes of failures when the conditions of bearings, including mounting direction and location, are recorded prior to dismounting.

Dismounting method

Tables 15-7 to 15-9 describe dismounting methods for interference fit bearings intended for reuse or for failure analysis.

The force necessary to remove bearings can be calculated using the equations given on page A 142.

Table 15-7 Dismounting of cylindrical bore bearings

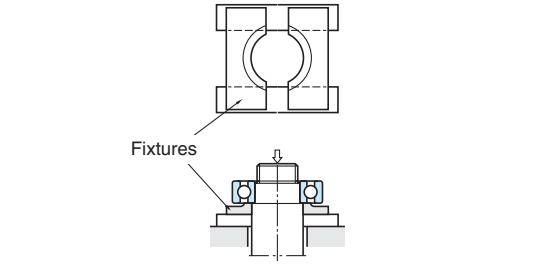
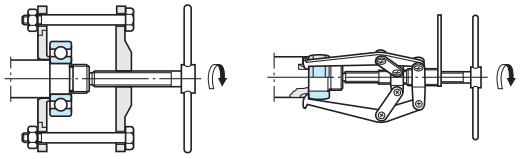
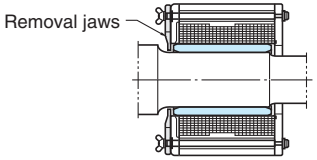
Inner ring dismounting methods	Descriptions
 (a) Dismounting by use of a press  (b) Dismounting by use of special tools (c) Dismounting by use of special tools  (d) Dismounting using induction heater	• Non-separable bearings should be treated carefully during dismounting so as to minimize external force, which affects their rolling elements. • The easiest way to remove bearings is by using a press as shown in Fig. (a). It is recommended that the fixture be prepared so that the inner ring can receive the removal force. • Figs. (b) and (c) show a dismounting method in which special tools are employed. In both cases, the jaws of the tool should firmly hold the side of the inner ring. • Fig. (d) shows an example of removal by use of an induction heater : this method can be adapted to both mounting and dismounting of the inner rings of NU and NJ type cylindrical roller bearings. The heater can be used for heating and expanding inner rings in a short time.

Table 15-8 Dismounting tapered bore bearings

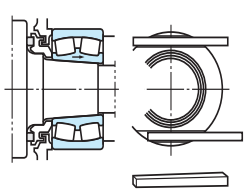
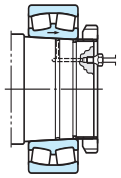
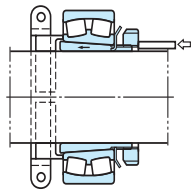
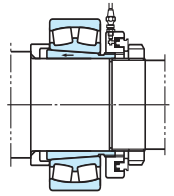
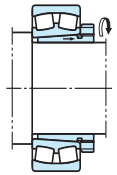
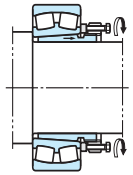
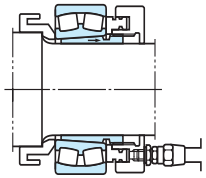
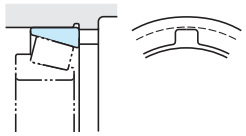
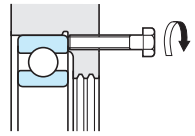
Inner ring dismounting methods	Descriptions
 (a) Dismounting by use of a wedge  (b) Dismounting by use of oil pressure  (c) Dismounting by use of clamps  (d) Dismounting by use of hydraulic nuts  (e) Dismounting by use of locknuts  (f) Dismounting by use of bolts  (g) Dismounting by use of hydraulic nuts	• Fig. (a) shows the dismounting of an inner ring by means of driving wedges into notches at the back of the labyrinth. Fig. (b) shows dismounting by means of feeding high pressure oil to the fitting surfaces. In both cases, it is recommended that a stopper (ex. shaft nuts) be provided to prevent bearings from suddenly dropping out. • For bearings with an adapter sleeve, the following two methods are suitable. As shown in Fig. (c), fix bearings with clamps, loosen locknuts, then hammer off the adapter sleeve. This method is mainly used for small size bearings. Fig. (d) shows the method using hydraulic nuts. • Small size bearings with withdrawal sleeves can be removed by tightening locknuts as shown in Fig. (e). For large size bearings, provide several bolt holes on locknuts as shown in Fig. (f), and tighten bolts. The bearings can then be removed as easily as small size bearings. • Fig. (g) shows the method using hydraulic nuts.

Table 15-9 Dismounting of outer rings

Outer ring dismounting methods	Description
 (a) Notchs for dismounting  (b) Bolt holes and bolts for dismounting	• To dismount outer rings with interference fits, it is recommended that notches or bolt holes be provided on the shoulder of the housings.

15-6 Maintenance and inspection of bearings

Periodic and thorough maintenance and inspection are indispensable to drawing full performance from bearings and lengthening their useful life.

Besides, prevention of accidents and down time by early detection of failures through maintenance and inspection greatly contributes to the enhancement of productivity and profitability.

15-6-1 Cleaning

Before dismounting a bearing for inspection, record the physical condition of the bearing, including taking photographs.

Cleaning should be done after checking the amount of remaining lubricant and collecting lubricant as a sample for examination.

- A dirty bearing should be cleaned using two cleaning processes, such as rough cleaning and finish cleaning.
  It is recommended that a net be set on the bottom of cleaning containers.
- In rough cleaning, use brushes to remove grease and dirt. Bearings should be handled carefully. Note that raceway surfaces may be damaged by foreign matter, if bearings are rotated in cleaning oil.
- During finish cleaning, clean bearings carefully by rotating them slowly in cleaning oil.

In general, neutral water-free light oil or kerosene is used to clean bearings, a warm alkali solution can also be used if necessary. In any case, it is essential to keep oil clean by filtering it prior to cleaning.

Apply anti-corrosion oil or rust preventive grease on bearings immediately after cleaning.

15-6-2 Inspection and analysis

Before determining that dismounted bearings will be reused, the accuracy of their dimensions and running, internal clearance, fitting surfaces, raceways, rolling contact surfaces, cages and seals must be carefully examined, so as to confirm that no abnormality is present.

It is desirable for skilled persons who have sufficient knowledge of bearings to make decisions on the reuse of bearings.

Criteria for reuse differs according to the performance and importance of machines and inspection frequency.

If the following defects are found, replace the bearing with a new one.

- Cracks and chips in bearing components
- Flaking on the raceway surfaces and the rolling contact surfaces
- Other failures of a serious degree described in the following section "16. Examples of bearing failures."

15-7 Methods of analyzing bearing failures

It is important for enhancing productivity and profitability, as well as for accident prevention that abnormalities in bearings are detected during operation.

Representative detection methods are described in the following section.

1) Noise checking

Since the detection of abnormalities in bearings from noises requires ample experience, sufficient training must be given to inspectors. Given this, it is recommended that specific persons be assigned to this work in order to gain this experience.

Attaching hearing aids or listening rods on housings is effective for detecting bearing noise.

2) Checking of operating temperature

Since this method utilizes change in operating temperature, its application is limited to relatively stable operations.

For detection, operating temperatures must be continuously recorded.

If abnormalities occur in bearings, operating temperature not only increase but also change irregularly.

It is recommended that this method be employed together with noise checking.

3) Lubricant checking

This method detects abnormalities from the foreign matter, including dirt and metallic powder, in lubricants collected as samples.

This method is recommended for inspection of bearings which cannot be checked by close visual inspection, and large size bearings.

16. Examples of bearing failures

Table 16-1 (1) Bearing failures, causes and countermeasures

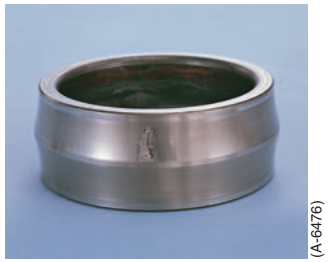
Failures	Characteristics	Damages	Causes	Countermeasures
1 Flaking	 (A-6961)  (A-6476) Flaking is a phenomenon when material is removed in flakes from a surface layer of the bearing raceways or rolling elements due to rolling fatigue. This phenomenon is generally attributed to the approaching end of bearing service life. However, if flaking occurs at early stages of bearing service life, it is necessary to determine causes and adopt countermeasures. [Reference] Pitting Pitting is another type of failure caused by rolling fatigue, in which minute holes of approx. 0.1 mm in depth are generated on the raceway surface.	Flaking occurring at an incipient stage	· Too small internal clearance · Improper or insufficient lubricant · Too much load · Rust	· Provide proper internal clearance. · Select proper lubricating method or lubricant.
		Flaking on one side of radial bearing raceway	· Extraordinarily large axial load	· Fitting between outer ring on the free side and housing should be changed to clearance fit.
		Symmetrical flaking along circumference of raceway	· Inaccurate housing roundness	· Correct processing accuracy of housing bore. (Especially for split housings, care should be taken to ensure processing accuracy.)
		Slanted flaking on the radial ball bearing raceway	· Improper mounting · Shaft deflection · Inaccuracy of the shaft and housing	· Correct centering. · Widen bearing internal clearance. · Correct squareness of shaft or housing shoulder.
		Flaking occurring near the edge of the raceway or rolling contact surface of roller bearings		
		Flaking on the raceway surface at the same interval as rolling element spacing	· Heavy impact load during mounting · A flaw of cylindrical roller bearings or tapered roller bearings caused when they are mounted. · Rust gathered while out of operation	· Improve mounting procedure. · Provide rust prevention treatment before long cessation of operation.
2 Cracking, chipping	 (A-6395)	Cracking in outer ring or inner ring	· Excessive interference · Excessive fillet on shaft or housing · Heavy impact load · Advanced flaking or seizure	· Select proper fit. · Adjust fillet on the shaft or in the housing to smaller than that of the bearing chamfer dimension. · Re-examine load conditions.
		Cracking on rolling elements	· Heavy impact load · Advanced flaking	· Improve mounting and handling procedure. · Re-examine load conditions.
		Cracking on the rib	· Impact on rib during mounting · Excessive axial impact load	· Improve mounting procedure. · Re-examine load conditions.
3 Brinelling, nicks	 (A-6617) (Brinelling) · Brinelling is a small surface indentation generated either on the raceway through plastic deformation at the contact point between the raceway and rolling elements, or on the rolling surfaces from insertion of foreign matter, when heavy load is applied while the bearing is stationary or rotating at a low rotation speed. · Nicks are those indentations produced directly by rough handling such as hammering.	Brinelling on the raceway or rolling contact surface	· Entry of foreign matter	· Clean bearing and its peripheral parts. · Improve sealing devices.
		Brinelling on the raceway surface at the same interval as the rolling element spacing	· Impact load during mounting · Excessive load applied while bearing is stationary	· Improve mounting procedure. · Improve machine handling.
		Nicks on the raceway or rolling contact surface	· Careless handling	· Improve mounting and handling procedure.

Table 16-1 (2) Bearing failures, causes and countermeasures

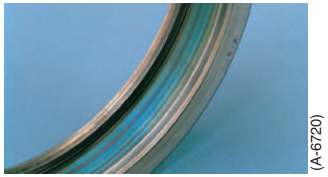
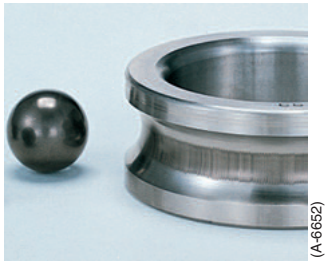
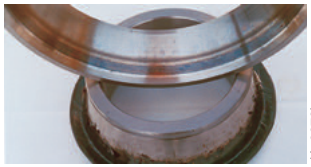
Failures	Characteristics	Damages	Causes	Countermeasures
4 Pear skin, discoloration	 (A-6720) (Discoloration) · Pear skin is a phenomenon in which minute brinell marks cover the entire rolling surface, caused by the insertion of foreign matter. This is characterized by loss of luster and a rolling surface that is rough in appearance. In extreme cases, this is accompanied by discoloration due to heat generation. · Discoloration is a phenomenon in which the surface color changes because of staining or heat generation during rotation. Color change caused by rust and corrosion is generally separate from this phenomenon.	Indentation similar to pear skin on the raceway and rolling contact surface.	· Entry of minute foreign matter	· Clean the bearing and its peripheral parts. · Improve sealing device.
		Discoloration of the raceway, surface rolling contact surface, rib face, and cage riding land.	· Too small bearing internal clearance · Improper or insufficient lubricant · Quality deterioration of lubricant due to aging, etc.	· Provide proper internal clearance. · Select proper lubricating method or lubricant.
5 Scratches, scuffing	 (A-6459) (Scuffing) · Scratches are relatively shallow marks generated by sliding contact, in the same direction as the sliding. This is not accompanied by apparent melting of material. · Scuffing refers to marks, the surface of which are partially melted due to higher contact pressure and therefore a greater heat effect. · Generally, scuffing may be regarded as a serious case of scratches.	Scratches on raceway or rolling contact surface	· Insufficient lubricant at initial operation · Careless handling	· Apply lubricant to the raceway and rolling contact surface when mounting. · Improve mounting procedure.
		Scuffing on rib face and roller end face	· Improper or insufficient lubricant · Improper mounting · Excessive axial load	· Select proper lubricating method or lubricant. · Correct centering of axial direction.
6 Smearing	 (A-6640) Smearing is a phenomenon in which a cluster of minute seizures cover the rolling contact surface. Since smearing is caused by high temperature due to friction, the surface of the material usually melts partially ; and, the smeared surfaces appear very rough in many cases.	Smearing on raceway or rolling contact surface	· Improper or insufficient lubricant · Slipping of the rolling elements (This occurs due to the break down of lubricant film when an abnormal self rotation causes slip of the rolling elements on the raceway.)	· Select proper lubricating method or lubricant. · Provide proper preload.
7 Rust, corrosion	 (A-7130) · Rust is a film of oxides, or hydroxides, or carbonates formed on a metal surface due to chemical reaction. · Corrosion is a phenomenon in which a metal surface is eroded by acid or alkali solutions through chemical reaction (electrochemical reaction such as chemical combination and battery formation) ; resulting in oxidation or dissolution. (It often occurs when sulfur or chloride contained in the lubricant additives is dissolved at high temperature.)	Rust partially or completely covering the bearing surface.	· Improper storage condition · Dew formation in atmosphere	· Improve bearing storage conditions. · Improve sealing devices. · Provide rust preventive treatment before long cessation of operation.
		Rust and corrosion at the same interval as rolling element spacing	· Contamination by water or corrosive matter	· Improve sealing devices.
8 Electric pitting	 (A-6652) When an electric current passes through a bearing while in operation, it can generate sparks between the raceway and rolling elements through a very thin oil film, resulting in melting of the surface metal in this area. This phenomenon appears to be pitting at first sight. (The resultant flaw is referred to as a pit.) When the pit is magnified, it appears as a hole like a crater, indicating that the material melted when it was sparking. In some cases, the rolling surface becomes corrugated by pitting.	Pitting or a corrugated surface failure on raceway and rolling contact surface (The bearings must be replaced, if the corrugated texture is found by scratching the surface with a fingernail or if pitting can be observed by visual inspection.)	· Sparks generated when electric current passes through bearings	· Providing a bypass which prevents current from passing through bearings. · Insulation of bearings.

Table 16-1 (3) Bearing failures, causes and countermeasures

Failures	Characteristics	Damages	Causes	Countermeasures
9 Wear	 (A-4719) Normally, wear of bearing is observed on sliding contact surfaces such as roller end faces and rib faces, cage pockets, the guide surface of cages and cage riding lands. Wear is not directly related to material fatigue. Wear caused by foreign matter and corrosion can affect not only sliding surfaces but rolling surfaces.	Wear on the contact surfaces (roller end faces, rib faces, cage pockets)	Improper or insufficient lubricant	· Select proper lubricating method or lubricant. · Improve sealing device. · Clean the bearing and its peripheral parts.
		Wear on raceways and rolling contact surfaces	· Entry of foreign matter · Improper or insufficient lubricant	
10 Fretting	 (A-6649) Fretting occurs to bearings which are subject to vibration while in stationary condition or which are exposed to minute vibration. It is characterized by rust-colored wear particles. Since fretting on the raceways often appears similar to brinelling, it is sometimes called "falsebrinelling".	Rust-colored wear particles generated on the fitting surface (fretting corrosion)	· Insufficient interference	· Provide greater interference · Apply lubricant to the fitting surface
		Brinelling on the raceway surface at the same interval as rolling element spacing (false brinelling)	· Vibration and oscillation when bearings are stationary.	· Improve fixing method of the shaft and housing. · Provide preload to bearing.
11 Creeping	 (A-6647) Creeping is a phenomenon in which bearing rings move relative to the shaft or housing during operation.	Wear, discoloration and scuffing, caused by slipping on the fitting surfaces	· Insufficient interference · Insufficient tightening of sleeve	· Provide greater interference. · Proper tightening of sleeve.
12 Damage to cages	 (A-6455) Since cages are made of low hardness materials, external pressure and contact with other parts can easily produce flaws and distortion. In some cases, these are aggravated and become chipping and cracks. Large chipping and cracks are often accompanied by deformation, which may reduce the accuracy of the cage itself and may hinder the smooth movement of rolling elements.	Flaws, distortion, chipping, cracking and excessive wear in cages. Loose or damaged rivets.	· Extraordinary vibration, impact, moment · Improper or insufficient lubricant · Improper mounting (misalignment) · Dents made during mounting	· Re-examine load conditions. · Select proper lubricating method or lubricant. · Minimize mounting deviation. · Re-examine cage types. · Improve mounting.
13 Seizure	 (A-6679) A phenomenon caused by abnormal heating in bearings.	Discoloration, distortion and melting together	· Too small internal clearance · Improper or insufficient lubricant · Excessive load · Aggravated by other bearing flaws	· Provide proper internal clearance. · Select proper lubricating method or lubricant. · Re-examine bearing type. · Earlier discovery of bearing flaws.

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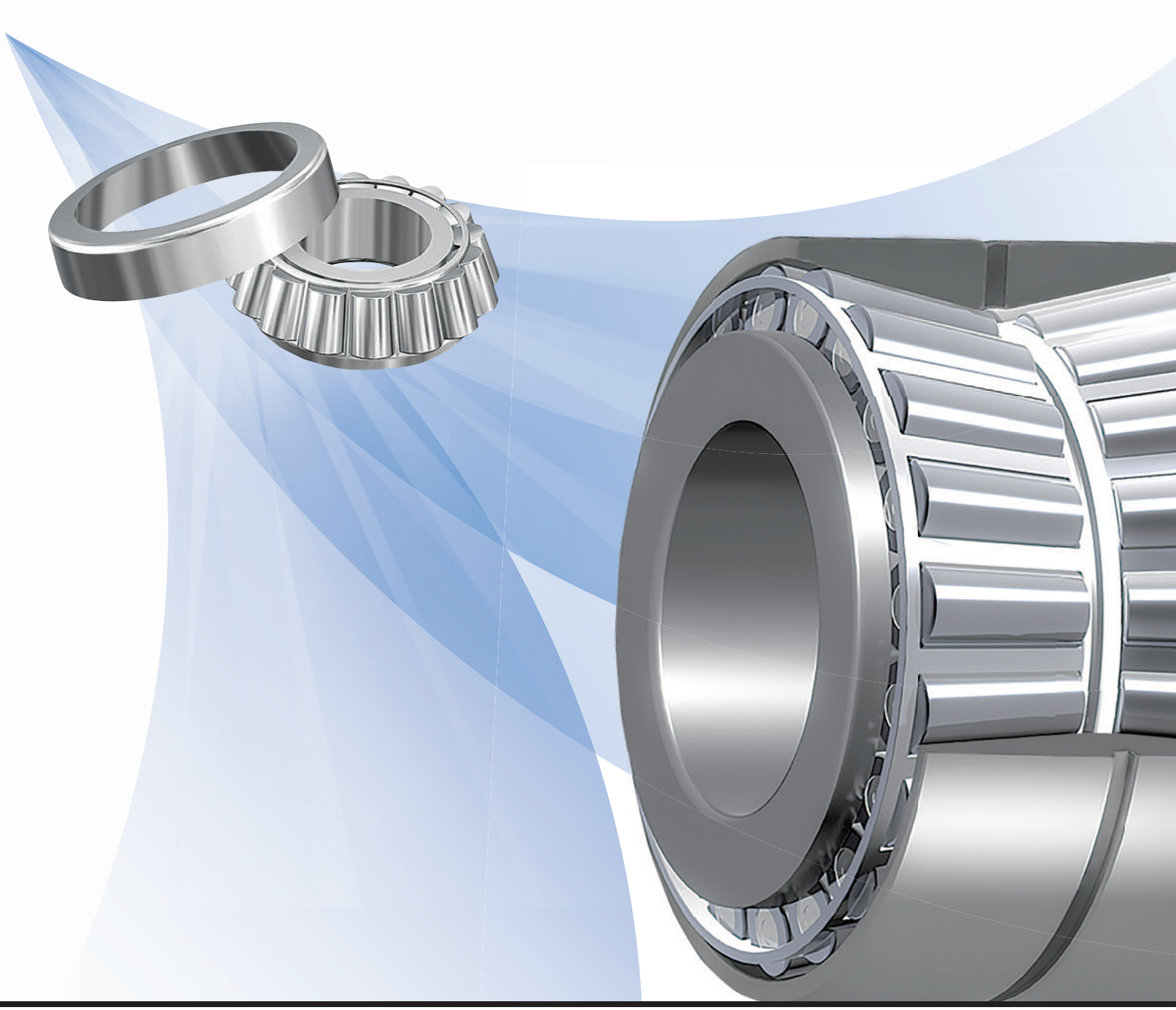


CAT. NO. BS001EN-ODS

Koyo®

Inch Series

TAPERED ROLLER BEARINGS

Publication of New Koyo Inch series Tapered Roller Bearing Catalog

Allow us to express our heartfelt appreciation for your valuable patronage.

At this time we are pleased to provide you with our new Koyo Inch Series Tapered Roller Bearing Catalog.

JTEKT Corporation has long enjoyed a strong reputation as a maker of inch-series tapered roller bearings from the time of its predecessor Koyo Seiko, and in recent years we have continued intense R&D activities to make improvements in such areas as the size, weight, and environmental friendliness of these bearings. The fruits of these efforts are reflected in the bearings described in this new catalog.

You will notice that this new catalogue has undergone a thorough revision from the previous version and contains model information based on the latest results.

We believe this catalogue will prove valuable to you in your selection and use of Koyo bearings, and we look forward to your continued patronage.

★The contents of this catalog are subject to change without prior notice. Every possible effort has been made to ensure that the data herein is correct; however, JTEKT cannot assume responsibility for any errors or omissions.

Contents

Technical section

Specification tables

Single-row

Double-row

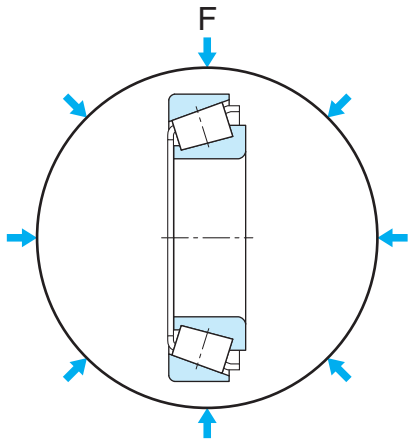
Supplementary tables

1 Outstanding features of tapered roller bearings

1) Higher load ratings

Tapered roller bearings with higher load ratings can accept radial loads or axial loads in one direction and combined radial and axial loads.

This type of bearing is suitable for use under heavy load or impact load.



2) The cup can be mounted separately from the cone assembly

Since the cup is separable from the cone assembly, the cone assembly can be installed on the shaft and the cup in the housing, individually.

This feature facilitates mounting of the bearing while making the design of the shaft and housing simpler. In addition, more options regarding the fitting practice employed are available than with any other type of bearing.

3) Mounted clearance is adjustable

In general, bearings of unitized design are supplied with a predetermined radial clearance which will vary according to fitting practice and application. Tapered roller bearings on the other hand can be adjusted at the time of installation by varying the axial location of either the cone assembly or cup.

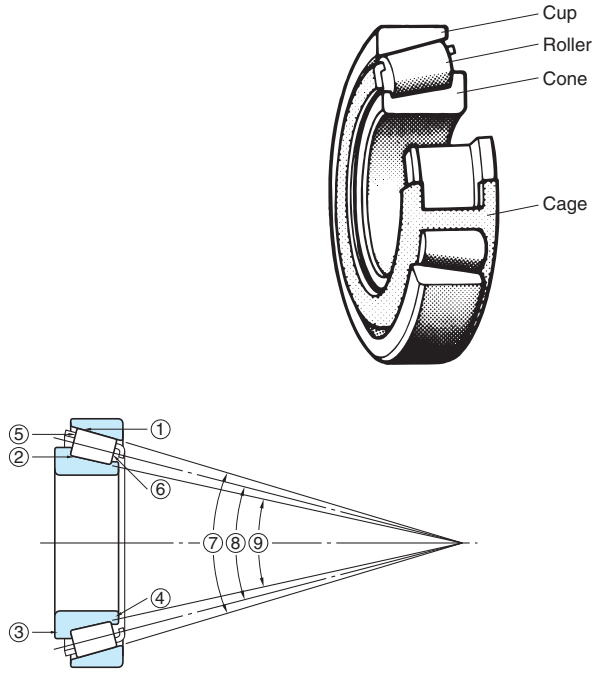
2 Structure of tapered roller bearings

2.1 Single-row

Tapered roller bearings consist of cup, cone, rollers and a cage. This bearing contains tapered rollers for its rolling element which are guided by the cone backface rib on the roller large end face.

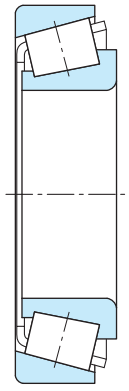
The raceway surfaces of cone and cup and the rolling contact surface of rollers are designed so that the respective apexes converge at a point on the bearing center line.

Bearings are classified into standard, intermediate and steep types, in accordance with their contact angle (α).
The larger the contact angle is, the greater the bearing resistance to axial load.

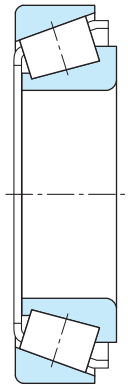


① Cup raceway
② Cone raceway
③ Cone backface rib
④ Cone front face rib
⑤ Roller large end face
⑥ Roller small end face
⑦ Included cup angle
⑧ Included roller center angle
⑨ Included cone angle

TS type (pages 38, 108)

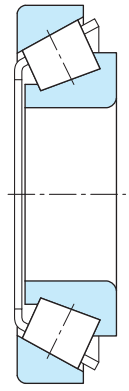


Standard contact angle



Medium contact angle

TSS type (page 102)

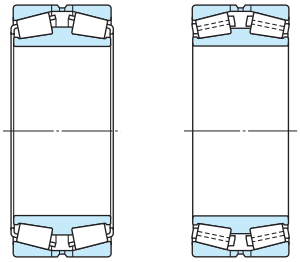


Steep contact angle

2.2 Double-row

■ Double-row (Face to face)

TDI type (page 110)



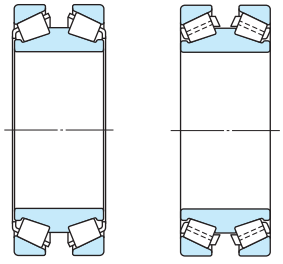
Design 1 Design 1-P

The TDI type bearing is made up of two single-row cups and one double cone, and is generally provided with a cup spacer.
The bearing with cup spacer is handy for mounting, as its end play has been pre-adjusted for each application.

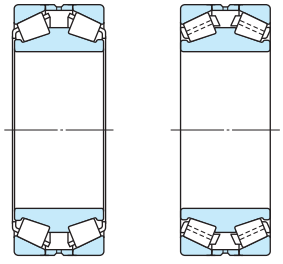
The spacer is provided with an lubrication groove and several lubrication holes.

Used for roll neck of medium-duty rolling mills, speed reducers, etc.

TDIS type ····· For axial suport (page 120)



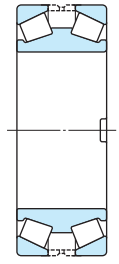
Design 1 Design 1-P



Design 2 Design 2-P

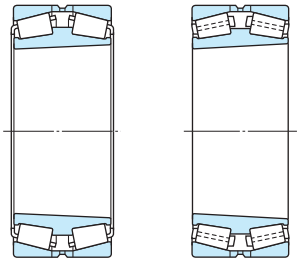
The TDIS type bearing is of the same construction as the TDI type, except that it has larger contact angle so that it can accommodate heavier axial load.

Used for applications where the axial load is greater than the radial load or where only the axial load is applied.
The bearing with the key way on the cone is mainly used for rollling mill roll necks. The bearing may be also used with pre-load without using the cup spacer.



Example of key way

TDIT type ····· Tapered bore (page 122)



Design 1 Design 1-P

Where the interference fit is necessary, and needs to be removed frequently, the use of TDIT type is convenient.
It is also possible to mount the bearing on the shaft by using an adaptor sleeve.

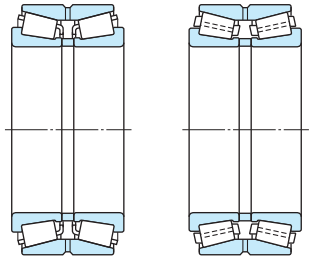
Used for roll neck of light or medium-duty rolling mills and roll neck of calendar mills.

The use of a hydraulic unit will facilitate bearing mounting/dismounting.

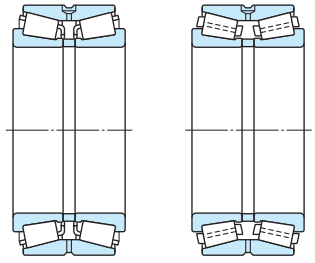
The roll neck taper needs to be matched to the bore diameter of bearing by using taper gauge, sign bar gauge, etc.

■ Double-row (Back to back)

TDO, TDOS type (page 126)



Design 1 Design 1-P



Design 2 Design 2-P

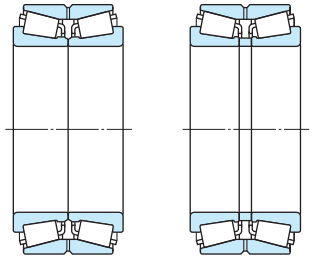
The TDO type bearing is made up of one double cup, two single-row cones and one cone spacer. The cup is provided with several lubrication holes.

The cone spacer has been adjusted to provide an end play suitable to each application.
It is also possible to freely adjust the end play for use by removing the cone spacer, however, it requires time and labor.

Suitable to case where moment may act.
Used for speed reducer, winding machine, etc.

The steep angle type (TDOS type) having large contact angle has increased axial load capacity, and is widely used for worm shaft of medium, heavy duty applications, thrust bearing of reducers etc.

TNA type (page 146)



Design 1 Design 2
(with cone spacer)

The TNA type bearing has different assembled width tolerance from the TDO type, specially selected for the TNA type.

[Reference] Features of bearing with pin type cage

(1) Load rating can be increased.
The pin type cage accommodates a larger number of rollers, thus making it possible to increase the load rating of bearing.

(2) Reduced friction resistance
Friction coefficient of pin type cage is reduced, as contact area of roller and cage is limited.

(3) Easy mounting/dismounting
The pin type cage is provided with a tap hole for lifting. The use of tap hole will facilitate the work.
Use ISO metric thread for lifting tap screw.

3 Bearing service life

3.1 Bearing service life

When bearings rotate under load, material flakes from the surfaces of cone and cup or rolling elements by fatigue arising from repeated contact stress.

This phenomenon is called flaking.

The total number of bearing rotations until flaking occurs is regarded as the bearing "(fatigue) service life".

"(Fatigue) service life" differs greatly depending upon bearing structures, dimensions, materials, and processing methods.

Since this phenomenon results from fatigue distribution in bearing materials themselves, differences in bearing service life should be statistically considered.

When a group of identical bearings are rotated under the same conditions, the total number of revolutions until 90 % of the bearings are left without flaking (i.e. a service life of 90 % reliability) is defined as the basic rating life. In operation at a constant speed, the basic rating life can be expressed in terms of time.

3.2 Basic dynamic load ratings

Basic dynamic load ratings, C

The basic dynamic load rating is either pure radial (for radial bearings) or central axial load (for thrust bearings) of constant magnitude in a constant direction, under which the basic rating life of 1 million revolutions can be obtained, when the cone rotates while the cup is stationary, or vice versa. The basic dynamic load rating, which represents the capacity of a bearing under rolling fatigue, is specified as the basic dynamic radial load rating (C_r) for radial bearings, and basic dynamic axial load rating (C_a) for thrust bearings. These load ratings are listed in the specification table.

These values are prescribed by ISO 281/1990, and are subject to change by conformance to the latest ISO standards.

3.3 Calculation of service life

Generally, the relationship between the dynamic load rating, applied load and basic rating life of the bearing is expressed as follows :

$$L_{10} = \left(\frac{C}{P}\right)^{10/3} \quad \cdots\cdots (3.1)$$

where :

L_{10} : basic rating life $\times 10^6$ revolutions

C : basic dynamic load rating N

P : dynamic equivalent radial (or axial) load N

In case the bearing operates at a constant speed, it is often convenient to express the life in terms of hours which can be obtained by the following equation :

$$L_{10h} = \left(\frac{C}{P}\right)^{10/3} \frac{16\,667}{n} \quad \cdots\cdots (3.2)$$

where :

L_{10h} : life in terms of hours h

$$\left\{ \begin{array}{l} L_{10h} = L_{10} \times \dfrac{10^6}{60n} \\ \quad = \left(\dfrac{C}{P}\right)^{10/3} \dfrac{10^6}{60n} \\ \quad = \left(\dfrac{C}{P}\right)^{10/3} \dfrac{16\,667}{n} \end{array} \right\}$$

n : rotational speed min^{-1}

Life calculation can be further simplified by the use of service life coefficient (f_h) and coefficient of rotational speed (f_n) as tabulated in **Tables 3.3** and **3.4**.

$$L_{10h} = 500 \cdot f_h{}^{10/3} \quad \cdots\cdots (3.3)$$

$$f_h = f_n \cdot \frac{C}{P} \quad \cdots\cdots (3.4)$$

$$f_n = \left(\frac{33.3}{n}\right)^{3/10} \quad \cdots\cdots (3.5)$$

3.4 Correction of basic dynamic load rating for high temperature use and dimension stabilizing treatment

In high temperature operation, bearing material hardness deteriorates, as material compositions are altered. As a result, the basic dynamic load rating is diminished. Once altered, material composition is not recovered, even if operating temperatures return to normal.

Therefore, for bearings used in high temperature operation, the basic dynamic load rating should be corrected by multiplying the basic dynamic load rating values specified in the bearing specification table by the temperature coefficient values in **Table 3.1**.

Table 3.1 Temperature coefficient values

Bearing temperature, °C	**125**	**150**	**175**	**200**	**250**
Temperature coefficient	1	1	0.95	0.90	0.75

3.5 Modified rating life L_{nm}

The life of rolling bearings was standardized as a basic rating life in the 1960s, but in actual applications, sometimes the actual life and the basic rating life have been quite different due to the lubrication status and the influence of the usage environment. To make the calculated life closer to the actual life, a corrected rating life has been considered since the 1980s. In this corrected rating life, bearing characteristic factor a_2 (a correction factor for the case in which the characteristics related to the life are changed due to the bearing materials, manufacturing process, and design) and usage condition factor a_3 (a correction factor that takes into account usage conditions that have a direct influence on the bearing life, such as the lubrication) or factor a_{23} formed from the interdependence of these two factors, are considered with the basic rating life. These factors were handled differently by each bearing manufacturer, but they have been standardized as a modified rating life in **ISO 281** in 2007. In 2013, **JIS B 1518** (dynamic load ratings and rating life) was amended to conform to the **ISO**.

The basic rating life (L_{10}) shown in **Equation (3.1)** is the (fatigue) life with a dependability of 90 % under normal usage conditions for rolling bearings that have standard factors such as internal design, materials, and manufacturing quality. **JIS B 1518**:2013 specifies a calculation method based on **ISO 281**:2007. To calculate accurate bearing life under a variety of operating conditions, it is necessary to consider elements such as the effect of changes in factors that can be anticipated when using different reliabilities and system approaches, and interactions between factors. Therefore, the specified calculation method considers additional stress due to the lubrication status, lubricant contamination, and fatigue load limit C_u (refer to p. 10) on the inside of the bearing. The life that uses this life modification factor a_{ISO}, which considers the above factors, is called modified rating life L_{nm} and is calculated with the following **Equation (3.6)**.

$$L_{nm} = a_1 a_{ISO} L_{10} \quad \cdots\cdots (3.6)$$

In this equation,

L_{nm} : modified rating life — 10^6 rotations
(This rating life has been modified for one of or a combination of the following: reliability of 90 % or higher, fatigue load limit, special bearing characteristics, lubrication contamination, and special operating conditions.)

L_{10} : basic rating life — 10^6 rotations
(reliability: 90 %)

a_1 : life modification factor for reliability ····· refer to section (1)

a_{ISO} : life modification factor ····· refer to section (2)

[Remark]
When bearing dimensions are to be selected given L_{nm} greater than 90 % in reliability, the strength of shaft and housing must be considered.

(1) Life modification factor for reliability a_1

The term “reliability” is defined as “for a group of apparently identical rolling bearings, operating under the same conditions, the percentage of the group that is expected to attain or exceed a specified life” in **ISO 281**:2007. Values of a_1 used to calculate a modified rating life with a reliability of 90 % or higher (a failure probability of 10 % or less) are shown in **Table 3.2**.

Table 3.2 Life modification factor for reliability a_1

Reliability, %	$L_{n\mathrm{m}}$	a_1
90	$L_{10\mathrm{m}}$	1
95	$L_{5\mathrm{m}}$	0.64
96	$L_{4\mathrm{m}}$	0.55
97	$L_{3\mathrm{m}}$	0.47
98	$L_{2\mathrm{m}}$	0.37
99	$L_{1\mathrm{m}}$	0.25
99.2	$L_{0.8\mathrm{m}}$	0.22
99.4	$L_{0.6\mathrm{m}}$	0.19
99.6	$L_{0.4\mathrm{m}}$	0.16
99.8	$L_{0.2\mathrm{m}}$	0.12
99.9	$L_{0.1\mathrm{m}}$	0.093
99.92	$L_{0.08\mathrm{m}}$	0.087
99.94	$L_{0.06\mathrm{m}}$	0.080
99.95	$L_{0.05\mathrm{m}}$	0.077

(Citation from **JIS B 1518**:2013)

(2) Life modification factor a_{ISO}

a) System approach

The various influences on bearing life are dependent on each other. The system approach of calculating the modified life has been evaluated as a practical method for determining life modification factor a_{ISO} (ref. **Fig. 3.1**). Life modification factor a_{ISO} is calculated with the following equation. A diagram is available for each bearing type (radial ball bearings, radial roller bearings, thrust ball bearings, and thrust roller bearings). (Each diagram (**Fig. 3.2**) is a citation from **JIS B 1518**:2013.)

Note that in practical use, this is set so that life modification factor $a_{\mathrm{ISO}} \leqq 50$.

$$a_{\mathrm{ISO}} = f\left(\frac{e_{\mathrm{c}} C_{\mathrm{u}}}{P}, \kappa\right) \quad \cdots\cdots (3.7)$$

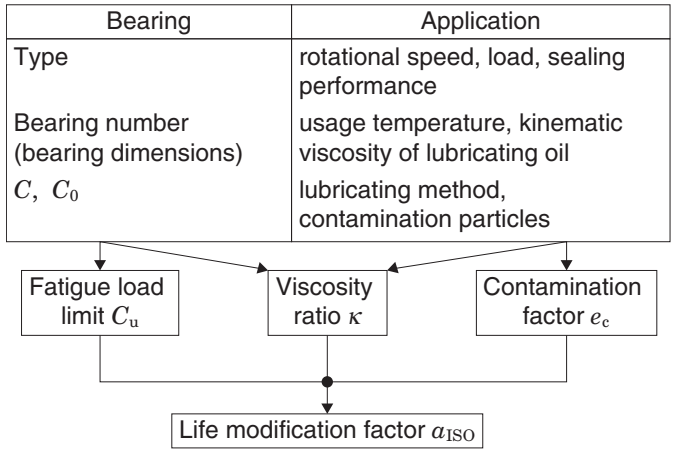


Fig. 3.1 System approach

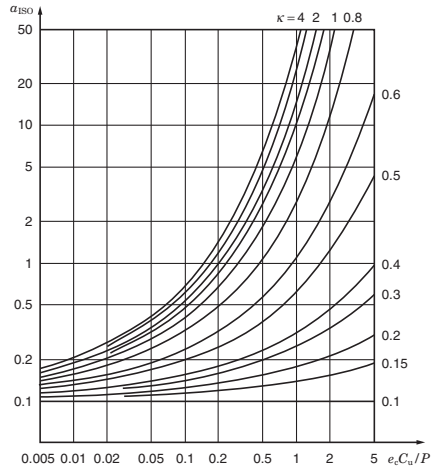


Fig. 3.2 Life modification factor a_{ISO} (Radial roller bearings)

(**Fig. 3.2** Citation from **JIS B 1518**:2013)

b) Fatigue load limit C_{u}

For regulated steel materials or alloy steel that has equivalent quality, the fatigue life is unlimited so long as the load condition does not exceed a certain value and so long as the lubrication conditions, lubrication cleanliness class, and other operating conditions are favorable. For general high-quality materials and bearings with high manufacturing quality, the fatigue stress limit is reached at a contact stress of approximately 1.5 GPa between the raceway and rolling elements. If one or both of the material quality and manufacturing quality are low, the fatigue stress limit will also be low.

The term “fatigue load limit” C_{u} is defined as “bearing load under which the fatigue stress limit is just reached in the most heavily loaded raceway contact” in **ISO 281**:2007. and is affected by factors such as the bearing type, size, and material.

For details on the fatigue load limits of special bearings and other bearings not listed in this catalog, contact JTEKT.

c) Contamination factor e_c

If solid particles in the contaminated lubricant are caught between the raceway and the rolling elements, indentations may form on one or both of the raceway and the rolling elements. These indentations will lead to localized increases in stress, which will decrease the life. This decrease in life attributable to the contamination of the lubricant can be calculated from the contamination level as contamination factor e_c.

D_{pw} shown in this table is the pitch diameter of ball/roller set, which is expressed simply as $D_{pw} = (D + d)/2$. (D: Outside diameter, d: Bore diameter)

For information such as details on special lubricating conditions or detailed investigations, contact JTEKT.

Table 3.3 Values of contamination factor e_c

Contamination level	e_c	
	$D_{pw} < 100$ mm	$D_{pw} \leqq 100$ mm
Extremely high cleanliness: The size of the particles is approximately equal to the thickness of the lubricant oil film, this is found in laboratory-level environments.	1	1
High cleanliness: The oil has been filtered by an extremely fine filter, this is found with standard grease-packed bearings and sealed bearings.	0.8 to 0.6	0.9 to 0.8
Standard cleanliness: The oil has been filtered by a fine filter, this is found with standard grease-packed bearings and shielded bearings.	0.6 to 0.5	0.8 to 0.6
Minimal contamination: The lubricant is slightly contaminated.	0.5 to 0.3	0.6 to 0.4
Normal contamination: This is found when no seal is used and a coarse filter is used in an environment in which wear debris and particles from the surrounding area penetrate into the lubricant.	0.3 to 0.1	0.4 to 0.2
High contamination: This is found when the surrounding environment is considerably contaminated and the bearing sealing is insufficient.	0.1 to 0	0.1 to 0
Extremely high contamination	0	0

(**Table 3.3** Citation from **JIS B 1518**:2013)

d) Viscosity ratio κ

The lubricant forms an oil film on the roller contact surface, which separates the raceway and the rolling elements. The status of the lubricant oil film is expressed by viscosity ratio κ, the actual kinematic viscosity at the operating temperature ν divided by the reference kinematic viscosity ν_1 as shown in the following equation.

A κ greater than 4, equal to 4, or less than 0.1 is not applicable.

For details on lubricants such as grease and lubricants with extreme pressure additives, contact JTEKT.

$$\kappa = \frac{\nu}{\nu_1} \quad \cdots\cdots (3.8)$$

ν : Actual kinematic viscosity at the operating temperature; the viscosity of the lubricant at the operating temperature

ν_1 : Reference kinematic viscosity; determined according to the speed and pitch diameter of ball/roller set D_{pw} of the bearing (ref. Fig. 3.3)

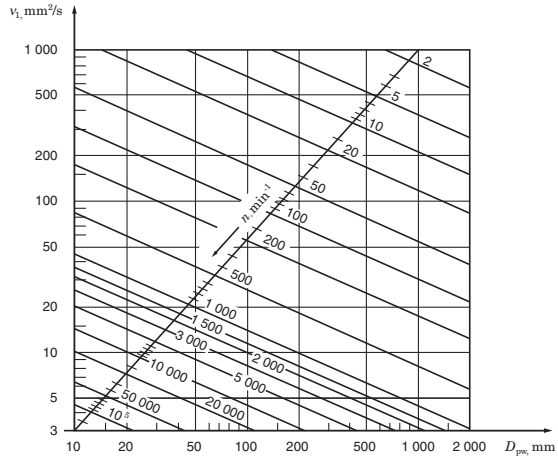


Fig. 3.3 Reference kinematic viscosity ν_1

(**Fig. 3.3** Citation from **JIS B 1518**:2013)

Table 3.4 Speed factor

Rotational speed n ($\mathrm{min^{-1}}$)	Coefficient of rotational speed f_n	Rotational speed n ($\mathrm{min^{-1}}$)	Coefficient of rotational speed f_n	Rotational speed n ($\mathrm{min^{-1}}$)	Coefficient of rotational speed f_n	Rotational speed n ($\mathrm{min^{-1}}$)	Coefficient of rotational speed f_n
10	1.435	**65**	0.819	**650**	0.410	**4 000**	0.238
11	1.395	**70**	0.800	**700**	0.401	**4 200**	0.234
12	1.359	**75**	0.784	**750**	0.393	**4 400**	0.231
13	1.326	**80**	0.769	**800**	0.385	**4 600**	0.228
14	1.297	**85**	0.756	**850**	0.379	**4 800**	0.225
15	1.271	**90**	0.742	**900**	0.372	**5 000**	0.222
16	1.246	**95**	0.731	**950**	0.366	**5 200**	0.220
17	1.224	**100**	0.719	**1 000**	0.361	**5 400**	0.217
18	1.203	**110**	0.699	**1 050**	0.355	**5 600**	0.215
19	1.184	**120**	0.681	**1 100**	0.350	**5 800**	0.213
20	1.166	**130**	0.665	**1 150**	0.346	**6 000**	0.211
21	1.149	**140**	0.650	**1 200**	0.341	**6 200**	0.209
22	1.133	**150**	0.637	**1 250**	0.337	**6 400**	0.207
23	1.118	**160**	0.625	**1 300**	0.333	**6 600**	0.205
24	1.104	**170**	0.613	**1 400**	0.326	**6 800**	0.203
25	1.090	**180**	0.603	**1 500**	0.319	**7 000**	0.201
26	1.077	**190**	0.593	**1 600**	0.313	**7 200**	0.199
27	1.065	**200**	0.584	**1 700**	0.307	**7 400**	0.198
28	1.054	**220**	0.568	**1 800**	0.302	**7 600**	0.196
29	1.043	**240**	0.553	**1 900**	0.297	**8 000**	0.193
30	1.032	**260**	0.540	**2 000**	0.293	**8 500**	0.190
31	1.022	**280**	0.528	**2 100**	0.289	**9 000**	0.187
32	1.012	**300**	0.517	**2 200**	0.285	**9 500**	0.184
33.3	1.000	**320**	0.507	**2 300**	0.281	**10 000**	0.181
34	0.994	**340**	0.498	**2 400**	0.277	**11 000**	0.176
36	0.977	**360**	0.490	**2 500**	0.274	**12 000**	0.171
38	0.962	**380**	0.482	**2 600**	0.271	**13 000**	0.167
40	0.947	**400**	0.475	**2 700**	0.268	**14 000**	0.163
42	0.933	**420**	0.467	**2 800**	0.265	**15 000**	0.160
44	0.920	**440**	0.461	**2 900**	0.262	**16 000**	0.157
46	0.908	**460**	0.455	**3 000**	0.259	**17 000**	0.154
48	0.896	**480**	0.449	**3 200**	0.254	**18 000**	0.152
50	0.886	**500**	0.444	**3 400**	0.250	**19 000**	0.149
55	0.866	**550**	0.432	**3 600**	0.246	**20 000**	0.147
60	0.838	**600**	0.420	**3 800**	0.242		

3.6 Basic static load rating

Excessive static load or impact load even at very low rotation causes partial permanent deformation of the rolling element and raceway contacting surfaces. This permanent deformation increases with the load; if it exceeds a certain limit, smooth rotation will be hindered.

The basic static load rating is the static load which responds to the calculated contact stress shown below, at the contact center between the raceway and rolling elements which receive the maximum load.

- Roller bearings ..... 4 000 MPa

The total extent of contact stress-caused permanent deformation on surfaces of rolling elements and raceway will be approximately 0.000 1 times greater than the rolling element diameter.

The basic static load rating for radial bearings is specified as the basic static radial load rating. This load ratings are listed in the bearing specification table, using C_{0r}.

This value is prescribed by ISO 78/1987 and is subject to change by conformance to the latest ISO standards.

3.7 Safety coefficient

The allowable static equivalent load for a bearing is determined by the basic static load rating of the bearing; however, bearing service life, which is affected by permanent deforma-

Table 3.5 Life factor

Service life coefficient f_h	L_{10} (10^6 rev.)	L_{10h} (h)	Service life coefficient f_h	L_{10} (10^6 rev.)	L_{10h} (h)	Service life coefficient f_h	L_{10} (10^6 rev.)	L_{10h} (h)
0.70	0.30	150	**2.45**	19.8	9 920	**4.20**	120	59 800
0.75	0.38	190	**2.50**	21.2	10 600	**4.25**	124	62 200
0.80	0.48	240	**2.55**	22.6	11 300	**4.30**	129	64 600
0.85	0.58	290	**2.60**	24.2	12 100	**4.35**	134	67 200
0.90	0.70	350	**2.65**	25.8	12 900	**4.40**	140	69 800
0.95	0.84	420	**2.70**	27.4	13 700	**4.45**	145	72 500
1.00	1.00	500	**2.75**	29.1	14 600	**4.50**	150	75 200
1.05	1.18	590	**2.80**	30.9	15 500	**4.55**	156	78 000
1.10	1.37	685	**2.85**	32.8	16 400	**4.60**	162	80 900
1.15	1.59	795	**2.90**	34.8	17 400	**4.65**	168	83 900
1.20	1.84	920	**2.95**	36.8	18 400	**4.70**	174	87 000
1.25	2.10	1 050	**3.00**	38.9	19 500	**4.75**	180	90 800
1.30	2.40	1 200	**3.05**	41.1	20 600	**4.80**	187	93 300
1.35	2.72	1 360	**3.10**	43.4	21 700	**4.85**	193	96 600
1.40	3.07	1 530	**3.15**	45.8	22 900	**4.90**	200	99 900
1.45	3.45	1 730	**3.20**	48.3	24 100	**4.95**	207	103 000
1.50	3.86	1 930	**3.25**	50.8	25 400	**5.00**	214	107 000
1.55	4.31	2 160	**3.30**	53.5	26 800	**5.10**	228	114 000
1.60	4.79	2 400	**3.35**	56.3	28 100	**5.20**	244	122 000
1.65	5.31	2 650	**3.40**	59.1	29 600	**5.30**	260	130 000
1.70	5.86	2 930	**3.45**	62.0	31 000	**5.40**	276	138 000
1.75	6.46	3 230	**3.50**	65.1	32 500	**5.50**	294	147 000
1.80	7.09	3 550	**3.55**	68.2	34 100	**5.60**	312	156 000
1.85	7.77	3 890	**3.60**	71.5	35 800	**5.70**	331	165 000
1.90	8.50	4 250	**3.65**	74.9	37 400	**5.80**	351	175 000
1.95	9.26	4 630	**3.70**	78.3	39 200	**5.90**	371	186 000
2.00	10.1	5 040	**3.75**	81.9	41 000	**6.00**	392	196 000
2.05	10.9	5 470	**3.80**	85.6	42 800	**6.50**	513	256 000
2.10	11.9	5 930	**3.85**	89.4	44 700	**7.00**	656	328 000
2.15	12.8	6 420	**3.90**	93.4	46 700	**7.50**	826	413 000
2.20	13.8	6 920	**3.95**	97.4	48 700	**8.00**	1 020	512 000
2.25	14.9	7 460	**4.00**	102	50 800	**8.50**	1 250	627 000
2.30	16.1	8 030	**4.05**	106	52 900	**9.00**	1 520	758 000
2.35	17.2	8 620	**4.10**	110	55 200	**9.50**	1 820	908 000
2.40	18.5	9 250	**4.15**	115	57 400	**10.00**	2 150	1 080 000

tion, differs in accordance with the performance required of the bearing and operating conditions.

Therefore, a safety coefficient is designated, based on empirical data, so as to ensure safety in relation to basic static load rating.

$$f_s = \frac{C_0}{P_0} \quad \cdots\cdots (3.9)$$

where :

f_s : safety coefficient (ref. **Table 3.6**)

C_0 : basic static load rating N

P_0 : static equivalent load N

Table 3.6 Values of safety coefficient f_s

Operating condition		f_s (min.)	
		Ball bearing	Roller bearing
With bearing rotation	When high accuracy is required	2	3
	Normal operation	1	1.5
	When impact load is applied	1.5	3
Without bearing rotation (occasional oscillation)	Normal operation	0.5	1
	When impact load or uneven distribution load is applied	1	2

[Remark] For spherical thrust roller bearings, $f_s \geqq 4$.

4 Equivalent load

4.1 Dynamic equivalent load

Bearings are used under various operating conditions; however, in most cases, bearings receive radial and axial load combined, while the load magnitude fluctuates during operation.

Therefore, it is impossible to directly compare the actual load and basic dynamic load rating.

The two are compared by replacing the loads applied to the shaft center with one of a constant magnitude and in a specific direction, that yields the same bearing service life as under actual load and rotational speed.

This theoretical load is referred to as the dynamic equivalent load (P).

4.1.1 Calculation of dynamic equivalent load

Dynamic equivalent loads for radial bearings and thrust bearings ($\alpha \neq 90°$) which receive a combined load of a constant magnitude in a specific direction can be calculated using the following equation,

$$P = XF_r + YF_a \quad \cdots\cdots (4.1)$$

where :

P : dynamic equivalent load — N
(for radial bearings, P_r : dynamic equivalent radial load; for thrust bearings, P_a : dynamic equivalent axial load)

F_r : radial load — N

F_a : axial load — N

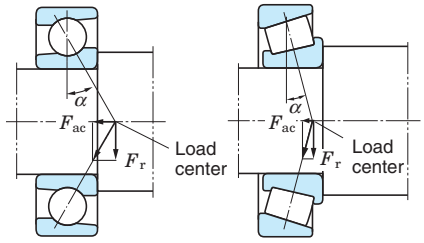
X : radial load factor

Y : axial load factor
(values of X and Y are listed in the bearing specification table.)

■ When $F_a/F_r \leqq e$ for single-row radial bearings, it is taken that $X = 1$, and $Y = 0$.
Hence, the dynamic equivalent load rating is $P_r = F_r$.
(Values of e, which designates the limit of F_a/F_r, are listed in the bearing specification table.)

■ For single-row tapered roller bearings, axial component forces (F_{ac}) are generated as shown in **Fig. 4.1**, therefore a pair of bearings is arranged face-to-face or back-to-back.
The axial component force can be calculated using the following equation.

$$F_{ac} = \frac{F_r}{2Y} \quad \cdots\cdots (4.2)$$

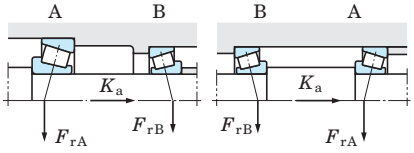


(Load center position is listed in the bearing specification table.)

Fig. 4.1 Axial component force

For instance, when radial loads F_{rA} and F_{rB} are on tapered roller bearings A and B as shown in **Table 4.1** and, in addition, a axial load K_a from the outside is on bearing A, the dynamic equivalent loads P_A and P_B on bearings A and B are as follows :

Table 4.1 Dynamic equivalent load calculation : when a pair of tapered roller bearings is arranged face-to-face or back-to-back.

Paired mounting: Back-to-back arrangement / Face-to-face arrangement	Loading condition	Bearing	Axial load	Dynamic equivalent load
	$\frac{F_{rB}}{2Y_B} + K_a \geqq \frac{F_{rA}}{2Y_A}$	Bearing A	$\frac{F_{rB}}{2Y_B} + K_a$	$P_A = XF_{rA} + Y_A\left(\frac{F_{rB}}{2Y_B} + K_a\right)$ $P_A = F_{rA}$, where $P_A < F_{rA}$
		Bearing B	–	$P_B = F_{rB}$
	$\frac{F_{rB}}{2Y_B} + K_a < \frac{F_{rA}}{2Y_A}$	Bearing A	–	$P_A = F_{rA}$
		Bearing B	$\frac{F_{rA}}{2Y_A} - K_a$	$P_B = XF_{rB} + Y_B\left(\frac{F_{rA}}{2Y_A} - K_a\right)$ $P_B = F_{rB}$, where $P_B < F_{rB}$

4.2 Static equivalent load

The static equivalent load is a theoretical load calculated such that, during rotation at very low speed or when bearings are stationary, the same contact stress as that imposed under actual loading condition is generated at the contact center between raceway and rolling element to which the maximum load is applied.

For radial bearings, radial load passing through the bearing center is used for the calculation; for thrust bearings, axial load in a direction along the bearing axis is used.

The static equivalent load can be calculated using the following equations.

[Radial bearings] ··· The greater value obtained by the following two equations is used.

$$P_0 = X_0 F_r + Y_0 F_a \quad \cdots\cdots (4.3)$$

$$P_{0r} = F_r \quad \cdots\cdots (4.4)$$

where :

P_{0r} : static equivalent radial load N

P_{0a} : static equivalent axial load N

F_r : radial load N

F_a : axial load N

X_0 : static radial load factor

Y_0 : static axial load factor

(values of X_0 and Y_0 are listed in the bearing specification table.)

5 Bearing tolerances

5.1 Boundary tolerances for tapered roller bearings

Koyo Inch Series tapered roller bearings are manufactured to the five tolerance levels recognized by the ANSI/ABMA, Classes 4, 2, 3, 0 and 00, in order to ascending precision.

Metric J series For "J" prefix Bearing No. tapered roller bearings are produced in Classes PK, PN, PC and PB, in accordance with industry standards. These classes provide quality levels suitable for all applications. The higher grades have reduced runout tolerances, producing smoother rotation of the bearings with less noise and vibration.

Improved mounting fits are also obtained because of closer tolerances on bore and outside diameter. Tolerances class4 to class 00 and class PK to class PB are shown in **Table 5.1**, **5.2**. Koyo tapered roller bearings may be supplied in any precision desired.

Table 5.1 Tolerances and permissible values for Inch series tapered roller bearings

(1) Cone

Applied bearing type	Cone bore d				Single plane mean bore diameter deviation Δ_{dmp}													
	over		up to		Class 4			Class 2			Class 3			Class 0			Class 00	
					upper		lower	upper		lower	upper		lower	upper		lower	upper	lower
	mm	inch	mm	inch	μm	inch		μm	inch		μm	inch		μm	inch		μm inch	
All types	–	–	**76.2**	**3.0**	13	0.0005	0	13	0.0005	0	13	0.0005	0	13	0.0005	0	8 0.0003	0
	76.2	**3.0**	**304.8**	**12.0**	25	0.0010	0	25	0.0010	0	13	0.0005	0	13	0.0005	0	8 0.0003	0
	304.8	**12.0**	**609.6**	**24.0**	51	0.0020	0	51	0.0020	0	25	0.0010	0	–	–	–	– –	–
	609.6	**24.0**	**914.4**	**36.0**	76	0.0030	0	–	–	–	38	0.0015	0	–	–	–	– –	–
	914.4	**36.0**	**1 219.2**	**48.0**	102	0.0040	0	–	–	–	51	0.0020	0	–	–	–	– –	–
	1 219.2	**48.0**	**1 828.8**	**72.0**	127	0.0050	0	–	–	–	76	0.0030	0	–	–	–	– –	–

(2) Cup

Applied bearing type	Cup outside diameter D				Single plane mean outside diameter deviation Δ_{Dmp}													
	over		up to		Class 4			Class 2			Class 3			Class 0			Class 00	
					upper		lower	upper		lower	upper		lower	upper		lower	upper	lower
	mm	inch	mm	inch	μm	inch		μm	inch		μm	inch		μm	inch		μm inch	
All types	–	–	**304.8**	**12.0**	25	0.0010	0	25	0.0010	0	13	0.0005	0	13	0.0005	0	8 0.0003	0
	304.8	**12.0**	**609.6**	**24.0**	51	0.0020	0	51	0.0020	0	25	0.0010	0	–	–	–	– –	–
	609.6	**24.0**	**914.4**	**36.0**	76	0.0030	0	76	0.0030	0	38	0.0015	0	–	–	–	– –	–
	914.4	**36.0**	**1 219.2**	**48.0**	102	0.0040	0	–	–	–	51	0.0020	0	–	–	–	– –	–
	1 219.2	**48.0**	**2 133.6**	**84.0**	127	0.0050	0	–	–	–	76	0.0030	0	–	–	–	– –	–

(3) Assembled bearing width and overall width

Applied bearing type	Cone bore d				Cup OD D				Actual bearing width deviation Δ_{Ts}													
	over		up to		over		up to		Class 4				Class 2				Class 3				Class 0, 00			
									upper		lower		upper		lower		upper		lower		upper		lower	
	mm	inch	mm	inch	mm	inch	mm	inch	μm	inch	μm	inch	μm	inch	μm	inch	μm	inch	μm	inch	μm	inch	μm	inch
Single row	**0**	**0**	**101.6**	**4**	**0**	**0**	**2 133.6**	**84**	203	0.0080	0	0	203	0.0080	0	0	203	0.0080	–203	–0.0080	203	0.0080	–203	–0.0080
	101.6	**4**	**304.8**	**12**	**0**	**0**	**2 133.6**	**84**	356	0.0140	–254	–0.0100	203	0.0080	0	0	203	0.0080	–203	–0.0080	203	0.0080	–203	–0.0080
	304.8	**12**	**609.6**	**24**	**0**	**0**	**508.0**	**20**	381	0.0150	–381	–0.0150	381	0.0150	–381	–0.0150	203	0.0080	–203	–0.0080	–	–	–	–
	304.8	**12**	**609.6**	**24**	**508**	**20**	**2 133.6**	**84**	381	0.0150	–381	–0.0150	381	0.0150	–381	–0.0150	381	0.0150	–381	–0.0150	–	–	–	–
	609.6	**24**	**1 828.8**	**72**	**0**	**0**	**2 133.6**	**84**	381	0.0150	–381	–0.0150	–	–	–	–	381	0.0150	–381	–0.0150	–	–	–	–
Double row	**0**	**0**	**101.6**	**4**	**0**	**0**	**2 133.6**	**84**	406	0.0160	0	0	406	0.0160	0	0	406	0.0160	–406	–0.0160	406	0.0160	–406	–0.0160
	101.6	**4**	**304.8**	**12**	**0**	**0**	**2 133.6**	**84**	711	0.0280	–508	–0.0200	406	0.0160	–203	–0.0080	406	0.0160	–406	–0.0160	406	0.0160	–406	–0.0160
	304.8	**12**	**609.6**	**24**	**0**	**0**	**508.0**	**20**	762	0.0300	–762	–0.0300	762	0.0300	–762	–0.0300	406	0.0160	–406	–0.0160	–	–	–	–
	304.8	**12**	**609.8**	**24**	**508**	**20**	**2 133.6**	**84**	762	0.0300	–762	–0.0300	762	0.0300	–762	–0.0300	762	0.0300	–762	–0.0300	–	–	–	–
	609.8	**24**	**1 828.8**	**72**	**0**	**0**	**2 133.6**	**84**	762	0.0300	–762	–0.0300	–	–	–	–	762	0.0300	–762	–0.0300	–	–	–	–

(4) Radial runout of assmbled bearing cone / cup

Applied bearing type	Cup outside diameter D				Assembled bearing runout K_{ia}, K_{ea}									
	over		up to		Class 4		Class 2		Class 3		Class 0		Class 00	
					max.		max.		max.		max.		max.	
	mm	inch	mm	inch	μm	inch	μm	inch	μm	inch	μm	inch	μm	inch
All types	–	–	**304.8**	**12**	51	0.0020	38	0.0015	8	0.0003	4	0.00015	2	0.000075
	304.8	**12**	**609.6**	**24**	51	0.0020	38	0.0015	18	0.0007	–	–	–	–
	609.6	**24**	**914.4**	**36**	76	0.0030	51	0.0020	51	0.0020	–	–	–	–
	914.4	**36**	**2 133.6**	**84**	76	0.0030	–	–	76	0.0030	–	–	–	–

Table 5.2 Tolerances for metric "J" series tapered roller bearing

(1) Bore diameter and width of cone and assembled width

Unit : μm

Cone Bore d (mm)		Single plane mean bore diameter deviation Δ_{dmp}								Single cone width deviation Δ_{Bs}								Actual bearing width deviation Δ_{Ts}							
		Class K		Class N		Class C		Class B		Class K		Class N		Class C		Class B		Class K		Class N		Class C		Class B	
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower
0	**10**	0	– 12	0	–12	0	– 7	0	– 5	0	– 120	0	–50	0	– 200	0	–200	200	0	100	0	200	–200	200	–200
10	**18**	0	– 12	0	–12	0	– 7	0	– 5	0	– 120	0	–50	0	– 200	0	–200	200	0	100	0	200	–200	200	–200
18	**30**	0	– 12	0	–12	0	– 8	0	– 6	0	– 120	0	–50	0	– 200	0	–200	200	0	100	0	200	–200	200	–200
30	**50**	0	– 12	0	–12	0	–10	0	– 8	0	– 120	0	–50	0	– 240	0	–240	200	0	100	0	200	–200	200	–200
50	**80**	0	– 15	0	–15	0	–12	0	– 9	0	– 150	0	–50	0	– 300	0	–300	200	0	100	0	200	–200	200	–200
80	**120**	0	– 20	0	–20	0	–15	0	–10	0	– 200	0	–50	0	– 400	0	–400	200	– 200	100	0	200	–200	200	–200
120	**180**	0	– 25	0	–25	0	–18	0	–13	0	– 250	0	–50	0	– 500	0	–500	350	– 250	150	0	350	–250	350	–250
180	**250**	0	– 30	0	–30	0	–22	0	–15	0	– 300	0	–50	0	– 600	0	–600	350	– 250	150	0	350	–250	350	–250
250	**315**	0	– 35	0	–35	0	–25	0	–18	0	– 350	0	–50	0	– 700	0	–700	400	– 400	200	0	350	–250	350	–250
315	**400**	0	– 40	0	–40	0	–30	–	–	0	– 400	0	–50	0	– 800	–	–	450	– 450	200	0	400	–400	–	–
400	**500**	0	– 45	0	–45	0	–35	–	–	0	– 450	0	–50	0	– 900	–	–	500	– 500	200	0	450	–450	–	–
500	**630**	0	– 60	–	–	0	–40	–	–	0	– 500	0	–50	0	–1 100	–	–	600	– 600	–	–	500	–500	–	–
630	**800**	0	– 75	–	–	0	–50	–	–	0	– 750	–	–	0	–1 600	–	–	750	– 750	–	–	600	–600	–	–
800	**1 000**	0	–100	–	–	0	–60	–	–	0	–1 000	–	–	0	–2 000	–	–	900	– 900	–	–	750	–750	–	–
1 000	**1 250**	0	–125	–	–	0	–75	–	–	0	–1 250	–	–	0	–2 000	–	–	1 050	–1 050	–	–	750	–750	–	–
1 250	**1 600**	0	–160	–	–	0	–90	–	–	0	–1 600	–	–	0	–2 000	–	–	1 200	–1 200	–	–	900	–900	–	–

(2) Outside diameter and width of cup and radial runout of assembled bearing cone / cup

Unit : μm

Cup OD D (mm)		Single plane mean outside diameter deviation Δ_{Dmp}								Single cup width deviation Δ_{Cs}								Assembled bearing radial runout K_{ia}, K_{ea}							
		Class K		Class N		Class C		Class B		Class K		Class N		Class C		Class B		Class K		Class N		Class C		Class B	
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	K_{ia} max.	K_{ea} max.	K_{ia} max.	K_{ea} max.	K_{ia} max.	K_{ea} max.	K_{ia} max.	K_{ea} max.
0	**18**	0	– 12	0	–12	0	– 8	0	– 6	0	– 120	0	–100	0	– 200	0	–200	15	18	15	18	5	6	3	4
18	**30**	0	– 12	0	–12	0	– 8	0	– 6	0	– 120	0	–100	0	– 200	0	–200	15	18	15	18	5	6	3	4
30	**50**	0	– 14	0	–14	0	– 9	0	– 7	0	– 120	0	–100	0	– 200	0	–200	18	20	18	20	5	7	3	5
50	**80**	0	– 16	0	–16	0	– 11	0	– 9	0	– 120	0	–100	0	– 240	0	–240	20	25	20	25	6	8	4	5
80	**120**	0	– 18	0	–18	0	– 13	0	–10	0	– 150	0	–100	0	– 300	0	–300	25	35	25	35	7	10	4	6
120	**150**	0	– 20	0	–20	0	– 15	0	–11	0	– 200	0	–100	0	– 400	0	–400	30	40	30	40	8	11	5	7
150	**180**	0	– 25	0	–25	0	– 18	0	–13	0	– 250	0	–100	0	– 500	0	–500	35	45	35	45	11	13	6	8
180	**250**	0	– 30	0	–30	0	– 20	0	–15	0	– 300	0	–100	0	– 600	0	–600	50	50	50	50	13	15	8	10
250	**315**	0	– 35	0	–35	0	– 25	0	–18	0	– 350	0	–100	0	– 700	0	–700	60	60	60	60	13	18	9	11
315	**400**	0	– 40	0	–40	0	– 28	0	–20	0	– 400	0	–100	0	– 800	–	–	70	70	70	70	15	20	–	13
400	**500**	0	– 45	0	–45	0	– 33	–	–	0	– 450	0	–100	0	– 900	–	–	80	80	80	80	20	24	–	–
500	**630**	0	– 50	0	–50	0	– 38	–	–	0	– 500	–	–	0	–1 100	–	–	90	100	–	100	25	30	–	–
630	**800**	0	– 75	–	–	0	– 45	–	–	0	– 750	–	–	0	–1 600	–	–	100	120	–	–	30	36	–	–
800	**1 000**	0	–100	–	–	0	– 60	–	–	0	–1 000	–	–	0	–2 000	–	–	115	140	–	–	37	43	–	–
1 000	**1 250**	0	–125	–	–	0	– 80	–	–	0	–1 250	–	–	0	–2 000	–	–	130	160	–	–	45	52	–	–
1 250	**1 600**	0	–160	–	–	0	–100	–	–	0	–1 600	–	–	0	–2 000	–	–	150	180	–	–	55	62	–	–

6 Numbering system

The numbering system of the inch series tapered roller bearings is specified by the ABMA Standard as follows.

This will provide a guideline for identification of duty, angularity and dimensions of the inch series tapered roller bearings.

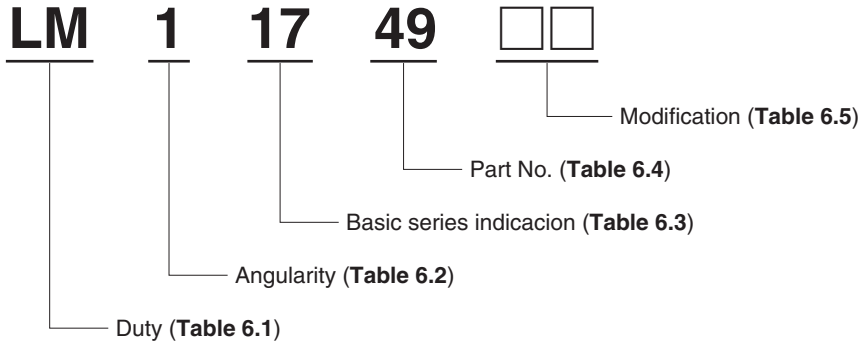


Table 6.1 Duty

Inch series tapered roller bearings will be divided into ten classes according to their duty as follows :

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

Table 6.2 Angularity

The first digit following the prefix letters will indicate approximately the included angle (α) of the outer race or the cup angle according to the following code.

Code	Details
1	$0 < \alpha < 24^\circ$
2	$24^\circ \leqq \alpha < 25^\circ\ 30'$
3	$25^\circ\ 30' \leqq \alpha < 27^\circ$
4	$27^\circ \leqq \alpha < 28^\circ\ 30'$
5	$28^\circ\ 30' \leqq \alpha < 30^\circ\ 30'$
6	$30^\circ\ 30' < \alpha < 32^\circ\ 30'$
7	$32^\circ\ 30' \leqq \alpha < 36^\circ$
8	$36^\circ \leqq \alpha < 45^\circ$
9	$45^\circ \leqq \alpha$, but not thrust only
0	Thrust bearing only

Table 6.3 Basic series indication

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

Series indication	Max. bore range (inch)
00 to **19** incl.	**0 – 1**
20 to **99** incl.	**1 – 2**
000 to **029** incl.	
039 to **129** incl.	**2 – 3**
130 to **189** incl.	**3 – 4**
190 to **239** incl.	**4 – 5**
240 to **289** incl.	**5 – 6**
290 to **339** incl.	**6 – 7**
340 to **389** incl.	**7 – 8**
390 to **429** incl.	**8 – 9**

Table 6.4 Part No.

The 5th and 6th digits or the last two digits of the bearing number indicate the part number of the individual member of the bearing.

Bearing member	Code
Cup : (Outer ring)	Expressed by 10 to 19, and 10 is used for the cup of the minimum outside diameter of the series.
Cone : (Inner ring)	Expressed by 30 to 49, and 49 is used for the cone of the maximum bore size of the series.

Table 6.5 Modification

These codes indicate the special design features. Some examples are;

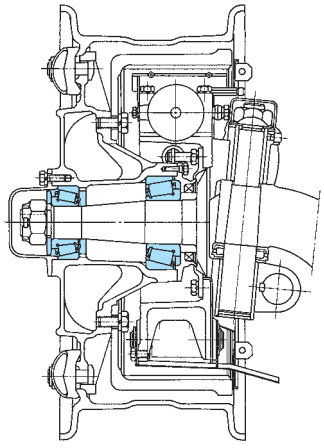
Code	Details
A	Bearing limit for overall width or size in master closer then standard.
B	Single cup with flange.
BR	Single or double cup or cone with snap ring.
BW	Single cup with flange and slotted.
CR	Rib cup.
CP	Chrome plated cone and cup.
D	Double cone or cup – minimum length.
DA	Spherical O.D. – double cup – self-aligning –

7 Typical applications

Automotive

• Front wheels

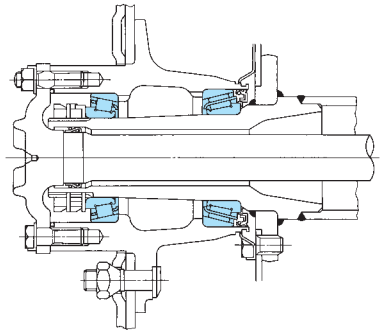
In general, automotive front wheel bearings are primarily subjected to radial loads. However, during cornering or running on bad roads, substantial moment loads can be imposed. Therefore, it is extremely important to select bearings which can absorb these moment loads without difficulty. At the present time, two tapered roller bearings are generally used in each front wheels of trucks.

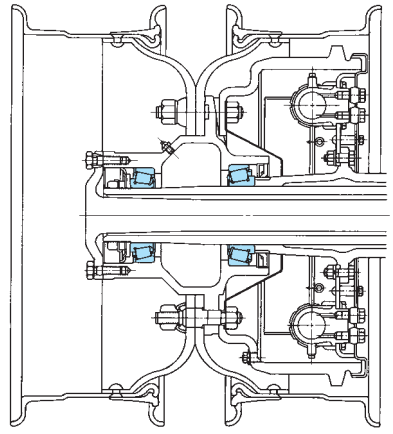


• Rear wheels

Tapered roller bearings are generally used in rear wheels of trucks and buses over 2 tons in gross vehicle weight.

Since the cone and cup can misalign during cornering, which can have an adverse affect on service life, bearings which offer superior performance under these conditions should be selected.



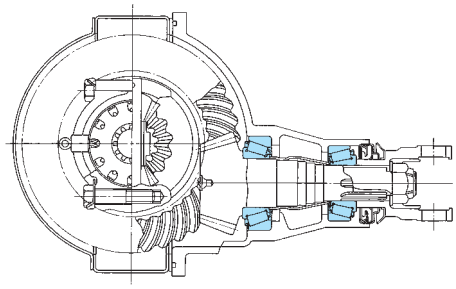


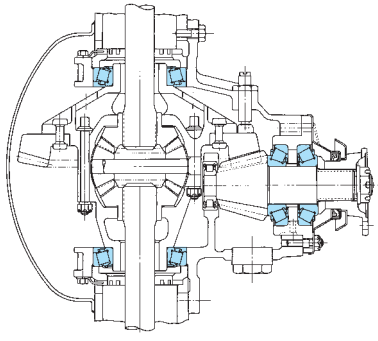
• Differentials

The bearings used in automotive differentials are preloaded to maintain accuracy between the drive pinion and ring gear. The accuracy of gear engagement affects greatly the performance of the differential as well as running noise.

From this point of view, it is necessary to select bearings which will provide optimum rigidity so that satisfactory engagement of the gears is obtained during operation. The pinion shaft is supported by either two tapered roller bearings (cantilever mount) mounted back to back, or two steep angle tapered roller bearings plus a single cylindrical roller bearing opposite the tapered roller bearings (straddle mount).

The differential ring gear is supported by tapered roller bearings mounted face to face.

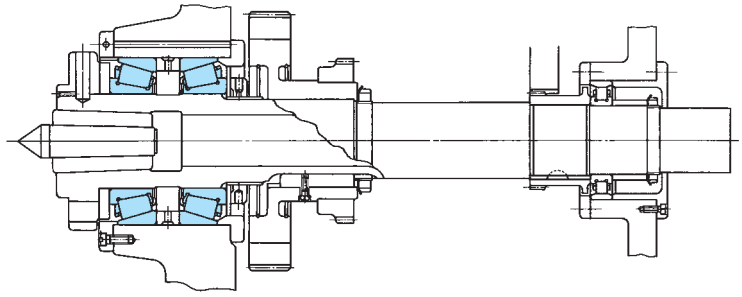




General industries

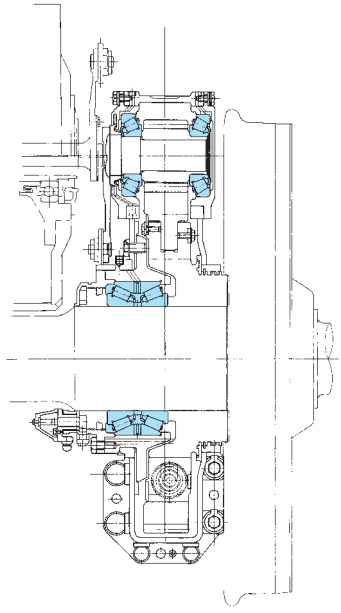
• Machine tool spindles

Tapered roller bearings are widely used to support spindles of various machine tools such as engine lathes and milling machines. Since these spindles require rigidity and accuracy of guidance in both radial and axial directions, a pair of tapered roller bearings are usually mounted in a back-to-back arrangement and adjusted to obtain the proper preload. In addition to providing rigid radial and axial support, tapered roller bearings simplify the machine structure and promote simple preload adjustment.

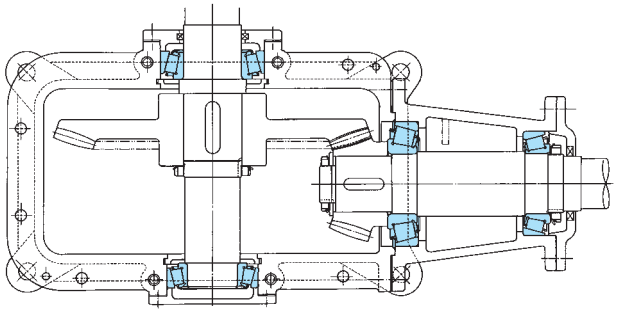


• Electric railway car gear units

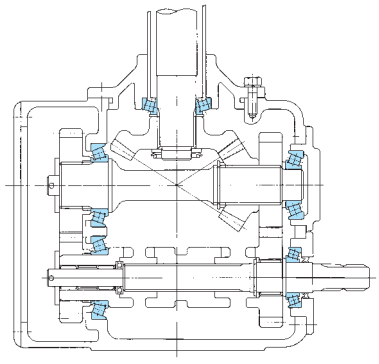
The driving axles of electric cars are equipped with gearing units to transmit the torque and rotation generated by the traction main motors. In the parallel cardan gear units (currently more widely used than square cardan gear units), both the pinion shaft and gear housing are generally fitted with tapered roller bearings.



• Bevel-gear units



• Farm equipment, transmission



Specification tables of tapered roller bearings

Series No.	Cone (Inner ring)	Page	Cup (Outer ring)	Page
335	334	47	332	41,43,45,47,
	335	51		49,51,53,55,
	335S	49		57,59,61
	336	59	332A	43,47,51,53,
	337	55		55,59
	338	43		
	339	53		
	339X	53		
	340	51		
	341	41		
	342	59		
	342A	59		
	342S	61		
	343	51		
	344	57		
	344A	57		
	346	49		
	347	55		
	348	45		
355	350	59	352	59,65
	350A	57	353	63
	355	61,63	354	61
	355A	63	354A	57,61,63,65
	355X	63	354X	57
	357	57		
	358	65		
	358A	65		
	359A	65		
	359S	65		
365	365	67	362	65
	365A	59	362A	59,65,67,69,
	365S	67		71
	366	67	363	65
	367	65		
	368	69		
	368A	69		
	368S	71		
	369A	65		
	369S	65		
	370A	69		
375	375	69	372	65,67,71
	375S	69	372A	69
	376	65	374	69
	376A	65		
	377	71		
	377A	71		
	377S	71		

Series No.	Cone (Inner ring)	Page	Cup (Outer ring)	Page
375	378A	67		
385	385	73	382	73
	385A	69	382A	65,69,73,75
	385AS	69	382S	69
	385AX	69	383A	71
	385X	73	383X	73
	386	73		
	386A	65		
	387	73		
	387A	73		
	387AS	73		
	387S	73		
	388A	75		
	389	73		
	389AS	71		
	389S	73		
395	390	75	393A	75
	390A	77	393AS	75
	392	77	394	69,75,77
	395	77	394A	67,75,77,79,
	395A	79		81
	395S	79	394AS	69
	396	67		
	397	75		
	398	69		
	399	79		
	399A	81		
	399AS	81		
415	415	57	414	45,51,53,57,
	416	45		59
	417	51	414A	45,53,57
	418	57	414X	57
	419	59		
	420	59		
	421	53		
	422	57		
	423X	59		
	424X	53		
435	435	63	432	51,53,59,61,
	436	65		63
	438	63	432A	49,57,61,63,
	439	61		65
	440	57		
	441	53		
	442S	59		
	443	49		
	444	57		

Series No.	Cone (Inner ring)	Page	Cup (Outer ring)	Page
435	447	61		
	449	51		
455	455	69	452	69
	455S	69	453	71
	456	71	453A	61,63,67,73
	458	63	453X	61,65,67,71,
	458S	65		73
	460	63	454	69,73
	461	61		
	462	73		
	463	67		
	464	61		
	464A	61		
	465	67		
	465A	67		
	466	73		
	466S	73		
	467	67		
	468	71		
	469	73		
475	475	73	472	77,79,81
	475X	73	472A	73,77,79,81,
	476	77		83
	476A	77	472X	79,83
	477	79		
	478	79		
	478S	81		
	479	81		
	480	81		
	482	81,83		
	482A	81		
	483	79		
	484	83		
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LM770900	LM770945	101	LM770910	101
LM772700	LM772748	101	LM772710	101
776000	EE776430	101	776520	101
LL778100	LL778149	101	LL778110	101
HM801300	HM801346	55	HM801310	55,59
	HM801346X	55		
	HM801349	59		
M802000	M802048	59	M802011	59
HM803100	HM803145	59	HM803110	59,63
	HM803146	59		
	HM803149	63		
M804000	M804049	65	M804010	65
HM804800	HM804840	61	HM804810	61,63,65,67
	HM804842	63	HM804811	63
	HM804843	63		
	HM804846	65		
	HM804848	67		
	HM804849	67		
LM806600	LM806649	71	LM806610	71
HM807000	HM807035	61	HM807010	61,63,67,69,
	HM807040	63		71
	HM807044	67		
	HM807046	69		
	HM807049	71		
HM813800	HM813836	71	HM813810	73,77
	HM813840	73	HM813811	71,77,79,81,
	HM813841	77		83
	HM813841A	77		
	HM813842	79		
	HM813843	77		
	HM813844	81		
	HM813846	83		
	HM813849	83		
LM814800	LM814845	83	LM814810	83,87
	LM814849	87		
L879900	L879947	101	L879910	101

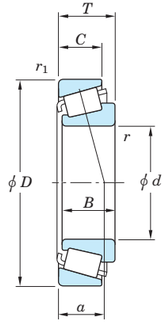
Series No.	Cone (Inner ring)	Page	Cup (Outer ring)	Page
HM903200	HM903241	103	HM903210	103,105
	HM903245	103		
	HM903248	105		
	HM903249	103		
M903300	M903345	103	M903310	103
HM907600	HM907635	103	HM907614	103,105
	HM907639	105		
	HM907643	105		
HM911200R	HM911242R	105	HM911210	105
	HM911245R	105		
	HM911249R	105		
H913800R	H913842R	105	H913810	105,107
	H913849R	107		
HH914400	HH914449	105	HH914412	105
HH923600	HH923649	107	HH923610	107
			HH923611	107
H924000	H924045	107	H924010	107
HH926700	HH926744	97	HH926710	97
	HH926749	97	HH926716	97
HM926700	HM926740	107	HM926710	107
	HM926747	107		
	HM926749	107		
HH932100	HH932132	107	HH932110	107
	HH932145	107		
H936300	H936340	107	H936310	107
	H936349	107	H936316	107
HH953700	HH953749	107	HH953710	107
H961600	H961649	107	H961610	107
LM961500	LM961548	107	LM961510	107

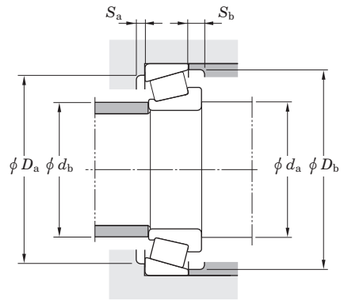
Metric "J" series

Series No.	Cone (Inner ring)	Page	Cup (Outer ring)	Page
JL69300	JL69349	109	JL69310	109
JLM104900	JLM104948	109	JLM104910	109
JM205100	JM205149	109	JM205110	109
JM207000	JM207049	109	JM207010	109
JH211700	JH211749	109	JH211710	109
	JH211749A	109		
JH217200	JH217249	109	JH217210	109
JH307700	JH307749	109	JH307710	109
JHM318400	JHM318448	109	JHM318410	109
JH415600	JH415647	109	JH415610	109
JLM506800	JLM506849	109	JLM506810	109
JLM508700	JLM508748	109	JLM508710	109
JM511900	JM511946	109	JM511910	109
JM515600	JM515649	109	JM515610	109
JHM516800	JHM516849	109	JHM516810	109
JHM522600	JHM522649	109	JHM522610	109
JHM534100	JHM534149	109	JHM534110	109
JM612900	JM612949	109	JM612910	109
JLM710900	JLM710949	109	JLM710910	109
JLM714100	JLM714149	109	JLM714110	109
JM714200	JM714249	109	JM714210	109
JM716600	JM716649	109	JM716610	109
JM718100	JM718149	109	JM718110	109
JM719100	JM719149	109	JM719113	109
JHM720200	JHM720249	109	JHM720210	109
JM720200	JM720249	109	JM720210	109
JM734400	JM734449	109	JM734410	109
JM736100	JM736149	109	JM736110	109
JM738200	JM738249	109	JM738210	109
JHM807000	JHM807045	109	JHM807012	109
JLM813000	JLM813049	109	JLM813010	109
JM822000	JM822049	109	JM822010	109
JHM840400	JHM840449	109	JHM840410	109

TS type

d 7.938 ~ 20.638 mm
0.3125 ~ 0.8125 inch





$P = XF_r + YF_a$
$P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$

$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

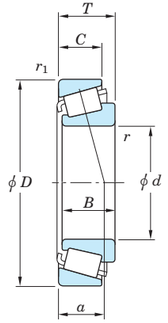
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
7.938	0.3125	31.991	1.2595	10.008	0.3940	10.785	0.4246	7.938	0.3125	0.5	0.02	1.2	0.05	13.4	9.30	1.25	**A2031**	**A2126**	7.1	0.28	12.5	0.49	12.5	0.49	26.0	1.02	29.0	1.14	0.40	1.48	0.82	3.10	2.15	1.45
9.525	0.3750	31.991	1.2595	10.008	0.3940	10.785	0.4246	7.938	0.3125	1.2	0.05	1.2	0.05	13.4	9.30	1.25	**A2037**	**A2126**	7.1	0.28	15.0	0.59	13.5	0.53	26.0	1.02	29.0	1.14	0.40	1.48	0.82	3.10	2.15	1.45
11.112	0.4375	31.991	1.2595	10.008	0.3940	14.351	0.5650	7.938	0.3125	0.8	0.03	1.2	0.05	13.4	9.30	1.25	**A2043**	**A2126**	7.1	0.28	15.5	0.61	14.5	0.57	26.0	1.02	29.0	1.14	0.40	1.48	0.82	3.10	2.15	1.45
	0.4375	34.988	1.3775	10.998	0.4330	10.988	0.4326	8.730	0.3437	1.2	0.05	1.2	0.05	15.7	11.9	1.55	**A4044**	**A4138**	8.3	0.33	17.5	0.69	15.5	0.61	29.0	1.14	32.0	1.26	0.45	1.33	0.73	3.65	2.80	1.29
11.986	0.4719	31.991	1.2595	10.008	0.3940	10.785	0.4246	7.938	0.3125	0.8	0.03	1.2	0.05	13.4	9.30	1.25	**A2047**	**A2126**	7.1	0.28	16.5	0.65	15.5	0.61	26.0	1.02	29.0	1.14	0.40	1.48	0.82	3.10	2.15	1.45
12.700	0.5000	34.988	1.3775	10.998	0.4330	10.988	0.4326	8.730	0.3437	1.2	0.05	1.2	0.05	15.7	11.9	1.55	**A4050**	**A4138**	8.3	0.33	18.5	0.73	17.0	0.67	29.0	1.14	32.0	1.26	0.45	1.33	0.73	3.65	2.80	1.29
14.989	0.5901	34.988	1.3775	10.998	0.4330	10.988	0.4326	8.730	0.3437	0.8	0.03	1.2	0.05	15.7	11.9	1.55	**A4059**	**A4138**	8.3	0.33	19.5	0.77	19.0	0.75	29.0	1.14	32.0	1.26	0.45	1.33	0.73	3.65	2.80	1.29
15.875	0.6250	34.988	1.3775	10.998	0.4330	10.998	0.4330	8.712	0.3430	1.2	0.05	1.2	0.05	18.1	14.3	1.90	**L21549**	**L21511**	7.6	0.30	21.5	0.85	19.5	0.77	29.0	1.14	32.5	1.28	0.32	1.88	1.04	4.15	2.25	1.83
	0.6250	39.992	1.5745	12.014	0.4730	11.153	0.4391	9.525	0.3750	1.2	0.05	1.2	0.05	18.2	15.1	2.00	**A6062**	**A6157**	10.3	0.41	22.0	0.87	20.5	0.81	34.0	1.34	37.0	1.46	0.53	1.14	0.63	4.20	3.75	1.11
	0.6250	41.275	1.6250	14.288	0.5625	14.681	0.5780	11.112	0.4375	1.2	0.05	2.0	0.08	27.3	20.5	2.85	**03062**	**03162**	9.3	0.37	21.5	0.85	20.0	0.79	34.0	1.34	37.5	1.48	0.31	1.93	1.06	6.30	3.35	1.88
	0.6250	42.862	1.6875	16.670	0.6563	16.670	0.6563	13.495	0.5313	1.6	0.06	1.6	0.06	38.2	29.5	4.15	**17580R**	**17520**	10.9	0.43	23.0	0.91	21.0	0.83	36.5	1.44	39.0	1.54	0.33	1.81	1.00	8.80	4.95	1.77
	0.6250	49.225	1.9380	19.845	0.7813	21.539	0.8480	14.288	0.5625	0.8	0.03	1.2	0.05	47.2	37.7	5.40	**09062**	**09195**	10.6	0.42	22.0	0.87	21.5	0.85	42.0	1.65	44.5	1.75	0.27	2.26	1.24	10.9	4.95	2.20
	0.6250	53.975	2.1250	22.225	0.8750	21.839	0.8598	15.875	0.6250	0.8	0.03	2.4	0.09	52.6	41.2	5.65	**21063**	**21212**	16.6	0.65	29.0	1.14	26.5	1.04	43.0	1.69	50.0	1.97	0.59	1.02	0.56	12.2	12.3	0.99
16.000	0.6299	47.000	1.8504	21.000	0.8268	21.000	0.8268	16.000	0.6299	1.0	0.04	2.0	0.08	45.4	37.7	5.05	**HM81649**	**HM81610**	15.0	0.59	27.5	1.08	23.0	0.91	37.5	1.48	43.0	1.69	0.55	1.10	0.60	10.5	9.85	1.07
16.993	0.6690	41.275	1.6250	11.905	0.4687	11.153	0.4391	8.730	0.3437	0.8	0.03	1.2	0.05	18.2	15.1	2.00	**A6067**	**A6162**	10.2	0.40	22.0	0.87	21.0	0.83	34.5	1.36	37.0	1.46	0.53	1.14	0.63	4.20	3.75	1.11
17.000	0.6693	49.225	1.9380	23.020	0.9063	21.539	0.8480	17.462	0.6875	2.0	0.08	1.6	0.06	47.2	37.7	5.40	**09099X**	**09196**	13.8	0.54	27.0	1.06	24.0	0.94	41.5	1.63	44.5	1.75	0.27	2.26	1.24	10.9	4.95	2.20
17.462	0.6875	39.878	1.5700	13.843	0.5450	14.605	0.5750	10.668	0.4200	1.2	0.05	1.2	0.05	31.8	26.0	3.60	**LM11749R**	**LM11710**	8.6	0.34	23.0	0.91	21.5	0.85	34.0	1.34	37.0	1.46	0.29	2.10	1.15	7.30	3.55	2.04
17.653	0.6950	49.225	1.9380	23.020	0.9063	21.539	0.8480	17.462	0.6875	2.4	0.09	1.6	0.06	47.2	37.7	5.40	**09070**	**09196**	13.8	0.54	26.0	1.02	24.0	0.94	41.5	1.63	44.5	1.75	0.27	2.26	1.24	10.9	4.95	2.20
18.000	0.7087	49.225	1.9380	23.020	0.9063	21.539	0.8480	17.462	0.6875	1.0	0.04	1.6	0.06	47.2	37.7	5.40	**09073X**	**09196**	13.8	0.54	23.0	0.91	24.0	0.94	41.5	1.63	44.5	1.75	0.27	2.26	1.24	10.9	4.95	2.20
19.004	0.7482	56.896	2.2400	19.368	0.7625	19.837	0.7810	15.875	0.6250	1.6	0.06	1.2	0.05	50.0	43.1	6.20	**1774**	**1729**	12.5	0.49	27.0	1.06	25.0	0.98	49.0	1.93	51.0	2.01	0.31	1.95	1.07	11.6	6.10	1.90
	0.7482	56.896	2.2400	19.368	0.7625	19.837	0.7810	15.875	0.6250	1.6	0.06	1.6	0.06	50.0	43.1	6.20	**1774**	**1729X**	12.5	0.49	27.0	1.06	25.0	0.98	49.0	1.93	52.0	2.05	0.31	1.95	1.07	11.6	6.10	1.90
19.050	0.7500	39.992	1.5745	12.014	0.4730	11.153	0.4391	9.525	0.3750	1.0	0.04	1.2	0.05	18.2	15.1	2.00	**A6075**	**A6157**	10.3	0.41	24.0	0.94	23.0	0.91	34.0	1.34	37.0	1.46	0.53	1.14	0.63	4.20	3.75	1.11
	0.7500	45.237	1.7810	15.494	0.6100	16.637	0.6550	12.065	0.4750	1.2	0.05	1.2	0.05	36.8	30.1	4.25	**LM11949**	**LM11910**	10.0	0.39	25.0	0.98	23.5	0.93	39.5	1.56	41.5	1.63	0.30	2.00	1.10	8.45	4.35	1.95
	0.7500	49.225	1.9380	19.845	0.7813	21.539	0.8480	14.288	0.5625	1.2	0.05	1.2	0.05	47.2	37.7	5.40	**09078**	**09195**	10.6	0.42	25.5	1.00	24.0	0.94	42.0	1.65	44.5	1.75	0.27	2.26	1.24	10.9	4.95	2.20
	0.7500	49.225	1.9380	21.209	0.8350	19.050	0.7500	17.462	0.6875	1.2	0.05	1.6	0.06	47.2	37.7	5.40	**09067**	**09196**	13.8	0.54	25.5	1.00	24.0	0.94	41.5	1.63	44.5	1.75	0.27	2.26	1.24	10.9	4.95	2.20
	0.7500	49.225	1.9380	23.020	0.9063	21.539	0.8480	17.462	0.6875	SP	SP	3.6	0.14	47.2	37.7	5.40	**09074**	**09194**	13.8	0.54	26.0	1.02	24.0	0.94	39.0	1.54	44.5	1.75	0.27	2.26	1.24	10.9	4.95	2.20
	0.7500	49.225	1.9380	23.020	0.9063	21.539	0.8480	17.462	0.6875	1.6	0.06	1.6	0.06	47.2	37.7	5.40	**09078X**	**09196**	13.8	0.54	25.5	1.00	24.0	0.94	41.5	1.63	44.5	1.75	0.27	2.26	1.24	10.9	4.95	2.20
	0.7500	53.975	2.1250	19.368	0.7625	19.837	0.7810	15.875	0.6250	1.6	0.06	0.8	0.03	50.0	43.1	6.20	**1775**	**1730**	12.5	0.49	27.0	1.06	25.0	0.98	48.5	1.91	50.0	1.97	0.31	1.95	1.07	11.6	6.10	1.90
	0.7500	53.975	2.1250	22.225	0.8750	21.839	0.8598	15.875	0.6250	1.6	0.06	0.4	0.02	52.6	41.2	5.65	**21075**	**21213**	16.6	0.65	31.5	1.24	26.5	1.04	43.0	1.69	50.0	1.97	0.59	1.02	0.56	12.2	12.3	0.99
	0.7500	66.421	2.6150	23.812	0.9375	25.433	1.0013	19.050	0.7500	3.6	0.14	1.2	0.05	83.8	75.2	11.2	**2693X**	**2631**	13.9	0.55	30.0	1.18	25.0	0.98	58.0	2.28	60.0	2.36	0.25	2.36	1.30	19.5	8.45	2.30
20.000	0.7874	50.005	1.9687	13.495	0.5313	14.260	0.5614	9.525	0.3750	1.6	0.06	1.0	0.04	33.3	28.8	4.05	**07079**	**07196**	10.8	0.43	27.5	1.08	26.0	1.02	44.5	1.75	47.0	1.85	0.40	1.49	0.82	7.65	5.25	1.46
	0.7874	53.975	2.1250	22.225	0.8750	21.839	0.8598	15.875	0.6250	2.0	0.08	2.4	0.09	52.6	41.2	5.65	**21078**	**21212**	16.6	0.65	31.5	1.24	26.5	1.04	43.0	1.69	50.0	1.97	0.59	1.02	0.56	12.2	12.3	0.99
20.638	0.8125	49.225	1.9380	19.845	0.7813	19.845	0.7813	15.875	0.6250	1.6	0.06	1.6	0.06	45.5	37.7	5.35	**12580**	**12520**	12.7	0.50	28.5	1.12	26.0	1.02	42.5	1.67	45.5	1.79	0.32	1.86	1.02	10.5	5.80	1.81

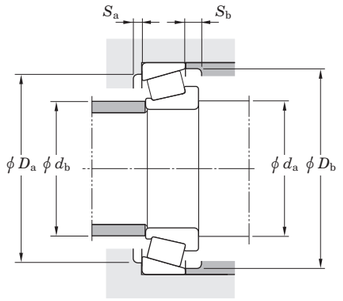
Note 1) SP indicates the specially chamfered from.

Koyo

TS type

d 21.430 ~ (25.400) mm
0.8437 ~ (1.0000) inch





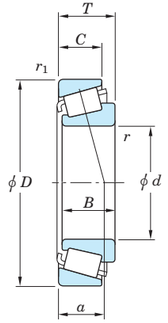
$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

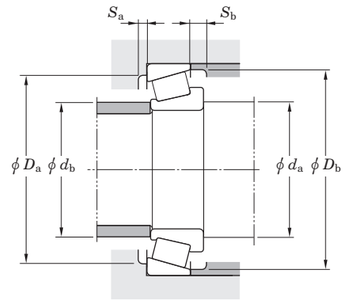
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch					
21.430	0.8437	50.005	1.9687	17.526	0.6900	18.288	0.7200	13.970	0.5500	1.2	0.05	1.2	0.05	48.8	40.7	5.80	**M12649**	**M12610**	11.1	0.44	27.5	1.08	25.5	1.00	44.0	1.73	46.0	1.81	0.28	2.16	1.19	11.2	5.35	2.10
21.987	0.8656	45.974	1.8100	15.494	0.6100	16.637	0.6550	12.065	0.4750	1.2	0.05	1.2	0.05	37.5	34.6	4.85	**LM12749**	**LM12711**	10.0	0.39	27.5	1.08	26.0	1.02	40.0	1.57	42.5	1.67	0.31	1.96	1.08	8.65	4.50	1.91
22.225	0.8750	50.005	1.9687	17.526	0.6900	18.288	0.7200	13.970	0.5500	1.2	0.05	1.2	0.05	48.8	40.7	5.80	**M12648**	**M12610**	11.1	0.44	28.5	1.12	26.5	1.04	44.0	1.73	46.0	1.81	0.28	2.16	1.19	11.2	5.35	2.10
	0.8750	50.005	1.9687	17.526	0.6900	18.288	0.7200	13.970	0.5500	1.2	0.05	1.2	0.05	48.8	40.7	5.80	**M12648A**	**M12610**	11.1	0.44	28.5	1.12	26.5	1.04	44.0	1.73	46.0	1.81	0.28	2.16	1.19	11.2	5.35	2.10
	0.8750	50.800	2.0000	15.011	0.5910	14.260	0.5614	12.700	0.5000	1.2	0.05	1.6	0.06	33.3	28.8	4.05	**07087**	**07210X**	12.3	0.48	28.5	1.12	27.0	1.06	44.5	1.75	47.5	1.87	0.40	1.49	0.82	7.65	5.25	1.46
	0.8750	52.388	2.0625	19.368	0.7625	20.168	0.7940	14.288	0.5625	1.6	0.06	1.6	0.06	45.9	37.9	5.45	**1380**	**1328**	11.6	0.46	29.5	1.16	29.5	1.16	45.0	1.77	48.5	1.91	0.29	2.05	1.13	10.7	5.35	2.00
	0.8750	53.975	2.1250	19.368	0.7625	20.168	0.7940	14.288	0.5625	1.6	0.06	1.6	0.06	45.9	37.9	5.45	**1380**	**1329**	11.6	0.46	29.5	1.16	29.5	1.16	46.0	1.81	49.0	1.93	0.29	2.05	1.13	10.7	5.35	2.00
	0.8750	56.896	2.2400	19.368	0.7625	19.837	0.7810	15.875	0.6250	1.2	0.05	1.2	0.05	50.0	43.1	6.20	**1755**	**1729**	12.5	0.49	29.0	1.14	27.5	1.08	49.0	1.93	51.0	2.01	0.31	1.95	1.07	11.6	6.10	1.90
	0.8750	57.150	2.2500	17.462	0.6875	17.462	0.6875	13.495	0.5313	1.6	0.06	1.6	0.06	47.2	42.7	6.10	**15572**	**15520**	12.7	0.50	32.5	1.28	30.5	1.20	51.0	2.01	53.0	2.09	0.35	1.73	0.95	10.8	6.40	1.69
	0.8750	57.150	2.2500	19.845	0.7813	19.355	0.7620	15.875	0.6250	0.8	0.03	1.6	0.06	60.8	57.1	8.25	**1975R**	**1922**	13.9	0.55	29.0	1.14	28.0	1.10	51.0	2.01	53.5	2.11	0.33	1.82	1.00	14.0	7.90	1.77
	0.8750	57.150	2.2500	22.225	0.8750	22.225	0.8750	17.462	0.6875	0.8	0.03	1.6	0.06	65.8	55.7	8.05	**1280**	**1220**	15.3	0.60	29.5	1.16	29.0	1.14	49.0	1.93	52.0	2.05	0.35	1.73	0.95	15.2	9.00	1.69
	0.8750	66.421	2.6150	23.812	0.9375	25.433	1.0013	19.050	0.7500	1.6	0.06	1.2	0.05	83.8	75.2	11.2	**2684**	**2631**	13.9	0.55	31.5	1.24	29.0	1.14	58.0	2.28	60.0	2.36	0.25	2.36	1.30	19.5	8.45	2.30
	0.8750	80.000	3.1496	20.996	0.8266	22.403	0.8820	17.826	0.7018	0.8	0.03	1.2	0.05	85.0	74.8	11.4	**341**	**332**	15.1	0.59	33.5	1.32	32.0	1.26	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
22.606	0.8900	47.000	1.8504	15.500	0.6102	15.500	0.6102	12.000	0.4724	1.6	0.06	1.0	0.04	35.0	32.8	4.45	**LM72849**	**LM72810**	12.3	0.48	30.0	1.18	28.0	1.10	40.5	1.59	44.0	1.73	0.47	1.27	0.70	8.05	6.50	1.24
23.812	0.9375	50.292	1.9800	14.224	0.5600	14.732	0.5800	10.668	0.4200	1.6	0.06	1.2	0.05	39.1	37.0	5.15	**L44640R**	**L44610**	10.8	0.43	30.5	1.20	28.5	1.12	44.5	1.75	47.0	1.85	0.37	1.60	0.88	8.95	5.70	1.56
	0.9375	52.000	2.0472	15.011	0.5910	14.260	0.5614	12.700	0.5000	1.6	0.06	2.0	0.08	33.3	28.8	4.05	**07093**	**07205**	12.3	0.48	30.5	1.20	28.5	1.12	44.5	1.75	48.0	1.89	0.40	1.49	0.82	7.65	5.25	1.46
	0.9375	56.896	2.2400	19.368	0.7625	19.837	0.7810	15.875	0.6250	0.8	0.03	1.2	0.05	50.0	43.1	6.20	**1779**	**1729**	12.5	0.49	29.5	1.16	28.5	1.12	49.0	1.93	51.0	2.01	0.31	1.95	1.07	11.6	6.10	1.90
	0.9375	56.896	2.2400	19.368	0.7625	19.837	0.7810	15.875	0.6250	0.8	0.03	1.6	0.06	50.0	43.1	6.20	**1779**	**1729X**	12.5	0.49	29.5	1.16	28.5	1.12	49.0	1.93	52.0	2.05	0.31	1.95	1.07	11.6	6.10	1.90
	0.9375	66.421	2.6150	23.812	0.9375	25.433	1.0013	19.050	0.7500	0.8	0.03	1.2	0.05	83.8	75.2	11.2	**2685**	**2631**	13.9	0.55	30.5	1.20	30.0	1.18	58.0	2.28	60.0	2.36	0.25	2.36	1.30	19.5	8.45	2.30
	0.9375	71.996	2.8345	19.000	0.7480	18.923	0.7450	15.875	0.6250	2.4	0.09	1.6	0.06	69.8	60.0	8.85	**26093**	**26283**	14.3	0.56	35.0	1.38	32.0	1.26	62.0	2.44	65.0	2.56	0.36	1.67	0.92	16.1	9.90	1.62
24.981	0.9835	50.005	1.9687	13.495	0.5313	14.260	0.5614	9.525	0.3750	1.6	0.06	1.0	0.04	33.3	28.8	4.05	**07098**	**07196**	10.8	0.43	31.0	1.22	29.0	1.14	44.5	1.75	47.0	1.85	0.40	1.49	0.82	7.65	5.25	1.46
	0.9835	62.000	2.4409	16.002	0.6300	16.566	0.6522	14.288	0.5625	1.6	0.06	1.6	0.06	47.4	40.6	5.80	**17098**	**17244**	12.7	0.50	33.0	1.30	30.5	1.20	54.0	2.13	57.0	2.24	0.38	1.57	0.86	10.9	7.15	1.53
25.000	0.9842	50.005	1.9687	13.495	0.5313	14.260	0.5614	9.525	0.3750	1.6	0.06	1.0	0.04	33.3	28.8	4.05	**07097**	**07196**	10.8	0.43	31.0	1.22	29.0	1.14	44.5	1.75	47.0	1.85	0.40	1.49	0.82	7.65	5.25	1.46
	0.9842	62.000	2.4409	16.002	0.6300	16.566	0.6522	14.288	0.5625	1.6	0.06	1.6	0.06	47.4	40.6	5.80	**17098X**	**17244**	12.7	0.50	33.0	1.30	30.5	1.20	54.0	2.13	57.0	2.24	0.38	1.57	0.86	10.9	7.15	1.53
	0.9842	66.421	2.6150	23.812	0.9375	25.433	1.0013	19.050	0.7500	2.0	0.08	1.2	0.05	83.8	75.2	11.2	**2694X**	**2631**	13.9	0.55	33.0	1.30	31.0	1.22	58.0	2.28	60.0	2.36	0.25	2.36	1.30	19.5	8.45	2.30
	0.9842	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	3.6	0.14	3.2	0.13	98.6	89.3	13.3	**3188X**	**3120**	20.3	0.80	40.0	1.57	35.0	1.38	61.0	2.40	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
25.400	1.0000	50.005	1.9687	13.495	0.5313	14.260	0.5614	9.525	0.3750	1.0	0.04	1.0	0.04	33.3	28.8	4.05	**07100**	**07196**	10.8	0.43	30.5	1.20	29.5	1.16	44.5	1.75	47.0	1.85	0.40	1.49	0.82	7.65	5.25	1.46
	1.0000	50.005	1.9687	13.495	0.5313	14.260	0.5614	9.525	0.3750	1.6	0.06	1.0	0.04	33.3	28.8	4.05	**07100S**	**07196**	10.8	0.43	31.5	1.24	29.5	1.16	44.5	1.75	47.0	1.85	0.40	1.49	0.82	7.65	5.25	1.46
	1.0000	50.005	1.9687	13.495	0.5313	14.260	0.5614	9.525	0.3750	3.2	0.13	1.0	0.04	33.3	28.8	4.05	**07100SA**	**07196**	10.8	0.43	35.0	1.38	29.5	1.16	44.5	1.75	47.0	1.85	0.40	1.49	0.82	7.65	5.25	1.46
	1.0000	50.292	1.9800	14.224	0.5600	14.732	0.5800	10.668	0.4200	1.2	0.05	1.2	0.05	39.1	37.0	5.15	**L44643R**	**L44610**	10.8	0.43	31.5	1.24	29.5	1.16	44.5	1.75	47.0	1.85	0.37	1.60	0.88	8.95	5.70	1.56
	1.0000	51.994	2.0470	15.011	0.5910	14.260	0.5614	12.700	0.5000	1.0	0.04	1.2	0.05	33.3	28.8	4.05	**07100**	**07204**	12.3	0.48	30.5	1.20	29.5	1.16	45.0	1.77	48.0	1.89	0.40	1.49	0.82	7.65	5.25	1.46
	1.0000	53.975	2.1250	19.368	0.7625	19.837	0.7810	15.875	0.6250	0.8	0.03	0.8	0.03	50.0	43.1	6.20	**1780**	**1730**	12.5	0.49	30.5	1.20	30.0	1.18	48.5	1.91	50.0	1.97	0.31	1.95	1.07	11.6	6.10	1.90
	1.0000	57.150	2.2500	17.462	0.6875	17.462	0.6875	13.495	0.5313	1.2	0.05	1.6	0.06	47.2	42.7	6.10	**15578**	**15520**	12.7	0.50	32.5	1.28	30.5	1.20	51.0	2.01	53.0	2.09	0.35	1.73	0.95	10.8	6.40	1.69
	1.0000	58.738	2.3125	19.050	0.7500	19.355	0.7620	15.080	0.5937	1.2	0.05	1.2	0.05	60.8	57.1	8.25	**1986R**	**1932**	13.1	0.52	32.5	1.28	30.5	1.20	52.0	2.05	54.0	2.13	0.33	1.82	1.00	14.0	7.90	1.77
	1.0000	59.530	2.3437	23.368	0.9200	23.114	0.9100	18.288	0.7200	0.8	0.03	1.6	0.06	63.0	57.1	7.95	**M84249**	**M84210**	18.2	0.72	36.0	1.42	32.5	1.28	49.5	1.95	56.0	2.20	0.55	1.10	0.60	14.6	13.6	1.07
	1.0000	60.325	2.3750	19.845	0.7813	19.355	0.7620	15.875	0.6250	3.6	0.14	1.2	0.05	60.8	57.1	8.25	**1994XR**	**1931**	13.9	0.55	37.0	1.46	30.5	1.20	52.0	2.05	55.0	2.17	0.33	1.82	1.00	14.0	7.90	1.77
	1.0000	61.912	2.4375	19.050	0.7500	20.638	0.8125	14.288	0.5625	0.8	0.03	2.0	0.08	55.7	50.7	7.30	**15101**	**15243**	13.2	0.52	32.5	1.28	31.5	1.24	55.0	2.17	58.0	2.28	0.35	1.71	0.94	12.9	7.75	1.67
	1.0000	62.000	2.4409	19.050	0.7500	20.638	0.8125	14.288	0.5625	3.6	0.14	1.2	0.05	55.7	50.7	7.30	**15100**	**15245**	13.2	0.52	38.0	1.50	31.5	1.24	55.0	2.17	58.0	2.28	0.35	1.71	0.94	12.9	7.75	1.67

Note 1) SP indicates the specially chamfered from.

TS type
d (25.400) ~ (28.575) mm
(1.0000) ~ (1.1250) inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

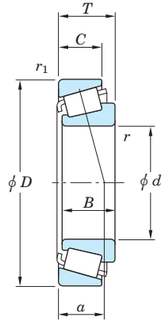
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

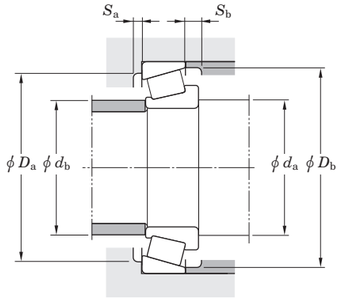
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
25.400	1.0000	63.500	2.5000	19.050	0.7500	20.638	0.8125	14.288	0.5625	0.8	0.03	1.2	0.05	55.7	50.7	7.30	**15101**	**15250R**	13.2	0.52	32.5	1.28	31.5	1.24	55.0	2.17	59.0	2.32	0.35	1.71	0.94	12.9	7.75	1.67
	1.0000	63.500	2.5000	20.638	0.8125	20.638	0.8125	15.875	0.6250	3.6	0.14	1.2	0.05	55.7	50.7	7.30	**15100**	**15250**	15.0	0.59	38.0	1.50	31.5	1.24	55.0	2.17	59.0	2.32	0.35	1.71	0.94	12.9	7.75	1.67
	1.0000	63.500	2.5000	20.638	0.8125	20.638	0.8125	15.875	0.6250	3.6	0.14	1.6	0.06	55.7	50.7	7.30	**15100**	**15250X**	15.0	0.59	38.0	1.50	31.5	1.24	55.0	2.17	59.0	2.32	0.35	1.71	0.94	12.9	7.75	1.67
	1.0000	63.500	2.5000	20.638	0.8125	20.638	0.8125	15.875	0.6250	1.6	0.06	1.6	0.06	55.7	50.7	7.30	**15102**	**15250X**	15.0	0.59	34.0	1.34	31.5	1.24	55.0	2.17	59.0	2.32	0.35	1.71	0.94	12.9	7.75	1.67
	1.0000	64.292	2.5312	21.432	0.8438	21.432	0.8438	16.670	0.6563	1.6	0.06	1.6	0.06	69.1	70.7	9.90	**M86643R**	**M86610**	18.0	0.71	38.0	1.50	36.5	1.44	54.0	2.13	61.0	2.40	0.55	1.10	0.60	16.0	14.9	1.07
	1.0000	66.421	2.6150	23.812	0.9375	25.433	1.0013	19.050	0.7500	1.2	0.05	1.2	0.05	83.8	75.2	11.2	**2687**	**2631**	13.9	0.55	33.5	1.32	31.5	1.24	58.0	2.28	60.0	2.36	0.25	2.36	1.30	19.5	8.45	2.30
	1.0000	68.262	2.6875	22.225	0.8750	22.225	0.8750	17.462	0.6875	0.8	0.03	1.6	0.06	63.7	61.1	8.80	**02473**	**02420**	17.1	0.67	34.5	1.36	33.5	1.32	59.0	2.32	63.0	2.48	0.42	1.44	0.79	14.8	10.5	1.41
	1.0000	68.262	2.6875	22.225	0.8750	22.225	0.8750	17.462	0.6875	0.8	0.03	0.8	0.03	63.7	61.1	8.80	**02473**	**02421**	17.1	0.67	34.5	1.36	33.5	1.32	59.0	2.32	63.0	2.48	0.42	1.44	0.79	14.8	10.5	1.41
	1.0000	72.000	2.8346	19.000	0.7480	18.923	0.7450	15.875	0.6250	1.6	0.06	1.6	0.06	69.8	60.0	8.85	**26100**	**26283**	14.3	0.56	34.5	1.36	32.5	1.28	62.0	2.44	65.0	2.56	0.36	1.67	0.92	16.1	9.90	1.62
	1.0000	72.233	2.8438	25.400	1.0000	25.400	1.0000	19.842	0.7812	0.8	0.03	2.4	0.09	83.8	87.4	12.4	**HM88630**	**HM88610**	20.7	0.81	39.5	1.56	39.5	1.56	60.0	2.36	69.0	2.72	0.55	1.10	0.60	19.6	18.3	1.07
	1.0000	72.626	2.8593	24.608	0.9688	24.257	0.9550	17.462	0.6875	2.4	0.09	1.6	0.06	77.3	60.5	8.75	**41100**	**41286**	20.7	0.81	41.0	1.61	36.5	1.44	61.0	2.40	68.0	2.68	0.60	1.00	0.55	17.9	18.4	0.97
	1.0000	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	0.8	0.03	0.8	0.03	98.6	89.3	13.3	**3189**	**3130**	20.3	0.80	35.5	1.40	35.0	1.38	63.0	2.48	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.0000	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	2.0	0.08	3.2	0.13	98.6	89.3	13.3	**3189X**	**3120**	20.3	0.80	37.5	1.48	35.0	1.38	61.0	2.40	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.0000	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	0.8	0.03	1.2	0.05	85.0	74.8	11.4	**338**	**332**	15.1	0.59	36.5	1.44	35.0	1.38	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.0000	80.000	3.1496	24.176	0.9518	22.403	0.8820	21.000	0.8268	0.8	0.03	2.4	0.09	85.0	74.8	11.4	**338**	**332A**	18.3	0.72	36.5	1.44	35.0	1.38	71.0	2.80	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
25.987	1.0231	50.292	1.9800	14.224	0.5600	14.732	0.5800	10.668	0.4200	3.6	0.14	1.2	0.05	39.1	37.0	5.15	**L44645R**	**L44610**	10.8	0.43	36.5	1.44	31.0	1.22	44.5	1.75	47.0	1.85	0.37	1.60	0.88	8.95	5.70	1.56
	1.0231	57.150	2.2500	17.462	0.6875	17.462	0.6875	13.495	0.5313	3.6	0.14	1.6	0.06	47.2	42.7	6.10	**15579X**	**15520**	12.7	0.50	38.5	1.52	32.0	1.26	51.0	2.01	53.0	2.09	0.35	1.73	0.95	10.8	6.40	1.69
26.157	1.0298	63.500	2.5000	20.638	0.8125	20.638	0.8125	15.875	0.6250	0.8	0.03	1.2	0.05	55.7	50.7	7.30	**15103**	**15250**	15.0	0.59	33.5	1.32	33.0	1.30	55.0	2.17	59.0	2.32	0.35	1.71	0.94	12.9	7.75	1.67
26.162	1.0300	66.421	2.6150	23.812	0.9375	25.433	1.0013	19.050	0.7500	1.6	0.06	1.2	0.05	83.8	75.2	11.2	**2682**	**2631**	13.9	0.55	34.5	1.36	32.0	1.26	58.0	2.28	60.0	2.36	0.25	2.36	1.30	19.5	8.45	2.30
26.975	1.0620	57.150	2.2500	19.845	0.7813	19.355	0.7620	15.875	0.6250	0.8	0.03	1.6	0.06	60.8	57.1	8.25	**1987R**	**1922**	13.9	0.55	32.5	1.28	31.5	1.24	51.0	2.01	53.5	2.11	0.33	1.82	1.00	14.0	7.90	1.77
26.987	1.0625	72.626	2.8593	24.608	0.9688	24.257	0.9550	17.462	0.6875	2.4	0.09	1.6	0.06	77.3	60.5	8.75	**41106**	**41286**	20.7	0.81	42.0	1.65	36.5	1.44	61.0	2.40	68.0	2.68	0.60	1.00	0.55	17.9	18.4	0.97
26.988	1.0625	50.292	1.9800	14.224	0.5600	14.732	0.5800	10.668	0.4200	3.6	0.14	1.2	0.05	39.1	37.0	5.15	**L44649R**	**L44610**	10.8	0.43	37.5	1.48	31.0	1.22	44.5	1.75	47.0	1.85	0.37	1.60	0.88	8.95	5.70	1.56
	1.0625	57.150	2.2500	19.845	0.7813	19.355	0.7620	15.875	0.6250	3.2	0.13	1.6	0.06	60.8	57.1	8.25	**1997XR**	**1922**	13.9	0.55	37.5	1.48	31.5	1.24	51.0	2.01	53.5	2.11	0.33	1.82	1.00	14.0	7.90	1.77
	1.0625	60.325	2.3750	19.842	0.7812	17.462	0.6875	15.875	0.6250	3.6	0.14	1.6	0.06	47.2	42.7	6.10	**15580**	**15523**	15.1	0.59	38.5	1.52	32.0	1.26	51.0	2.01	54.0	2.13	0.35	1.73	0.95	10.8	6.40	1.69
	1.0625	62.000	2.4409	19.050	0.7500	20.638	0.8125	14.288	0.5625	0.8	0.03	1.2	0.05	55.7	50.7	7.30	**15106**	**15245**	13.2	0.52	33.5	1.32	33.0	1.30	55.0	2.17	58.0	2.28	0.35	1.71	0.94	12.9	7.75	1.67
	1.0625	66.421	2.6150	23.812	0.9375	25.433	1.0013	19.050	0.7500	1.6	0.06	1.2	0.05	83.8	75.2	11.2	**2688**	**2631**	13.9	0.55	35.0	1.38	33.0	1.30	58.0	2.28	60.0	2.36	0.25	2.36	1.30	19.5	8.45	2.30
28.575	1.1250	57.150	2.2500	17.462	0.6875	17.462	0.6875	13.495	0.5313	3.6	0.14	1.6	0.06	47.2	42.7	6.10	**15590**	**15520**	12.7	0.50	39.0	1.54	33.5	1.32	51.0	2.01	53.0	2.09	0.35	1.73	0.95	10.8	6.40	1.69
	1.1250	57.150	2.2500	19.845	0.7813	19.355	0.7620	15.875	0.6250	0.8	0.03	1.6	0.06	60.8	57.1	8.25	**1985R**	**1922**	13.9	0.55	34.0	1.34	33.5	1.32	51.0	2.01	53.5	2.11	0.33	1.82	1.00	14.0	7.90	1.77
	1.1250	57.150	2.2500	19.845	0.7813	19.355	0.7620	15.875	0.6250	3.6	0.14	1.6	0.06	60.8	57.1	8.25	**1988R**	**1922**	13.9	0.55	39.5	1.56	33.5	1.32	51.0	2.01	53.5	2.11	0.33	1.82	1.00	14.0	7.90	1.77
	1.1250	59.131	2.3280	15.875	0.6250	16.764	0.6600	11.811	0.4650	SP	SP	1.2	0.05	44.8	43.1	6.05	**LM67043**	**LM67010**	13.0	0.51	40.5	1.59	34.0	1.34	52.0	2.05	56.0	2.20	0.41	1.46	0.80	10.3	7.25	1.42
	1.1250	62.000	2.4409	19.050	0.7500	20.638	0.8125	14.288	0.5625	3.6	0.14	1.2	0.05	55.7	50.7	7.30	**15112**	**15245**	13.2	0.52	40.0	1.57	34.0	1.34	55.0	2.17	58.0	2.28	0.35	1.71	0.94	12.9	7.75	1.67
	1.1250	62.000	2.4409	19.050	0.7500	20.638	0.8125	14.288	0.5625	0.8	0.03	1.2	0.05	55.7	50.7	7.30	**15113**	**15245**	13.2	0.52	34.5	1.36	34.0	1.34	55.0	2.17	58.0	2.28	0.35	1.71	0.94	12.9	7.75	1.67
	1.1250	64.292	2.5312	21.432	0.8438	21.432	0.8438	16.670	0.6563	1.6	0.06	1.6	0.06	69.1	70.7	9.90	**M86647R**	**M86610**	18.0	0.71	40.0	1.57	38.0	1.50	54.0	2.13	61.0	2.40	0.55	1.10	0.60	16.0	14.9	1.07
	1.1250	66.421	2.6150	23.812	0.9375	25.433	1.0013	19.050	0.7500	1.2	0.05	1.2	0.05	83.8	75.2	11.2	**2689**	**2631**	13.9	0.55	36.0	1.42	34.0	1.34	58.0	2.28	60.0	2.36	0.25	2.36	1.30	19.5	8.45	2.30
	1.1250	66.421	2.6150	23.812	0.9375	25.433	1.0013	19.050	0.7500	4.8	0.19	1.2	0.05	83.8	75.2	11.2	**2689X**	**2631**	13.9	0.55	42.0	1.65	34.0	1.34	58.0	2.28	60.0	2.36	0.25	2.36	1.30	19.5	8.45	2.30
	1.1250	66.421	2.6150	25.400	1.0000	25.357	0.9983	20.638	0.8125	2.4	0.09	3.2	0.13	89.2	85.1	12.7	**2578**	**2520**	16.0	0.63	39.0	1.54	35.0	1.38	57.0	2.24	62.5	2.46	0.27	2.19	1.21	20.7	9.65	2.14
	1.1250	68.262	2.6875	22.225	0.8750	22.225	0.8750	17.462	0.6875	0.8	0.03	1.6	0.06	63.7	61.1	8.80	**02474**	**02420**	17.1	0.67	36.5	1.44	36.0	1.42	59.0	2.32	63.0	2.48	0.42	1.44	0.79	14.8	10.5	1.41
	1.1250	68.262	2.6875	22.225	0.8750	22.225	0.8750	17.462	0.6875	2.4	0.09	1.6	0.06	70.2	71.1	10.0	**M88040**	**M88010**	19.2	0.76	42.0	1.65	39.0	1.54	58.0	2.28	65.0	2.56	0.55	1.10	0.60	16.3	15.2	1.07

Note 1) SP indicates the specially chamfered from.

TS type

d (28.575) ~ (30.162) mm
(1.1250) ~ (1.1875) inch





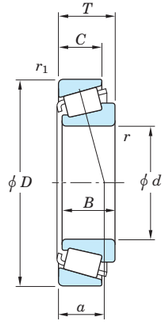
$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

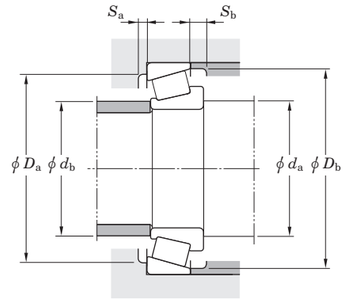
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch					
28.575	1.1250	68.262	2.6875	22.225	0.8750	22.225	0.8750	17.462	0.6875	2.4	0.09	2.4	0.09	70.2	71.1	10.0	**M88040**	**M88011**	19.2	0.76	42.0	1.65	39.0	1.54	58.0	2.28	65.0	2.56	0.55	1.10	0.60	16.3	15.2	1.07
	1.1250	72.000	2.8346	19.000	0.7480	18.923	0.7450	15.875	0.6250	1.6	0.06	1.6	0.06	59.4	60.0	7.25	**26112**	**26283**	14.3	0.56	37.0	1.46	35.0	1.38	62.0	2.44	65.0	2.56	0.36	1.67	0.92	16.1	9.90	1.62
	1.1250	72.626	2.8593	24.608	0.9688	24.257	0.9550	17.462	0.6875	4.8	0.19	1.6	0.06	77.3	60.5	8.75	**41125**	**41286**	20.7	0.81	48.0	1.89	36.5	1.44	61.0	2.40	68.0	2.68	0.60	1.00	0.55	17.9	18.4	0.97
	1.1250	72.626	2.8593	24.608	0.9688	24.257	0.9550	17.462	0.6875	1.6	0.06	1.6	0.06	77.3	60.5	8.75	**41126**	**41286**	20.7	0.81	41.5	1.63	36.5	1.44	61.0	2.40	68.0	2.68	0.60	1.00	0.55	17.9	18.4	0.97
	1.1250	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	3.6	0.14	3.2	0.13	98.6	89.3	13.3	**3192**	**3120**	20.3	0.80	42.5	1.67	37.0	1.46	61.0	2.40	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.1250	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	1.2	0.05	3.2	0.13	98.6	89.3	13.3	**3198**	**3120**	20.3	0.80	39.0	1.54	37.0	1.46	61.0	2.40	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.1250	73.025	2.8750	22.225	0.8750	22.225	0.8750	17.462	0.6875	0.8	0.03	3.2	0.13	68.8	65.7	9.55	**02872**	**02820**	18.4	0.72	37.5	1.48	37.0	1.46	62.0	2.44	68.0	2.68	0.45	1.32	0.73	16.0	12.4	1.29
	1.1250	73.025	2.8750	22.225	0.8750	22.225	0.8750	17.462	0.6875	0.8	0.03	0.8	0.03	68.8	65.7	9.55	**02872**	**02830**	18.4	0.72	37.5	1.48	37.0	1.46	64.0	2.52	69.0	2.72	0.45	1.32	0.73	16.0	12.4	1.29
	1.1250	80.962	3.1875	22.225	0.8750	22.225	0.8750	17.462	0.6875	0.8	0.03	0.8	0.03	68.8	65.7	9.55	**02872**	**02831**	18.4	0.72	37.5	1.48	37.0	1.46	67.0	2.64	69.0	2.72	0.45	1.32	0.73	16.0	12.4	1.29
29.000	1.1417	50.292	1.9800	14.224	0.5600	14.732	0.5800	10.668	0.4200	3.6	0.14	1.2	0.05	36.3	37.2	5.15	**L45449**	**L45410**	10.9	0.43	39.5	1.56	33.0	1.30	44.5	1.75	48.0	1.89	0.37	1.62	0.89	8.35	5.25	1.58
	1.1417	66.421	2.6150	23.812	0.9375	25.433	1.0013	19.050	0.7500	1.0	0.04	1.2	0.05	83.8	75.2	11.2	**2695X**	**2631**	13.9	0.55	35.0	1.38	34.0	1.34	58.0	2.28	60.0	2.36	0.25	2.36	1.30	19.5	8.45	2.30
29.367	1.1562	66.421	2.6150	23.812	0.9375	25.433	1.0013	19.050	0.7500	3.6	0.14	1.2	0.05	83.8	75.2	11.2	**2690**	**2631**	13.9	0.55	41.0	1.61	35.0	1.38	58.0	2.28	60.0	2.36	0.25	2.36	1.30	19.5	8.45	2.30
	1.1562	66.421	2.6150	23.812	0.9375	25.433	1.0013	19.050	0.7500	0.8	0.03	1.2	0.05	83.8	75.2	11.2	**2691**	**2631**	13.9	0.55	35.5	1.40	35.0	1.38	58.0	2.28	60.0	2.36	0.25	2.36	1.30	19.5	8.45	2.30
29.985	1.1805	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	0.8	0.03	3.2	0.13	98.6	89.3	13.3	**3190S**	**3120**	20.3	0.80	39.0	1.54	38.0	1.50	61.0	2.40	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
29.987	1.1806	62.000	2.4409	16.002	0.6300	16.566	0.6522	14.288	0.5625	1.6	0.06	1.6	0.06	47.4	40.6	5.80	**17118**	**17244**	12.7	0.50	37.0	1.46	34.5	1.36	54.0	2.13	57.0	2.24	0.38	1.57	0.86	10.9	7.15	1.53
	1.1806	62.000	2.4409	19.050	0.7500	20.638	0.8125	14.288	0.5625	1.2	0.05	1.2	0.05	55.7	50.7	7.30	**15117**	**15245**	13.2	0.52	36.5	1.44	35.0	1.38	55.0	2.17	58.0	2.28	0.35	1.71	0.94	12.9	7.75	1.67
	1.1806	71.996	2.8345	19.000	0.7480	18.923	0.7450	15.875	0.6250	1.6	0.06	2.0	0.08	69.8	60.0	8.85	**26118**	**26283S**	14.3	0.56	38.0	1.50	36.0	1.42	62.0	2.44	65.0	2.56	0.36	1.67	0.92	16.1	9.90	1.62
	1.1806	72.000	2.8346	19.000	0.7480	18.923	0.7450	15.875	0.6250	1.6	0.06	1.6	0.06	69.8	60.0	8.85	**26118**	**26283**	14.3	0.56	38.0	1.50	36.0	1.42	62.0	2.44	65.0	2.56	0.36	1.67	0.92	16.1	9.90	1.62
30.000	1.1811	62.000	2.4409	16.002	0.6300	16.566	0.6522	14.288	0.5625	1.6	0.06	1.6	0.06	47.4	40.6	5.80	**17118S**	**17244**	12.7	0.50	37.0	1.46	34.5	1.36	54.0	2.13	57.0	2.24	0.38	1.57	0.86	10.9	7.15	1.53
	1.1811	68.956	2.7148	19.845	0.7813	19.202	0.7560	15.875	0.6250	0.8	0.03	3.2	0.13	57.7	55.0	7.95	**14118**	**14274A**	15.5	0.61	37.0	1.46	36.5	1.44	59.0	2.32	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
	1.1811	69.012	2.7170	19.845	0.7813	19.583	0.7710	15.875	0.6250	3.6	0.14	1.2	0.05	57.7	55.0	7.95	**14117A**	**14276**	15.5	0.61	42.5	1.67	39.5	1.56	60.0	2.36	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
	1.1811	69.012	2.7170	19.845	0.7813	19.583	0.7710	15.875	0.6250	3.6	0.14	3.2	0.13	57.7	55.0	7.95	**14118A**	**14274**	15.5	0.61	42.5	1.67	39.5	1.56	59.0	2.32	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
	1.1811	69.850	2.7500	23.812	0.9375	25.357	0.9983	19.050	0.7500	3.6	0.14	1.2	0.05	89.2	85.1	12.7	**2586**	**2523**	14.4	0.57	42.0	1.65	35.5	1.40	61.0	2.40	64.0	2.52	0.27	2.19	1.21	20.7	9.65	2.14
	1.1811	71.996	2.8345	19.000	0.7480	18.923	0.7450	15.875	0.6250	1.6	0.06	1.6	0.06	69.8	60.0	8.85	**26118S**	**26283**	14.3	0.56	38.0	1.50	36.0	1.42	62.0	2.44	65.0	2.56	0.36	1.67	0.92	16.1	9.90	1.62
	1.1811	72.085	2.8380	29.522	1.1623	26.721	1.0520	18.415	0.7250	3.6	0.14	2.4	0.09	57.7	55.0	7.95	**14120A**	**14283**	22.6	0.89	42.5	1.67	39.5	1.56	60.0	2.36	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
	1.1811	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	3.6	0.14	3.2	0.13	98.6	89.3	13.3	**3190**	**3120**	20.3	0.80	43.0	1.69	38.0	1.50	61.0	2.40	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.1811	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	0.8	0.03	1.2	0.05	85.0	74.8	11.4	**348**	**332**	15.1	0.59	39.5	1.56	39.5	1.56	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.1811	88.501	3.4843	26.988	1.0625	29.083	1.1450	22.225	0.8750	0.8	0.03	1.6	0.06	123	112	17.2	**416**	**414**	16.9	0.67	39.5	1.56	39.5	1.56	77.0	3.03	80.0	3.15	0.26	2.28	1.25	28.6	12.9	2.22
	1.1811	88.501	3.4843	26.988	1.0625	29.083	1.1450	22.225	0.8750	0.8	0.03	3.2	0.13	123	112	17.2	**416**	**414A**	16.9	0.67	39.5	1.56	39.5	1.56	76.0	2.99	79.0	3.11	0.26	2.28	1.25	28.6	12.9	2.22
30.112	1.1855	62.000	2.4409	19.050	0.7500	20.638	0.8125	14.288	0.5625	0.8	0.03	1.2	0.05	55.7	50.7	7.30	**15116**	**15245**	13.2	0.52	36.0	1.42	35.5	1.40	55.0	2.17	58.0	2.28	0.35	1.71	0.94	12.9	7.75	1.67
30.162	1.1875	58.738	2.3125	14.684	0.5781	15.080	0.5937	10.716	0.4219	3.6	0.14	1.0	0.04	37.0	33.3	4.60	**08118**	**08231**	13.5	0.53	41.5	1.63	35.0	1.38	52.0	2.05	55.0	2.17	0.48	1.26	0.69	8.45	6.85	1.23
	1.1875	62.000	2.4409	16.002	0.6300	16.566	0.6522	14.288	0.5625	1.6	0.06	1.6	0.06	47.4	40.6	5.80	**17119**	**17244**	12.7	0.50	37.0	1.46	34.5	1.36	54.0	2.13	57.0	2.24	0.38	1.57	0.86	10.9	7.15	1.53
	1.1875	64.292	2.5312	21.432	0.8438	21.432	0.8438	16.670	0.6563	1.6	0.06	1.6	0.06	69.1	70.7	9.90	**M86649R**	**M86610**	18.0	0.71	41.0	1.61	38.0	1.50	54.0	2.13	61.0	2.40	0.55	1.10	0.60	16.0	14.9	1.07
	1.1875	68.262	2.6875	22.225	0.8750	22.225	0.8750	17.462	0.6875	0.8	0.03	1.6	0.06	63.7	61.1	8.80	**02477**	**02420**	17.1	0.67	38.0	1.50	36.0	1.42	59.0	2.32	63.0	2.48	0.42	1.44	0.79	14.8	10.5	1.41
	1.1875	68.262	2.6875	22.225	0.8750	22.225	0.8750	17.462	0.6875	2.4	0.09	1.6	0.06	70.2	71.1	10.0	**M88043**	**M88010**	19.2	0.76	43.5	1.71	39.5	1.56	58.0	2.28	65.0	2.56	0.55	1.10	0.60	16.3	15.2	1.07
	1.1875	69.850	2.7500	23.812	0.9375	25.357	0.9983	19.050	0.7500	2.4	0.09	1.6	0.06	89.2	85.1	12.7	**2558**	**2523S**	14.4	0.57	40.0	1.57	36.5	1.44	61.0	2.40	64.0	2.52	0.27	2.19	1.21	20.7	9.65	2.14
	1.1875	69.850	2.7500	23.812	0.9375	25.357	0.9983	19.050	0.7500	0.8	0.03	1.2	0.05	89.2	85.1	12.7	**2559**	**2523**	14.4	0.57	37.0	1.46	36.5	1.44	61.0	2.40	64.0	2.52	0.27	2.19	1.21	20.7	9.65	2.14
	1.1875	72.022	2.8355	23.812	0.9375	25.357	0.9983	19.050	0.7500	2.4	0.09	0.8	0.03	89.2	85.1	12.7	**2558**	**2525**	14.4	0.57	40.0	1.57	36.5	1.44	64.0	2.52	65.0	2.56	0.27	2.19	1.21	20.7	9.65	2.14

Note 1) SP indicates the specially chamfered from.

TS type
d (30.162) ~ (31.750) mm
(1.1875) ~ (1.2500) inch





$P = XF_r + YF_a$
$P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$

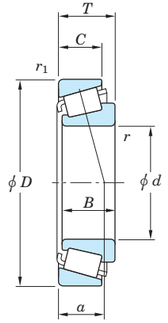
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

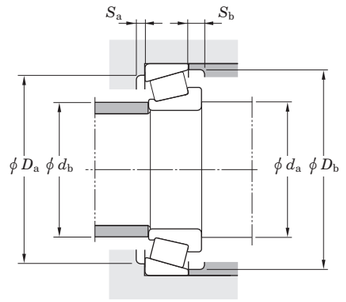
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
30.162	1.1875	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	0.8	0.03	0.8	0.03	98.6	89.3	13.3	**3187**	**3130**	20.3	0.80	39.0	1.54	38.5	1.52	63.0	2.48	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.1875	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	3.6	0.14	3.2	0.13	98.6	89.3	13.3	**3191**	**3120**	20.3	0.80	44.0	1.73	38.5	1.52	61.0	2.40	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.1875	76.200	3.0000	30.162	1.1875	29.997	1.1810	23.812	0.9375	3.6	0.14	0.8	0.03	98.6	89.3	13.3	**3191**	**3129**	20.3	0.80	44.0	1.73	38.5	1.52	65.0	2.56	69.0	2.72	0.33	1.80	0.99	23.0	13.1	1.76
	1.1875	79.375	3.1250	29.370	1.1563	29.771	1.1721	23.812	0.9375	0.8	0.03	3.2	0.13	109	105	15.7	**3474**	**3420**	20.8	0.82	41.0	1.61	40.0	1.57	67.0	2.64	74.0	2.91	0.37	1.64	0.90	25.5	15.9	1.60
	1.1875	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	0.8	0.03	1.2	0.05	85.0	74.8	11.4	**334**	**332**	15.1	0.59	39.5	1.56	39.5	1.56	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.1875	80.000	3.1496	24.176	0.9518	22.403	0.8820	21.000	0.8268	0.8	0.03	2.4	0.09	85.0	74.8	11.4	**334**	**332A**	18.3	0.72	39.5	1.56	39.5	1.56	71.0	2.80	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.1875	80.035	3.1510	21.432	0.8438	20.940	0.8244	15.875	0.6250	1.6	0.06	1.6	0.06	71.6	65.9	9.70	**28118**	**28317**	16.9	0.67	40.0	1.57	37.5	1.48	69.0	2.72	73.0	2.87	0.40	1.49	0.82	16.5	11.3	1.46
30.213	1.1895	62.000	2.4409	19.050	0.7500	20.638	0.8125	14.288	0.5625	3.6	0.14	1.2	0.05	55.7	50.7	7.30	**15118**	**15245**	13.2	0.52	41.5	1.63	35.5	1.40	55.0	2.17	58.0	2.28	0.35	1.71	0.94	12.9	7.75	1.67
	1.1895	62.000	2.4409	19.050	0.7500	20.638	0.8125	14.288	0.5625	1.6	0.06	1.2	0.05	55.7	50.7	7.30	**15119**	**15245**	13.2	0.52	37.5	1.48	35.5	1.40	55.0	2.17	58.0	2.28	0.35	1.71	0.94	12.9	7.75	1.67
	1.1895	62.000	2.4409	19.050	0.7500	20.638	0.8125	14.288	0.5625	0.8	0.03	1.2	0.05	55.7	50.7	7.30	**15120**	**15245**	13.2	0.52	36.0	1.42	35.5	1.40	55.0	2.17	58.0	2.28	0.35	1.71	0.94	12.9	7.75	1.67
30.226	1.1900	69.012	2.7170	19.845	0.7813	19.583	0.7710	15.875	0.6250	0.8	0.03	3.2	0.13	57.7	55.0	7.95	**14116**	**14274**	15.5	0.61	37.0	1.46	36.5	1.44	59.0	2.32	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
30.955	1.2187	64.292	2.5312	21.432	0.8438	21.432	0.8438	16.670	0.6563	2.4	0.09	1.6	0.06	69.1	70.7	9.90	**M86648R**	**M86610**	18.0	0.71	41.0	1.61	38.0	1.50	54.0	2.13	61.0	2.40	0.55	1.10	0.60	16.0	14.9	1.07
31.623	1.2450	66.675	2.6250	20.638	0.8125	20.638	0.8125	15.875	0.6250	1.6	0.06	1.6	0.06	58.1	54.5	7.90	**1674**	**1620**	15.7	0.62	45.0	1.77	38.5	1.52	58.0	2.28	61.0	2.40	0.37	1.62	0.89	13.5	8.55	1.57
31.750	1.2500	58.738	2.3125	14.684	0.5781	15.080	0.5937	10.716	0.4219	1.0	0.04	1.0	0.04	37.0	33.3	4.60	**08125**	**08231**	13.5	0.53	37.5	1.48	36.0	1.42	52.0	2.05	55.0	2.17	0.48	1.26	0.69	8.45	6.85	1.23
	1.2500	59.131	2.3280	15.875	0.6250	16.764	0.6600	11.811	0.4650	SP	SP	1.2	0.05	44.8	43.1	6.05	**LM67048**	**LM67010**	13.0	0.51	42.5	1.67	36.0	1.42	52.0	2.05	56.0	2.20	0.41	1.46	0.80	10.3	7.25	1.42
	1.2500	62.000	2.4409	18.161	0.7150	19.050	0.7500	14.288	0.5625	SP	SP	1.2	0.05	55.7	50.7	7.30	**15123**	**15245**	13.2	0.52	42.5	1.67	36.5	1.44	55.0	2.17	58.0	2.28	0.35	1.71	0.94	12.9	7.75	1.67
	1.2500	62.000	2.4409	19.050	0.7500	20.638	0.8125	14.288	0.5625	3.6	0.14	1.2	0.05	55.7	50.7	7.30	**15125**	**15245**	13.2	0.52	42.5	1.67	36.5	1.44	55.0	2.17	58.0	2.28	0.35	1.71	0.94	12.9	7.75	1.67
	1.2500	62.000	2.4409	19.050	0.7500	20.638	0.8125	14.288	0.5625	0.8	0.03	1.2	0.05	55.7	50.7	7.30	**15126**	**15245**	13.2	0.52	37.0	1.46	36.5	1.44	55.0	2.17	58.0	2.28	0.35	1.71	0.94	12.9	7.75	1.67
	1.2500	66.421	2.6150	25.400	1.0000	25.357	0.9983	20.638	0.8125	0.8	0.03	3.2	0.13	89.2	85.1	12.7	**2580**	**2520**	16.0	0.63	38.5	1.52	37.5	1.48	57.0	2.24	62.5	2.46	0.27	2.19	1.21	20.7	9.65	2.14
	1.2500	66.421	2.6150	25.400	1.0000	25.357	0.9983	20.638	0.8125	3.6	0.14	3.2	0.13	89.2	85.1	12.7	**2582**	**2520**	16.0	0.63	44.0	1.73	37.5	1.48	57.0	2.24	62.5	2.46	0.27	2.19	1.21	20.7	9.65	2.14
	1.2500	68.262	2.6875	22.225	0.8750	22.225	0.8750	17.462	0.6875	3.6	0.14	1.6	0.06	63.7	61.1	8.80	**02475**	**02420**	17.1	0.67	44.5	1.75	38.5	1.52	59.0	2.32	63.0	2.48	0.42	1.44	0.79	14.8	10.5	1.41
	1.2500	68.262	2.6875	22.225	0.8750	22.225	0.8750	17.462	0.6875	1.6	0.06	1.6	0.06	63.7	61.1	8.80	**02475A**	**02420**	17.1	0.67	42.0	1.65	38.0	1.50	59.0	2.32	63.0	2.48	0.42	1.44	0.79	14.8	10.5	1.41
	1.2500	68.262	2.6875	22.225	0.8750	22.225	0.8750	17.462	0.6875	0.8	0.03	1.6	0.06	63.7	61.1	8.80	**02476**	**02420**	17.1	0.67	39.0	1.54	38.5	1.52	59.0	2.32	63.0	2.48	0.42	1.44	0.79	14.8	10.5	1.41
	1.2500	68.262	2.6875	22.225	0.8750	22.225	0.8750	17.462	0.6875	1.6	0.06	1.6	0.06	70.2	71.1	10.0	**M88046**	**M88010**	19.2	0.76	43.0	1.69	40.5	1.59	58.0	2.28	65.0	2.56	0.55	1.10	0.60	16.3	15.2	1.07
	1.2500	68.956	2.7148	19.845	0.7813	19.583	0.7710	15.875	0.6250	3.6	0.14	3.2	0.13	57.7	55.0	7.95	**14125**	**14274A**	15.5	0.61	44.0	1.73	37.5	1.48	59.0	2.32	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
	1.2500	69.012	2.7170	26.982	1.0623	26.721	1.0520	15.875	0.6250	4.3	0.17	3.2	0.13	57.7	55.0	7.95	**14123A**	**14274**	22.6	0.89	44.0	1.73	40.0	1.57	59.0	2.32	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
	1.2500	71.973	2.8336	27.000	1.0630	25.400	1.0000	21.443	0.8442	1.6	0.06	1.6	0.06	83.8	87.4	12.4	**HM88644**	**HM88611**	22.3	0.88	45.0	1.77	42.5	1.67	60.0	2.36	69.0	2.72	0.55	1.10	0.60	19.6	18.3	1.07
	1.2500	72.034	2.8360	30.162	1.1875	29.997	1.1810	23.812	0.9375	0.8	0.03	2.8	0.11	98.6	89.3	13.3	**3188**	**3126**	20.3	0.80	40.0	1.57	39.5	1.56	61.0	2.40	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.2500	72.233	2.8438	25.400	1.0000	25.400	1.0000	19.842	0.7812	1.6	0.06	2.4	0.09	83.8	87.4	12.4	**HM88644**	**HM88610**	20.7	0.81	45.0	1.77	42.5	1.67	60.0	2.36	69.0	2.72	0.55	1.10	0.60	19.6	18.3	1.07
	1.2500	72.626	2.8593	28.575	1.1250	29.997	1.1810	22.225	0.8750	0.8	0.03	3.2	0.13	98.6	89.3	13.3	**3188**	**3125**	18.7	0.74	40.0	1.57	39.5	1.56	61.0	2.40	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.2500	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	0.8	0.03	0.8	0.03	98.6	89.3	13.3	**3188**	**3130**	20.3	0.80	40.0	1.57	39.5	1.56	63.0	2.48	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.2500	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	1.6	0.06	0.8	0.03	98.6	89.3	13.3	**3188S**	**3130**	20.3	0.80	41.5	1.63	39.5	1.56	63.0	2.48	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.2500	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	3.6	0.14	0.8	0.03	98.6	89.3	13.3	**3193**	**3130**	20.3	0.80	45.5	1.79	39.5	1.56	63.0	2.48	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.2500	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	2.4	0.09	3.2	0.13	98.6	89.3	13.3	**3199**	**3120**	20.3	0.80	42.5	1.67	39.5	1.56	61.0	2.40	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.2500	73.025	2.8750	22.225	0.8750	22.225	0.8750	17.462	0.6875	3.6	0.14	3.2	0.13	68.8	65.7	9.55	**02875**	**02820**	17.1	0.67	45.5	1.79	39.5	1.56	62.0	2.44	68.0	2.68	0.45	1.32	0.73	16.0	12.4	1.29
	1.2500	73.025	2.8750	22.225	0.8750	22.225	0.8750	17.462	0.6875	3.6	0.14	0.8	0.03	68.8	65.7	9.55	**02875**	**02830**	17.1	0.67	45.5	1.79	39.5	1.56	64.0	2.52	69.0	2.72	0.45	1.32	0.73	16.0	12.4	1.29
	1.2500	73.025	2.8750	22.225	0.8750	22.225	0.8750	17.462	0.6875	0.8	0.03	3.2	0.13	68.8	65.7	9.55	**02876**	**02820**	17.1	0.67	40.0	1.57	39.5	1.56	62.0	2.44	68.0	2.68	0.45	1.32	0.73	16.0	12.4	1.29
	1.2500	73.025	2.8750	22.225	0.8750	23.812	0.9375	17.462	0.6875	3.6	0.14	3.2	0.13	80.3	78.1	11.5	**2875**	**2820**	16.3	0.64	44.5	1.75	39.0	1.54	62.0	2.44	68.0	2.68	0.37	1.63	0.89	18.6	11.7	1.59

Note 1) SP indicates the specially chamfered from.

TS type
d (31.750) ~ 33.338 mm
(1.2500) ~ 1.3125 inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

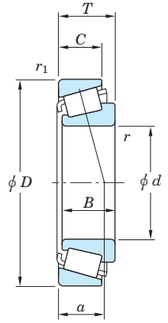
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

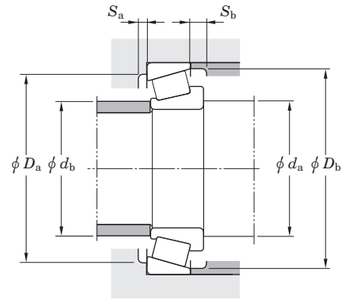
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)					Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	(500 rpm for 3 000 Hrs.) Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	C_r	C_{0r}	C_u			mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
31.750	1.2500	73.025	2.8750	22.225	0.8750	23.812	0.9375	17.462	0.6875	0.8	0.03	0.8	0.03	80.3	78.1	11.5	**2879**	**2821**	16.3	0.64	39.0	1.54	39.0	1.54	65.0	2.56	68.0	2.68	0.37	1.63	0.89	18.6	11.7	1.59
	1.2500	73.025	2.8750	26.543	1.0450	25.400	1.0000	21.000	0.8268	1.6	0.06	2.4	0.09	83.8	87.4	12.4	**HM88644**	**HM88612**	21.8	0.86	45.0	1.77	42.5	1.67	60.0	2.36	69.0	2.72	0.55	1.10	0.60	19.6	18.3	1.07
	1.2500	73.025	2.8750	26.988	1.0625	26.975	1.0620	22.225	0.8750	3.6	0.14	1.6	0.06	97.2	94.1	13.9	**23685**	**23620**	18.8	0.74	45.0	1.77	40.0	1.57	64.0	2.52	68.0	2.68	0.37	1.62	0.89	22.6	14.2	1.58
	1.2500	73.025	2.8750	29.370	1.1563	27.783	1.0938	23.020	0.9063	1.2	0.05	3.2	0.13	93.0	101	14.2	**HM88542**	**HM88510**	23.4	0.92	45.5	1.79	42.5	1.67	59.0	2.32	70.0	2.76	0.55	1.10	0.60	21.7	20.3	1.07
	1.2500	73.812	2.9060	29.370	1.1563	27.783	1.0938	23.020	0.9063	1.2	0.05	3.2	0.13	93.0	101	14.2	**HM88542**	**HM88512**	23.4	0.92	45.5	1.79	42.5	1.67	59.0	2.32	70.0	2.76	0.55	1.10	0.60	21.7	20.3	1.07
	1.2500	76.200	3.0000	29.370	1.1563	28.575	1.1250	23.020	0.9063	0.8	0.03	0.8	0.03	99.5	107	15.2	**HM89440**	**HM89411**	23.9	0.94	45.5	1.79	44.5	1.75	65.0	2.56	73.0	2.87	0.55	1.10	0.60	23.2	21.7	1.07
	1.2500	79.375	3.1250	29.370	1.1563	29.771	1.1721	23.812	0.9375	1.6	0.06	3.2	0.13	109	105	15.7	**3476X**	**3420**	20.8	0.82	43.0	1.69	41.0	1.61	67.0	2.64	74.0	2.91	0.37	1.64	0.90	25.5	15.9	1.60
	1.2500	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	0.8	0.03	1.2	0.05	85.0	74.8	11.4	**346**	**332**	15.1	0.59	40.0	1.57	39.5	1.56	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.2500	80.167	3.1562	29.370	1.1563	29.771	1.1721	23.812	0.9375	1.2	0.05	3.2	0.13	109	105	15.7	**3476**	**3422**	20.8	0.82	43.0	1.69	41.0	1.61	68.0	2.68	74.0	2.91	0.37	1.64	0.90	25.5	15.9	1.60
	1.2500	95.250	3.7500	27.783	1.0938	29.901	1.1772	22.225	0.8750	0.8	0.03	0.8	0.03	129	122	18.8	**443**	**432A**	18.4	0.72	42.0	1.65	41.0	1.61	84.0	3.31	87.0	3.43	0.28	2.11	1.16	30.0	14.6	2.06
31.986	1.2593	72.233	2.8438	25.400	1.0000	25.400	1.0000	19.842	0.7812	3.2	0.13	2.4	0.09	83.8	87.4	12.4	**HM88638**	**HM88610**	20.7	0.81	48.5	1.91	42.5	1.67	60.0	2.36	69.0	2.72	0.55	1.10	0.60	19.6	18.3	1.07
32.004	1.2600	72.000	2.8346	19.000	0.7480	18.923	0.7450	15.875	0.6250	1.6	0.06	1.6	0.06	69.8	60.0	8.85	**26126**	**26283**	14.3	0.56	39.5	1.56	37.5	1.48	62.0	2.44	65.0	2.56	0.36	1.67	0.92	16.1	9.90	1.62
32.542	1.2812	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	0.8	0.03	3.2	0.13	98.6	89.3	13.3	**3194**	**3120**	20.3	0.80	41.0	1.61	40.0	1.57	61.0	2.40	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
33.338	1.3125	66.421	2.6150	25.400	1.0000	25.357	0.9983	20.638	0.8125	0.8	0.03	3.2	0.13	89.2	85.1	12.7	**2581**	**2520**	16.0	0.63	39.5	1.56	39.0	1.54	57.0	2.24	62.5	2.46	0.27	2.19	1.21	20.7	9.65	2.14
	1.3125	66.421	2.6150	25.400	1.0000	25.357	0.9983	20.638	0.8125	3.6	0.14	3.2	0.13	89.2	85.1	12.7	**2585**	**2520**	16.0	0.63	45.0	1.77	39.0	1.54	57.0	2.24	62.5	2.46	0.27	2.19	1.21	20.7	9.65	2.14
	1.3125	66.675	2.6250	20.638	0.8125	20.638	0.8125	15.875	0.6250	3.6	0.14	1.6	0.06	58.1	54.5	7.90	**1680**	**1620**	15.7	0.62	45.0	1.77	38.5	1.52	58.0	2.28	61.0	2.40	0.37	1.62	0.89	13.5	8.55	1.58
	1.3125	68.262	2.6875	22.225	0.8750	22.225	0.8750	17.462	0.6875	0.8	0.03	1.6	0.06	70.2	71.1	10.0	**M88048**	**M88010**	19.2	0.76	42.5	1.67	41.0	1.61	58.0	2.28	65.0	2.56	0.55	1.10	0.60	16.3	15.2	1.07
	1.3125	68.956	2.7148	19.845	0.7813	19.583	0.7710	15.875	0.6250	3.6	0.14	3.2	0.13	57.7	55.0	7.95	**14130**	**14274A**	15.5	0.61	45.0	1.77	38.5	1.52	59.0	2.32	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
	1.3125	68.956	2.7148	19.845	0.7813	19.583	0.7710	15.875	0.6250	0.8	0.03	3.2	0.13	57.7	55.0	7.95	**14131**	**14274A**	15.5	0.61	39.5	1.56	38.5	1.52	59.0	2.32	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
	1.3125	69.012	2.7170	22.385	0.8813	19.583	0.7710	18.415	0.7250	3.6	0.14	2.4	0.09	57.7	55.0	7.95	**14130**	**14277**	18.0	0.71	45.0	1.77	38.5	1.52	59.0	2.32	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
	1.3125	69.723	2.7450	19.050	0.7500	18.923	0.7450	19.050	0.7500	3.6	0.14	1.6	0.06	69.8	60.0	8.85	**26131**	**26274**	14.3	0.56	44.5	1.75	38.5	1.52	62.0	2.44	65.0	2.56	0.36	1.67	0.92	16.1	9.90	1.62
	1.3125	72.000	2.8346	19.000	0.7480	18.923	0.7450	15.875	0.6250	3.6	0.14	1.6	0.06	59.4	60.0	7.25	**26131**	**26283**	14.3	0.56	44.5	1.75	38.5	1.52	62.0	2.44	65.0	2.56	0.36	1.67	0.92	16.1	9.90	1.62
	1.3125	72.000	2.8346	19.000	0.7480	18.923	0.7450	15.875	0.6250	1.6	0.06	1.6	0.06	69.8	60.0	8.85	**26132**	**26283**	14.3	0.56	40.5	1.59	38.0	1.50	62.0	2.44	65.0	2.56	0.36	1.67	0.92	16.1	9.90	1.62
	1.3125	72.238	2.8440	20.638	0.8125	20.638	0.8125	15.875	0.6250	3.6	0.14	1.2	0.05	62.3	61.3	8.90	**16131**	**16284**	16.6	0.65	46.0	1.81	39.5	1.56	63.0	2.48	67.0	2.64	0.40	1.49	0.82	14.4	9.90	1.46
	1.3125	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	3.6	0.14	1.8	0.07	98.6	89.3	13.3	**3196**	**3130**	20.3	0.80	47.0	1.85	40.5	1.59	63.0	2.48	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.3125	72.626	2.8593	30.162	1.1875	29.997	1.1810	23.812	0.9375	0.8	0.03	0.8	0.03	98.6	89.3	13.3	**3197**	**3130**	20.3	0.80	41.5	1.63	40.5	1.59	63.0	2.48	67.0	2.64	0.33	1.80	0.99	23.0	13.1	1.76
	1.3125	73.025	2.8750	22.225	0.8750	23.812	0.9375	17.462	0.6875	3.6	0.14	0.8	0.03	80.3	78.1	11.5	**2876**	**2821**	16.3	0.64	46.0	1.81	40.0	1.57	65.0	2.56	68.0	2.68	0.37	1.63	0.89	18.6	11.7	1.59
	1.3125	73.025	2.8750	23.812	0.9375	25.654	1.0100	19.050	0.7500	1.6	0.06	0.8	0.03	92.6	92.2	13.8	**2790R**	**2735X**	15.9	0.63	42.0	1.65	40.0	1.57	66.0	2.60	69.0	2.72	0.30	1.98	1.09	21.5	11.1	1.93
	1.3125	73.025	2.8750	29.370	1.1563	27.783	1.0938	23.020	0.9063	0.8	0.03	3.2	0.13	93.0	101	14.2	**HM88547**	**HM88510**	23.4	0.92	45.5	1.79	42.6	1.68	59.0	2.32	70.0	2.76	0.55	1.10	0.60	21.7	20.3	1.07
	1.3125	74.612	2.9375	23.812	0.9375	25.654	1.0100	19.050	0.7500	3.6	0.14	0.8	0.03	92.6	92.2	13.8	**2785R**	**2736**	15.9	0.63	46.0	1.81	40.0	1.57	66.0	2.60	70.0	2.76	0.30	1.98	1.09	21.5	11.1	1.93
	1.3125	76.200	3.0000	19.000	0.7480	18.923	0.7450	15.875	0.6250	3.6	0.14	1.6	0.06	69.8	60.0	8.85	**26131**	**26300**	14.3	0.56	44.5	1.75	38.5	1.52	64.0	2.52	67.0	2.64	0.36	1.67	0.92	16.1	9.90	1.62
	1.3125	76.200	3.0000	23.812	0.9375	25.654	1.0100	19.050	0.7500	3.6	0.14	0.8	0.03	92.6	92.2	13.8	**2785R**	**2729**	15.9	0.63	46.0	1.81	40.0	1.57	68.0	2.68	70.0	2.76	0.30	1.98	1.09	21.5	11.1	1.93
	1.3125	76.200	3.0000	29.370	1.1563	28.575	1.1250	23.020	0.9063	0.8	0.03	3.2	0.13	99.5	107	15.2	**HM89443**	**HM89410**	23.9	0.94	46.5	1.83	44.6	1.76	62.0	2.44	73.0	2.87	0.55	1.10	0.60	23.2	21.7	1.07
	1.3125	76.200	3.0000	29.370	1.1563	28.575	1.1250	23.812	0.9375	0.8	0.03	1.2	0.05	101	97.4	14.4	**31590**	**31521**	21.6	0.85	43.0	1.69	42.5	1.67	66.0	2.60	72.0	2.83	0.40	1.49	0.82	23.6	16.2	1.46
	1.3125	79.375	3.1250	29.370	1.1563	29.771	1.1721	23.812	0.9375	3.6	0.14	3.2	0.13	109	105	15.7	**3477**	**3420**	20.8	0.82	47.5	1.87	41.0	1.61	67.0	2.64	74.0	2.91	0.37	1.64	0.90	25.5	15.9	1.60
	1.3125	79.375	3.1250	29.370	1.1563	29.771	1.1721	23.812	0.9375	0.8	0.03	3.2	0.13	109	105	15.7	**3483**	**3420**	20.8	0.82	41.0	1.61	41.0	1.61	67.0	2.64	74.0	2.91	0.37	1.64	0.90	25.5	15.9	1.60
	1.3125	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	0.8	0.03	1.2	0.05	85.0	74.8	11.4	**335S**	**332**	15.1	0.59	41.5	1.63	40.5	1.59	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.3125	80.167	3.1562	29.370	1.1563	29.771	1.1721	23.812	0.9375	3.6	0.14	3.2	0.13	109	105	15.7	**3477**	**3422**	20.8	0.82	47.5	1.87	41.0	1.61	68.0	2.68	74.0	2.91	0.37	1.64	0.90	25.5	15.9	1.60

Note 1) SP indicates the specially chamfered from.

TS type

d 34.925 ~ (34.980) mm
1.3750 ~ (1.3772) inch





$P = XF_r + YF_a$
$P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$

$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

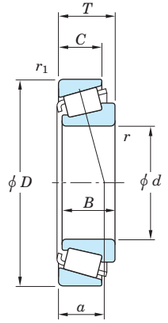
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

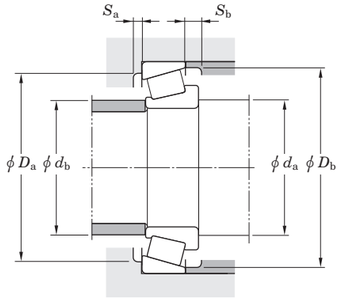
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
34.925	1.3750	65.088	2.5625	18.034	0.7100	18.288	0.7200	13.970	0.5500	SP	SP	1.2	0.05	60.0	58.5	8.40	**LM48548**	**LM48510**	14.3	0.56	46.0	1.81	40.0	1.57	58.0	2.28	61.0	2.40	0.38	1.59	0.88	13.8	8.90	1.55
	1.3750	68.956	2.7148	19.845	0.7813	19.583	0.7710	15.875	0.6250	1.6	0.06	3.2	0.13	57.7	55.0	7.95	**14137A**	**14274A**	15.5	0.61	42.0	1.65	40.0	1.57	59.0	2.32	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
	1.3750	68.956	2.7148	19.845	0.7813	19.583	0.7710	15.875	0.6250	3.6	0.14	3.2	0.13	57.7	55.0	7.95	**14138A**	**14274A**	15.5	0.61	46.0	1.81	40.0	1.57	59.0	2.32	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
	1.3750	69.012	2.7170	26.982	1.0623	26.721	1.0520	15.875	0.6250	0.8	0.03	1.2	0.05	57.7	55.0	7.95	**14136A**	**14276**	22.6	0.89	40.0	1.57	38.0	1.50	60.0	2.36	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
	1.3750	72.233	2.8438	25.400	1.0000	25.400	1.0000	19.842	0.7812	2.4	0.09	2.4	0.09	83.8	87.4	12.4	**HM88649**	**HM88610**	20.7	0.81	48.5	1.91	42.5	1.67	60.0	2.36	69.0	2.72	0.55	1.10	0.60	19.6	18.3	1.07
	1.3750	72.238	2.8440	20.638	0.8125	20.638	0.8125	15.875	0.6250	3.6	0.14	1.2	0.05	62.3	61.3	8.90	**16137**	**16284**	16.6	0.65	46.5	1.83	40.5	1.59	63.0	2.48	67.0	2.64	0.40	1.49	0.82	14.4	9.90	1.46
	1.3750	73.025	2.8750	22.225	0.8750	22.225	0.8750	17.462	0.6875	3.6	0.14	3.2	0.13	68.8	65.7	9.55	**02877**	**02820**	18.4	0.72	48.5	1.91	42.0	1.65	62.0	2.44	68.0	2.68	0.45	1.32	0.73	16.0	12.4	1.29
	1.3750	73.025	2.8750	22.225	0.8750	22.225	0.8750	17.462	0.6875	3.6	0.14	0.8	0.03	68.8	65.7	9.55	**02877**	**02830**	18.4	0.72	48.5	1.91	42.0	1.65	64.0	2.52	69.0	2.72	0.45	1.32	0.73	16.0	12.4	1.29
	1.3750	73.025	2.8750	22.225	0.8750	22.225	0.8750	17.462	0.6875	0.8	0.03	3.2	0.13	68.8	65.7	9.55	**02878**	**02820**	18.4	0.72	42.5	1.67	42.0	1.65	62.0	2.44	68.0	2.68	0.45	1.32	0.73	16.0	12.4	1.29
	1.3750	73.025	2.8750	22.225	0.8750	23.812	0.9375	17.462	0.6875	3.6	0.14	3.2	0.13	80.3	78.1	11.5	**2877**	**2820**	16.3	0.64	47.5	1.87	41.0	1.61	62.0	2.44	68.0	2.68	0.37	1.63	0.89	18.6	11.7	1.59
	1.3750	73.025	2.8750	22.225	0.8750	23.812	0.9375	17.462	0.6875	0.8	0.03	0.8	0.03	80.3	78.1	11.5	**2878**	**2821**	16.3	0.64	42.5	1.67	41.0	1.61	65.0	2.56	68.0	2.68	0.37	1.63	0.89	18.6	11.7	1.59
	1.3750	73.025	2.8750	23.812	0.9375	24.608	0.9688	19.050	0.7500	1.6	0.06	0.8	0.03	90.1	87.3	13.1	**25877R**	**25821**	15.8	0.62	43.0	1.69	40.5	1.59	65.0	2.56	68.0	2.68	0.29	2.07	1.14	20.9	10.4	2.02
	1.3750	73.025	2.8750	23.812	0.9375	24.608	0.9688	19.050	0.7500	3.6	0.14	2.4	0.09	90.1	87.3	13.1	**25878R**	**25820**	15.8	0.62	47.0	1.85	40.5	1.59	64.0	2.52	68.0	2.68	0.29	2.07	1.14	20.9	10.4	2.02
	1.3750	73.025	2.8750	23.812	0.9375	25.654	1.0100	19.050	0.7500	5.2	0.20	0.8	0.03	92.6	92.2	13.8	**2786R**	**2735X**	15.9	0.63	51.0	2.01	41.0	1.61	66.0	2.60	69.0	2.72	0.30	1.98	1.09	21.5	11.1	1.93
	1.3750	73.025	2.8750	26.988	1.0625	26.975	1.0620	22.225	0.8750	3.6	0.14	1.6	0.06	97.2	94.1	13.9	**23690**	**23620**	18.8	0.74	49.0	1.93	42.0	1.65	64.0	2.52	68.0	2.68	0.37	1.62	0.89	22.6	14.2	1.58
	1.3750	76.200	3.0000	20.638	0.8125	20.940	0.8244	15.507	0.6105	1.6	0.06	1.2	0.05	71.6	65.9	9.70	**28137**	**28300**	16.5	0.65	43.5	1.71	41.0	1.61	68.0	2.68	71.0	2.80	0.40	1.49	0.82	16.5	11.3	1.46
	1.3750	76.200	3.0000	23.812	0.9375	25.654	1.0100	19.050	0.7500	0.8	0.03	1.6	0.06	92.6	92.2	13.8	**2793R**	**2729X**	15.9	0.63	42.0	1.65	41.0	1.61	67.0	2.64	70.0	2.76	0.30	1.98	1.09	21.5	11.1	1.93
	1.3750	76.200	3.0000	23.812	0.9375	25.654	1.0100	19.050	0.7500	3.6	0.14	3.2	0.13	92.6	92.2	13.8	**2796R**	**2720**	15.9	0.63	47.5	1.87	41.0	1.61	66.0	2.60	70.0	2.76	0.30	1.98	1.09	21.5	11.1	1.93
	1.3750	76.200	3.0000	29.370	1.1563	28.575	1.1250	23.020	0.9063	3.6	0.14	0.8	0.03	99.5	107	15.2	**HM89446**	**HM89411**	23.9	0.94	53.0	2.09	44.5	1.75	65.0	2.56	73.0	2.87	0.55	1.10	0.60	23.2	21.7	1.07
	1.3750	76.200	3.0000	29.370	1.1563	28.575	1.1250	23.812	0.9375	3.6	0.14	1.2	0.05	101	97.4	14.4	**31593**	**31521**	21.6	0.85	50.0	1.97	43.5	1.71	66.0	2.60	72.0	2.83	0.40	1.49	0.82	23.6	16.2	1.46
	1.3750	76.200	3.0000	29.370	1.1563	28.575	1.1250	23.812	0.9375	1.6	0.06	3.2	0.13	101	97.4	14.4	**31594**	**31520**	21.6	0.85	46.0	1.81	43.5	1.71	64.0	2.52	72.0	2.83	0.40	1.49	0.82	23.6	16.2	1.46
	1.3750	79.375	3.1250	29.370	1.1563	29.771	1.1721	23.812	0.9375	3.6	0.14	3.2	0.13	109	105	15.7	**3478**	**3420**	20.8	0.82	50.0	1.97	43.5	1.71	67.0	2.64	74.0	2.91	0.37	1.64	0.90	25.5	15.9	1.60
	1.3750	79.375	3.1250	29.370	1.1563	29.771	1.1721	23.812	0.9375	0.8	0.03	3.2	0.13	109	105	15.7	**3482**	**3420**	20.8	0.82	44.0	1.73	43.5	1.71	67.0	2.64	74.0	2.91	0.37	1.64	0.90	25.5	15.9	1.60
	1.3750	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	0.8	0.03	1.2	0.05	85.0	74.8	11.4	**335**	**332**	15.1	0.59	42.5	1.67	41.5	1.63	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.3750	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	1.2	0.05	1.2	0.05	85.0	74.8	11.4	**340**	**332**	15.1	0.59	43.5	1.71	41.5	1.63	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.3750	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	3.6	0.14	1.2	0.05	85.0	74.8	11.4	**343**	**332**	15.1	0.59	47.5	1.87	41.5	1.63	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.3750	80.000	3.1496	24.176	0.9518	22.403	0.8820	21.000	0.8268	0.8	0.03	2.4	0.09	85.0	74.8	11.4	**335**	**332A**	18.3	0.72	42.5	1.67	41.5	1.63	71.0	2.80	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.3750	80.000	3.1496	24.176	0.9518	22.403	0.8820	21.000	0.8268	3.6	0.14	2.4	0.09	85.0	74.8	11.4	**343**	**332A**	18.3	0.72	47.5	1.87	41.5	1.63	71.0	2.80	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.3750	80.000	3.1496	29.370	1.1563	30.391	1.1965	23.812	0.9375	3.6	0.14	3.2	0.13	114	106	16.2	**3379**	**3325**	18.7	0.74	48.0	1.89	41.5	1.63	70.0	2.76	75.0	2.95	0.27	2.20	1.21	26.6	12.4	2.14
	1.3750	80.035	3.1510	24.608	0.9688	23.698	0.9330	18.512	0.7288	0.8	0.03	1.6	0.06	91.6	91.6	13.3	**27875**	**27820**	22.2	0.87	45.5	1.79	44.5	1.75	68.0	2.68	75.0	2.95	0.56	1.07	0.59	21.2	20.3	1.04
	1.3750	85.725	3.3750	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	1.2	0.05	135	136	20.3	**3872**	**3821**	22.9	0.90	53.0	2.09	46.0	1.81	75.0	2.95	81.0	3.19	0.40	1.49	0.82	31.5	21.7	1.46
	1.3750	85.725	3.3750	30.162	1.1875	30.162	1.1875	23.812	0.9375	0.8	0.03	3.2	0.13	135	136	20.3	**3872A**	**3820**	22.9	0.90	46.0	1.81	46.0	1.81	73.0	2.87	81.0	3.19	0.40	1.49	0.82	31.5	21.7	1.46
	1.3750	87.312	3.4375	30.162	1.1875	30.886	1.2160	23.812	0.9375	3.6	0.14	3.2	0.13	120	120	18.2	**3581R**	**3525**	20.5	0.81	48.0	1.89	45.5	1.79	75.0	2.95	81.0	3.19	0.31	1.96	1.08	27.9	14.6	1.91
	1.3750	88.501	3.4843	26.988	1.0625	29.083	1.1450	22.225	0.8750	0.8	0.03	1.6	0.06	123	112	17.2	**417**	**414**	16.9	0.67	42.5	1.67	42.0	1.65	77.0	3.03	80.0	3.15	0.26	2.28	1.25	28.6	12.9	2.22
	1.3750	90.488	3.5625	39.688	1.5625	40.386	1.5900	33.338	1.3125	3.6	0.14	3.2	0.13	166	169	25.9	**4368**	**4335**	25.6	1.01	51.0	2.01	46.0	1.81	77.0	3.03	85.0	3.35	0.28	2.11	1.16	38.8	18.9	2.06
	1.3750	95.250	3.7500	27.783	1.0938	29.901	1.1772	22.225	0.8750	0.8	0.03	2.4	0.09	129	122	18.8	**449**	**432**	18.4	0.72	44.0	1.73	43.5	1.71	83.0	3.27	87.0	3.43	0.28	2.11	1.16	30.0	14.6	2.06
34.976	1.3770	68.262	2.6875	15.875	0.6250	16.520	0.6504	11.908	0.4688	1.6	0.06	1.6	0.06	57.6	53.8	7.70	**19138R**	**19268**	14.5	0.57	42.5	1.67	40.5	1.59	61.0	2.40	65.0	2.56	0.44	1.35	0.74	13.2	10.0	1.32
	1.3770	68.956	2.7148	19.845	0.7813	19.583	0.7710	15.875	0.6250	1.2	0.05	3.2	0.13	57.7	55.0	7.95	**14139**	**14274A**	15.5	0.61	41.5	1.63	40.0	1.57	59.0	2.32	63.0	2.48	0.38	1.57	0.86	13.4	8.70	1.53
	1.3770	80.000	3.1496	21.006	0.8270	20.940	0.8244	15.875	0.6250	1.6	0.06	1.6	0.06	71.6	65.9	9.70	**28138**	**28315**	16.5	0.65	43.5	1.71	41.0	1.61	69.0	2.72	73.0	2.87	0.40	1.49	0.82	16.5	11.3	1.46
34.980	1.3772	59.131	2.3280	15.875	0.6250	16.764	0.6600	11.938	0.4700	SP	SP	1.2	0.05	44.9	48.5	6.85	**L68149**	**L68110**	13.2	0.52	45.5	1.79	39.0	1.54	53.0	2.09	56.0	2.20	0.42	1.44	0.79	10.3	7.35	1.41

Note 1) SP indicates the specially chamfered from.

TS type

d (34.980) ~ (36.512) mm
(1.3772) ~ (1.4375) inch





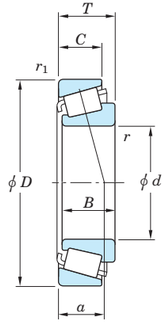
$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

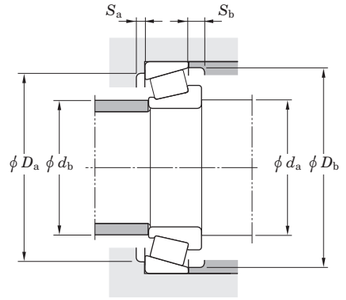
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
34.980	1.3772	59.975	2.3612	15.875	0.6250	16.764	0.6600	11.938	0.4700	SP	SP	1.2	0.05	44.9	48.5	6.85	**L68149**	**L68111**	13.2	0.52	45.5	1.79	39.0	1.54	53.0	2.09	56.0	2.20	0.42	1.44	0.79	10.3	7.35	1.41
34.988	1.3775	61.973	2.4399	16.700	0.6575	17.000	0.6693	13.599	0.5354	SP	SP	1.0	0.04	51.2	52.8	7.45	**LM78349**	**LM78310**	14.5	0.57	46.0	1.81	40.0	1.57	54.0	2.13	59.0	2.32	0.44	1.35	0.74	11.8	8.95	1.32
	1.3775	65.987	2.5979	20.638	0.8125	20.638	0.8125	16.670	0.6563	3.6	0.14	2.4	0.09	70.7	67.0	10.3	**M38547**	**M38511**	15.1	0.59	46.0	1.81	39.5	1.56	59.0	2.32	62.0	2.44	0.35	1.70	0.93	15.7	9.50	1.66
35.000	1.3780	73.025	2.8750	26.988	1.0625	26.975	1.0620	22.225	0.8750	3.6	0.14	0.8	0.03	97.2	94.1	13.9	**23691**	**23621**	18.8	0.74	49.0	1.93	42.0	1.65	63.0	2.48	68.0	2.68	0.37	1.62	0.89	22.6	14.2	1.58
	1.3780	77.788	3.0625	26.988	1.0625	26.975	1.0620	22.225	0.8750	3.6	0.14	0.8	0.03	97.2	94.1	13.9	**23691**	**23623**	18.8	0.74	49.0	1.93	42.0	1.65	65.0	2.56	71.0	2.80	0.37	1.62	0.89	22.6	14.2	1.58
	1.3780	79.375	3.1250	23.812	0.9375	25.400	1.0000	19.050	0.7500	0.8	0.03	0.8	0.03	101	105	15.8	**26883R**	**26822**	16.4	0.65	42.5	1.67	42.0	1.65	71.0	2.80	74.0	2.91	0.32	1.88	1.04	23.5	12.8	1.83
	1.3780	79.375	3.1250	29.370	1.1563	29.771	1.1721	23.812	0.9375	1.6	0.06	3.2	0.13	109	105	15.7	**3480**	**3420**	20.8	0.82	44.5	1.75	42.5	1.67	67.0	2.64	74.0	2.91	0.37	1.64	0.90	25.5	15.9	1.60
	1.3780	79.375	3.1250	29.370	1.1563	29.771	1.1721	23.812	0.9375	3.6	0.14	3.2	0.13	109	105	15.7	**3492X**	**3420**	20.8	0.82	49.0	1.93	44.0	1.73	67.0	2.64	74.0	2.91	0.37	1.64	0.90	25.5	15.9	1.60
	1.3780	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	0.8	0.03	1.2	0.05	85.0	74.8	11.4	**339**	**332**	15.1	0.59	42.5	1.67	41.5	1.63	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.3780	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	2.0	0.08	1.2	0.05	85.0	74.8	11.4	**339X**	**332**	15.1	0.59	45.5	1.79	41.5	1.63	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.3780	80.000	3.1496	24.176	0.9518	22.403	0.8820	21.000	0.8268	0.8	0.03	1.2	0.05	85.0	74.8	11.4	**339**	**332A**	18.3	0.72	42.5	1.67	41.5	1.63	71.0	2.80	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.3780	80.167	3.1562	25.400	1.0000	25.400	1.0000	20.638	0.8125	0.8	0.03	3.2	0.13	101	105	15.8	**26883R**	**26820**	18.0	0.71	42.5	1.67	42.0	1.65	69.0	2.72	74.0	2.91	0.32	1.88	1.04	23.5	12.8	1.83
	1.3780	88.501	3.4843	26.988	1.0625	29.083	1.1450	22.225	0.8750	0.8	0.03	1.6	0.06	123	112	17.2	**421**	**414**	16.9	0.67	42.5	1.67	42.0	1.65	77.0	3.03	80.0	3.15	0.26	2.28	1.25	28.6	12.9	2.22
	1.3780	88.501	3.4843	26.988	1.0625	29.083	1.1450	22.225	0.8750	0.8	0.03	3.2	0.13	123	112	17.2	**421**	**414A**	16.9	0.67	42.5	1.67	42.0	1.65	76.0	2.99	79.0	3.11	0.26	2.28	1.25	28.6	12.9	2.22
	1.3780	95.250	3.7500	27.783	1.0938	29.901	1.1772	22.225	0.8750	3.6	0.14	2.4	0.09	129	122	18.8	**441**	**432**	18.4	0.72	49.0	1.93	43.5	1.71	83.0	3.27	87.0	3.43	0.28	2.11	1.16	30.0	14.6	2.06
35.306	1.3900	73.025	2.8750	22.225	0.8750	23.812	0.9375	17.462	0.6875	3.6	0.14	3.2	0.13	80.3	78.1	11.5	**2880**	**2820**	16.3	0.64	48.0	1.89	42.0	1.65	62.0	2.44	68.0	2.68	0.37	1.63	0.89	18.6	11.7	1.59
35.717	1.4062	72.233	2.8438	25.400	1.0000	25.400	1.0000	19.842	0.7812	3.6	0.14	2.4	0.09	83.8	87.4	12.4	**HM88648**	**HM88610**	20.7	0.81	52.0	2.05	42.5	1.67	60.0	2.36	69.0	2.72	0.55	1.10	0.60	19.6	18.3	1.07
36.449	1.4350	73.025	2.8750	22.225	0.8750	22.225	0.8750	17.462	0.6875	0.8	0.03	3.2	0.13	68.8	65.7	9.55	**02884**	**02820**	18.4	0.72	44.5	1.75	42.0	1.65	62.0	2.44	69.0	2.72	0.45	1.32	0.73	16.0	12.4	1.29
36.487	1.4365	73.025	2.8750	23.812	0.9375	24.608	0.9688	19.050	0.7500	1.6	0.06	0.8	0.03	90.1	87.3	13.1	**25880R**	**25821**	15.8	0.62	44.0	1.73	42.0	1.65	65.0	2.56	68.0	2.68	0.29	2.07	1.14	20.9	10.4	2.02
	1.4365	73.025	2.8750	23.812	0.9375	25.654	1.0100	19.050	0.7500	1.6	0.06	0.8	0.03	92.6	92.2	13.8	**2780R**	**2735X**	15.9	0.63	44.5	1.75	42.5	1.67	66.0	2.60	69.0	2.72	0.30	1.98	1.09	21.5	11.1	1.93
	1.4365	73.025	2.8750	23.812	0.9375	25.654	1.0100	19.050	0.7500	3.6	0.14	0.8	0.03	92.6	92.2	13.8	**2794R**	**2735X**	15.9	0.63	49.0	1.93	42.5	1.67	66.0	2.60	69.0	2.72	0.30	1.98	1.09	21.5	11.1	1.93
	1.4365	79.375	3.1250	25.400	1.0000	25.654	1.0100	20.638	0.8125	1.6	0.06	3.2	0.13	92.6	92.2	13.8	**2780R**	**2734**	17.5	0.69	44.5	1.75	42.5	1.67	68.0	2.68	70.0	2.76	0.30	1.98	1.09	21.5	11.1	1.93
	1.4365	80.167	3.1562	29.370	1.1563	30.391	1.1965	23.812	0.9375	3.6	0.14	3.2	0.13	114	106	16.2	**3378**	**3320**	18.7	0.74	49.0	1.93	44.5	1.75	70.0	2.76	75.0	2.95	0.27	2.20	1.21	26.6	12.4	2.14
	1.4365	81.755	3.2187	29.370	1.1563	30.391	1.1965	23.812	0.9375	3.6	0.14	3.2	0.13	114	106	16.2	**3378**	**3329**	18.7	0.74	49.0	1.93	44.5	1.75	71.0	2.80	75.0	2.95	0.27	2.20	1.21	26.6	12.4	2.14
36.512	1.4375	68.262	2.6875	15.875	0.6250	16.520	0.6504	11.908	0.4688	1.6	0.06	1.6	0.06	57.6	53.8	7.70	**19143R**	**19268**	14.5	0.57	44.0	1.73	42.0	1.65	61.0	2.40	65.0	2.56	0.44	1.35	0.74	13.2	10.0	1.32
	1.4375	69.012	2.7170	19.050	0.7500	19.050	0.7500	15.083	0.5938	3.6	0.14	0.8	0.03	61.7	62.0	8.95	**13682**	**13620**	16.1	0.63	48.0	1.89	41.5	1.63	62.0	2.44	65.0	2.56	0.40	1.49	0.82	14.2	9.75	1.46
	1.4375	71.438	2.8125	15.875	0.6250	16.520	0.6504	11.908	0.4688	1.6	0.06	1.0	0.04	57.6	53.8	7.70	**19143R**	**19281**	14.5	0.57	44.0	1.73	42.0	1.65	63.0	2.48	66.0	2.60	0.44	1.35	0.74	13.2	10.0	1.32
	1.4375	71.996	2.8345	17.018	0.6700	16.520	0.6504	14.288	0.5625	1.6	0.06	1.6	0.06	57.6	53.8	7.70	**19143R**	**19283**	15.7	0.62	44.0	1.73	42.0	1.65	63.0	2.48	66.0	2.60	0.44	1.35	0.74	13.2	10.0	1.32
	1.4375	71.996	2.8345	19.000	0.7480	20.638	0.8125	14.237	0.5605	3.6	0.14	1.6	0.06	62.3	61.3	8.90	**16143**	**16282**	15.0	0.59	48.5	1.91	42.0	1.65	63.0	2.48	67.0	2.64	0.40	1.49	0.82	14.4	9.90	1.46
	1.4375	72.238	2.8440	20.638	0.8125	20.638	0.8125	15.875	0.6250	3.6	0.14	1.2	0.05	62.3	61.3	8.90	**16143**	**16284**	16.6	0.65	48.5	1.91	42.0	1.65	63.0	2.48	67.0	2.64	0.40	1.49	0.82	14.4	9.90	1.46
	1.4375	76.200	3.0000	29.370	1.1563	28.575	1.1250	23.020	0.9063	0.8	0.03	0.8	0.03	99.5	107	15.2	**HM89448**	**HM89411**	23.9	0.94	48.5	1.91	44.5	1.75	65.0	2.56	73.0	2.87	0.55	1.10	0.60	23.2	21.7	1.07
	1.4375	76.200	3.0000	29.370	1.1563	28.575	1.1250	23.020	0.9063	3.6	0.14	0.8	0.03	99.5	107	15.2	**HM89449**	**HM89411**	23.9	0.94	54.0	2.13	44.5	1.75	65.0	2.56	73.0	2.87	0.55	1.10	0.60	23.2	21.7	1.07
	1.4375	76.200	3.0000	29.370	1.1563	28.575	1.1250	23.812	0.9375	3.6	0.14	1.2	0.05	101	97.4	14.4	**31597**	**31521**	21.6	0.85	51.0	2.01	44.5	1.75	66.0	2.60	72.0	2.83	0.40	1.49	0.82	23.6	16.2	1.46
	1.4375	79.375	3.1250	23.812	0.9375	25.400	1.0000	19.050	0.7500	0.8	0.03	0.8	0.03	101	105	15.8	**26877R**	**26822**	16.4	0.65	44.0	1.73	43.0	1.69	71.0	2.80	74.0	2.91	0.32	1.88	1.04	23.5	12.8	1.83
	1.4375	79.375	3.1250	29.370	1.1563	29.771	1.1721	23.812	0.9375	0.8	0.03	3.2	0.13	109	105	15.7	**3479**	**3420**	20.8	0.82	45.5	1.79	44.5	1.75	67.0	2.64	74.0	2.91	0.37	1.64	0.90	25.5	15.9	1.60
	1.4375	82.550	3.2500	23.812	0.9375	25.400	1.0000	19.050	0.7500	3.6	0.14	2.0	0.08	96.8	100	15.1	**25570**	**25519**	17.5	0.69	51.0	2.01	45.0	1.77	73.0	2.87	77.0	3.03	0.33	1.79	0.99	22.5	12.9	1.75
	1.4375	85.725	3.3750	30.162	1.1875	30.162	1.1875	23.812	0.9375	0.8	0.03	3.2	0.13	135	136	20.3	**3878**	**3820**	22.9	0.90	48.0	1.89	47.0	1.85	73.0	2.87	81.0	3.19	0.40	1.49	0.82	31.5	21.7	1.46
	1.4375	88.501	3.4843	26.988	1.0625	29.083	1.1450	22.225	0.8750	2.4	0.09	1.6	0.06	123	112	17.2	**424X**	**414**	16.9	0.67	47.5	1.87	43.0	1.69	77.0	3.03	80.0	3.15	0.26	2.28	1.25	28.6	12.9	2.22

Note 1) SP indicates the specially chamfered from.

TS type
d (36.512) ~ (38.100) mm
(1.4375) ~ (1.5000) inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

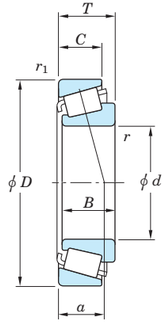
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

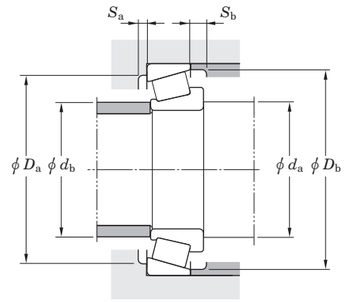
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
36.512	1.4375	93.662	3.6875	31.750	1.2500	31.750	1.2500	26.195	1.0313	1.6	0.06	3.2	0.13	132	134	20.2	**46143**	**46368**	24.0	0.94	49.0	1.93	47.5	1.87	79.0	3.11	87.0	3.43	0.40	1.49	0.82	30.8	21.1	1.46
	1.4375	93.662	3.6875	31.750	1.2500	31.750	1.2500	26.195	1.0313	1.6	0.06	1.2	0.05	132	134	20.2	**46143**	**46369**	24.0	0.94	49.0	1.93	47.5	1.87	79.0	3.11	87.0	3.43	0.40	1.49	0.82	30.8	21.1	1.46
38.100	1.5000	63.500	2.5000	12.700	0.5000	11.908	0.4688	9.525	0.3750	1.6	0.06	0.8	0.03	32.1	33.1	4.60	**13889**	**13830**	11.9	0.47	45.0	1.77	42.5	1.67	59.0	2.32	60.0	2.36	0.35	1.73	0.95	7.30	4.30	1.69
	1.5000	65.088	2.5625	12.700	0.5000	11.908	0.4688	9.525	0.3750	1.6	0.06	0.8	0.03	32.1	33.1	4.60	**13889**	**13836**	11.9	0.47	45.0	1.77	42.5	1.67	59.0	2.32	61.0	2.40	0.35	1.73	0.95	7.30	4.30	1.69
	1.5000	65.088	2.5625	18.034	0.7100	18.288	0.7200	13.970	0.5500	SP	SP	1.2	0.05	53.9	56.5	8.15	**LM29748**	**LM29710**	13.8	0.54	49.0	1.93	42.5	1.67	59.0	2.32	62.0	2.44	0.33	1.80	0.99	12.4	7.05	1.76
	1.5000	65.088	2.5625	19.812	0.7800	18.288	0.7200	15.748	0.6200	2.4	0.09	1.2	0.05	53.9	56.5	8.15	**LM29749**	**LM29711**	15.6	0.61	46.0	1.81	42.5	1.67	58.0	2.28	62.0	2.44	0.33	1.80	0.99	12.4	7.05	1.76
	1.5000	68.262	2.6875	19.997	0.7873	16.520	0.6504	16.030	0.6311	1.6	0.06	1.6	0.06	57.6	53.8	7.70	**19150R**	**19269**	18.6	0.73	45.0	1.77	43.0	1.69	63.0	2.48	66.0	2.60	0.44	1.35	0.74	13.2	10.0	1.32
	1.5000	68.275	2.6880	20.000	0.7874	16.520	0.6504	16.032	0.6312	1.6	0.06	1.6	0.06	57.6	53.8	7.70	**19150R**	**19268X**	18.7	0.74	45.0	1.77	43.0	1.69	61.0	2.40	65.0	2.56	0.44	1.35	0.74	13.2	10.0	1.32
	1.5000	69.012	2.7170	19.050	0.7500	19.050	0.7500	15.083	0.5938	3.6	0.14	0.8	0.03	61.7	62.0	8.95	**13685**	**13620**	16.1	0.63	49.5	1.95	43.0	1.69	62.0	2.44	65.0	2.56	0.40	1.49	0.82	14.2	9.75	1.46
	1.5000	69.012	2.7170	19.050	0.7500	19.050	0.7500	15.083	0.5938	2.0	0.08	2.4	0.09	61.7	62.0	8.95	**13687**	**13621**	16.1	0.63	46.5	1.83	43.0	1.69	61.0	2.40	65.0	2.56	0.40	1.49	0.82	14.2	9.75	1.46
	1.5000	69.012	2.7170	26.195	1.0313	26.187	1.0310	15.083	0.5938	1.6	0.06	2.4	0.09	61.7	62.0	8.95	**13686**	**13621**	16.1	0.63	46.5	1.83	43.0	1.69	61.0	2.40	65.0	2.56	0.40	1.49	0.82	14.2	9.75	1.46
	1.5000	69.012	2.7170	26.195	1.0313	26.195	1.0313	15.083	0.5938	1.6	0.06	0.8	0.03	61.7	62.0	8.95	**13686**	**13620**	16.1	0.63	46.5	1.83	43.0	1.69	62.0	2.44	65.0	2.56	0.40	1.49	0.82	14.2	9.75	1.46
	1.5000	69.969	2.7547	21.996	0.8660	19.050	0.7500	18.029	0.7098	3.6	0.14	1.6	0.06	61.7	62.0	8.95	**13685**	**13624**	16.1	0.63	49.5	1.95	43.0	1.69	61.0	2.40	65.0	2.56	0.40	1.49	0.82	14.2	9.75	1.46
	1.5000	71.438	2.8125	15.875	0.6250	16.520	0.6504	11.908	0.4688	1.6	0.06	1.0	0.04	57.6	53.8	7.70	**19150R**	**19281**	14.5	0.57	45.0	1.77	43.0	1.69	63.0	2.48	66.0	2.60	0.44	1.35	0.74	13.2	10.0	1.32
	1.5000	71.438	2.8125	17.462	0.6875	16.520	0.6504	15.875	0.6250	1.6	0.06	1.6	0.06	57.6	53.8	7.70	**19150R**	**19282**	16.1	0.63	45.0	1.77	43.0	1.69	63.0	2.48	66.0	2.60	0.44	1.35	0.74	13.2	10.0	1.32
	1.5000	71.996	2.8346	17.018	0.6700	16.520	0.6504	14.288	0.5625	1.6	0.06	1.6	0.06	57.6	53.8	7.70	**19150R**	**19283**	15.7	0.62	45.0	1.77	43.0	1.69	63.0	2.48	66.0	2.60	0.44	1.35	0.74	13.2	10.0	1.32
	1.5000	71.996	2.8346	19.000	0.7480	20.638	0.8125	14.237	0.5605	3.6	0.14	1.6	0.06	62.3	61.3	8.90	**16150**	**16282**	15.0	0.59	49.5	1.95	43.0	1.69	63.0	2.48	67.0	2.64	0.40	1.49	0.82	14.4	9.90	1.46
	1.5000	72.238	2.8440	20.638	0.8125	20.638	0.8125	15.875	0.6250	3.6	0.14	1.2	0.05	62.3	61.3	8.90	**16150**	**16284**	16.6	0.65	49.5	1.95	43.0	1.69	63.0	2.48	67.0	2.64	0.40	1.49	0.82	14.4	9.90	1.46
	1.5000	72.238	2.8440	20.638	0.8125	20.638	0.8125	15.875	0.6250	2.4	0.09	1.2	0.05	62.3	61.3	8.90	**16151**	**16284**	16.6	0.65	49.5	1.95	43.0	1.69	63.0	2.48	67.0	2.64	0.40	1.49	0.82	14.4	9.90	1.46
	1.5000	72.238	2.8440	23.812	0.9375	20.638	0.8125	19.050	0.7500	3.6	0.14	2.4	0.09	62.3	61.3	8.90	**16150**	**16283**	19.8	0.78	49.5	1.95	43.0	1.69	61.0	2.40	67.0	2.64	0.40	1.49	0.82	14.4	9.90	1.46
	1.5000	73.025	2.8750	23.812	0.9375	25.654	1.0100	19.050	0.7500	4.3	0.17	0.8	0.03	92.6	92.2	13.8	**2776R**	**2735X**	15.9	0.63	52.0	2.05	43.5	1.71	66.0	2.60	69.0	2.72	0.30	1.98	1.09	21.5	11.1	1.93
	1.5000	73.025	2.8750	23.812	0.9375	25.654	1.0100	19.050	0.7500	1.6	0.06	0.8	0.03	92.6	92.2	13.8	**2788AR**	**2735X**	15.9	0.63	46.0	1.81	43.5	1.71	66.0	2.60	69.0	2.72	0.30	1.98	1.09	21.5	11.1	1.93
	1.5000	73.025	2.8750	23.812	0.9375	25.654	1.0100	19.050	0.7500	3.6	0.14	0.8	0.03	92.6	92.2	13.8	**2788R**	**2735X**	15.9	0.63	50.0	1.97	43.5	1.71	66.0	2.60	69.0	2.72	0.30	1.98	1.09	21.5	11.1	1.93
	1.5000	76.200	3.0000	23.812	0.9375	25.654	1.0100	19.050	0.7500	3.6	0.14	0.8	0.03	92.6	92.2	13.8	**2788R**	**2729**	15.9	0.63	50.0	1.97	43.5	1.71	68.0	2.68	70.0	2.76	0.30	1.98	1.09	21.5	11.1	1.93
	1.5000	79.375	3.1250	23.812	0.9375	25.400	1.0000	19.050	0.7500	0.8	0.03	2.4	0.09	101	105	15.8	**26878R**	**26822A**	16.4	0.65	45.0	1.77	44.5	1.75	69.0	2.72	74.0	2.91	0.32	1.88	1.04	23.5	12.8	1.83
	1.5000	79.375	3.1250	29.370	1.1563	29.771	1.1721	23.812	0.9375	3.6	0.14	3.2	0.13	109	105	15.7	**3490**	**3420**	20.8	0.82	52.0	2.05	45.9	1.81	67.0	2.64	74.0	2.91	0.37	1.64	0.90	25.5	15.9	1.60
	1.5000	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	3.6	0.14	1.2	0.05	85.0	74.8	11.4	**347**	**332**	15.1	0.59	50.0	1.97	44.0	1.73	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.5000	80.000	3.1496	24.176	0.9518	22.403	0.8820	21.000	0.8268	0.8	0.03	2.4	0.09	85.0	74.8	11.4	**337**	**332A**	18.3	0.72	44.5	1.75	44.0	1.73	71.0	2.80	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.5000	80.035	3.1510	21.432	0.8438	20.940	0.8244	15.875	0.6250	1.6	0.06	1.6	0.06	71.6	65.9	9.70	**28150**	**28317**	16.9	0.67	45.5	1.79	43.5	1.71	69.0	2.72	73.0	2.87	0.40	1.49	0.82	16.5	11.3	1.46
	1.5000	80.035	3.1510	21.432	0.8438	20.940	0.8244	15.875	0.6250	3.6	0.14	1.6	0.06	71.6	65.9	9.70	**28151**	**28317**	16.9	0.67	45.5	1.79	43.5	1.71	69.0	2.72	73.0	2.87	0.40	1.49	0.82	16.5	11.3	1.46
	1.5000	80.035	3.1510	24.608	0.9688	23.698	0.9330	18.512	0.7288	0.8	0.03	1.6	0.06	91.6	91.6	13.3	**27880**	**27820**	22.2	0.87	48.0	1.89	47.0	1.85	68.0	2.68	75.0	2.95	0.56	1.07	0.59	21.2	20.3	1.04
	1.5000	80.035	3.1510	24.608	0.9688	23.698	0.9330	18.512	0.7288	3.6	0.14	1.6	0.06	91.6	91.6	13.3	**27881**	**27820**	22.2	0.87	53.0	2.09	47.0	1.85	68.0	2.68	75.0	2.95	0.56	1.07	0.59	21.2	20.3	1.04
	1.5000	80.035	3.1510	29.370	1.1563	30.391	1.1965	23.812	0.9375	0.8	0.03	1.6	0.06	114	106	16.2	**3387**	**3339**	18.7	0.74	45.0	1.77	44.5	1.75	71.0	2.80	75.0	2.95	0.27	2.20	1.21	26.6	12.4	2.14
	1.5000	80.167	3.1562	29.370	1.1563	30.391	1.1965	23.812	0.9375	3.6	0.14	0.8	0.03	114	106	16.2	**3381**	**3331**	18.7	0.74	51.0	2.01	44.5	1.75	72.0	2.83	75.0	2.95	0.27	2.20	1.21	26.6	12.4	2.14
	1.5000	82.550	3.2500	29.370	1.1563	28.575	1.1250	23.020	0.9063	0.8	0.03	3.2	0.13	109	117	16.9	**HM801346**	**HM801310**	24.4	0.96	51.0	2.01	49.0	1.93	68.0	2.68	78.0	3.07	0.55	1.10	0.60	25.5	23.8	1.07
	1.5000	82.550	3.2500	29.370	1.1563	28.575	1.1250	23.020	0.9063	2.4	0.09	3.2	0.13	109	117	16.9	**HM801346X**	**HM801310**	24.4	0.96	54.0	2.13	49.0	1.93	68.0	2.68	78.0	3.07	0.55	1.10	0.60	25.5	23.8	1.07
	1.5000	82.931	3.2650	23.812	0.9375	25.400	1.0000	19.050	0.7500	0.8	0.03	0.8	0.03	96.8	100	15.1	**25572**	**25520**	17.5	0.69	46.0	1.81	46.0	1.81	74.0	2.91	77.0	3.03	0.33	1.79	0.99	22.5	12.9	1.75
	1.5000	84.138	3.3125	30.162	1.1875	30.886	1.2160	23.812	0.9375	1.6	0.06	3.2	0.13	120	120	18.2	**3580R**	**3520**	20.5	0.81	48.0	1.89	45.5	1.79	74.0	2.91	79.5	3.13	0.31	1.96	1.08	27.9	14.6	1.91
	1.5000	85.725	3.3750	30.162	1.1875	30.162	1.1875	23.812	0.9375	0.8	0.03	1.2	0.05	135	136	20.3	**3875**	**3821**	22.9	0.90	49.5	1.95	48.5	1.91	75.0	2.95	81.0	3.19	0.40	1.49	0.82	31.5	21.7	1.46
	1.5000	85.725	3.3750	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	1.2	0.05	135	136	20.3	**3876**	**3821**	22.9	0.90	55.0	2.17	48.5	1.91	75.0	2.95	81.0	3.19	0.40	1.49	0.82	31.5	21.7	1.46

Note 1) SP indicates the specially chamfered from.

TS type

d (38.100) ~ (40.000) mm
(1.5000) ~ (1.5748) inch





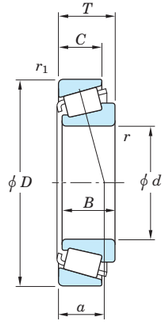
$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

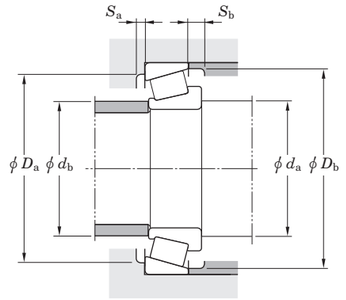
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
38.100	1.5000	87.312	3.4375	30.162	1.1875	30.886	1.2160	23.812	0.9375	3.6	0.14	0.8	0.03	120	120	18.2	**3583R**	**3526**	20.5	0.81	52.0	2.05	45.5	1.79	76.0	2.99	80.0	3.15	0.31	1.96	1.08	27.9	14.6	1.91
	1.5000	88.501	3.4843	26.988	1.0625	29.083	1.1450	22.225	0.8750	0.8	0.03	1.6	0.06	123	112	17.2	**415**	**414**	16.9	0.67	45.0	1.77	44.5	1.75	77.0	3.03	80.0	3.15	0.26	2.28	1.25	28.6	12.9	2.22
	1.5000	88.501	3.4843	26.988	1.0625	29.083	1.1450	22.225	0.8750	3.6	0.14	1.6	0.06	123	112	17.2	**418**	**414**	16.9	0.67	51.0	2.01	44.5	1.75	77.0	3.03	80.0	3.15	0.26	2.28	1.25	28.6	12.9	2.22
	1.5000	88.900	3.5000	26.988	1.0625	29.083	1.1450	22.225	0.8750	0.8	0.03	0.8	0.03	123	112	17.2	**415**	**414X**	16.9	0.67	45.0	1.77	44.5	1.75	78.0	3.07	79.0	3.11	0.26	2.28	1.25	28.6	12.9	2.22
	1.5000	90.488	3.5625	39.688	1.5625	40.386	1.5900	33.338	1.3125	1.6	0.06	3.2	0.13	166	169	25.9	**4375**	**4335**	25.6	1.01	51.0	2.01	48.5	1.91	77.0	3.03	85.0	3.35	0.28	2.11	1.16	38.8	18.9	2.06
	1.5000	93.662	3.6875	31.750	1.2500	31.750	1.2500	25.400	1.0000	3.6	0.14	3.2	0.13	131	123	18.8	**49150**	**49368**	24.0	0.94	52.0	2.05	46.0	1.81	82.0	3.23	87.0	3.43	0.36	1.67	0.92	30.6	18.8	1.62
	1.5000	93.662	3.6875	31.750	1.2500	31.750	1.2500	26.195	1.0313	0.8	0.03	3.2	0.13	132	134	20.2	**46150**	**46368**	24.0	0.94	49.0	1.93	47.5	1.87	79.0	3.11	87.0	3.43	0.40	1.49	0.82	30.8	21.1	1.46
	1.5000	93.662	3.6875	31.750	1.2500	31.750	1.2500	26.195	1.0313	3.6	0.14	3.2	0.13	132	134	20.2	**46151**	**46368**	24.0	0.94	54.0	2.13	47.5	1.87	79.0	3.11	87.0	3.43	0.40	1.49	0.82	30.8	21.1	1.46
	1.5000	95.250	3.7500	27.783	1.0938	28.575	1.1250	22.225	0.8750	3.6	0.14	0.8	0.03	135	141	21.6	**33880**	**33822**	20.4	0.80	54.0	2.13	48.0	1.89	86.0	3.39	90.0	3.54	0.33	1.82	1.00	31.4	17.7	1.77
	1.5000	95.250	3.7500	27.783	1.0938	29.901	1.1772	22.225	0.8750	0.8	0.03	0.8	0.03	129	122	18.8	**440**	**432A**	18.4	0.72	46.5	1.83	45.5	1.79	84.0	3.31	87.0	3.43	0.28	2.11	1.16	30.0	14.6	2.06
	1.5000	95.250	3.7500	27.783	1.0938	29.901	1.1772	22.225	0.8750	3.6	0.14	0.8	0.03	129	122	18.8	**444**	**432A**	18.4	0.72	52.0	2.05	45.5	1.79	84.0	3.31	87.0	3.43	0.28	2.11	1.16	30.0	14.6	2.06
	1.5000	101.600	4.0000	34.925	1.3750	36.068	1.4200	26.988	1.0625	3.6	0.14	3.2	0.13	164	159	24.8	**525**	**522**	22.2	0.87	54.0	2.13	48.0	1.89	89.0	3.50	95.0	3.74	0.29	2.10	1.16	38.4	18.7	2.05
	1.5000	101.600	4.0000	34.925	1.3750	36.068	1.4200	26.988	1.0625	0.8	0.03	3.2	0.13	164	159	24.8	**525X**	**522**	22.2	0.87	49.0	1.93	48.0	1.89	89.0	3.50	95.0	3.74	0.29	2.10	1.16	38.4	18.7	2.05
	1.5000	107.950	4.2500	36.512	1.4375	36.957	1.4550	28.575	1.1250	3.6	0.14	3.2	0.13	172	172	26.8	**542**	**532X**	23.9	0.94	55.0	2.17	49.0	1.93	94.0	3.70	100.0	3.94	0.30	2.03	1.11	40.4	20.5	1.97
38.913	1.5320	122.238	4.8125	51.595	2.0313	51.702	2.0355	36.512	1.4375	3.6	0.14	3.2	0.13	276	318	43.6	**5561R**	**5535**	39.0	1.54	57.0	2.24	52.0	2.05	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
39.624	1.5600	63.500	2.5000	12.700	0.5000	11.908	0.4688	9.525	0.3750	1.6	0.06	0.8	0.03	32.1	33.1	4.60	**13892**	**13830**	11.9	0.47	45.0	1.77	42.5	1.67	59.0	2.32	60.0	2.36	0.35	1.73	0.95	7.30	4.30	1.69
39.688	1.5625	73.025	2.8750	16.667	0.6562	17.462	0.6875	12.700	0.5000	0.8	0.03	1.6	0.06	57.6	55.8	8.15	**18587**	**18520**	14.5	0.57	46.0	1.81	46.0	1.81	66.0	2.60	69.0	2.72	0.35	1.71	0.94	13.2	7.90	1.67
	1.5625	73.025	2.8750	23.812	0.9375	25.654	1.0100	19.050	0.7500	3.6	0.14	0.8	0.03	92.6	92.2	13.8	**2789R**	**2735X**	15.9	0.63	52.0	2.05	45.0	1.77	66.0	2.60	69.0	2.72	0.30	1.98	1.09	21.5	11.1	1.93
	1.5625	80.000	3.1496	23.812	0.9375	25.400	1.0000	19.050	0.7500	1.6	0.06	1.2	0.05	101	105	15.8	**26880R**	**26824**	16.4	0.65	48.0	1.89	45.5	1.79	70.0	2.76	74.0	2.91	0.32	1.88	1.04	23.5	12.8	1.83
	1.5625	80.167	3.1562	25.400	1.0000	25.400	1.0000	20.638	0.8125	3.6	0.14	0.8	0.03	101	105	15.8	**26881R**	**26830**	18.0	0.71	52.0	2.05	45.5	1.79	71.0	2.80	74.0	2.91	0.32	1.88	1.04	23.5	12.8	1.83
	1.5625	80.167	3.1562	29.370	1.1563	30.391	1.1965	23.812	0.9375	0.8	0.03	3.2	0.13	114	106	16.2	**3386**	**3320**	18.7	0.74	46.5	1.83	45.5	1.79	70.0	2.76	75.0	2.95	0.27	2.20	1.21	26.6	12.4	2.14
	1.5625	81.755	3.2187	29.370	1.1563	30.391	1.1965	23.812	0.9375	3.6	0.14	3.2	0.13	114	106	16.2	**3382**	**3329**	18.7	0.74	52.0	2.05	45.5	1.79	71.0	2.80	75.0	2.95	0.27	2.20	1.21	26.6	12.4	2.14
	1.5625	84.138	3.3125	29.370	1.1563	30.391	1.1965	23.812	0.9375	3.6	0.14	3.2	0.13	114	106	16.2	**3382**	**3328**	18.7	0.74	52.0	2.05	45.5	1.79	72.0	2.83	76.0	2.99	0.27	2.20	1.21	26.6	12.4	2.14
	1.5625	88.501	3.4843	26.988	1.0625	29.083	1.1450	22.225	0.8750	3.6	0.14	1.6	0.06	123	112	17.2	**422**	**414**	16.9	0.67	52.0	2.05	46.5	1.83	77.0	3.03	80.0	3.15	0.26	2.28	1.25	28.6	12.9	2.22
	1.5625	88.501	3.4843	26.988	1.0625	29.083	1.1450	22.225	0.8750	3.6	0.14	3.2	0.13	123	112	17.2	**422**	**414A**	16.9	0.67	52.0	2.05	46.5	1.83	76.0	2.99	79.0	3.11	0.26	2.28	1.25	28.6	12.9	2.22
	1.5625	90.488	3.5625	39.688	1.5625	40.386	1.5900	33.338	1.3125	3.6	0.14	3.2	0.13	166	169	25.9	**4367**	**4335**	25.6	1.01	55.0	2.17	49.0	1.93	77.0	3.03	85.0	3.35	0.28	2.11	1.16	38.8	18.9	2.06
	1.5625	93.264	3.6718	30.162	1.1875	30.302	1.1930	23.812	0.9375	3.6	0.14	3.2	0.13	129	137	20.9	**3774**	**3720**	22.2	0.87	55.0	2.17	51.0	2.01	82.0	3.23	88.0	3.46	0.34	1.77	0.97	30.1	17.4	1.73
	1.5625	101.600	4.0000	34.925	1.3750	36.068	1.4200	26.988	1.0625	3.6	0.14	3.2	0.13	164	159	24.8	**525A**	**522**	22.2	0.87	56.0	2.20	49.0	1.93	89.0	3.50	95.0	3.74	0.29	2.10	1.16	38.4	18.7	2.05
	1.5625	120.040	4.7260	41.275	1.6250	41.275	1.6250	31.750	1.2500	0.8	0.03	3.2	0.13	218	217	34.0	**620**	**612A**	27.3	1.07	52.0	2.05	52.0	2.05	103.0	4.06	109.0	4.29	0.31	1.91	1.05	50.9	27.4	1.86
	1.5625	120.650	4.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	0.8	0.03	3.2	0.13	218	217	34.0	**620**	**612**	27.3	1.07	52.0	2.05	52.0	2.05	105.0	4.13	110.0	4.33	0.31	1.91	1.05	50.9	27.4	1.86
39.980	1.5740	76.200	3.0000	18.009	0.7090	17.384	0.6844	14.288	0.5625	1.6	0.06	1.6	0.06	64.7	63.3	9.15	**11157R**	**11300**	17.5	0.69	48.5	1.91	46.0	1.81	67.0	2.64	72.0	2.83	0.49	1.23	0.68	14.9	12.4	1.20
	1.5740	80.000	3.1496	18.009	0.7090	17.384	0.6844	14.288	0.5625	1.6	0.06	1.6	0.06	64.7	63.3	9.15	**11157R**	**11315**	17.5	0.69	48.5	1.91	46.0	1.81	67.0	2.64	72.0	2.83	0.49	1.23	0.68	14.9	12.4	1.20
	1.5740	80.035	3.1510	21.432	0.8438	20.940	0.8244	15.875	0.6250	3.6	0.14	1.6	0.06	71.6	65.9	9.70	**28159**	**28317**	16.9	0.67	52.0	2.05	45.0	1.77	69.0	2.72	73.0	2.87	0.40	1.49	0.82	16.5	11.3	1.46
40.000	1.5748	76.200	3.0000	18.009	0.7090	17.384	0.6844	14.288	0.5625	2.0	0.08	1.6	0.06	64.7	63.3	9.15	**11157XR**	**11300**	17.5	0.69	52.0	2.05	46.0	1.81	67.0	2.64	72.0	2.83	0.49	1.23	0.68	14.9	12.4	1.20
	1.5748	76.200	3.0000	20.638	0.8125	20.940	0.8244	15.507	0.6105	1.6	0.06	1.2	0.05	71.6	65.9	9.70	**28158**	**28300**	16.5	0.65	47.5	1.87	45.0	1.77	68.0	2.68	71.0	2.80	0.40	1.49	0.82	16.5	11.3	1.46
	1.5748	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	3.6	0.14	1.2	0.05	85.0	74.8	11.4	**344**	**332**	15.1	0.59	52.0	2.05	45.5	1.79	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.5748	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	0.8	0.03	1.2	0.05	85.0	74.8	11.4	**344A**	**332**	15.1	0.59	46.0	1.81	45.5	1.79	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.5748	85.000	3.3465	20.638	0.8125	21.692	0.8540	17.462	0.6875	0.8	0.03	1.2	0.05	89.6	81.7	12.4	**350A**	**354A**	15.5	0.61	47.5	1.87	46.5	1.83	77.0	3.03	80.0	3.15	0.31	1.96	1.08	20.7	10.8	1.91
	1.5748	85.000	3.3465	20.638	0.8125	21.692	0.8540	17.462	0.6875	2.4	0.09	1.6	0.06	89.6	81.7	12.4	**357**	**354X**	15.5	0.61	51.0	2.01	46.5	1.83	77.0	3.03	80.0	3.15	0.31	1.96	1.08	20.7	10.8	1.91

Note 1) SP indicates the specially chamfered from.

TS type
d (40.000) ~ (41.275) mm
(1.5748) ~ (1.6250) inch





$P = XF_r + YF_a$
$P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$

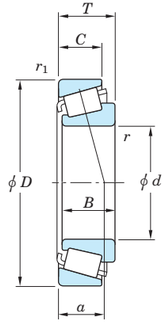
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

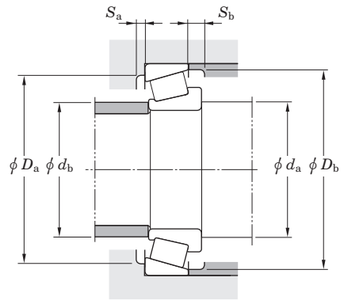
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
40.000	1.5748	85.725	3.3750	30.162	1.1875	30.162	1.1875	23.812	0.9375	0.8	0.03	1.2	0.05	135	136	20.3	**3879**	**3821**	22.9	0.90	51.0	2.01	50.0	1.97	75.0	2.95	81.0	3.19	0.40	1.49	0.82	31.5	21.7	1.46
	1.5748	87.312	3.4375	30.162	1.1875	30.886	1.2160	23.812	0.9375	3.6	0.14	3.2	0.13	120	120	18.2	**3582R**	**3525**	20.5	0.81	53.0	2.09	48.5	1.91	75.0	2.95	81.0	3.19	0.31	1.96	1.08	27.9	14.6	1.91
	1.5748	88.501	3.4843	26.988	1.0625	29.083	1.1450	22.225	0.8750	3.6	0.14	1.6	0.06	123	112	17.2	**420**	**414**	16.9	0.67	52.0	2.05	46.0	1.81	77.0	3.03	80.0	3.15	0.26	2.28	1.25	28.6	12.9	2.22
	1.5748	90.119	3.5480	23.000	0.9055	21.692	0.8540	21.808	0.8586	4.0	0.16	2.4	0.09	89.6	81.7	12.4	**350**	**352**	17.8	0.70	54.0	2.13	46.5	1.83	78.0	3.07	82.0	3.23	0.31	1.96	1.08	20.7	10.8	1.91
	1.5748	95.250	3.7500	27.783	1.0938	29.901	1.1772	22.225	0.8750	3.6	0.14	2.4	0.09	129	122	18.8	**442S**	**432**	23.6	0.93	54.0	2.13	49.0	1.93	83.0	3.27	87.0	3.43	0.28	2.11	1.16	30.0	14.6	2.06
	1.5748	107.950	4.2500	36.512	1.4375	36.957	1.4550	28.575	1.1250	3.6	0.14	3.2	0.13	172	172	26.8	**543**	**532X**	23.9	0.94	57.0	2.24	50.0	1.97	94.0	3.70	100.0	3.94	0.30	2.03	1.11	40.4	20.5	1.97
40.483	1.5938	82.550	3.2500	29.370	1.1563	28.575	1.1250	23.020	0.9063	3.6	0.14	3.2	0.13	109	117	16.9	**HM801349**	**HM801310**	24.4	0.96	58.0	2.28	49.0	1.93	68.0	2.68	78.0	3.07	0.55	1.10	0.60	25.5	23.8	1.07
41.275	1.6250	73.025	2.8750	16.667	0.6562	17.462	0.6875	12.700	0.5000	3.6	0.14	1.6	0.06	57.6	55.8	8.15	**18590**	**18520**	14.5	0.57	53.0	2.09	46.0	1.81	66.0	2.60	69.0	2.72	0.35	1.71	0.94	13.2	7.90	1.67
	1.6250	73.025	2.8750	16.667	0.6562	17.462	0.6875	12.700	0.5000	1.2	0.05	1.6	0.06	57.6	55.8	8.15	**18591**	**18520**	14.5	0.57	47.5	1.87	46.0	1.81	66.0	2.60	69.0	2.72	0.35	1.71	0.94	13.2	7.90	1.67
	1.6250	73.431	2.8910	19.558	0.7700	19.812	0.7800	14.732	0.5800	3.6	0.14	0.8	0.03	72.5	73.0	10.6	**LM501349**	**LM501310**	16.1	0.63	53.0	2.09	46.5	1.83	67.0	2.64	70.0	2.76	0.40	1.50	0.83	16.7	11.4	1.46
	1.6250	73.431	2.8910	21.430	0.8437	19.812	0.7800	16.604	0.6537	3.6	0.14	0.8	0.03	72.5	73.0	10.6	**LM501349**	**LM501314**	18.0	0.71	53.0	2.09	46.5	1.83	66.0	2.60	70.0	2.76	0.40	1.50	0.83	16.7	11.4	1.46
	1.6250	73.431	2.8910	23.012	0.9060	19.812	0.7800	18.186	0.7160	3.6	0.14	2.4	0.09	72.5	73.0	10.6	**LM501349**	**LM501311**	16.1	0.63	53.0	2.09	46.5	1.83	64.0	2.52	70.0	2.76	0.40	1.50	0.83	16.7	11.4	1.46
	1.6250	76.200	3.0000	18.009	0.7090	17.384	0.6844	14.288	0.5625	1.6	0.06	1.6	0.06	64.7	63.3	9.15	**11162R**	**11300**	17.5	0.69	49.0	1.93	46.5	1.83	67.0	2.64	72.0	2.83	0.49	1.23	0.68	14.9	12.4	1.20
	1.6250	76.200	3.0000	18.009	0.7090	17.384	0.6844	14.288	0.5625	1.6	0.06	1.6	0.06	64.7	63.3	9.15	**11162UR**	**11300**	17.5	0.69	49.0	1.93	46.0	1.81	67.0	2.64	72.0	2.83	0.49	1.23	0.68	14.9	12.4	1.20
	1.6250	76.200	3.0000	18.009	0.7090	17.384	0.6844	14.288	0.5625	0.8	0.03	1.6	0.06	64.7	63.3	9.15	**11163R**	**11300**	17.5	0.69	47.0	1.85	46.5	1.83	67.0	2.64	72.0	2.83	0.49	1.23	0.68	14.9	12.4	1.20
	1.6250	76.200	3.0000	22.225	0.8750	23.020	0.9063	17.462	0.6875	3.6	0.14	0.8	0.03	82.9	83.3	12.3	**24780R**	**24720**	17.4	0.69	54.0	2.13	47.0	1.85	68.0	2.68	72.0	2.83	0.39	1.53	0.84	19.2	12.9	1.49
	1.6250	76.200	3.0000	22.225	0.8750	23.020	0.9063	17.462	0.6875	3.6	0.14	3.2	0.13	82.9	83.3	12.3	**24780R**	**24722**	17.4	0.69	54.0	2.13	47.0	1.85	66.0	2.60	72.0	2.83	0.39	1.53	0.84	19.2	12.9	1.49
	1.6250	76.200	3.0000	22.225	0.8750	23.020	0.9063	17.462	0.6875	0.8	0.03	0.8	0.03	82.9	83.3	12.3	**24781R**	**24720**	17.4	0.69	47.0	1.85	47.0	1.85	68.0	2.68	72.0	2.83	0.39	1.53	0.84	19.2	12.9	1.49
	1.6250	76.200	3.0000	25.400	1.0000	23.020	0.9063	20.638	0.8125	3.6	0.14	2.4	0.09	82.9	83.3	12.3	**24780R**	**24721**	20.6	0.81	54.0	2.13	47.0	1.85	66.0	2.60	72.0	2.83	0.39	1.53	0.84	19.2	12.9	1.49
	1.6250	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	0.8	0.03	1.2	0.05	85.0	74.8	11.4	**336**	**332**	15.1	0.59	47.0	1.85	46.0	1.81	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.6250	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	3.6	0.14	1.2	0.05	85.0	74.8	11.4	**342**	**332**	15.1	0.59	53.0	2.09	46.0	1.81	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.6250	80.000	3.1496	28.575	1.1250	29.977	1.1802	17.826	0.7018	3.6	0.14	1.2	0.05	85.0	74.8	11.4	**342A**	**332**	22.7	0.89	53.0	2.09	46.0	1.81	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.6250	80.000	3.1496	31.750	1.2500	29.977	1.1802	21.000	0.8268	3.6	0.14	2.4	0.09	85.0	74.8	11.4	**342A**	**332A**	22.7	0.89	53.0	2.09	46.0	1.81	71.0	2.80	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.6250	80.167	3.1562	25.400	1.0000	25.400	1.0000	20.638	0.8125	0.8	0.03	3.2	0.13	101	105	15.8	**26885R**	**26820**	17.9	0.70	48.0	1.89	47.0	1.85	69.0	2.72	74.0	2.91	0.32	1.88	1.04	23.5	12.8	1.83
	1.6250	80.167	3.1562	29.370	1.1563	25.400	1.0000	24.608	0.9688	3.6	0.14	3.2	0.13	101	105	15.8	**26882R**	**26821**	17.9	0.70	54.0	2.13	47.0	1.85	68.0	2.68	74.0	2.91	0.32	1.88	1.04	23.5	12.8	1.83
	1.6250	82.550	3.2500	26.543	1.0450	25.654	1.0100	20.193	0.7950	3.6	0.14	3.2	0.13	105	105	15.4	**M802048**	**M802011**	23.3	0.92	57.0	2.24	50.6	1.99	70.0	2.76	79.0	3.11	0.55	1.10	0.60	24.2	22.6	1.07
	1.6250	84.138	3.3125	29.370	1.1563	30.391	1.1965	23.812	0.9375	3.6	0.14	3.2	0.13	114	106	16.2	**3383**	**3328**	18.7	0.74	52.0	2.05	46.0	1.81	72.0	2.83	76.0	2.99	0.27	2.20	1.21	26.6	12.4	2.14
	1.6250	84.138	3.3125	29.370	1.1563	30.391	1.1965	23.812	0.9375	0.8	0.03	3.2	0.13	114	106	16.2	**3384**	**3328**	18.7	0.74	48.0	1.89	41.5	1.63	72.0	2.83	76.0	2.99	0.27	2.20	1.21	26.6	12.4	2.14
	1.6250	84.138	3.3125	30.162	1.1875	30.886	1.2160	23.812	0.9375	3.6	0.14	3.2	0.13	120	120	18.2	**3577R**	**3520**	20.5	0.81	54.0	2.13	48.0	1.89	74.0	2.91	79.5	3.13	0.31	1.96	1.08	27.9	14.6	1.91
	1.6250	84.138	3.3125	30.162	1.1875	30.886	1.2160	23.812	0.9375	1.6	0.06	3.2	0.13	120	120	18.2	**3585R**	**3520**	20.5	0.81	50.0	1.97	48.0	1.89	74.0	2.91	79.5	3.13	0.31	1.96	1.08	27.9	14.6	1.91
	1.6250	85.725	3.3750	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	1.2	0.05	135	136	20.3	**3877**	**3821**	22.9	0.90	57.0	2.24	50.3	1.98	75.0	2.95	81.0	3.19	0.40	1.49	0.82	31.5	21.7	1.46
	1.6250	85.725	3.3750	30.162	1.1875	30.162	1.1875	23.812	0.9375	2.4	0.09	1.2	0.05	135	136	20.3	**3877A**	**3821**	22.9	0.90	55.0	2.17	50.3	1.98	75.0	2.95	81.0	3.19	0.40	1.49	0.82	31.5	21.7	1.46
	1.6250	85.725	3.3750	30.162	1.1875	30.162	1.1875	23.812	0.9375	0.8	0.03	1.2	0.05	135	136	20.3	**3880**	**3821**	22.9	0.90	52.0	2.05	50.3	1.98	75.0	2.95	81.0	3.19	0.40	1.49	0.82	31.5	21.7	1.46
	1.6250	87.312	3.4375	30.162	1.1875	30.886	1.2160	23.812	0.9375	0.8	0.03	3.2	0.13	120	120	18.2	**3576R**	**3525**	20.5	0.81	49.0	1.93	48.0	1.89	75.0	2.95	81.0	3.19	0.31	1.96	1.08	27.9	14.6	1.91
	1.6250	88.501	3.4843	26.988	1.0625	29.083	1.1450	22.225	0.8750	3.6	0.14	1.6	0.06	123	112	17.2	**419**	**414**	16.9	0.67	54.0	2.13	47.0	1.85	77.0	3.03	80.0	3.15	0.26	2.28	1.25	28.6	12.9	2.22
	1.6250	88.501	3.4843	26.988	1.0625	29.083	1.1450	22.225	0.8750	0.8	0.03	1.6	0.06	123	112	17.2	**423X**	**414**	16.9	0.67	49.0	1.93	47.0	1.85	77.0	3.03	80.0	3.15	0.26	2.28	1.25	28.6	12.9	2.22
	1.6250	88.900	3.5000	20.638	0.8125	22.225	0.8750	16.513	0.6501	3.6	0.14	1.2	0.05	92.9	87.3	13.3	**365A**	**362A**	16.1	0.63	55.0	2.17	48.5	1.91	81.0	3.19	84.0	3.31	0.32	1.88	1.03	21.4	11.7	1.83
	1.6250	88.900	3.5000	30.162	1.1875	29.370	1.1563	23.020	0.9063	0.8	0.03	3.2	0.13	124	125	18.5	**HM803145**	**HM803110**	26.1	1.03	54.0	2.13	53.0	2.09	74.0	2.91	85.0	3.35	0.55	1.10	0.60	28.8	26.9	1.07
	1.6250	88.900	3.5000	30.162	1.1875	29.370	1.1563	23.020	0.9063	3.6	0.14	3.2	0.13	124	125	18.5	**HM803146**	**HM803110**	26.1	1.03	60.0	2.36	53.0	2.09	74.0	2.91	85.0	3.35	0.55	1.10	0.60	28.8	26.9	1.07
	1.6250	90.488	3.5625	39.688	1.5625	40.386	1.5900	33.338	1.3125	3.6	0.14	3.2	0.13	166	169	25.9	**4388**	**4335**	25.6	1.01	57.0	2.24	51.0	2.01	77.0	3.03	85.0	3.35	0.28	2.11	1.16	38.8	18.9	2.06

Note 1) SP indicates the specially chamfered from.

TS type
d (41.275) ~ (44.450) mm
(1.6250) ~ (1.7500) inch





$P = XF_r + YF_a$
$P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$

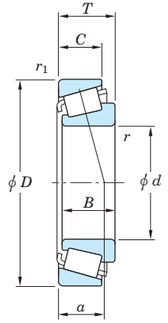
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

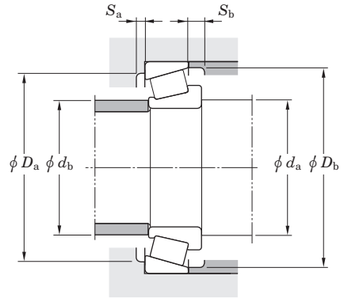
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
41.275	1.6250	93.662	3.6875	31.750	1.2500	31.750	1.2500	25.400	1.0000	3.6	0.14	3.2	0.13	131	123	18.8	**49162**	**49368**	22.9	0.90	55.0	2.17	49.0	1.93	82.0	3.23	87.0	3.43	0.36	1.67	0.92	30.6	18.8	1.62
	1.6250	93.662	3.6875	31.750	1.2500	31.750	1.2500	26.195	1.0313	0.8	0.03	3.2	0.13	132	134	20.2	**46162**	**46368**	24.0	0.94	52.0	2.05	51.0	2.01	79.0	3.11	87.0	3.43	0.40	1.49	0.82	30.8	21.1	1.46
	1.6250	95.250	3.7500	27.783	1.0938	29.901	1.1772	22.225	0.8750	1.2	0.05	2.4	0.09	129	122	18.8	**439**	**432**	18.4	0.72	51.0	2.01	48.5	1.91	83.0	3.27	87.0	3.43	0.28	2.11	1.16	30.0	14.6	2.06
	1.6250	95.250	3.7500	27.783	1.0938	29.901	1.1772	22.225	0.8750	3.6	0.14	0.8	0.03	129	122	18.8	**447**	**432A**	18.4	0.72	55.0	2.17	48.5	1.91	84.0	3.31	87.0	3.43	0.28	2.11	1.16	30.0	14.6	2.06
	1.6250	95.250	3.7500	30.162	1.1875	29.370	1.1563	23.020	0.9063	3.6	0.14	3.2	0.13	130	140	20.7	**HM804840**	**HM804810**	26.5	1.04	61.0	2.40	54.0	2.13	81.0	3.19	91.0	3.58	0.55	1.10	0.60	30.4	28.4	1.07
	1.6250	101.600	4.0000	34.925	1.3750	36.068	1.4200	26.988	1.0625	3.6	0.14	3.2	0.13	164	159	24.8	**526**	**522**	22.2	0.87	57.0	2.24	50.0	1.97	89.0	3.50	95.0	3.74	0.29	2.10	1.16	38.4	18.7	2.05
	1.6250	101.600	4.0000	34.925	1.3750	36.068	1.4200	26.988	1.0625	0.8	0.03	3.2	0.13	164	159	24.8	**526A**	**522**	22.2	0.87	52.0	2.05	50.0	1.97	89.0	3.50	95.0	3.74	0.29	2.10	1.16	38.4	18.7	2.05
	1.6250	104.775	4.1250	30.162	1.1875	29.317	1.1542	24.605	0.9687	1.6	0.06	3.2	0.13	136	144	22.2	**464A**	**453X**	23.6	0.93	54.0	2.13	52.0	2.05	92.0	3.62	98.0	3.86	0.34	1.79	0.98	31.7	18.2	1.74
	1.6250	104.775	4.1250	36.512	1.4375	36.512	1.4375	28.575	1.1250	1.6	0.06	3.2	0.13	185	187	28.6	**59162**	**59412**	26.9	1.06	55.0	2.17	54.0	2.13	92.0	3.62	99.0	3.90	0.40	1.49	0.82	43.2	29.6	1.46
	1.6250	104.775	4.1250	36.512	1.4375	36.512	1.4375	28.575	1.1250	1.6	0.06	3.2	0.13	176	195	29.3	**HM807035**	**HM807010**	29.3	1.15	60.0	2.36	57.0	2.24	89.0	3.50	100.0	3.94	0.49	1.23	0.68	41.3	34.4	1.20
	1.6250	107.950	4.2500	27.783	1.0938	29.317	1.1542	22.225	0.8750	2.4	0.09	0.8	0.03	136	144	22.2	**464**	**453A**	23.6	0.93	56.0	2.20	52.0	2.05	97.0	3.82	100.0	3.94	0.34	1.79	0.98	31.7	18.2	1.74
	1.6250	107.950	4.2500	36.512	1.4375	36.957	1.4550	28.575	1.1250	3.6	0.14	3.2	0.13	172	172	26.8	**541**	**532X**	23.9	0.94	58.0	2.28	52.0	2.05	94.0	3.70	100.0	3.94	0.30	2.03	1.11	40.4	20.5	1.97
42.000	1.6535	76.200	3.0000	18.009	0.7090	17.384	0.6844	14.288	0.5625	2.0	0.08	1.6	0.06	64.7	63.3	9.15	**11165XR**	**11300**	17.5	0.69	51.0	2.01	46.0	1.81	67.0	2.64	72.0	2.83	0.49	1.23	0.68	14.9	12.4	1.20
	1.6535	76.200	3.0000	18.009	0.7090	17.384	0.6844	14.288	0.5625	4.3	0.17	3.6	0.14	64.7	63.3	9.15	**11165XSR**	**11300**	17.5	0.69	53.0	2.09	46.0	1.81	67.0	2.64	72.0	2.83	0.49	1.23	0.68	14.9	12.4	1.20
42.070	1.6563	90.488	3.5625	39.688	1.5625	40.386	1.5900	33.338	1.3125	3.6	0.14	3.2	0.13	166	169	25.9	**4395**	**4335**	25.6	1.01	58.0	2.28	51.0	2.01	77.0	3.03	85.0	3.35	0.28	2.11	1.16	38.8	18.9	2.06
42.850	1.6870	104.775	4.1250	30.162	1.1875	29.317	1.1542	24.605	0.9687	0.8	0.03	3.2	0.13	136	144	22.2	**461**	**453X**	23.6	0.93	54.5	2.15	54.0	2.13	92.0	3.62	98.0	3.86	0.34	1.79	0.98	31.7	18.2	1.74
42.862	1.6875	76.992	3.0312	17.463	0.6875	17.145	0.6750	11.908	0.4688	1.6	0.06	1.6	0.06	56.6	62.2	8.15	**12168**	**12303**	17.5	0.69	51.0	2.01	48.5	1.91	68.0	2.68	73.0	2.87	0.51	1.19	0.65	13.0	11.3	1.16
	1.6875	82.931	3.2650	26.988	1.0625	25.400	1.0000	22.225	0.8750	2.4	0.09	2.4	0.09	96.8	100	15.1	**25578**	**25523**	20.7	0.81	53.0	2.09	49.5	1.95	72.0	2.83	77.0	3.03	0.33	1.79	0.99	22.5	12.9	1.75
	1.6875	83.058	3.2700	23.812	0.9375	25.400	1.0000	19.050	0.7500	3.6	0.14	3.2	0.13	96.8	100	15.1	**25576**	**25521**	17.5	0.69	55.0	2.17	49.0	1.93	72.0	2.83	77.0	3.03	0.33	1.79	0.99	22.5	12.9	1.75
	1.6875	84.138	3.3125	30.162	1.1875	30.886	1.2160	23.812	0.9375	3.6	0.14	3.2	0.13	120	120	18.2	**3579R**	**3520**	20.5	0.81	56.0	2.20	49.5	1.95	74.0	2.91	79.5	3.13	0.31	1.96	1.08	27.9	14.6	1.91
	1.6875	85.000	3.3464	25.400	1.0000	25.608	1.0082	20.638	0.8125	3.6	0.14	1.2	0.05	100	106	16.0	**2973**	**2924**	18.9	0.74	55.0	2.17	49.0	1.93	76.0	2.99	80.0	3.15	0.35	1.73	0.95	23.3	13.8	1.69
	1.6875	114.300	4.5000	44.450	1.7500	44.450	1.7500	34.925	1.3750	2.0	0.08	3.2	0.13	237	230	35.1	**65383**	**65320**	31.7	1.25	60.0	2.36	56.0	2.20	97.0	3.82	107.0	4.21	0.43	1.40	0.77	55.4	40.7	1.36
42.875	1.6880	76.200	3.0000	25.400	1.0000	25.400	1.0000	20.638	0.8125	1.6	0.06	1.6	0.06	101	105	15.8	**26886R**	**26823**	18.0	0.71	51.0	2.01	48.5	1.91	69.0	2.72	73.0	2.87	0.32	1.88	1.04	23.5	12.8	1.83
	1.6880	79.375	3.1250	23.812	0.9375	25.400	1.0000	19.050	0.7500	3.6	0.14	0.8	0.03	101	105	15.8	**26884R**	**26822**	16.1	0.63	55.0	2.17	48.5	1.91	71.0	2.80	74.0	2.91	0.32	1.88	1.04	23.5	12.8	1.83
	1.6880	80.000	3.1496	21.000	0.8268	22.403	0.8820	17.826	0.7018	3.6	0.14	1.2	0.05	85.0	74.8	11.4	**342S**	**332**	15.1	0.59	54.0	2.13	47.5	1.87	73.0	2.87	75.0	2.95	0.27	2.20	1.21	19.6	9.15	2.14
	1.6880	80.167	3.1562	25.400	1.0000	25.400	1.0000	20.638	0.8125	3.6	0.14	3.2	0.13	101	105	15.8	**26884R**	**26820**	18.0	0.71	55.0	2.17	48.5	1.91	69.0	2.72	74.0	2.91	0.32	1.88	1.04	23.5	12.8	1.83
	1.6880	82.931	3.2650	23.812	0.9375	25.400	1.0000	19.050	0.7500	3.6	0.14	0.8	0.03	96.8	100	15.1	**25577**	**25520**	17.5	0.69	55.0	2.17	49.0	1.93	74.0	2.91	77.0	3.03	0.33	1.79	0.99	22.5	12.9	1.75
	1.6880	83.058	3.2700	23.812	0.9375	25.400	1.0000	19.050	0.7500	3.6	0.14	3.2	0.13	96.8	100	15.1	**25577**	**25521**	17.5	0.69	55.0	2.17	49.0	1.93	72.0	2.83	77.0	3.03	0.33	1.79	0.99	22.5	12.9	1.75
44.450	1.7500	73.025	2.8750	18.258	0.7188	18.258	0.7188	15.083	0.5938	1.6	0.06	1.6	0.06	59.4	65.5	9.50	**L102849**	**L102810**	14.6	0.57	51.0	2.01	49.0	1.93	66.0	2.60	69.0	2.72	0.32	1.88	1.04	13.7	7.45	1.84
	1.7500	76.992	3.0312	17.463	0.6875	17.145	0.6750	11.908	0.4688	1.6	0.06	1.6	0.06	60.8	62.2	8.95	**12175**	**12303**	17.5	0.69	52.0	2.05	49.5	1.95	68.0	2.68	73.0	2.87	0.51	1.19	0.65	13.0	11.3	1.16
	1.7500	79.375	3.1250	17.462	0.6875	17.462	0.6875	13.495	0.5313	2.8	0.11	1.6	0.06	59.2	59.1	8.65	**18685**	**18620**	16.0	0.63	54.0	2.13	49.5	1.95	71.0	2.80	74.0	2.91	0.37	1.60	0.88	13.6	8.70	1.56
	1.7500	82.931	3.2650	23.812	0.9375	25.400	1.0000	19.050	0.7500	3.6	0.14	2.4	0.09	96.8	100	15.1	**25580**	**25524**	17.5	0.69	57.0	2.24	50.0	1.97	72.0	2.83	77.0	3.03	0.33	1.79	0.99	22.5	12.9	1.75
	1.7500	82.931	3.2650	23.812	0.9375	25.400	1.0000	19.050	0.7500	5.2	0.20	0.8	0.03	96.8	100	15.1	**25582**	**25520**	17.5	0.69	59.0	2.32	51.0	2.01	74.0	2.91	77.0	3.03	0.33	1.79	0.99	22.5	12.9	1.75
	1.7500	82.931	3.2650	36.830	1.4500	35.878	1.4125	19.050	0.7500	SP	SP	0.8	0.03	96.8	100	15.1	**25583**	**25520**	17.5	0.69	59.0	2.32	51.0	2.01	74.0	2.91	77.0	3.03	0.33	1.79	0.99	22.5	12.9	1.75
	1.7500	83.058	3.2700	23.876	0.9400	25.400	1.0000	19.114	0.7525	0.5	0.02	2.0	0.08	96.8	100	15.1	**25581**	**25522**	17.6	0.69	51.0	2.01	50.0	1.97	73.0	2.87	77.0	3.03	0.33	1.79	0.99	22.5	12.9	1.75
	1.7500	84.138	3.3125	30.162	1.1875	30.886	1.2160	23.812	0.9375	3.6	0.14	3.2	0.13	120	120	18.2	**3578R**	**3520**	20.5	0.81	57.0	2.24	51.0	2.01	74.0	2.91	79.5	3.13	0.31	1.96	1.08	27.9	14.6	1.91
	1.7500	85.000	3.3465	19.000	0.7480	21.692	0.8540	19.000	0.7480	2.4	0.09	2.0	0.08	89.6	81.7	12.4	**355**	**354**	13.7	0.54	54.0	2.13	50.0	1.97	77.0	3.03	81.0	3.19	0.31	1.96	1.08	20.7	10.8	1.91
	1.7500	85.000	3.3465	20.638	0.8125	21.692	0.8540	17.462	0.6875	2.4	0.09	1.2	0.05	89.6	81.7	12.4	**355**	**354A**	15.5	0.61	54.0	2.13	50.0	1.97	77.0	3.03	80.0	3.15	0.31	1.96	1.08	20.7	10.8	1.91

Note 1) SP indicates the specially chamfered from.

TS type
d (44.450) mm
(1.7500) inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

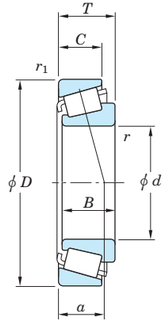
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
44.450	1.7500	85.000	3.3465	20.638	0.8125	21.692	0.8540	17.462	0.6875	0.8	0.03	1.2	0.05	89.6	81.7	12.4	**355A**	**354A**	15.5	0.61	51.0	2.01	50.0	1.97	77.0	3.03	80.0	3.15	0.31	1.96	1.08	20.7	10.8	1.91
	1.7500	85.000	3.3465	20.638	0.8125	21.692	0.8540	17.462	0.6875	3.6	0.14	1.2	0.05	89.6	81.7	12.4	**355X**	**354A**	15.5	0.61	56.0	2.20	50.0	1.97	77.0	3.03	80.0	3.15	0.31	1.96	1.08	20.7	10.8	1.91
	1.7500	85.000	3.3465	23.812	0.9375	25.400	1.0000	19.050	0.7500	3.6	0.14	2.4	0.09	96.8	100	15.1	**25580**	**25526**	17.5	0.69	57.0	2.24	50.0	1.97	74.0	2.91	78.0	3.07	0.33	1.79	0.99	22.5	12.9	1.75
	1.7500	85.000	3.3465	25.400	1.0000	25.608	1.0082	20.638	0.8125	3.6	0.14	1.2	0.05	100	106	16.0	**2975**	**2924**	18.9	0.74	54.0	2.13	51.0	2.01	76.0	2.99	80.0	3.15	0.35	1.73	0.95	23.3	13.8	1.69
	1.7500	87.312	3.4375	30.162	1.1875	30.886	1.2160	23.812	0.9375	5.6	0.22	3.2	0.13	120	120	18.2	**3578AR**	**3525**	20.5	0.81	57.0	2.24	51.0	2.01	75.0	2.95	81.0	3.19	0.31	1.96	1.08	27.9	14.6	1.91
	1.7500	88.900	3.5000	30.162	1.1875	29.370	1.1563	23.020	0.9063	3.6	0.14	3.2	0.13	124	125	18.5	**HM803149**	**HM803110**	26.1	1.03	62.0	2.44	53.4	2.10	74.0	2.91	85.0	3.35	0.55	1.10	0.60	28.8	26.9	1.07
	1.7500	90.000	3.5433	23.000	0.9055	21.692	0.8540	23.000	0.9055	2.4	0.09	2.0	0.08	89.6	81.7	12.4	**355**	**353**	17.8	0.70	54.0	2.13	50.0	1.97	78.0	3.07	81.0	3.19	0.31	1.96	1.08	20.7	10.8	1.91
	1.7500	90.488	3.5625	39.688	1.5625	40.386	1.5900	33.338	1.3125	3.6	0.14	3.2	0.13	166	169	25.9	**4370**	**4335**	25.6	1.01	57.0	2.24	51.0	2.01	77.0	3.03	85.0	3.35	0.28	2.11	1.16	38.8	18.9	2.06
	1.7500	93.264	3.6718	30.162	1.1875	30.302	1.1930	23.812	0.9375	3.6	0.14	0.8	0.03	129	137	20.9	**3782**	**3730**	22.2	0.87	58.0	2.28	52.0	2.05	84.0	3.31	88.0	3.46	0.34	1.77	0.97	30.1	17.4	1.73
	1.7500	93.264	3.6718	30.162	1.1875	30.302	1.1930	23.812	0.9375	6.4	0.25	3.2	0.13	129	137	20.9	**3783**	**3720**	22.2	0.87	64.0	2.52	54.0	2.13	82.0	3.23	88.0	3.46	0.34	1.77	0.97	30.1	17.4	1.73
	1.7500	93.264	3.6718	30.162	1.1875	30.302	1.1930	23.812	0.9375	6.4	0.25	0.8	0.03	129	137	20.9	**3783**	**3730**	22.2	0.87	64.0	2.52	54.0	2.13	84.0	3.31	88.0	3.46	0.34	1.77	0.97	30.1	17.4	1.73
	1.7500	93.662	3.6875	31.750	1.2500	31.750	1.2500	25.400	1.0000	3.6	0.14	3.2	0.13	131	123	18.8	**49175**	**49368**	22.9	0.90	59.0	2.32	53.0	2.09	82.0	3.23	87.0	3.43	0.36	1.67	0.92	30.6	18.8	1.62
	1.7500	93.662	3.6875	31.750	1.2500	31.750	1.2500	25.400	1.0000	0.8	0.03	3.2	0.13	131	123	18.8	**49176**	**49368**	22.9	0.90	54.0	2.13	53.0	2.09	82.0	3.23	87.0	3.43	0.36	1.67	0.92	30.6	18.8	1.62
	1.7500	93.662	3.6875	31.750	1.2500	31.750	1.2500	26.195	1.0313	0.8	0.03	3.2	0.13	132	134	20.2	**46175**	**46368**	24.0	0.94	55.0	2.17	54.0	2.13	79.0	3.11	87.0	3.43	0.40	1.49	0.82	30.8	21.1	1.46
	1.7500	93.662	3.6875	31.750	1.2500	31.750	1.2500	26.195	1.0313	3.6	0.14	3.2	0.13	132	134	20.2	**46176**	**46368**	24.0	0.94	60.0	2.36	54.0	2.13	79.0	3.11	87.0	3.43	0.40	1.49	0.82	30.8	21.1	1.46
	1.7500	93.662	3.6875	31.750	1.2500	31.750	1.2500	26.195	1.0313	3.6	0.14	1.2	0.05	132	134	20.2	**46176**	**46369**	24.0	0.94	60.0	2.36	54.0	2.13	79.0	3.11	87.0	3.43	0.40	1.49	0.82	30.8	21.1	1.46
	1.7500	95.250	3.7500	27.783	1.0938	28.575	1.1250	22.225	0.8750	0.8	0.03	2.4	0.09	135	141	21.6	**33885**	**33821**	20.4	0.80	53.0	2.09	53.0	2.09	85.0	3.35	90.0	3.54	0.33	1.82	1.00	31.4	17.7	1.77
	1.7500	95.250	3.7500	27.783	1.0938	29.901	1.1772	22.225	0.8750	0.8	0.03	2.4	0.09	129	122	18.8	**435**	**432**	18.4	0.72	52.0	2.05	51.0	2.01	83.0	3.27	87.0	3.43	0.28	2.11	1.16	30.0	14.6	2.06
	1.7500	95.250	3.7500	27.783	1.0938	29.901	1.1772	22.225	0.8750	3.6	0.14	0.8	0.03	129	122	18.8	**438**	**432A**	18.4	0.72	57.0	2.24	51.0	2.01	84.0	3.31	87.0	3.43	0.28	2.11	1.16	30.0	14.6	2.06
	1.7500	95.250	3.7500	30.162	1.1875	29.370	1.1563	23.020	0.9063	0.8	0.03	2.4	0.09	130	140	20.7	**HM804842**	**HM804810**	26.5	1.04	57.0	2.24	57.0	2.24	81.0	3.19	91.0	3.58	0.55	1.10	0.60	30.4	28.4	1.07
	1.7500	95.250	3.7500	30.162	1.1875	29.370	1.1563	23.020	0.9063	3.6	0.14	2.4	0.09	130	140	20.7	**HM804843**	**HM804810**	26.5	1.04	63.0	2.48	57.0	2.24	81.0	3.19	91.0	3.58	0.55	1.10	0.60	30.4	28.4	1.07
	1.7500	95.250	3.7500	30.162	1.1875	29.370	1.1563	23.020	0.9063	3.6	0.14	0.8	0.03	130	140	20.7	**HM804843**	**HM804811**	26.5	1.04	63.0	2.48	57.0	2.24	83.0	3.27	91.0	3.58	0.55	1.10	0.60	30.4	28.4	1.07
	1.7500	98.425	3.8750	30.162	1.1875	30.302	1.1930	23.812	0.9375	6.4	0.25	3.2	0.13	129	137	20.9	**3783**	**3732**	22.2	0.87	64.0	2.52	54.0	2.13	84.0	3.31	90.0	3.54	0.34	1.77	0.97	30.1	17.4	1.73
	1.7500	98.425	3.8750	30.162	1.1875	31.750	1.2500	25.400	1.0000	0.8	0.03	3.2	0.13	143	143	21.9	**49576**	**49520**	24.1	0.95	55.0	2.17	54.0	2.13	88.0	3.46	96.0	3.78	0.40	1.50	0.82	33.4	22.8	1.46
	1.7500	101.600	4.0000	31.750	1.2500	31.750	1.2500	25.400	1.0000	0.8	0.03	0.8	0.03	143	143	21.9	**49576**	**49522**	24.1	0.95	55.0	2.17	54.0	2.13	90.0	3.54	96.0	3.78	0.40	1.50	0.82	33.4	22.8	1.46
	1.7500	101.600	4.0000	31.750	1.2500	31.750	1.2500	25.400	1.0000	3.6	0.14	3.2	0.13	143	143	21.9	**49577**	**49520**	24.1	0.95	60.0	2.36	54.0	2.13	88.0	3.46	96.0	3.78	0.40	1.50	0.82	33.4	22.8	1.46
	1.7500	101.600	4.0000	34.925	1.3750	36.068	1.4200	26.988	1.0625	3.6	0.14	3.2	0.13	164	159	24.8	**527**	**522**	22.2	0.87	59.0	2.32	53.0	2.09	89.0	3.50	95.0	3.74	0.29	2.10	1.16	38.4	18.7	2.05
	1.7500	104.775	4.1250	30.162	1.1875	30.958	1.2188	23.812	0.9375	0.8	0.03	0.8	0.03	157	165	25.6	**45280**	**45221**	22.2	0.87	55.0	2.17	54.0	2.13	95.0	3.74	99.0	3.90	0.33	1.80	0.99	36.6	20.8	1.76
	1.7500	104.775	4.1250	36.512	1.4375	36.512	1.4375	28.575	1.1250	3.6	0.14	1.0	0.04	185	187	28.6	**59175**	**59413**	26.9	1.06	63.0	2.48	56.0	2.20	92.0	3.62	99.0	3.90	0.40	1.49	0.82	43.2	29.6	1.46
	1.7500	104.775	4.1250	36.512	1.4375	36.512	1.4375	28.575	1.1250	0.8	0.03	3.2	0.13	185	187	28.6	**59176**	**59412**	26.9	1.06	57.0	2.24	56.0	2.20	92.0	3.62	99.0	3.90	0.40	1.49	0.82	43.2	29.6	1.46
	1.7500	104.775	4.1250	36.512	1.4375	36.512	1.4375	28.575	1.1250	3.6	0.14	3.2	0.13	176	195	29.3	**HM807040**	**HM807010**	29.3	1.15	66.0	2.60	59.0	2.32	89.0	3.50	100.0	3.94	0.49	1.23	0.68	41.3	34.4	1.20
	1.7500	107.950	4.2500	27.783	1.0938	29.317	1.1542	22.225	0.8750	0.8	0.03	0.8	0.03	136	144	22.2	**458**	**453A**	23.6	0.93	55.0	2.17	54.0	2.13	97.0	3.82	100.0	3.94	0.34	1.79	0.98	31.7	18.2	1.74
	1.7500	107.950	4.2500	27.783	1.0938	29.317	1.1542	22.225	0.8750	3.6	0.14	0.8	0.03	136	144	22.2	**460**	**453A**	23.6	0.93	60.0	2.36	54.0	2.13	97.0	3.82	100.0	3.94	0.34	1.79	0.98	31.7	18.2	1.74
	1.7500	107.950	4.2500	36.512	1.4375	36.512	1.4375	28.575	1.1250	3.6	0.14	3.2	0.13	185	187	28.6	**59175**	**59425**	26.9	1.06	63.0	2.48	56.0	2.20	93.0	3.66	101.0	3.98	0.40	1.49	0.82	43.2	29.6	1.46
	1.7500	111.125	4.3750	38.100	1.5000	36.957	1.4550	30.162	1.1875	3.6	0.14	3.2	0.13	172	172	26.8	**535**	**532A**	23.9	0.94	60.0	2.36	54.0	2.13	95.0	3.74	100.0	3.94	0.30	2.03	1.11	40.4	20.5	1.97
	1.7500	111.125	4.3750	38.100	1.5000	36.957	1.4550	33.338	1.3125	3.6	0.14	3.2	0.13	172	172	26.8	**535**	**532**	23.9	0.94	60.0	2.36	54.0	2.13	95.0	3.74	100.0	3.94	0.30	2.03	1.11	40.4	20.5	1.97
	1.7500	114.300	4.5000	44.450	1.7500	44.450	1.7500	34.925	1.3750	2.0	0.08	3.2	0.13	237	230	35.1	**65384**	**65320**	31.7	1.25	62.0	2.44	56.0	2.20	97.0	3.82	107.0	4.21	0.43	1.40	0.77	55.4	40.7	1.36
	1.7500	114.300	4.5000	44.450	1.7500	44.450	1.7500	34.925	1.3750	2.0	0.08	0.8	0.03	237	230	35.1	**65384**	**65321**	31.7	1.25	62.0	2.44	56.0	2.20	98.0	3.86	107.0	4.21	0.43	1.40	0.77	55.4	40.7	1.36
	1.7500	114.300	4.5000	44.450	1.7500	44.450	1.7500	34.925	1.3750	3.6	0.14	3.2	0.13	237	230	35.1	**65385**	**65320**	31.7	1.25	65.0	2.56	56.0	2.20	97.0	3.82	107.0	4.21	0.43	1.40	0.77	55.4	40.7	1.36
	1.7500	120.040	4.7260	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	218	217	34.0	**615**	**612A**	27.3	1.07	62.0	2.44	56.0	2.20	103.0	4.06	109.0	4.29	0.31	1.91	1.05	50.9	27.4	1.86
	1.7500	120.650	4.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	218	217	34.0	**615**	**612**	27.3	1.07	62.0	2.44	56.0	2.20	105.0	4.13	110.0	4.33	0.31	1.91	1.05	50.9	27.4	1.86

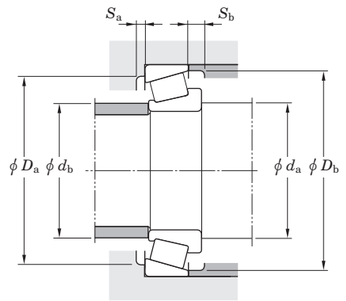
Note 1) SP indicates the specially chamfered from.

TS type

d 44.869 ~ (47.625) mm

1.7665 ~ (1.8750) inch





$P = XF_r + YF_a$
$P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$

$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

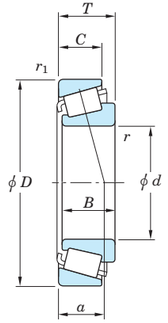
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

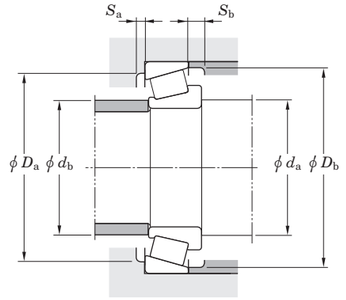
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1^{1)}$ (min.)					Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	(500 rpm for 3 000 Hrs.) Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	C_r	C_{0r}	C_u			mm	inch	mm	inch	mm	inch	mm	inch						
44.869	1.7665	92.075	3.6250	24.608	0.9688	25.400	1.0000	19.845	0.7813	3.6	0.14	0.8	0.03	107	119	17.9	**28576R**	**28521**	19.9	0.78	59.0	2.32	53.0	2.09	83.0	3.27	87.0	3.43	0.38	1.59	0.87	24.7	15.9	1.55
44.983	1.7710	85.000	3.3465	26.988	1.0625	25.400	1.0000	22.225	0.8750	1.6	0.06	2.4	0.09	96.8	100	15.1	**25584**	**25527**	20.7	0.81	53.0	2.09	51.0	2.01	73.0	2.87	78.0	3.07	0.33	1.79	0.99	22.5	12.9	1.75
	1.7710	93.264	3.6718	30.162	1.1875	30.302	1.1930	23.812	0.9375	3.6	0.14	3.2	0.13	129	137	20.9	**3776**	**3720**	22.2	0.87	59.0	2.32	53.0	2.09	82.0	3.23	88.0	3.46	0.34	1.77	0.97	30.1	17.4	1.73
	1.7710	101.600	4.0000	34.925	1.3750	36.068	1.4200	26.988	1.0625	4.3	0.17	3.2	0.13	164	159	24.8	**527S**	**522**	22.2	0.87	61.0	2.40	53.0	2.09	89.0	3.50	95.0	3.74	0.29	2.10	1.16	38.4	18.7	2.05
45.000	1.7717	85.000	3.3465	20.638	0.8125	21.692	0.8540	17.462	0.6875	1.6	0.06	1.2	0.05	89.6	81.7	12.4	**358**	**354A**	15.5	0.61	52.5	2.07	50.0	1.97	77.0	3.03	80.0	3.15	0.31	1.96	1.08	20.7	10.8	1.91
	1.7717	85.000	3.3465	20.638	0.8125	21.692	0.8540	17.462	0.6875	3.6	0.14	1.2	0.05	89.6	81.7	12.4	**358A**	**354A**	15.5	0.61	56.5	2.22	50.0	1.97	77.0	3.03	80.0	3.15	0.31	1.96	1.08	20.7	10.8	1.91
	1.7717	90.000	3.5433	20.000	0.7874	22.225	0.8750	15.875	0.6250	2.0	0.08	2.0	0.08	92.9	87.3	13.3	**367**	**362**	15.4	0.61	55.0	2.17	51.0	2.01	81.0	3.19	84.0	3.31	0.32	1.88	1.03	21.4	11.7	1.83
	1.7717	90.119	3.5480	23.000	0.9055	21.692	0.8540	21.808	0.8586	1.6	0.06	2.4	0.09	89.6	81.7	12.4	**358**	**352**	17.8	0.70	52.5	2.07	50.0	1.97	78.0	3.07	82.0	3.23	0.31	1.96	1.08	20.7	10.8	1.91
	1.7717	100.000	3.9370	25.000	0.9842	22.225	0.8750	21.824	0.8592	0.8	0.03	2.0	0.08	105	98.5	15.1	**376**	**372**	21.5	0.85	57.0	2.24	54.0	2.13	86.0	3.39	90.0	3.54	0.34	1.77	0.97	24.1	14.0	1.73
	1.7717	100.000	3.9370	25.000	0.9842	22.225	0.8750	21.824	0.8592	2.4	0.09	2.0	0.08	105	98.5	15.1	**376A**	**372**	21.5	0.85	57.0	2.24	54.0	2.13	86.0	3.39	90.0	3.54	0.34	1.77	0.97	24.1	14.0	1.73
	1.7717	104.775	4.1250	30.162	1.1875	29.317	1.1542	24.605	0.9687	2.4	0.09	3.2	0.13	136	144	22.2	**458S**	**453X**	23.6	0.93	59.0	2.32	55.0	2.17	92.0	3.62	98.0	3.86	0.34	1.79	0.98	31.7	18.2	1.74
	1.7717	104.775	4.1250	39.688	1.5625	40.157	1.5810	33.338	1.3125	3.6	0.14	3.2	0.13	189	211	32.3	**4559**	**4535**	27.3	1.07	62.0	2.44	59.0	2.32	90.0	3.54	99.0	3.90	0.34	1.79	0.98	44.4	25.4	1.74
45.230	1.7807	79.985	3.1490	19.842	0.7812	20.638	0.8125	15.080	0.5937	2.0	0.08	1.2	0.05	69.1	70.8	10.4	**17887**	**17831**	15.9	0.63	52.0	2.05	49.5	1.95	72.0	2.83	76.0	2.99	0.37	1.64	0.90	15.9	9.95	1.60
45.237	1.7810	84.138	3.3125	30.162	1.1875	30.886	1.2160	23.812	0.9375	3.6	0.14	3.2	0.13	120	120	18.2	**3586R**	**3520**	20.5	0.81	58.0	2.28	52.0	2.05	74.0	2.91	79.5	3.13	0.31	1.96	1.08	27.9	14.6	1.91
45.242	1.7812	73.431	2.8910	19.558	0.7700	19.812	0.7800	15.748	0.6200	3.6	0.14	0.8	0.03	70.0	78.1	11.4	**LM102949**	**LM102910**	14.7	0.58	56.0	2.20	50.0	1.97	68.0	2.68	70.0	2.76	0.31	1.97	1.08	16.1	8.40	1.92
	1.7812	77.788	3.0625	19.842	0.7812	19.842	0.7812	15.080	0.5937	3.6	0.14	0.8	0.03	71.7	73.5	10.7	**LM603049**	**LM603011**	17.5	0.69	57.0	2.24	50.0	1.97	71.0	2.80	74.0	2.91	0.43	1.41	0.77	16.5	12.1	1.37
	1.7812	77.788	3.0625	21.430	0.8437	19.842	0.7812	16.667	0.6562	3.6	0.14	0.8	0.03	71.7	73.5	10.7	**LM603049**	**LM603012**	19.1	0.75	57.0	2.24	50.0	1.97	71.0	2.80	74.0	2.91	0.43	1.41	0.77	16.5	12.1	1.37
	1.7812	79.974	3.1486	19.842	0.7812	19.842	0.7812	15.080	0.5937	3.6	0.14	0.8	0.03	71.7	73.5	10.7	**LM603049**	**LM603014**	17.5	0.69	57.0	2.24	50.0	1.97	71.0	2.80	74.0	2.91	0.43	1.41	0.77	16.5	12.1	1.37
	1.7812	79.974	3.1486	21.430	0.8437	19.842	0.7812	16.667	0.6562	3.6	0.14	0.8	0.03	71.7	73.5	10.7	**LM603049**	**LM603015**	19.1	0.75	57.0	2.24	50.0	1.97	71.0	2.80	74.0	2.91	0.43	1.41	0.77	16.5	12.1	1.37
45.618	1.7960	85.000	3.3465	23.812	0.9375	25.400	1.0000	19.050	0.7500	3.6	0.14	2.4	0.09	96.8	100	15.1	**25590**	**25526**	17.5	0.69	58.0	2.28	51.0	2.01	74.0	2.91	78.0	3.07	0.33	1.79	0.99	22.5	12.9	1.75
45.987	1.8105	74.976	2.9518	18.000	0.7087	18.000	0.7087	14.000	0.5512	2.4	0.09	1.6	0.06	66.2	74.6	10.8	**LM503349R**	**LM503310**	16.0	0.63	53.0	2.09	51.0	2.01	67.0	2.64	72.0	2.83	0.40	1.49	0.82	15.2	10.4	1.46
46.038	1.8125	79.375	3.1250	17.462	0.6875	17.462	0.6875	13.495	0.5313	2.8	0.11	1.6	0.06	59.2	59.1	8.65	**18690**	**18620**	16.0	0.63	56.0	2.20	51.0	2.01	71.0	2.80	74.0	2.91	0.37	1.60	0.88	13.6	8.70	1.56
	1.8125	85.000	3.3465	17.462	0.6875	17.462	0.6875	13.495	0.5313	2.4	0.09	1.6	0.06	62.5	65.5	9.55	**18780**	**18720**	17.4	0.69	56.0	2.20	52.0	2.05	77.0	3.03	80.0	3.15	0.41	1.48	0.81	14.4	9.95	1.44
	1.8125	85.000	3.3465	20.638	0.8125	21.692	0.8540	17.462	0.6875	3.6	0.14	1.2	0.05	89.6	81.7	12.4	**359A**	**354A**	15.5	0.61	57.0	2.24	51.0	2.01	77.0	3.03	80.0	3.15	0.31	1.96	1.08	20.7	10.8	1.91
	1.8125	85.000	3.3465	20.638	0.8125	21.692	0.8540	17.462	0.6875	2.4	0.09	1.2	0.05	89.6	81.7	12.4	**359S**	**354A**	15.5	0.61	55.0	2.17	51.0	2.01	77.0	3.03	80.0	3.15	0.31	1.96	1.08	20.7	10.8	1.91
	1.8125	85.000	3.3465	25.400	1.0000	25.608	1.0082	20.638	0.8125	3.6	0.14	1.2	0.05	100	106	16.0	**2984**	**2924**	18.9	0.74	58.0	2.28	52.0	2.05	76.0	2.99	80.0	3.15	0.35	1.73	0.95	23.3	13.8	1.69
	1.8125	87.312	3.4375	26.988	1.0625	25.608	1.0082	22.225	0.8750	3.6	0.14	2.4	0.09	100	106	16.0	**2984**	**2925**	18.6	0.73	58.0	2.28	52.0	2.05	76.0	2.99	80.0	3.15	0.35	1.73	0.95	23.3	13.8	1.69
	1.8125	95.250	3.7500	27.783	1.0938	29.901	1.1772	22.225	0.8750	3.6	0.14	0.8	0.03	129	122	18.8	**436**	**432A**	18.4	0.72	59.0	2.32	52.0	2.05	84.0	3.31	87.0	3.43	0.28	2.11	1.16	30.0	14.6	2.06
	1.8125	95.250	3.7500	30.162	1.1875	30.302	1.1930	23.812	0.9375	3.6	0.14	3.2	0.13	129	137	20.9	**3777**	**3726**	22.2	0.87	60.0	2.36	53.0	2.09	83.0	3.27	89.0	3.50	0.34	1.77	0.97	30.1	17.4	1.73
47.625	1.8750	88.900	3.5000	20.638	0.8125	22.225	0.8750	16.513	0.6501	3.6	0.14	1.2	0.05	92.9	87.3	13.3	**369A**	**362A**	16.1	0.63	60.0	2.36	53.0	2.09	81.0	3.19	84.0	3.31	0.32	1.88	1.03	21.4	11.7	1.83
	1.8750	88.900	3.5000	25.400	1.0000	25.400	1.0000	19.050	0.7500	3.6	0.14	3.2	0.13	109	112	16.6	**M804049**	**M804010**	23.6	0.93	62.0	2.44	55.0	2.17	76.0	2.99	85.0	3.35	0.55	1.10	0.60	25.3	23.6	1.07
	1.8750	90.000	3.5433	20.000	0.7874	22.225	0.8750	20.000	0.7874	2.4	0.09	0.8	0.03	92.9	87.3	13.3	**369S**	**363**	15.4	0.61	57.0	2.24	53.0	2.09	82.0	3.23	85.0	3.35	0.32	1.88	1.03	21.4	11.7	1.83
	1.8750	93.264	3.6718	30.162	1.1875	30.302	1.1930	23.812	0.9375	6.4	0.25	0.8	0.03	129	137	20.9	**3778**	**3730**	22.2	0.87	67.0	2.64	55.0	2.17	84.0	3.31	88.0	3.46	0.34	1.77	0.97	30.1	17.4	1.73
	1.8750	95.250	3.7500	30.162	1.1875	29.370	1.1563	23.020	0.9063	3.6	0.14	3.2	0.13	130	140	20.7	**HM804846**	**HM804810**	26.5	1.04	64.0	2.52	57.0	2.24	81.0	3.19	91.0	3.58	0.55	1.10	0.60	30.4	28.4	1.07
	1.8750	96.838	3.8125	21.000	0.8268	21.946	0.8640	15.875	0.6250	0.8	0.03	0.8	0.03	101	101	15.3	**386A**	**382A**	17.4	0.69	56.0	2.20	55.0	2.17	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
	1.8750	98.425	3.8750	30.162	1.1875	30.302	1.1930	23.812	0.9375	3.6	0.14	3.2	0.13	129	137	20.9	**3779**	**3732**	22.2	0.87	61.0	2.40	55.0	2.17	84.0	3.31	90.0	3.54	0.34	1.77	0.97	30.1	17.4	1.73

Note 1) SP indicates the specially chamfered from.

TS type

d (47.625) ~ (50.800) mm
(1.8750) ~ (2.0000) inch





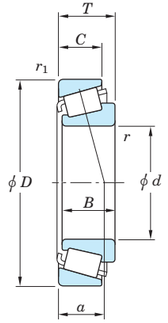
$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

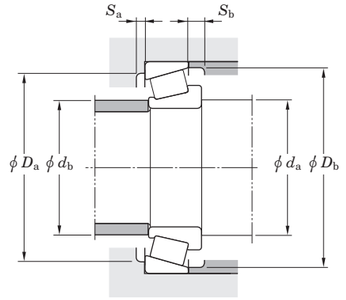
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
47.625	1.8750	101.600	4.0000	31.750	1.2500	29.370	1.1563	23.020	0.9063	3.6	0.14	3.2	0.13	143	143	21.9	**49580**	**49520**	24.1	0.95	62.0	2.44	59.0	2.32	88.0	3.46	96.0	3.78	0.40	1.50	0.82	33.4	22.8	1.46
	1.8750	101.600	4.0000	31.750	1.2500	31.750	1.2500	25.400	1.0000	6.4	0.25	3.2	0.13	143	143	21.9	**49581**	**49520**	24.1	0.95	68.0	2.68	59.0	2.32	88.0	3.46	96.0	3.78	0.40	1.50	0.82	33.4	22.8	1.46
	1.8750	101.600	4.0000	34.925	1.3750	36.068	1.4200	26.988	1.0625	3.6	0.14	3.2	0.13	164	159	24.8	**528**	**522**	22.2	0.87	62.0	2.44	55.0	2.17	89.0	3.50	95.0	3.74	0.29	2.10	1.16	38.4	18.7	2.05
	1.8750	101.600	4.0000	34.925	1.3750	36.068	1.4200	26.988	1.0625	1.6	0.06	3.2	0.13	164	159	24.8	**528A**	**522**	22.2	0.87	58.0	2.28	55.0	2.17	89.0	3.50	95.0	3.74	0.29	2.10	1.16	38.4	18.7	2.05
	1.8750	104.775	4.1250	30.162	1.1875	29.317	1.1542	24.605	0.9687	4.8	0.19	3.2	0.13	136	144	22.2	**463**	**453X**	23.6	0.93	65.0	2.56	56.0	2.20	92.0	3.62	98.0	3.86	0.34	1.79	0.98	31.7	18.2	1.74
	1.8750	104.775	4.1250	30.162	1.1875	29.317	1.1542	24.605	0.9687	0.8	0.03	3.2	0.13	136	144	22.2	**467**	**453X**	23.6	0.93	57.0	2.24	56.0	2.20	92.0	3.62	98.0	3.86	0.34	1.79	0.98	31.7	18.2	1.74
	1.8750	104.775	4.1250	30.162	1.1875	30.958	1.2188	23.812	0.9375	3.6	0.14	3.2	0.13	157	165	25.6	**45282**	**45220**	22.2	0.87	64.0	2.52	59.0	2.32	93.0	3.66	99.0	3.90	0.33	1.80	0.99	36.6	20.8	1.76
	1.8750	104.775	4.1250	36.512	1.4375	36.512	1.4375	28.575	1.1250	3.6	0.14	3.2	0.13	185	187	28.6	**59187**	**59412**	26.9	1.06	65.0	2.56	59.0	2.32	92.0	3.62	99.0	3.90	0.40	1.49	0.82	43.2	29.6	1.46
	1.8750	104.775	4.1250	36.512	1.4375	36.512	1.4375	28.575	1.1250	1.6	0.06	3.2	0.13	185	187	28.6	**59188**	**59412**	26.9	1.06	60.0	2.36	58.0	2.28	92.0	3.62	99.0	3.90	0.40	1.49	0.82	43.2	29.6	1.46
	1.8750	107.950	4.2500	27.783	1.0938	29.317	1.1542	22.225	0.8750	4.8	0.19	0.8	0.03	136	144	22.2	**463**	**453A**	23.6	0.93	65.0	2.56	56.0	2.20	97.0	3.82	100.0	3.94	0.34	1.79	0.98	31.7	18.2	1.74
	1.8750	107.950	4.2500	27.783	1.0938	29.317	1.1542	22.225	0.8750	0.8	0.03	0.8	0.03	136	144	22.2	**467**	**453A**	21.2	0.83	57.0	2.24	56.0	2.20	97.0	3.82	100.0	3.94	0.34	1.79	0.98	31.7	18.2	1.74
	1.8750	107.950	4.2500	36.512	1.4375	36.957	1.4550	28.575	1.1250	3.6	0.14	3.2	0.13	172	172	26.8	**536**	**532X**	23.9	0.94	62.0	2.44	56.0	2.20	94.0	3.70	100.0	3.94	0.30	2.03	1.11	40.4	20.5	1.97
	1.8750	117.475	4.6250	33.338	1.3125	31.750	1.2500	23.812	0.9375	3.6	0.14	0.8	0.03	162	152	23.2	**66187R**	**66461**	33.2	1.31	67.0	2.64	64.0	2.52	102.0	4.02	111.0	4.37	0.63	0.96	0.53	37.5	40.1	0.93
	1.8750	117.475	4.6250	33.338	1.3125	31.750	1.2500	23.812	0.9375	3.6	0.14	3.2	0.13	162	152	23.2	**66187R**	**66462**	33.2	1.31	67.0	2.64	64.0	2.52	100.0	3.94	111.0	4.37	0.63	0.96	0.53	37.5	40.1	0.93
	1.8750	120.040	4.7260	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	218	217	34.0	**617**	**612A**	27.3	1.07	65.0	2.56	59.0	2.32	103.0	4.06	109.0	4.29	0.31	1.91	1.05	50.9	27.4	1.86
	1.8750	120.650	4.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	218	217	34.0	**617**	**612**	27.3	1.07	65.0	2.56	59.0	2.32	105.0	4.13	110.0	4.33	0.31	1.91	1.05	50.9	27.4	1.86
48.412	1.9060	93.264	3.6718	30.162	1.1875	30.302	1.1930	23.812	0.9375	3.6	0.14	3.2	0.13	129	137	20.9	**3781A**	**3720**	22.2	0.87	62.0	2.44	56.0	2.20	82.0	3.23	88.0	3.46	0.34	1.77	0.97	30.1	17.4	1.73
	1.9060	95.250	3.7500	30.162	1.1875	29.370	1.1563	23.020	0.9063	2.4	0.09	3.2	0.13	130	140	20.7	**HM804848**	**HM804810**	26.5	1.04	63.0	2.48	57.5	2.26	81.0	3.19	91.0	3.58	0.55	1.10	0.60	30.4	28.4	1.07
	1.9060	95.250	3.7500	30.162	1.1875	29.370	1.1563	23.020	0.9063	3.6	0.14	3.2	0.13	130	140	20.7	**HM804849**	**HM804810**	26.5	1.04	66.0	2.60	57.5	2.26	81.0	3.19	91.0	3.58	0.55	1.10	0.60	30.4	28.4	1.07
49.212	1.9375	88.900	3.5000	20.638	0.8125	22.225	0.8750	16.513	0.6501	0.8	0.03	1.2	0.05	92.9	87.3	13.3	**365S**	**362A**	16.1	0.63	55.0	2.17	54.0	2.13	81.0	3.19	84.0	3.31	0.32	1.88	1.03	21.4	11.7	1.83
	1.9375	93.264	3.6718	30.162	1.1875	30.302	1.1930	23.812	0.9375	3.6	0.14	0.8	0.03	129	137	20.9	**3781**	**3730**	22.2	0.87	62.0	2.44	56.0	2.20	84.0	3.31	88.0	3.46	0.34	1.77	0.97	30.1	17.4	1.73
	1.9375	104.775	4.1250	36.512	1.4375	36.512	1.4375	28.575	1.1250	3.6	0.14	3.2	0.13	176	195	29.3	**HM807044**	**HM807010**	29.3	1.15	69.0	2.72	63.0	2.48	89.0	3.50	100.0	3.94	0.49	1.23	0.68	41.3	34.4	1.20
	1.9375	111.125	4.3750	38.100	1.5000	36.957	1.4550	33.338	1.3125	3.6	0.14	3.2	0.13	172	172	26.8	**545**	**532**	25.5	1.00	65.0	2.56	59.0	2.32	95.0	3.74	100.0	3.94	0.30	2.03	1.11	40.4	20.5	1.97
	1.9375	114.300	4.5000	44.450	1.7500	44.450	1.7500	34.925	1.3750	3.6	0.14	3.2	0.13	237	230	35.1	**65390**	**65320**	31.7	1.25	70.0	2.76	60.0	2.36	97.0	3.82	107.0	4.21	0.43	1.40	0.77	55.4	40.7	1.36
	1.9375	114.300	4.5000	44.450	1.7500	44.450	1.7500	36.068	1.4200	3.6	0.14	3.2	0.13	265	263	35.4	**HH506348**	**HH506310**	30.6	1.20	71.0	2.80	61.0	2.40	97.0	3.82	107.0	4.21	0.40	1.49	0.82	62.0	42.6	1.46
	1.9375	122.238	4.8125	43.658	1.7188	43.764	1.7230	36.512	1.4375	1.2	0.05	3.2	0.13	276	318	43.6	**5562R**	**5535**	31.1	1.22	63.0	2.48	60.0	2.36	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
49.982	1.9678	107.950	4.2500	36.512	1.4375	36.957	1.4550	28.575	1.1250	3.6	0.14	3.2	0.13	172	172	26.8	**546**	**532X**	23.9	0.94	65.0	2.56	59.0	2.32	94.0	3.70	100.0	3.94	0.30	2.03	1.11	40.4	20.5	1.97
49.987	1.9680	92.075	3.6250	24.608	0.9688	25.400	1.0000	19.845	0.7813	2.4	0.09	0.8	0.03	107	119	17.9	**28579R**	**28521**	19.9	0.78	60.0	2.36	56.0	2.20	83.0	3.27	87.0	3.43	0.38	1.59	0.87	24.7	15.9	1.55
	1.9680	100.000	3.9370	25.000	0.9842	22.225	0.8750	21.824	0.8592	2.4	0.09	2.0	0.08	105	98.5	15.1	**378A**	**372**	21.5	0.85	60.0	2.36	56.0	2.20	86.0	3.39	90.0	3.54	0.34	1.77	0.97	24.1	14.0	1.73
	1.9680	114.300	4.5000	44.450	1.7500	44.450	1.7500	36.068	1.4200	3.6	0.14	0.8	0.03	265	263	35.4	**HH506349**	**HH506311**	30.6	1.20	71.0	2.80	61.0	2.40	99.0	3.90	107.0	4.21	0.40	1.49	0.82	62.0	42.6	1.46
50.000	1.9685	88.900	3.5000	20.638	0.8125	22.225	0.8750	16.513	0.6501	2.0	0.08	1.2	0.05	92.9	87.3	13.3	**365**	**362A**	16.1	0.63	58.0	2.28	55.0	2.17	81.0	3.19	84.0	3.31	0.32	1.88	1.03	21.4	11.7	1.83
	1.9685	88.900	3.5000	20.638	0.8125	22.225	0.8750	16.513	0.6501	2.4	0.09	1.2	0.05	92.9	87.3	13.3	**366**	**362A**	16.1	0.63	59.0	2.32	55.0	2.17	81.0	3.19	84.0	3.31	0.32	1.88	1.03	21.4	11.7	1.83
	1.9685	104.775	4.1250	30.162	1.1875	29.317	1.1542	24.605	0.9687	2.4	0.09	3.2	0.13	136	144	22.2	**465**	**453X**	23.6	0.93	62.0	2.44	58.0	2.28	92.0	3.62	98.0	3.86	0.34	1.79	0.98	31.7	18.2	1.74
	1.9685	104.775	4.1250	30.162	1.1875	29.317	1.1542	24.605	0.9687	3.6	0.14	3.2	0.13	136	144	22.2	**465A**	**453X**	23.6	0.93	64.5	2.54	58.0	2.28	92.0	3.62	98.0	3.86	0.34	1.79	0.98	31.7	18.2	1.74
	1.9685	110.000	4.3307	22.000	0.8661	21.996	0.8660	18.824	0.7411	0.8	0.03	1.2	0.05	109	116	17.7	**396**	**394A**	21.3	0.84	61.0	2.40	60.0	2.36	101.0	3.98	105.0	4.13	0.40	1.49	0.82	25.0	17.2	1.46
	1.9685	120.650	4.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	218	217	34.0	**618X**	**612**	27.3	1.07	67.0	2.64	61.0	2.40	105.0	4.13	110.0	4.33	0.31	1.91	1.05	50.9	27.4	1.86
50.800	2.0000	80.962	3.1875	18.258	0.7188	18.258	0.7188	14.288	0.5625	1.6	0.06	1.6	0.06	67.8	81.1	11.8	**L305649R**	**L305610**	16.0	0.63	58.0	2.28	56.0	2.20	73.0	2.87	77.0	3.03	0.35	1.69	0.93	15.5	9.45	1.65
	2.0000	82.550	3.2500	21.590	0.8500	22.225	0.8750	16.510	0.6500	3.6	0.14	1.2	0.05	77.0	84.3	12.5	**LM104949**	**LM104911**	16.4	0.65	62.0	2.44	55.0	2.17	75.0	2.95	78.0	3.07	0.31	1.97	1.08	17.8	9.25	1.92

Note 1) SP indicates the specially chamfered from.

TS type
d (50.800) mm
(2.0000) inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

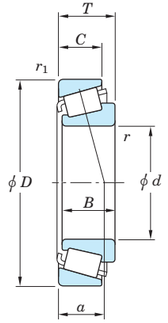
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

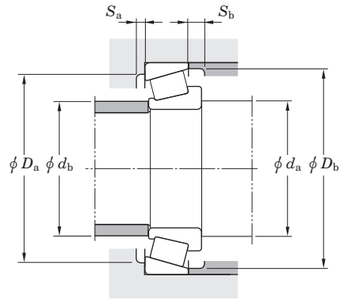
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center	Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a	d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	mm	inch	mm	inch	mm	inch	mm	inch						
50.800	2.0000	83.312	3.2800	17.462	0.6875	17.462	0.6875	13.495	0.5313	3.6	0.14	0.8	0.03	62.5	65.5	9.55	**18790**	**18721**	17.4	62.0	2.44	56.0	2.20	73.0	2.87	78.0	3.07	0.41	1.48	0.81	14.4	9.95	1.44
	2.0000	85.725	3.3750	19.050	0.7500	18.263	0.7190	12.700	0.5000	1.6	0.06	1.6	0.06	63.8	66.4	9.55	**18200**	**18337**	22.7	59.0	2.32	56.0	2.20	76.0	2.99	81.0	3.19	0.57	1.06	0.58	14.6	14.2	1.03
	2.0000	88.900	3.5000	17.462	0.6875	17.462	0.6875	13.495	0.5313	3.6	0.14	1.2	0.05	62.5	65.5	9.55	**18790**	**18724**	17.4	62.0	2.44	56.0	2.20	78.0	3.07	82.0	3.23	0.41	1.48	0.81	14.4	9.95	1.44
	2.0000	88.900	3.5000	20.638	0.8125	17.462	0.6875	16.670	0.6563	3.6	0.14	1.2	0.05	62.5	65.5	9.55	**18790**	**18723**	22.7	62.0	2.44	56.0	2.20	78.0	3.07	82.0	3.23	0.41	1.48	0.81	14.4	9.95	1.44
	2.0000	88.900	3.5000	20.638	0.8125	22.225	0.8750	16.513	0.6501	1.6	0.06	1.2	0.05	92.9	87.3	13.3	**368**	**362A**	16.1	58.0	2.28	56.0	2.20	81.0	3.19	84.0	3.31	0.32	1.88	1.03	21.4	11.7	1.83
	2.0000	88.900	3.5000	20.638	0.8125	22.225	0.8750	16.513	0.6501	3.6	0.14	1.2	0.05	92.9	87.3	13.3	**368A**	**362A**	16.1	62.0	2.44	56.0	2.20	81.0	3.19	84.0	3.31	0.32	1.88	1.03	21.4	11.7	1.83
	2.0000	88.900	3.5000	20.638	0.8125	22.225	0.8750	16.513	0.6501	5.2	0.20	1.2	0.05	92.9	87.3	13.3	**370A**	**362A**	16.1	65.0	2.56	56.0	2.20	81.0	3.19	84.0	3.31	0.32	1.88	1.03	21.4	11.7	1.83
	2.0000	89.980	3.5425	24.750	0.9744	25.400	1.0000	19.987	0.7869	3.6	0.14	2.4	0.09	107	119	17.9	**28580R**	**28520**	20.0	63.0	2.48	57.0	2.24	81.0	3.19	86.0	3.39	0.38	1.59	0.87	24.7	15.9	1.55
	2.0000	92.075	3.6250	24.608	0.9688	25.400	1.0000	19.845	0.7813	3.6	0.14	0.8	0.03	107	119	17.9	**28580R**	**28521**	19.9	63.0	2.48	57.0	2.24	83.0	3.27	87.0	3.43	0.38	1.59	0.87	24.7	15.9	1.55
	2.0000	92.075	3.6250	27.780	1.0937	25.400	1.0000	23.017	0.9062	3.6	0.14	2.4	0.09	107	119	17.9	**28580R**	**28523**	23.1	63.0	2.48	57.0	2.24	81.0	3.19	86.0	3.39	0.38	1.59	0.87	24.7	15.9	1.55
	2.0000	93.264	3.6718	20.638	0.8125	22.225	0.8750	15.083	0.5938	2.4	0.09	1.2	0.05	105	98.5	15.1	**375**	**374**	17.1	60.0	2.36	57.0	2.24	85.0	3.35	88.0	3.46	0.34	1.77	0.97	24.2	14.0	1.73
	2.0000	93.264	3.6718	30.162	1.1875	30.302	1.1930	23.812	0.9375	0.8	0.03	0.8	0.03	129	137	20.9	**3775**	**3730**	22.2	58.0	2.28	58.0	2.28	84.0	3.31	88.0	3.46	0.34	1.77	0.97	30.1	17.4	1.73
	2.0000	93.264	3.6718	30.162	1.1875	30.302	1.1930	23.812	0.9375	3.6	0.14	3.2	0.13	129	137	20.9	**3780**	**3720**	22.2	64.0	2.52	58.0	2.28	82.0	3.23	88.0	3.46	0.34	1.77	0.97	30.1	17.4	1.73
	2.0000	93.264	3.6718	30.162	1.1875	30.302	1.1930	23.812	0.9375	3.6	0.14	0.8	0.03	129	137	20.9	**3780**	**3730**	22.2	64.0	2.52	58.0	2.28	84.0	3.31	88.0	3.46	0.34	1.77	0.97	30.1	17.4	1.73
	2.0000	93.264	3.6718	30.162	1.1875	30.302	1.1930	23.812	0.9375	6.4	0.25	0.8	0.03	129	137	20.9	**3784**	**3730**	22.2	70.0	2.76	58.0	2.28	84.0	3.31	88.0	3.46	0.34	1.77	0.97	30.1	17.4	1.73
	2.0000	95.250	3.7500	27.783	1.0938	28.575	1.1250	22.225	0.8750	3.6	0.14	0.8	0.03	135	141	21.6	**33889**	**33822**	20.4	64.0	2.52	58.0	2.28	86.0	3.39	90.0	3.54	0.33	1.82	1.00	31.4	17.7	1.77
	2.0000	96.838	3.8125	21.000	0.8268	21.946	0.8640	15.875	0.6250	1.6	0.06	0.8	0.03	101	101	15.3	**385AS**	**382A**	17.4	60.0	2.36	58.0	2.28	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
	2.0000	96.838	3.8125	21.000	0.8268	21.946	0.8640	15.875	0.6250	0.8	0.03	0.8	0.03	101	101	15.3	**385AX**	**382A**	17.4	59.0	2.32	58.0	2.28	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
	2.0000	96.838	3.8125	22.225	0.8750	22.225	0.8750	19.050	0.7500	3.6	0.14	1.6	0.06	105	98.5	15.1	**375S**	**372A**	21.5	63.0	2.48	57.0	2.24	86.0	3.39	90.0	3.54	0.34	1.77	0.97	24.1	14.0	1.73
	2.0000	96.838	3.8125	25.400	1.0000	21.946	0.8640	20.274	0.7982	2.4	0.09	2.4	0.09	101	101	15.3	**385A**	**382S**	21.8	61.0	2.40	60.0	2.36	87.0	3.43	91.0	3.58	0.35	1.69	0.93	23.2	14.1	1.65
	2.0000	97.630	3.8437	24.608	0.9688	24.608	0.9688	19.446	0.7656	3.6	0.14	0.8	0.03	113	131	19.7	**28678**	**28622**	21.2	65.0	2.56	58.0	2.28	88.0	3.46	92.0	3.62	0.40	1.49	0.82	26.1	17.9	1.45
	2.0000	98.425	3.8750	30.162	1.1875	30.302	1.1930	23.812	0.9375	3.6	0.14	3.2	0.13	129	137	20.9	**3780**	**3732**	22.2	64.0	2.52	58.0	2.28	84.0	3.31	90.0	3.54	0.34	1.77	0.97	30.1	17.4	1.73
	2.0000	101.600	4.0000	31.750	1.2500	31.750	1.2500	25.400	1.0000	3.6	0.14	3.2	0.13	143	143	21.9	**49585**	**49520**	24.1	66.0	2.60	59.0	2.32	88.0	3.46	96.0	3.78	0.40	1.50	0.82	33.4	22.8	1.46
	2.0000	101.600	4.0000	34.925	1.3750	31.750	1.2500	28.575	1.1250	3.6	0.14	3.2	0.13	143	143	21.9	**49585**	**49521**	27.3	66.0	2.60	59.0	2.32	88.0	3.46	96.0	3.78	0.40	1.50	0.82	33.4	22.8	1.46
	2.0000	101.600	4.0000	34.925	1.3750	36.068	1.4200	26.988	1.0625	0.8	0.03	3.2	0.13	164	159	24.8	**529**	**522**	22.2	59.0	2.32	58.0	2.28	89.0	3.50	95.0	3.74	0.29	2.10	1.16	38.4	18.7	2.05
	2.0000	101.600	4.0000	34.925	1.3750	36.068	1.4200	26.988	1.0625	3.6	0.14	3.2	0.13	164	159	24.8	**529X**	**522**	22.2	65.0	2.56	58.0	2.28	89.0	3.50	95.0	3.74	0.29	2.10	1.16	38.4	18.7	2.05
	2.0000	104.775	4.1250	30.162	1.1875	30.958	1.2188	23.812	0.9375	6.4	0.25	3.2	0.13	157	165	25.6	**45284**	**45220**	22.2	71.0	2.80	59.0	2.32	93.0	3.66	99.0	3.90	0.33	1.80	0.99	36.6	20.8	1.76
	2.0000	104.775	4.1250	30.162	1.1875	30.958	1.2188	23.812	0.9375	6.4	0.25	0.8	0.03	157	165	25.6	**45284**	**45221**	22.2	71.0	2.80	59.0	2.32	95.0	3.74	99.0	3.90	0.33	1.80	0.99	36.6	20.8	1.76
	2.0000	104.775	4.1250	30.162	1.1875	30.958	1.2188	23.812	0.9375	2.4	0.09	0.8	0.03	157	165	25.6	**45285**	**45221**	22.2	63.0	2.48	59.0	2.32	95.0	3.74	99.0	3.90	0.33	1.80	0.99	36.6	20.8	1.76
	2.0000	104.775	4.1250	36.512	1.4375	36.512	1.4375	28.575	1.1250	3.6	0.14	3.2	0.13	185	187	28.6	**59200**	**59412**	26.9	68.0	2.68	61.0	2.40	92.0	3.62	99.0	3.90	0.40	1.49	0.82	43.2	29.6	1.46
	2.0000	104.775	4.1250	36.512	1.4375	36.512	1.4375	28.575	1.1250	3.6	0.14	3.2	0.13	176	195	29.3	**HM807046**	**HM807010**	29.3	70.0	2.76	63.0	2.48	89.0	3.50	100.0	3.94	0.49	1.23	0.68	41.3	34.4	1.20
	2.0000	104.775	4.1250	39.688	1.5625	40.157	1.5810	33.338	1.3125	3.6	0.14	3.2	0.13	189	211	32.3	**4580**	**4535**	27.3	67.0	2.64	61.0	2.40	90.0	3.54	99.0	3.90	0.34	1.79	0.98	44.4	25.4	1.74
	2.0000	107.950	4.2500	32.558	1.2818	29.317	1.1542	27.000	1.0630	0.8	0.03	0.8	0.03	136	144	22.2	**455**	**452**	28.3	60.0	2.36	59.0	2.32	99.0	3.90	100.0	3.94	0.34	1.79	0.98	31.7	18.2	1.74
	2.0000	107.950	4.2500	36.512	1.4375	36.957	1.4550	28.575	1.1250	3.6	0.14	3.2	0.13	172	172	26.8	**537**	**532X**	23.9	65.0	2.56	59.0	2.32	94.0	3.70	100.0	3.94	0.30	2.03	1.11	40.4	20.5	1.97
	2.0000	110.000	4.3307	22.000	0.8661	21.996	0.8660	18.824	0.7411	7.9	0.31	7.9	0.31	109	116	17.7	**398**	**394**	21.3	62.0	2.44	61.0	2.40	102.0	4.02	104.5	4.11	0.40	1.49	0.82	25.0	17.2	1.46
	2.0000	110.000	4.3307	22.000	0.8661	21.996	0.8660	18.824	0.7411	0.8	0.03	3.2	0.13	109	116	17.7	**398**	**394AS**	21.3	62.0	2.44	61.0	2.40	99.0	3.90	105.0	4.13	0.40	1.49	0.82	25.0	17.2	1.46
	2.0000	110.000	4.3307	27.795	1.0943	29.317	1.1542	27.000	1.0630	3.6	0.14	2.0	0.08	136	144	22.2	**455S**	**454**	21.2	65.0	2.56	59.0	2.32	96.0	3.78	100.0	3.94	0.34	1.79	0.98	31.7	18.2	1.74
	2.0000	111.125	4.3750	38.895	1.5313	40.157	1.5810	32.545	1.2813	3.6	0.14	3.2	0.13	189	211	32.3	**4580**	**4536**	26.5	67.0	2.64	61.0	2.40	96.0	3.78	102.0	4.02	0.34	1.79	0.98	44.4	25.4	1.74
	2.0000	112.712	4.4375	30.162	1.1875	30.048	1.1830	23.812	0.9375	3.6	0.14	0.8	0.03	139	164	25.1	**3975**	**3925**	25.9	68.0	2.68	61.0	2.40	101.0	3.98	106.0	4.17	0.40	1.49	0.82	32.4	22.3	1.46
	2.0000	112.712	4.4375	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	3.2	0.13	184	207	32.1	**39575**	**39520**	23.3	68.0	2.68	61.0	2.40	101.0	3.98	107.0	4.21	0.34	1.77	0.97	42.6	24.7	1.72
	2.0000	117.475	4.6250	33.338	1.3125	31.750	1.2500	23.812	0.9375	3.6	0.14	0.8	0.03	162	152	23.2	**66200R**	**66461**	33.2	71.0	2.80	65.0	2.56	102.0	4.02	111.0	4.37	0.63	0.96	0.53	37.5	40.1	0.93

Note 1) SP indicates the specially chamfered from.

TS type

d (50.800) ~ (53.975) mm
(2.0000) ~ (2.1250) inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

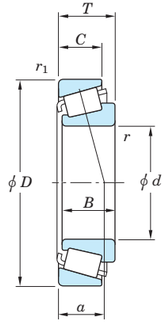
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

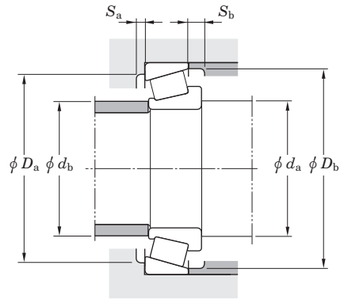
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
50.800	2.0000	120.000	4.7244	40.023	1.5757	41.275	1.6250	30.988	1.2200	3.6	0.14	3.0	0.12	218	217	34.0	**619**	**613X**	27.3	1.07	67.0	2.64	61.0	2.40	104.0	4.09	110.0	4.33	0.31	1.91	1.05	50.9	27.4	1.86
	2.0000	120.040	4.7260	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	1.6	0.06	218	217	34.0	**619**	**612A**	27.3	1.07	67.0	2.64	61.0	2.40	103.0	4.06	109.0	4.29	0.31	1.91	1.05	50.9	27.4	1.86
	2.0000	120.251	4.7343	44.450	1.7500	43.764	1.7230	36.512	1.4375	1.2	0.05	3.2	0.13	276	318	43.6	**5565R**	**5520**	31.9	1.26	67.0	2.64	65.0	2.56	110.0	4.33	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
	2.0000	120.650	4.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	218	217	34.0	**619**	**612**	27.3	1.07	67.0	2.64	61.0	2.40	105.0	4.13	110.0	4.33	0.31	1.91	1.05	50.9	27.4	1.86
	2.0000	122.238	4.8125	38.100	1.5000	36.678	1.4440	30.162	1.1875	2.4	0.09	3.2	0.13	202	223	34.8	**555**	**553X**	28.7	1.13	66.0	2.60	62.0	2.44	108.0	4.25	115.0	4.53	0.35	1.73	0.95	47.1	27.9	1.69
	2.0000	122.238	4.8125	43.658	1.7188	43.764	1.7230	36.512	1.4375	1.2	0.05	3.2	0.13	276	318	43.6	**5565R**	**5535**	31.1	1.22	67.0	2.64	65.0	2.56	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
	2.0000	127.000	5.0000	36.512	1.4375	36.512	1.4375	26.988	1.0625	3.6	0.14	1.6	0.06	209	235	36.2	**HM813836**	**HM813811**	32.9	1.30	72.0	2.83	66.0	2.60	113.0	4.45	121.0	4.76	0.50	1.20	0.66	48.6	41.7	1.17
	2.0000	127.000	5.0000	44.450	1.7500	44.450	1.7500	34.925	1.3750	3.6	0.14	3.2	0.13	259	269	41.0	**65200**	**65500**	35.2	1.39	75.0	2.95	69.0	2.72	107.0	4.21	119.0	4.69	0.49	1.23	0.68	60.6	50.5	1.20
	2.0000	127.000	5.0000	44.450	1.7500	44.450	1.7500	34.925	1.3750	3.6	0.14	1.2	0.05	259	269	41.0	**65200**	**65501**	35.2	1.39	75.0	2.95	69.0	2.72	110.0	4.33	120.0	4.72	0.49	1.23	0.68	60.6	50.5	1.20
	2.0000	136.525	5.3750	46.038	1.8125	44.450	1.7500	36.512	1.4375	3.6	0.14	3.2	0.13	259	269	41.0	**65200**	**65537**	36.7	1.44	75.0	2.95	69.0	2.72	110.0	4.33	120.0	4.72	0.49	1.23	0.68	60.6	50.5	1.20
51.592	2.0312	88.900	3.5000	20.638	0.8125	22.225	0.8750	16.513	0.6501	2.0	0.08	1.2	0.05	92.9	87.3	13.3	**368S**	**362A**	16.1	0.63	59.0	2.32	56.0	2.20	81.0	3.19	84.0	3.31	0.32	1.88	1.03	21.4	11.7	1.83
	2.0312	100.000	3.9370	25.000	0.9842	22.225	0.8750	21.824	0.8592	1.6	0.06	2.0	0.08	105	98.5	15.1	**377S**	**372**	21.5	0.85	60.0	2.36	58.0	2.28	86.0	3.39	90.0	3.54	0.34	1.77	0.97	24.1	14.0	1.73
52.388	2.0625	92.075	3.6250	24.608	0.9688	25.400	1.0000	19.845	0.7813	3.6	0.14	0.8	0.03	107	119	17.9	**28584R**	**28521**	19.9	0.78	65.0	2.56	58.0	2.28	83.0	3.27	87.0	3.43	0.38	1.59	0.87	24.7	15.9	1.55
	2.0625	93.264	3.6718	30.162	1.1875	30.302	1.1930	23.812	0.9375	2.4	0.09	0.8	0.03	129	137	20.9	**3767**	**3730**	22.2	0.87	63.0	2.48	59.0	2.32	84.0	3.31	88.0	3.46	0.34	1.77	0.97	30.1	17.4	1.73
	2.0625	95.250	3.7500	27.783	1.0938	28.575	1.1250	22.225	0.8750	1.6	0.06	0.8	0.03	135	141	21.6	**33890**	**33822**	20.4	0.80	61.0	2.40	59.0	2.32	86.0	3.39	90.0	3.54	0.33	1.82	1.00	31.4	17.7	1.77
	2.0625	95.250	3.7500	27.783	1.0938	28.575	1.1250	22.225	0.8750	3.6	0.14	0.8	0.03	135	141	21.6	**33891**	**33822**	20.4	0.80	66.0	2.60	59.0	2.32	86.0	3.39	90.0	3.54	0.33	1.82	1.00	31.4	17.7	1.77
	2.0625	100.000	3.9370	25.000	0.9842	22.225	0.8750	21.824	0.8592	2.4	0.09	2.0	0.08	105	98.5	15.1	**377**	**372**	21.5	0.85	62.0	2.44	58.0	2.28	86.0	3.39	90.0	3.54	0.34	1.77	0.97	24.1	14.0	1.73
	2.0625	100.000	3.9370	25.000	0.9842	22.225	0.8750	21.824	0.8592	4.8	0.19	2.0	0.08	105	98.5	15.1	**377A**	**372**	21.5	0.85	67.0	2.64	58.0	2.28	86.0	3.39	90.0	3.54	0.34	1.77	0.97	24.1	14.0	1.73
	2.0625	103.188	4.0625	38.100	1.5000	36.957	1.4550	30.162	1.1875	3.6	0.14	3.2	0.13	172	172	26.8	**540**	**533A**	23.9	0.94	71.0	2.80	60.0	2.36	95.0	3.74	100.0	3.94	0.30	2.03	1.11	40.4	20.5	1.97
	2.0625	104.775	4.1250	30.162	1.1875	29.317	1.1542	24.605	0.9687	1.6	0.06	3.2	0.13	136	144	22.2	**468**	**453X**	23.6	0.93	62.0	2.44	60.0	2.36	92.0	3.62	98.0	3.86	0.34	1.79	0.98	31.7	18.2	1.74
	2.0625	107.950	4.2500	36.512	1.4375	36.957	1.4550	28.575	1.1250	3.6	0.14	1.6	0.06	172	172	26.8	**540**	**532X**	23.9	0.94	71.0	2.80	60.0	2.36	94.0	3.70	100.0	3.94	0.30	2.03	1.11	40.4	20.5	1.97
53.975	2.1250	88.900	3.5000	19.050	0.7500	19.050	0.7500	13.492	0.5312	2.4	0.09	2.0	0.08	79.1	86.8	12.6	**LM806649**	**LM806610**	21.5	0.85	63.0	2.48	60.0	2.36	80.0	3.15	85.0	3.35	0.55	1.10	0.60	18.1	16.9	1.07
	2.1250	95.250	3.7500	27.783	1.0938	28.575	1.1250	22.225	0.8750	1.6	0.06	0.8	0.03	135	141	21.6	**33895**	**33822**	20.4	0.80	63.0	2.48	60.0	2.36	86.0	3.39	90.0	3.54	0.33	1.82	1.00	31.4	17.7	1.77
	2.1250	100.000	3.9370	21.000	0.8268	21.946	0.8640	17.826	0.7018	1.6	0.06	2.0	0.08	101	101	15.3	**389AS**	**383A**	17.4	0.69	62.0	2.44	60.0	2.36	89.0	3.50	93.0	3.66	0.35	1.69	0.93	23.2	14.1	1.65
	2.1250	104.775	4.1250	30.162	1.1875	29.317	1.1542	24.605	0.9687	3.6	0.14	3.2	0.13	136	144	22.2	**456**	**453X**	23.6	0.93	68.0	2.68	61.0	2.40	92.0	3.62	98.0	3.86	0.34	1.79	0.98	31.7	18.2	1.74
	2.1250	104.775	4.1250	30.162	1.1875	30.958	1.2188	23.812	0.9375	0.8	0.03	0.8	0.03	157	165	25.6	**45287**	**45221**	22.2	0.87	62.0	2.44	62.0	2.44	95.0	3.74	99.0	3.90	0.33	1.80	0.99	36.6	20.8	1.76
	2.1250	104.775	4.1250	36.512	1.4375	36.512	1.4375	28.575	1.1250	3.6	0.14	3.2	0.13	176	195	29.3	**HM807049**	**HM807010**	29.3	1.15	73.0	2.87	63.0	2.48	89.0	3.50	100.0	3.94	0.49	1.23	0.68	41.3	34.4	1.20
	2.1250	104.775	4.1250	39.688	1.5625	40.157	1.5810	33.338	1.3125	3.6	0.14	3.2	0.13	189	211	32.3	**4595**	**4535**	27.3	1.07	70.0	2.76	63.0	2.48	90.0	3.54	99.0	3.90	0.34	1.79	0.98	44.4	25.4	1.74
	2.1250	107.950	4.2500	27.795	1.0943	29.317	1.1542	27.000	1.0630	3.6	0.14	0.8	0.03	136	144	22.2	**456**	**453**	23.6	0.93	68.0	2.68	61.0	2.40	99.0	3.90	100.0	3.94	0.34	1.79	0.98	31.7	18.2	1.74
	2.1250	107.950	4.2500	36.512	1.4375	36.957	1.4550	28.575	1.1250	3.6	0.14	3.2	0.13	172	172	26.8	**539**	**532X**	23.9	0.94	68.0	2.68	61.0	2.40	94.0	3.70	100.0	3.94	0.30	2.03	1.11	40.4	20.5	1.97
	2.1250	107.950	4.2500	36.512	1.4375	36.957	1.4550	28.575	1.1250	5.6	0.22	3.2	0.13	172	172	26.8	**539A**	**532X**	23.9	0.94	72.0	2.83	61.0	2.40	94.0	3.70	100.0	3.94	0.30	2.03	1.11	40.4	20.5	1.97
	2.1250	117.475	4.6250	33.338	1.3125	31.750	1.2500	23.812	0.9375	3.6	0.14	3.2	0.13	162	152	23.2	**66212R**	**66462**	33.2	1.31	73.0	2.87	67.0	2.64	100.0	3.94	111.0	4.37	0.63	0.96	0.53	37.5	40.1	0.93
	2.1250	119.985	4.7238	32.751	1.2894	30.162	1.1875	26.949	1.0610	3.6	0.14	0.8	0.03	184	207	32.1	**39578**	**39528**	23.3	0.92	70.0	2.76	64.0	2.52	107.0	4.21	110.0	4.33	0.34	1.77	0.97	42.6	24.7	1.72
	2.1250	120.650	4.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	218	217	34.0	**621**	**612**	27.3	1.07	70.0	2.76	63.0	2.48	105.0	4.13	110.0	4.33	0.31	1.91	1.05	50.9	27.4	1.86
	2.1250	120.650	4.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	0.8	0.03	0.8	0.03	218	217	34.0	**624**	**612S**	27.3	1.07	64.0	2.52	63.0	2.48	107.0	4.21	110.0	4.33	0.31	1.91	1.05	50.9	27.4	1.86
	2.1250	122.238	4.8125	33.338	1.3125	31.750	1.2500	23.812	0.9375	3.6	0.14	3.2	0.13	160	153	23.3	**66584**	**66520**	35.4	1.39	75.0	2.95	68.0	2.68	105.0	4.13	116.0	4.57	0.67	0.90	0.50	37.1	42.2	0.88
	2.1250	122.238	4.8125	43.658	1.7188	43.764	1.7230	36.512	1.4375	1.2	0.05	3.2	0.13	276	318	43.6	**5577R**	**5535**	31.1	1.22	67.0	2.64	65.0	2.56	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
	2.1250	122.238	4.8125	43.658	1.7188	43.764	1.7230	36.512	1.4375	3.6	0.14	3.2	0.13	276	318	43.6	**5578R**	**5535**	31.1	1.22	73.0	2.87	67.0	2.64	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
	2.1250	123.825	4.8750	38.100	1.5000	36.678	1.4440	30.162	1.1875	3.6	0.14	3.2	0.13	202	223	34.8	**557S**	**552A**	28.7	1.13	71.0	2.80	65.0	2.56	109.0	4.29	116.0	4.57	0.35	1.73	0.95	47.1	27.9	1.69

Note 1) SP indicates the specially chamfered from.

TS type

d (53.975) ~ (57.150) mm
(2.1250) ~ (2.2500) inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

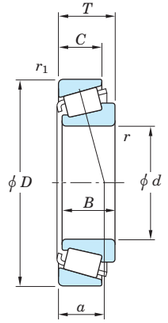
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

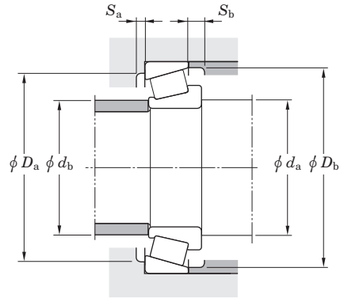
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	(500 rpm for 3 000 Hrs.) Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
53.975	2.1250	127.000	5.0000	44.450	1.7500	44.450	1.7500	34.925	1.3750	3.6	0.14	3.2	0.13	259	269	41.0	**65212**	**65500**	35.2	1.39	77.0	3.03	71.0	2.80	107.0	4.21	119.0	4.69	0.49	1.23	0.68	60.6	50.5	1.20
	2.1250	130.175	5.1250	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	246	267	41.8	**636**	**633**	30.3	1.19	73.0	2.87	67.0	2.64	116.0	4.57	124.0	4.88	0.36	1.66	0.91	57.4	35.5	1.62
54.813	2.1580	135.755	5.3447	53.975	2.1250	56.007	2.2050	44.450	1.7500	0.8	0.03	3.2	0.13	333	357	49.3	**6380**	**6320**	34.8	1.37	70.0	2.76	68.0	2.68	117.0	4.61	126.0	4.96	0.32	1.85	1.02	78.4	43.5	1.80
54.986	2.1648	97.630	3.8437	24.608	0.9688	24.608	0.9688	19.446	0.7656	2.4	0.09	0.8	0.03	113	131	19.7	**28680X**	**28622**	21.2	0.83	65.0	2.56	58.0	2.28	88.0	3.46	92.0	3.62	0.40	1.49	0.82	26.1	17.9	1.45
54.988	2.1649	104.775	4.1250	30.162	1.1875	29.317	1.1542	24.605	0.9687	2.4	0.09	3.2	0.13	136	144	22.2	**466**	**453X**	23.6	0.93	67.0	2.64	61.0	2.40	92.0	3.62	98.0	3.86	0.34	1.79	0.98	31.7	18.2	1.74
	2.1649	107.950	4.2500	27.783	1.0938	29.317	1.1542	22.225	0.8750	2.4	0.09	0.8	0.03	136	144	22.2	**466**	**453A**	23.6	0.93	67.0	2.64	61.0	2.40	97.0	3.82	100.0	3.94	0.34	1.79	0.98	31.7	18.2	1.74
	2.1649	110.000	4.3307	27.795	1.0943	29.317	1.1542	27.000	1.0630	2.4	0.09	2.0	0.08	136	144	22.2	**466**	**454**	25.7	1.01	67.0	2.64	61.0	2.40	96.0	3.78	100.0	3.94	0.34	1.79	0.98	31.7	18.2	1.74
54.991	2.1650	135.755	5.3447	53.975	2.1250	56.007	2.2050	44.450	1.7500	3.6	0.14	3.2	0.13	333	357	49.3	**6381**	**6320**	34.8	1.37	76.0	2.99	70.0	2.76	117.0	4.61	126.0	4.96	0.32	1.85	1.02	78.4	43.5	1.80
55.000	2.1654	96.838	3.8125	21.000	0.8268	21.946	0.8640	15.875	0.6250	2.4	0.09	0.8	0.03	101	101	15.3	**385**	**382A**	17.4	0.69	65.0	2.56	61.0	2.40	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
	2.1654	96.838	3.8125	21.000	0.8268	21.946	0.8640	15.875	0.6250	3.6	0.14	0.8	0.03	101	101	15.3	**385X**	**382A**	17.4	0.69	67.0	2.64	61.0	2.40	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
	2.1654	98.425	3.8750	21.000	0.8268	21.946	0.8640	17.826	0.7018	2.4	0.09	0.8	0.03	101	101	15.3	**385**	**382**	17.4	0.69	65.0	2.56	61.0	2.40	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
	2.1654	100.000	3.9370	25.400	1.0000	21.946	0.8640	22.225	0.8750	2.4	0.09	1.2	0.05	101	101	15.3	**385**	**383X**	21.8	0.86	65.0	2.56	61.0	2.40	87.0	3.43	93.0	3.66	0.35	1.69	0.93	23.2	14.1	1.65
	2.1654	120.000	4.7244	29.002	1.1418	29.007	1.1420	23.444	0.9230	0.8	0.03	3.2	0.13	148	161	25.0	**475**	**472A**	24.9	0.98	67.0	2.64	66.0	2.60	106.0	4.17	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.1654	120.000	4.7244	29.002	1.1418	29.007	1.1420	23.444	0.9230	2.0	0.08	3.2	0.13	148	161	25.0	**475X**	**472A**	24.9	0.98	69.0	2.72	66.0	2.60	106.0	4.17	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.1654	120.650	4.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	0.8	0.03	3.2	0.13	218	217	34.0	**622X**	**612**	27.3	1.07	66.0	2.60	64.0	2.52	105.0	4.13	110.0	4.33	0.31	1.91	1.05	50.9	27.4	1.86
55.006	2.1656	120.650	4.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	0.8	0.03	3.2	0.13	218	217	34.0	**622A**	**612**	27.3	1.07	66.0	2.60	64.0	2.52	105.0	4.13	110.0	4.33	0.31	1.91	1.05	50.9	27.4	1.86
55.474	2.1840	96.838	3.8125	21.000	0.8268	21.946	0.8640	15.875	0.6250	2.4	0.09	0.8	0.03	101	101	15.3	**386**	**382A**	17.4	0.69	65.0	2.56	61.0	2.40	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
55.562	2.1875	97.630	3.8437	24.608	0.9688	24.608	0.9688	19.446	0.7656	3.6	0.14	0.8	0.03	113	131	19.7	**28680**	**28622**	21.2	0.83	68.0	2.68	62.0	2.44	88.0	3.46	92.0	3.62	0.40	1.49	0.82	26.1	17.9	1.45
	2.1875	104.775	4.1250	30.162	1.1875	29.317	1.1542	24.605	0.9687	2.4	0.09	3.2	0.13	136	144	22.2	**466S**	**453X**	23.6	0.93	67.0	2.64	61.0	2.40	92.0	3.62	98.0	3.86	0.34	1.79	0.98	31.7	18.2	1.74
	2.1875	122.238	4.8125	43.658	1.7188	43.764	1.7230	36.512	1.4375	1.2	0.05	3.2	0.13	276	318	43.6	**5566R**	**5535**	31.1	1.22	70.0	2.76	68.0	2.68	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
	2.1875	127.000	5.0000	36.512	1.4375	36.512	1.4375	26.988	1.0625	3.6	0.14	3.2	0.13	209	235	36.2	**HM813840**	**HM813810**	32.9	1.30	76.0	2.99	70.0	2.76	111.0	4.37	121.0	4.76	0.50	1.20	0.66	48.6	41.7	1.17
55.575	2.1880	96.838	3.8125	21.000	0.8268	21.946	0.8640	15.875	0.6250	2.4	0.09	0.8	0.03	101	101	15.3	**389**	**382A**	17.4	0.69	65.0	2.56	61.0	2.40	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
	2.1880	96.838	3.8125	21.000	0.8268	26.256	1.0337	15.875	0.6250	2.4	0.09	0.8	0.03	101	101	15.3	**389S**	**382A**	17.4	0.69	65.0	2.56	61.0	2.40	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
55.753	2.1950	122.238	4.8125	33.338	1.3125	31.750	1.2500	23.812	0.9375	SP	SP	3.2	0.13	160	153	23.3	**66583**	**66520**	35.4	1.39	70.0	2.76	63.0	2.48	105.0	4.13	116.0	4.57	0.67	0.90	0.50	37.1	42.2	0.88
57.150	2.2500	96.838	3.8125	21.000	0.8268	21.946	0.8640	15.875	0.6250	2.4	0.09	0.8	0.03	101	101	15.3	**387**	**382A**	17.4	0.69	66.0	2.60	62.0	2.44	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
	2.2500	96.838	3.8125	21.000	0.8268	21.946	0.8640	15.875	0.6250	3.6	0.14	0.8	0.03	101	101	15.3	**387A**	**382A**	17.4	0.69	69.0	2.72	62.0	2.44	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
	2.2500	96.838	3.8125	21.000	0.8268	21.946	0.8640	15.875	0.6250	5.2	0.20	0.8	0.03	101	101	15.3	**387AS**	**382A**	17.4	0.69	72.0	2.83	62.0	2.44	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
	2.2500	96.838	3.8125	21.000	0.8268	21.946	0.8640	15.875	0.6250	0.8	0.03	0.8	0.03	101	101	15.3	**387S**	**382A**	17.4	0.69	63.0	2.48	62.0	2.44	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
	2.2500	98.425	3.8750	21.000	0.8268	21.946	0.8640	17.826	0.7018	2.4	0.09	0.8	0.03	101	101	15.3	**387**	**382**	17.4	0.69	66.0	2.60	62.0	2.44	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
	2.2500	98.425	3.8750	24.608	0.9688	24.608	0.9688	19.446	0.7656	3.6	0.14	0.8	0.03	113	131	19.7	**28682**	**28623**	21.2	0.83	70.0	2.76	63.0	2.48	88.0	3.46	93.0	3.66	0.40	1.49	0.82	26.1	17.9	1.45
	2.2500	104.775	4.1250	30.162	1.1875	29.317	1.1542	24.605	0.9687	2.4	0.09	3.2	0.13	136	144	22.2	**462**	**453X**	23.6	0.93	67.0	2.64	63.0	2.48	92.0	3.62	98.0	3.86	0.34	1.79	0.98	31.7	18.2	1.74
	2.2500	104.775	4.1250	30.162	1.1875	29.317	1.1542	24.605	0.9687	3.6	0.14	3.2	0.13	136	144	22.2	**469**	**453X**	23.6	0.93	70.0	2.76	63.0	2.48	92.0	3.62	98.0	3.86	0.34	1.79	0.98	31.7	18.2	1.74
	2.2500	104.775	4.1250	30.162	1.1875	30.958	1.2188	23.812	0.9375	0.8	0.03	0.8	0.03	157	165	25.6	**45289**	**45221**	22.2	0.87	65.0	2.56	65.0	2.56	95.0	3.74	99.0	3.90	0.33	1.80	0.99	36.6	20.8	1.76
	2.2500	104.775	4.1250	30.162	1.1875	30.958	1.2188	23.812	0.9375	2.4	0.09	0.8	0.03	157	165	25.6	**45290**	**45221**	22.2	0.87	68.0	2.68	65.0	2.56	95.0	3.74	99.0	3.90	0.33	1.80	0.99	36.6	20.8	1.76
	2.2500	104.775	4.1250	30.162	1.1875	30.958	1.2188	23.812	0.9375	6.4	0.25	0.8	0.03	157	165	25.6	**45291**	**45221**	22.2	0.87	76.0	2.99	65.0	2.56	95.0	3.74	99.0	3.90	0.33	1.80	0.99	36.6	20.8	1.76

Note 1) SP indicates the specially chamfered from.

TS type

d (57.150) ~ (60.000) mm
(2.2500) ~ (2.3622) inch





$P = XF_r + YF_a$
$P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$

$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

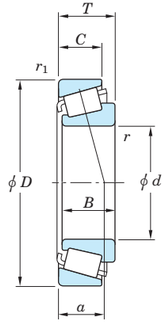
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

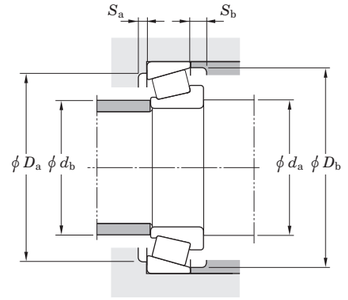
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
57.150	2.2500	110.000	4.3307	22.000	0.8661	21.996	0.8660	22.000	0.8661	2.4	0.09	0.8	0.03	109	116	17.7	**390**	**394**	21.3	0.84	70.0	2.76	66.0	2.60	102.0	4.02	104.5	4.11	0.40	1.49	0.82	25.0	17.2	1.46
	2.2500	111.125	4.3750	22.000	0.8661	21.996	0.8660	18.824	0.7411	2.4	0.09	1.2	0.05	109	116	17.7	**390**	**393AS**	21.3	0.84	70.0	2.76	66.0	2.60	101.0	3.98	105.0	4.13	0.40	1.49	0.82	25.0	17.2	1.46
	2.2500	112.712	4.4375	22.225	0.8750	21.996	0.8660	15.875	0.6250	2.4	0.09	3.2	0.13	109	116	17.7	**390**	**393A**	21.5	0.85	70.0	2.76	66.0	2.60	100.0	3.94	105.0	4.13	0.40	1.49	0.82	25.0	17.2	1.46
	2.2500	112.712	4.4375	30.162	1.1875	30.048	1.1830	23.812	0.9375	3.6	0.14	3.2	0.13	139	164	25.1	**3979**	**3920**	25.9	1.02	72.0	2.83	66.0	2.60	99.0	3.90	106.0	4.17	0.40	1.49	0.82	32.4	22.3	1.46
	2.2500	112.712	4.4375	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	3.2	0.13	184	207	32.1	**39580**	**39520**	23.3	0.92	72.0	2.83	66.0	2.60	101.0	3.98	107.0	4.21	0.34	1.77	0.97	42.6	24.7	1.72
	2.2500	112.712	4.4375	30.162	1.1875	30.162	1.1875	23.812	0.9375	7.9	0.31	3.2	0.13	184	207	32.1	**39581**	**39520**	23.3	0.92	81.0	3.19	66.0	2.60	101.0	3.98	107.0	4.21	0.34	1.77	0.97	42.6	24.7	1.72
	2.2500	112.712	4.4375	36.512	1.4375	30.162	1.1875	30.162	1.1875	3.6	0.14	3.2	0.13	184	207	32.1	**39580**	**39522**	29.7	1.17	72.0	2.83	66.0	2.60	101.0	3.98	107.0	4.21	0.34	1.77	0.97	42.6	24.7	1.72
	2.2500	117.475	4.6250	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	0.8	0.03	148	179	27.4	**33225**	**33461**	27.8	1.09	74.0	2.91	68.0	2.68	106.0	4.17	112.0	4.41	0.44	1.38	0.76	34.4	25.6	1.34
	2.2500	117.475	4.6250	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	3.2	0.13	148	179	27.4	**33225**	**33462**	27.8	1.09	74.0	2.91	68.0	2.68	104.0	4.09	112.0	4.41	0.44	1.38	0.76	34.4	25.6	1.34
	2.2500	117.475	4.6250	33.338	1.3125	31.750	1.2500	23.812	0.9375	3.6	0.14	0.8	0.03	162	152	23.2	**66225R**	**66461**	33.2	1.31	76.0	2.99	69.0	2.72	102.0	4.02	111.0	4.37	0.63	0.96	0.53	37.5	40.1	0.93
	2.2500	120.040	4.7260	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	218	217	34.0	**623**	**612A**	27.3	1.07	72.0	2.83	66.0	2.60	103.0	4.06	109.0	4.29	0.31	1.91	1.05	50.9	27.4	1.86
	2.2500	120.650	4.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	218	217	34.0	**623**	**612**	27.3	1.07	72.0	2.83	66.0	2.60	105.0	4.13	110.0	4.33	0.31	1.91	1.05	50.9	27.4	1.86
	2.2500	120.650	4.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	218	217	34.0	**623A**	**612**	27.3	1.07	78.0	3.07	66.0	2.60	105.0	4.13	110.0	4.33	0.31	1.91	1.05	50.9	27.4	1.86
	2.2500	122.238	4.8125	33.338	1.3125	31.750	1.2500	23.812	0.9375	3.6	0.14	3.2	0.13	160	153	23.3	**66587**	**66520**	35.4	1.39	77.0	3.03	71.0	2.80	105.0	4.13	116.0	4.57	0.67	0.90	0.50	37.1	42.2	0.88
	2.2500	122.238	4.8125	38.100	1.5000	36.678	1.4440	30.162	1.1875	3.6	0.14	3.2	0.13	202	223	34.8	**555S**	**553X**	28.7	1.13	73.0	2.87	67.0	2.64	108.0	4.25	115.0	4.53	0.35	1.73	0.95	47.1	27.9	1.69
	2.2500	123.825	4.8750	38.100	1.5000	36.678	1.4440	30.162	1.1875	7.9	0.31	3.2	0.13	202	223	34.8	**555SA**	**552A**	28.7	1.13	82.0	3.23	67.0	2.64	109.0	4.29	116.0	4.57	0.35	1.73	0.95	47.1	27.9	1.69
	2.2500	127.000	5.0000	44.450	1.7500	44.450	1.7500	34.925	1.3750	3.6	0.14	3.2	0.13	259	269	41.0	**65225**	**65500**	35.2	1.39	80.0	3.15	71.0	2.80	107.0	4.21	119.0	4.69	0.49	1.23	0.68	60.6	50.5	1.20
	2.2500	135.755	5.3447	53.975	2.1250	56.007	2.2050	44.450	1.7500	4.3	0.17	3.2	0.13	333	357	49.3	**6375**	**6320**	34.8	1.37	78.0	3.07	70.0	2.76	117.0	4.61	126.0	4.96	0.32	1.85	1.02	78.4	43.5	1.80
	2.2500	135.755	5.3447	53.975	2.1250	56.007	2.2050	44.450	1.7500	0.8	0.03	3.2	0.13	333	357	49.3	**6387**	**6320**	34.8	1.37	71.0	2.80	70.0	2.76	117.0	4.61	126.0	4.96	0.32	1.85	1.02	78.4	43.5	1.80
	2.2500	136.525	5.3750	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	246	267	41.8	**635**	**632**	30.3	1.19	75.0	2.95	69.0	2.72	118.0	4.65	125.0	4.92	0.36	1.66	0.91	57.4	35.5	1.62
	2.2500	149.225	5.8750	53.975	2.1250	41.275	1.6250	31.750	1.2500	6.4	0.25	3.2	0.13	357	404	54.4	**6465**	**6420**	39.3	1.55	86.0	3.39	81.0	3.19	129.0	5.08	141.0	5.55	0.36	1.66	0.91	83.9	51.9	1.62
	2.2500	149.225	5.8750	53.975	2.1250	54.229	2.1350	44.450	1.7500	3.6	0.14	3.2	0.13	357	404	54.4	**6455**	**6420**	39.3	1.55	81.0	3.19	75.0	2.95	129.0	5.08	141.0	5.55	0.36	1.66	0.91	83.9	51.9	1.62
57.531	2.2650	96.838	3.8125	21.000	0.8268	21.946	0.8640	15.875	0.6250	3.6	0.14	0.8	0.03	101	101	15.3	**388A**	**382A**	17.4	0.69	69.0	2.72	63.0	2.48	89.0	3.50	92.0	3.62	0.35	1.69	0.93	23.2	14.1	1.65
58.738	2.3125	112.712	4.4375	33.338	1.3125	30.048	1.1830	26.988	1.0625	3.6	0.14	3.2	0.13	139	164	25.1	**3981**	**3926**	29.1	1.15	73.0	2.87	67.0	2.64	98.0	3.86	106.0	4.17	0.40	1.49	0.82	32.4	22.3	1.46
	2.3125	122.238	4.8125	51.595	2.0313	51.702	2.0355	36.512	1.4375	3.6	0.14	3.2	0.13	276	318	43.6	**5558R**	**5535**	39.0	1.54	77.0	3.03	72.0	2.83	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
	2.3125	127.000	5.0000	44.450	1.7500	44.450	1.7500	34.925	1.3750	3.6	0.14	3.2	0.13	259	269	41.0	**65231**	**65500**	35.2	1.39	81.0	3.19	71.0	2.80	107.0	4.21	119.0	4.69	0.49	1.23	0.68	60.6	50.5	1.20
59.530	2.3437	112.712	4.4375	30.162	1.1875	30.048	1.1830	23.812	0.9375	1.6	0.06	3.2	0.13	139	164	25.1	**3978**	**3920**	25.9	1.02	70.0	2.76	68.0	2.68	99.0	3.90	106.0	4.17	0.40	1.49	0.82	32.4	22.3	1.46
59.880	2.3575	127.000	5.0000	44.450	1.7500	44.450	1.7500	34.925	1.3750	3.6	0.14	3.2	0.13	259	269	41.0	**65235**	**65500**	35.2	1.39	82.0	3.23	71.0	2.80	107.0	4.21	119.0	4.69	0.49	1.23	0.68	60.6	50.5	1.20
59.972	2.3611	122.238	4.8125	33.338	1.3125	31.750	1.2500	23.812	0.9375	0.8	0.03	3.2	0.13	160	153	23.3	**66589**	**66520**	35.4	1.39	74.0	2.91	73.0	2.87	105.0	4.13	116.0	4.57	0.67	0.90	0.50	37.1	42.2	0.88
59.977	2.3613	101.600	4.0000	25.400	1.0000	25.400	1.0000	19.845	0.7813	3.6	0.14	3.2	0.13	115	137	20.6	**28980**	**28920**	22.8	0.90	73.0	2.87	67.0	2.64	89.0	3.50	96.0	3.78	0.43	1.41	0.78	26.6	19.3	1.38
	2.3613	122.238	4.8125	33.338	1.3125	31.750	1.2500	23.812	0.9375	1.6	0.06	3.2	0.13	160	153	23.3	**66586**	**66520**	35.4	1.39	75.0	2.95	68.0	2.68	105.0	4.13	116.0	4.57	0.67	0.90	0.50	37.1	42.2	0.88
59.985	2.3616	135.755	5.3447	53.975	2.1250	56.007	2.2050	44.450	1.7500	3.6	0.14	3.2	0.13	333	357	49.3	**6391**	**6320**	34.8	1.37	79.0	3.11	70.0	2.76	117.0	4.61	126.0	4.96	0.32	1.85	1.02	78.4	43.5	1.80
59.987	2.3617	104.775	4.1250	21.432	0.8438	22.000	0.8661	15.875	0.6250	2.4	0.09	2.0	0.08	115	118	18.0	**39236**	**39412**	19.5	0.77	71.0	2.80	67.0	2.64	96.0	3.78	100.0	3.94	0.39	1.55	0.85	26.4	17.5	1.51
60.000	2.3622	107.950	4.2500	25.400	1.0000	25.400	1.0000	19.050	0.7500	3.6	0.14	3.2	0.13	116	143	21.6	**29580**	**29520**	24.7	0.97	74.0	2.91	68.0	2.68	96.0	3.78	103.0	4.06	0.46	1.31	0.72	26.9	21.1	1.28
	2.3622	107.950	4.2500	25.400	1.0000	25.400	1.0000	19.050	0.7500	0.8	0.03	0.8	0.03	116	143	21.6	**29582**	**29522**	24.7	0.97	69.0	2.72	68.0	2.68	98.0	3.86	103.0	4.06	0.46	1.31	0.72	26.9	21.1	1.26
	2.3622	110.000	4.3307	22.000	0.8661	21.996	0.8660	18.824	0.7411	0.8	0.03	1.2	0.05	109	116	17.7	**397**	**394A**	21.3	0.84	69.0	2.72	68.0	2.68	101.0	3.98	104.5	4.11	0.40	1.49	0.82	25.0	17.2	1.46

Note 1) SP indicates the specially chamfered from.

TS type

d (60.000) ~ (63.500) mm
(2.3622) ~ (2.5000) inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

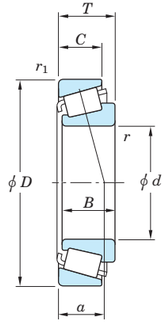
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

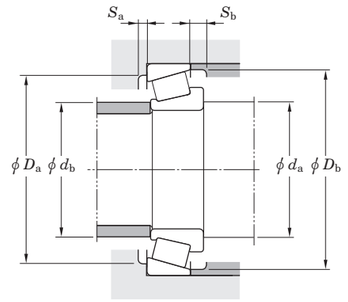
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)					Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	(500 rpm for 3 000 Hrs.) Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	C_r	C_{0r}	C_u			mm	inch	mm	inch	mm	inch	mm	inch						
60.000	2.3622	112.712	4.4375	30.162	1.1875	30.048	1.1830	23.812	0.9375	3.6	0.14	0.8	0.03	139	164	25.1	**3977**	**3925**	25.9	1.02	74.0	2.91	68.0	2.68	101.0	3.98	106.0	4.17	0.40	1.49	0.82	32.4	22.3	1.46
	2.3622	120.000	4.7244	29.002	1.1418	29.007	1.1420	23.444	0.9230	2.0	0.08	3.2	0.13	148	161	25.0	**476**	**472A**	24.9	0.98	73.0	2.87	69.0	2.72	106.0	4.17	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.3622	120.000	4.7244	29.794	1.1730	29.007	1.1420	24.237	0.9542	1.6	0.06	2.0	0.08	148	161	25.0	**476A**	**472**	25.7	1.01	72.0	2.83	69.0	2.72	107.0	4.21	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.3622	122.238	4.8125	33.338	1.3125	31.750	1.2500	23.812	0.9375	3.6	0.14	3.2	0.13	160	153	23.3	**66585**	**66520**	35.4	1.39	79.0	3.11	73.0	2.87	105.0	4.13	116.0	4.57	0.67	0.90	0.50	37.1	42.2	0.88
	2.3622	122.238	4.8125	33.338	1.3125	31.750	1.2500	23.812	0.9375	0.8	0.03	3.2	0.13	160	153	23.3	**66588**	**66520**	35.4	1.39	72.0	2.83	65.0	2.56	105.0	4.13	116.0	4.57	0.67	0.90	0.50	37.1	42.2	0.88
60.325	2.3750	100.000	3.9370	25.400	1.0000	25.400	1.0000	19.845	0.7813	3.6	0.14	3.2	0.13	115	137	20.6	**28985**	**28921**	22.8	0.90	73.0	2.87	67.0	2.64	89.0	3.50	96.0	3.78	0.43	1.41	0.78	26.6	19.3	1.38
	2.3750	100.000	3.9370	25.400	1.0000	25.400	1.0000	19.845	0.7813	3.6	0.14	0.8	0.03	115	137	20.6	**28985**	**28921A**	22.8	0.90	73.0	2.87	67.0	2.64	92.0	3.62	96.0	3.78	0.43	1.41	0.78	26.6	19.3	1.38
	2.3750	101.600	4.0000	25.400	1.0000	25.400	1.0000	19.845	0.7813	3.6	0.14	3.2	0.13	115	137	20.6	**28985**	**28920**	22.8	0.90	73.0	2.87	67.0	2.64	89.0	3.50	96.0	3.78	0.43	1.41	0.78	26.6	19.3	1.38
	2.3750	112.712	4.4375	30.162	1.1875	30.048	1.1830	23.812	0.9375	3.6	0.14	0.8	0.03	139	164	25.1	**3980**	**3925**	25.9	1.02	75.0	2.95	68.0	2.68	101.0	3.98	106.0	4.17	0.40	1.49	0.82	32.4	22.3	1.46
	2.3750	122.238	4.8125	38.100	1.5000	36.678	1.4440	30.162	1.1875	7.9	0.31	3.2	0.13	202	223	34.8	**557A**	**553X**	28.7	1.13	84.0	3.31	69.0	2.72	108.0	4.25	115.0	4.53	0.35	1.73	0.95	47.1	27.9	1.69
	2.3750	122.238	4.8125	38.100	1.5000	36.678	1.4440	30.162	1.1875	2.4	0.09	3.2	0.13	202	223	34.8	**558**	**553X**	28.7	1.13	73.0	2.87	69.0	2.72	108.0	4.25	115.0	4.53	0.35	1.73	0.95	47.1	27.9	1.69
	2.3750	122.238	4.8125	38.100	1.5000	36.678	1.4440	30.162	1.1875	3.6	0.14	3.2	0.13	202	223	34.8	**558A**	**553X**	28.7	1.13	76.0	2.99	69.0	2.72	108.0	4.25	115.0	4.53	0.35	1.73	0.95	47.1	27.9	1.69
	2.3750	122.238	4.8125	38.100	1.5000	38.354	1.5100	29.718	1.1700	7.9	0.31	1.6	0.06	238	249	39.1	**HM212044**	**HM212010**	27.3	1.07	85.0	3.35	70.0	2.76	110.0	4.33	116.0	4.57	0.34	1.78	0.98	55.5	32.0	1.73
	2.3750	122.238	4.8125	43.658	1.7188	43.764	1.7230	36.512	1.4375	0.8	0.03	3.2	0.13	276	318	43.6	**5582R**	**5535**	31.1	1.22	73.0	2.87	72.0	2.83	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
	2.3750	122.238	4.8125	43.658	1.7188	43.764	1.7230	36.512	1.4375	3.6	0.14	3.2	0.13	276	318	43.6	**5583R**	**5535**	31.1	1.22	78.0	3.07	72.0	2.83	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
	2.3750	127.000	5.0000	36.512	1.4375	36.512	1.4375	26.988	1.0625	3.6	0.14	1.6	0.06	209	235	36.2	**HM813841**	**HM813811**	32.9	1.30	80.0	3.15	73.0	2.87	113.0	4.45	121.0	4.76	0.50	1.20	0.66	48.6	41.7	1.17
	2.3750	127.000	5.0000	36.512	1.4375	36.512	1.4375	26.988	1.0625	1.6	0.06	3.2	0.13	209	235	36.2	**HM813841A**	**HM813810**	32.9	1.30	74.0	2.91	71.0	2.80	110.0	4.33	121.0	4.76	0.50	1.20	0.66	48.6	41.7	1.17
	2.3750	127.000	5.0000	44.450	1.7500	44.450	1.7500	34.925	1.3750	3.6	0.14	3.2	0.13	259	269	41.0	**65237**	**65500**	35.2	1.39	82.0	3.23	71.0	2.80	107.0	4.21	119.0	4.69	0.49	1.23	0.68	60.6	50.5	1.20
	2.3750	127.000	5.0000	44.450	1.7500	44.450	1.7500	34.925	1.3750	1.6	0.06	3.2	0.13	259	269	41.0	**65237A**	**65500**	35.2	1.39	78.0	3.07	71.0	2.80	107.0	4.21	119.0	4.69	0.49	1.23	0.68	60.6	50.5	1.20
	2.3750	130.175	5.1250	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	246	267	41.8	**637**	**633**	30.3	1.19	78.0	3.07	72.0	2.83	116.0	4.57	124.0	4.88	0.36	1.66	0.91	57.4	35.5	1.62
	2.3750	135.755	5.3447	53.975	2.1250	56.007	2.2050	44.450	1.7500	3.6	0.14	3.2	0.13	333	357	49.3	**6376**	**6320**	34.8	1.37	81.0	3.19	74.0	2.91	117.0	4.61	126.0	4.96	0.32	1.85	1.02	78.4	43.5	1.80
	2.3750	136.525	5.3750	46.038	1.8125	46.038	1.8125	36.512	1.4375	3.6	0.14	3.2	0.13	290	369	49.6	**H715332**	**H715311**	37.0	1.46	84.0	3.31	78.0	3.07	118.0	4.65	132.0	5.20	0.47	1.27	0.70	67.8	54.8	1.24
61.912	2.4375	110.000	4.3307	22.000	0.8661	21.996	0.8660	18.824	0.7411	0.8	0.03	1.2	0.05	109	116	17.7	**392**	**394A**	21.3	0.84	70.0	2.76	69.0	2.72	101.0	3.98	104.5	4.11	0.40	1.49	0.82	25.0	17.2	1.46
	2.4375	122.238	4.8125	38.100	1.5000	36.678	1.4440	30.162	1.1875	3.6	0.14	3.2	0.13	202	223	34.8	**554**	**553X**	28.7	1.13	77.0	3.03	71.0	2.80	108.0	4.25	115.0	4.53	0.35	1.73	0.95	47.1	27.9	1.69
	2.4375	123.825	4.8750	38.100	1.5000	36.678	1.4440	33.338	1.3125	3.6	0.14	3.2	0.13	202	223	34.8	**554**	**552**	28.7	1.13	77.0	3.03	71.0	2.80	109.0	4.29	116.0	4.57	0.35	1.73	0.95	47.1	27.9	1.69
	2.4375	125.000	4.9213	38.100	1.5000	36.678	1.4440	30.162	1.1875	3.6	0.14	3.2	0.13	202	223	34.8	**554**	**553**	28.7	1.13	77.0	3.03	71.0	2.80	109.0	4.29	116.0	4.57	0.35	1.73	0.95	47.1	27.9	1.69
	2.4375	127.000	5.0000	36.512	1.4375	36.512	1.4375	26.988	1.0625	3.6	0.14	1.6	0.06	209	235	36.2	**HM813843**	**HM813811**	32.9	1.30	81.0	3.19	75.0	2.95	113.0	4.45	121.0	4.76	0.50	1.20	0.66	48.6	41.7	1.17
	2.4375	139.700	5.5000	46.038	1.8125	46.038	1.8125	36.512	1.4375	3.6	0.14	3.2	0.13	290	369	49.6	**H715334**	**H715310**	37.0	1.46	86.0	3.39	79.0	3.11	120.0	4.72	133.0	5.24	0.47	1.27	0.70	67.8	54.8	1.24
	2.4375	152.400	6.0000	47.625	1.8750	46.038	1.8125	31.750	1.2500	3.6	0.14	3.2	0.13	306	278	38.3	**9180**	**9121**	44.5	1.75	90.0	3.54	81.0	3.19	130.0	5.12	145.0	5.71	0.66	0.91	0.50	71.3	79.9	0.89
	2.4375	158.750	6.2500	50.800	2.0000	46.038	1.8125	34.925	1.3750	3.6	0.14	3.2	0.13	306	278	38.3	**9180**	**9120**	47.6	1.87	90.0	3.54	81.0	3.19	134.0	5.28	145.0	5.71	0.66	0.91	0.50	71.3	79.9	0.89
	2.4375	158.750	6.2500	50.800	2.0000	46.038	1.8125	34.925	1.3750	0.8	0.03	3.2	0.13	306	278	38.3	**9181**	**9120**	47.6	1.87	85.0	3.35	78.0	3.07	134.0	5.28	145.0	5.71	0.66	0.91	0.50	71.3	79.9	0.89
62.738	2.4700	100.000	3.9370	25.400	1.0000	25.400	1.0000	19.845	0.7813	3.6	0.14	3.2	0.13	115	137	20.6	**28995**	**28921**	22.8	0.90	75.0	2.95	69.0	2.72	89.0	3.50	96.0	3.78	0.43	1.41	0.78	26.6	19.3	1.38
63.500	2.5000	107.158	4.2188	22.000	0.8661	22.000	0.8661	21.204	0.8348	2.0	0.08	2.4	0.09	115	118	18.0	**39250**	**39422**	20.8	0.82	73.0	2.87	69.0	2.72	97.0	3.82	102.0	4.02	0.39	1.55	0.85	26.4	17.5	1.51
	2.5000	107.950	4.2500	25.400	1.0000	25.400	1.0000	19.050	0.7500	1.6	0.06	3.2	0.13	116	143	21.6	**29586**	**29520**	24.7	0.97	73.0	2.87	71.0	2.80	96.0	3.78	103.0	4.06	0.46	1.31	0.72	26.9	21.1	1.28
	2.5000	110.000	4.3307	22.000	0.8661	21.996	0.8660	18.824	0.7411	1.6	0.06	1.2	0.05	109	116	17.7	**390A**	**394A**	21.3	0.84	73.0	2.87	70.0	2.76	101.0	3.98	104.5	4.11	0.40	1.49	0.82	25.0	17.2	1.46
	2.5000	110.000	4.3307	22.000	0.8661	21.996	0.8660	18.824	0.7411	3.6	0.14	1.2	0.05	109	116	17.7	**395**	**394A**	21.3	0.84	77.0	3.03	70.0	2.76	101.0	3.98	104.5	4.11	0.40	1.49	0.82	25.0	17.2	1.46
	2.5000	110.000	4.3307	22.000	0.8661	21.996	0.8660	22.000	0.8661	3.6	0.14	0.8	0.03	109	116	17.7	**395**	**394**	21.3	0.84	77.0	3.03	70.0	2.76	102.0	4.02	104.5	4.11	0.40	1.49	0.82	25.0	17.2	1.46
	2.5000	110.000	4.3307	25.400	1.0000	25.400	1.0000	19.050	0.7500	3.6	0.14	1.2	0.05	116	143	21.6	**29585**	**29521**	24.7	0.97	77.0	3.03	71.0	2.80	99.0	3.90	104.0	4.09	0.46	1.31	0.72	26.9	21.1	1.28
	2.5000	110.058	4.3330	22.000	0.8661	22.000	0.8661	17.236	0.6786	2.0	0.08	2.4	0.09	115	118	18.0	**39250**	**39433**	20.8	0.82	73.0	2.87	69.0	2.72	98.0	3.86	103.0	4.06	0.39	1.55	0.85	26.4	17.5	1.51

Note 1) SP indicates the specially chamfered from.

TS type

d (63.500) ~ (66.675) mm
(2.5000) ~ (2.6250) inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

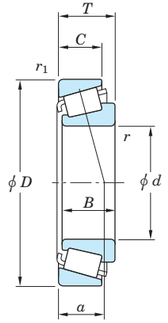
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

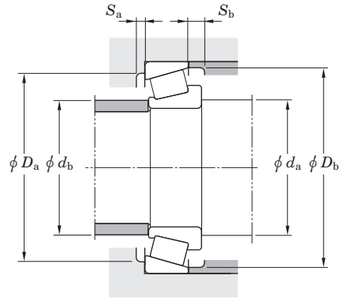
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)					Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	(500 rpm for 3 000 Hrs.) Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	C_r	C_{0r}	C_u			mm	inch	mm	inch	mm	inch	mm	inch						
63.500	2.5000	112.712	4.4375	30.162	1.1875	30.048	1.1830	23.812	0.9375	3.6	0.14	0.8	0.03	139	164	25.1	**3982**	**3925**	25.9	1.02	77.0	3.03	71.0	2.80	101.0	3.98	106.0	4.17	0.40	1.49	0.82	32.4	22.3	1.46
	2.5000	112.712	4.4375	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	3.2	0.13	184	207	32.1	**39585**	**39520**	23.3	0.92	77.0	3.03	71.0	2.80	101.0	3.98	107.0	4.21	0.34	1.77	0.97	42.6	24.7	1.72
	2.5000	120.000	4.7244	29.002	1.1418	29.007	1.1420	23.444	0.9230	0.8	0.03	3.2	0.13	148	161	25.0	**477**	**472A**	24.9	0.98	73.0	2.87	72.0	2.83	106.0	4.17	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.5000	120.000	4.7244	29.002	1.1418	29.007	1.1420	23.444	0.9230	3.6	0.14	3.2	0.13	148	161	25.0	**483**	**472A**	24.9	0.98	78.0	3.07	72.0	2.83	106.0	4.17	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.5000	120.000	4.7244	29.794	1.1730	29.007	1.1420	24.237	0.9542	0.8	0.03	2.0	0.08	129	161	18.8	**477**	**472**	25.7	1.01	73.0	2.87	72.0	2.83	108.0	4.25	113.0	4.45	0.38	1.56	0.86	34.5	22.7	1.52
	2.5000	120.000	4.7244	29.794	1.1730	30.162	1.1875	23.444	0.9230	0.8	0.03	0.8	0.03	148	179	27.4	**33251**	**33472**	27.4	1.08	73.0	2.87	72.0	2.83	107.0	4.21	113.0	4.45	0.44	1.38	0.76	34.4	25.6	1.34
	2.5000	122.238	4.8125	38.100	1.5000	36.678	1.4440	30.162	1.1875	3.6	0.14	3.2	0.13	202	223	34.8	**559**	**553X**	28.7	1.13	78.0	3.07	72.0	2.83	108.0	4.25	115.0	4.53	0.35	1.73	0.95	47.1	27.9	1.69
	2.5000	122.238	4.8125	38.354	1.5100	38.100	1.5000	29.718	1.1700	3.6	0.14	3.2	0.13	238	249	39.1	**HM212046**	**HM212011**	27.6	1.09	80.0	3.15	73.0	2.87	108.0	4.25	116.0	4.57	0.34	1.78	0.98	55.5	32.0	1.73
	2.5000	122.238	4.8125	38.354	1.5100	38.100	1.5000	29.718	1.1700	7.1	0.28	1.6	0.06	238	249	39.1	**HM212047**	**HM212010**	27.6	1.09	87.0	3.43	73.0	2.87	110.0	4.33	116.0	4.57	0.34	1.78	0.98	55.5	32.0	1.73
	2.5000	122.238	4.8125	43.658	1.7188	43.764	1.7230	36.512	1.4375	5.2	0.20	3.2	0.13	276	318	43.6	**5564R**	**5535**	31.1	1.22	79.0	3.11	72.0	2.83	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
	2.5000	122.238	4.8125	43.658	1.7188	43.764	1.7230	36.512	1.4375	3.6	0.14	3.2	0.13	276	318	43.6	**5584R**	**5535**	31.1	1.22	81.0	3.19	75.0	2.95	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
	2.5000	122.238	4.8125	51.595	2.0313	51.702	2.0355	36.512	1.4375	3.6	0.14	3.2	0.13	276	318	43.6	**5552R**	**5535**	39.0	1.54	81.0	3.19	72.0	2.83	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
	2.5000	123.825	4.8750	30.162	1.1875	29.007	1.1420	24.605	0.9687	0.8	0.03	3.2	0.13	148	161	25.0	**477**	**472X**	26.0	1.02	73.0	2.87	72.0	2.83	109.0	4.29	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.5000	127.000	5.0000	36.512	1.4375	36.170	1.4240	28.575	1.1250	3.6	0.14	3.2	0.13	196	226	35.3	**565**	**563**	28.6	1.13	80.0	3.15	73.0	2.87	112.0	4.41	120.0	4.72	0.36	1.65	0.91	45.8	28.5	1.61
	2.5000	127.000	5.0000	36.512	1.4375	36.170	1.4240	28.575	1.1250	6.4	0.25	3.2	0.13	196	226	35.3	**565S**	**563**	28.6	1.13	86.0	3.39	73.0	2.87	112.0	4.41	120.0	4.72	0.36	1.65	0.91	45.8	28.5	1.61
	2.5000	127.000	5.0000	36.512	1.4375	36.512	1.4375	26.988	1.0625	3.6	0.14	1.6	0.06	209	235	36.2	**HM813842**	**HM813811**	32.9	1.30	82.0	3.23	76.0	2.99	113.0	4.45	121.0	4.76	0.50	1.20	0.66	48.6	41.7	1.17
	2.5000	130.175	5.1250	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	246	267	41.8	**639**	**633**	30.3	1.19	81.0	3.19	74.0	2.91	116.0	4.57	124.0	4.88	0.36	1.66	0.91	57.4	35.5	1.62
	2.5000	135.755	5.3447	53.975	2.1250	56.007	2.2050	44.450	1.7500	4.3	0.17	3.2	0.13	333	357	49.3	**6382**	**6320**	34.8	1.37	84.0	3.31	77.0	3.03	117.0	4.61	126.0	4.96	0.32	1.85	1.02	78.4	43.5	1.80
	2.5000	136.525	5.3750	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	302	308	48.1	**H414235**	**H414210**	30.3	1.19	82.0	3.23	78.0	3.07	121.0	4.76	129.0	5.08	0.36	1.67	0.92	70.0	43.1	1.62
	2.5000	136.525	5.3750	46.038	1.8125	46.038	1.8125	36.512	1.4375	3.6	0.14	3.2	0.13	290	369	49.6	**H715336**	**H715311**	37.0	1.46	87.0	3.43	80.0	3.15	118.0	4.65	132.0	5.20	0.47	1.27	0.70	67.8	54.8	1.24
	2.5000	149.225	5.8750	53.975	2.1250	54.229	2.1350	44.450	1.7500	3.6	0.14	3.2	0.13	357	404	54.4	**6475**	**6420**	39.3	1.55	86.0	3.39	81.0	3.19	129.0	5.08	141.0	5.55	0.36	1.66	0.91	83.9	51.9	1.62
	2.5000	150.089	5.9090	44.450	1.7500	46.672	1.8375	36.512	1.4375	3.6	0.14	3.2	0.13	330	368	50.1	**745SR**	**742**	32.4	1.28	84.0	3.31	77.0	3.03	134.0	5.28	142.0	5.59	0.33	1.84	1.01	77.3	43.0	1.80
64.960	2.5575	146.050	5.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	261	301	45.3	**656**	**653**	33.4	1.31	86.0	3.39	79.0	3.11	131.0	5.16	139.0	5.47	0.41	1.47	0.81	60.9	42.6	1.43
	2.5575	149.225	5.8750	53.975	2.1250	54.229	2.1350	44.450	1.7500	3.6	0.14	3.2	0.13	357	404	54.4	**6464**	**6420**	39.3	1.55	87.0	3.43	81.0	3.19	129.0	5.08	141.0	5.55	0.36	1.66	0.91	83.9	51.9	1.62
	2.5575	150.089	5.9090	44.450	1.7500	46.672	1.8375	36.512	1.4375	3.6	0.14	3.2	0.13	330	368	50.1	**747SR**	**742**	32.4	1.28	86.0	3.39	81.0	3.19	134.0	5.28	142.0	5.59	0.33	1.84	1.01	77.3	43.0	1.80
64.963	2.5576	127.000	5.0000	36.512	1.4375	36.170	1.4240	28.575	1.1250	3.6	0.14	3.2	0.13	196	226	35.3	**569**	**563**	28.6	1.13	81.0	3.19	74.0	2.91	112.0	4.41	120.0	4.72	0.36	1.65	0.91	45.8	28.5	1.61
64.986	2.5585	112.712	4.4375	30.162	1.1875	30.924	1.2175	23.812	0.9375	2.4	0.09	3.2	0.13	184	207	32.1	**39586**	**39520**	23.3	0.92	76.0	2.99	72.0	2.83	101.0	3.98	107.0	4.21	0.34	1.77	0.97	42.6	24.7	1.72
64.988	2.5586	107.950	4.2500	25.400	1.0000	25.400	1.0000	19.050	0.7500	3.6	0.14	0.8	0.03	116	143	21.6	**29588**	**29522**	24.7	0.97	78.0	3.07	72.0	2.83	98.0	3.86	103.0	4.06	0.46	1.31	0.72	26.9	21.1	1.28
65.000	2.5591	110.000	4.3307	22.000	0.8661	21.996	0.8660	18.824	0.7411	2.0	0.08	1.2	0.05	109	116	17.7	**399**	**394A**	21.3	0.84	76.0	2.99	73.0	2.87	101.0	3.98	104.5	4.11	0.40	1.49	0.82	25.0	17.2	1.46
	2.5591	120.000	4.7244	29.002	1.1418	29.007	1.1420	23.444	0.9230	2.4	0.09	3.2	0.13	148	161	25.0	**478**	**472A**	24.9	0.98	77.0	3.03	73.0	2.87	106.0	4.17	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
65.088	2.5625	122.238	4.8125	51.595	2.0313	51.702	2.0355	36.512	1.4375	3.6	0.14	3.2	0.13	276	318	43.6	**5554R**	**5535**	39.0	1.54	83.0	3.27	72.0	2.83	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
	2.5625	135.755	5.3447	53.975	2.1250	56.007	2.2050	44.450	1.7500	3.6	0.14	3.2	0.13	333	357	49.3	**6379**	**6320**	34.8	1.37	84.0	3.31	77.5	3.05	117.0	4.61	126.0	4.96	0.32	1.85	1.02	78.4	43.5	1.80
	2.5625	136.525	5.3750	46.038	1.8125	46.038	1.8125	36.512	1.4375	3.6	0.14	3.2	0.13	290	369	49.6	**H715340**	**H715311**	37.0	1.46	88.0	3.46	82.0	3.23	118.0	4.65	132.0	5.20	0.47	1.27	0.70	67.8	54.8	1.24
65.883	2.5938	122.238	4.8125	43.658	1.7188	43.764	1.7230	36.512	1.4375	3.6	0.14	3.2	0.13	276	318	43.6	**5595R**	**5535**	31.1	1.22	83.0	3.27	77.0	3.03	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
66.675	2.6250	107.950	4.2500	25.400	1.0000	25.400	1.0000	19.050	0.7500	3.6	0.14	0.8	0.03	116	143	21.6	**29590**	**29522**	24.7	0.97	80.0	3.15	73.0	2.87	98.0	3.86	103.0	4.06	0.46	1.31	0.72	26.9	21.1	1.28
	2.6250	110.000	4.3307	22.000	0.8661	21.996	0.8660	18.824	0.7411	0.8	0.03	1.2	0.05	109	116	17.7	**395A**	**394A**	21.3	0.84	73.0	2.87	73.0	2.87	101.0	3.98	104.5	4.11	0.40	1.49	0.82	25.0	17.2	1.46
	2.6250	110.000	4.3307	22.000	0.8661	21.996	0.8660	18.824	0.7411	3.6	0.14	1.2	0.05	109	116	17.7	**395S**	**394A**	21.3	0.84	79.0	3.11	73.0	2.87	101.0	3.98	104.5	4.11	0.40	1.49	0.82	25.0	17.2	1.46

Note 1) SP indicates the specially chamfered from.

TS type

d (66.675) ~ (69.850) mm
(2.6250) ~ (2.7500) inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

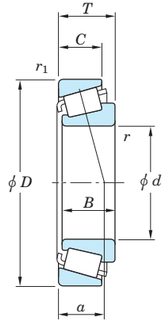
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

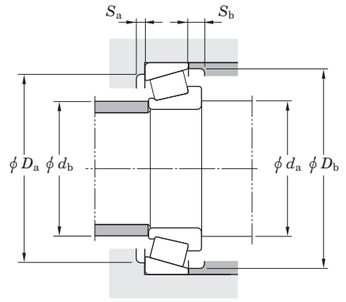
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)					Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	(500 rpm for 3 000 Hrs.) Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	C_r	C_{0r}	C_u			mm	inch	mm	inch	mm	inch	mm	inch						
66.675	2.6250	112.712	4.4375	30.162	1.1875	30.048	1.1830	23.812	0.9375	3.6	0.14	0.8	0.03	139	164	25.1	**3984**	**3925**	25.9	1.02	80.0	3.15	74.0	2.91	101.0	3.98	106.0	4.17	0.40	1.49	0.82	32.4	22.3	1.46
	2.6250	112.712	4.4375	30.162	1.1875	30.048	1.1830	23.812	0.9375	5.6	0.22	0.8	0.03	139	164	25.1	**3994**	**3925**	25.9	1.02	84.0	3.31	74.0	2.91	101.0	3.98	106.0	4.17	0.40	1.49	0.82	32.4	22.3	1.46
	2.6250	112.712	4.4375	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	3.2	0.13	184	207	32.1	**39590**	**39520**	23.3	0.92	80.0	3.15	74.0	2.91	101.0	3.98	107.0	4.21	0.34	1.77	0.97	42.6	24.7	1.72
	2.6250	112.712	4.4375	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	0.8	0.03	184	207	32.1	**39590**	**39521**	23.3	0.92	80.0	3.15	74.0	2.91	103.0	4.06	107.0	4.21	0.34	1.77	0.97	42.6	24.7	1.72
	2.6250	117.475	4.6250	30.162	1.1875	30.162	1.1875	23.812	0.9375	5.6	0.22	3.2	0.13	148	179	27.4	**33261**	**33462**	27.8	1.09	86.0	3.39	76.0	2.99	104.0	4.09	112.0	4.41	0.44	1.38	0.76	34.4	25.6	1.34
	2.6250	117.475	4.6250	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	3.2	0.13	148	179	27.4	**33262**	**33462**	27.8	1.09	81.0	3.19	75.0	2.95	104.0	4.09	112.0	4.41	0.44	1.38	0.76	34.4	25.6	1.34
	2.6250	120.000	4.7244	29.002	1.1418	29.007	1.1420	23.444	0.9230	2.0	0.08	3.2	0.13	148	161	25.0	**478S**	**472A**	24.9	0.98	78.0	3.07	74.0	2.91	106.0	4.17	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.6250	120.000	4.7244	29.002	1.1418	29.007	1.1420	23.444	0.9230	2.4	0.09	3.2	0.13	148	161	25.0	**479**	**472A**	24.9	0.98	78.0	3.07	74.0	2.91	106.0	4.17	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.6250	122.238	4.8125	38.100	1.5000	36.678	1.4440	30.162	1.1875	3.6	0.14	3.2	0.13	202	223	34.8	**560**	**553X**	28.7	1.13	81.0	3.19	75.0	2.95	108.0	4.25	115.0	4.53	0.35	1.73	0.95	47.1	27.9	1.69
	2.6250	122.238	4.8125	38.100	1.5000	38.354	1.5100	29.718	1.1700	3.6	0.14	1.6	0.06	238	249	39.1	**HM212049**	**HM212010**	27.3	1.07	82.0	3.23	75.5	2.97	110.0	4.33	116.0	4.57	0.34	1.78	0.98	55.5	32.0	1.73
	2.6250	127.000	5.0000	36.512	1.4375	36.512	1.4375	26.988	1.0625	3.6	0.14	1.6	0.06	209	235	36.2	**HM813844**	**HM813811**	32.9	1.30	85.0	3.35	78.0	3.07	113.0	4.45	121.0	4.76	0.50	1.20	0.66	48.6	41.7	1.17
	2.6250	130.175	5.1250	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	246	267	41.8	**641**	**633**	30.3	1.19	83.0	3.27	77.0	3.03	116.0	4.57	124.0	4.88	0.36	1.66	0.91	57.4	35.5	1.62
	2.6250	135.755	5.3447	53.975	2.1250	56.007	2.2050	44.450	1.7500	4.3	0.17	3.2	0.13	333	357	49.3	**6386**	**6320**	34.8	1.37	87.0	3.43	77.5	3.05	117.0	4.61	126.0	4.96	0.32	1.85	1.02	78.4	43.5	1.80
	2.6250	135.755	5.3447	53.975	2.1250	56.007	2.2050	44.450	1.7500	8.6	0.34	3.2	0.13	333	357	49.3	**6386A**	**6320**	34.8	1.37	92.0	3.62	77.0	3.03	117.0	4.61	126.0	4.96	0.32	1.85	1.02	78.4	43.5	1.80
	2.6250	135.755	5.3447	53.975	2.1250	56.007	2.2050	44.450	1.7500	6.4	0.25	3.2	0.13	333	357	49.3	**6389**	**6320**	34.8	1.37	91.0	3.58	77.5	3.05	117.0	4.61	126.0	4.96	0.32	1.85	1.02	78.4	43.5	1.80
	2.6250	136.525	5.3750	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	302	308	48.1	**H414242**	**H414210**	30.3	1.19	85.0	3.35	81.0	3.19	121.0	4.76	129.0	5.08	0.36	1.67	0.92	70.0	43.1	1.62
	2.6250	136.525	5.3750	46.038	1.8125	46.038	1.8125	36.512	1.4375	3.6	0.14	3.2	0.13	290	369	49.6	**H715341**	**H715311**	37.0	1.46	89.0	3.50	83.0	3.27	118.0	4.65	132.0	5.20	0.47	1.27	0.70	67.8	54.8	1.24
68.262	2.6875	103.188	4.0625	43.658	1.7188	51.702	2.0355	36.512	1.4375	3.6	0.14	3.2	0.13	276	318	43.6	**5557R**	**5535**	31.1	1.22	86.0	3.39	72.0	2.83	106.0	4.17	116.0	4.57	0.36	1.67	0.92	64.5	39.5	1.63
	2.6875	110.000	4.3307	22.000	0.8661	21.996	0.8660	18.824	0.7411	2.4	0.09	1.2	0.05	109	116	17.7	**399A**	**394A**	21.3	0.84	78.0	3.07	74.0	2.91	101.0	3.98	104.5	4.11	0.40	1.49	0.82	25.0	17.2	1.46
	2.6875	110.000	4.3307	22.000	0.8661	21.996	0.8660	18.824	0.7411	5.2	0.20	1.2	0.05	109	116	17.7	**399AS**	**394A**	21.3	0.84	83.0	3.27	74.0	2.91	101.0	3.98	104.5	4.11	0.40	1.49	0.82	25.0	17.2	1.46
	2.6875	117.475	4.6250	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	3.2	0.13	148	179	27.4	**33269**	**33462**	27.8	1.09	82.0	3.23	76.0	2.99	104.0	4.09	112.0	4.41	0.44	1.38	0.76	34.4	25.6	1.34
	2.6875	120.000	4.7244	29.002	1.1418	29.007	1.1420	23.444	0.9230	3.6	0.14	3.2	0.13	148	161	25.0	**480**	**472A**	24.9	0.98	82.0	3.23	75.0	2.95	106.0	4.17	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.6875	122.238	4.8125	38.100	1.5000	36.678	1.4440	30.162	1.1875	3.6	0.14	3.2	0.13	202	223	34.8	**560S**	**553X**	28.7	1.13	83.0	3.27	76.0	2.99	108.0	4.25	115.0	4.53	0.35	1.73	0.95	47.1	27.9	1.69
	2.6875	127.000	5.0000	36.512	1.4375	36.170	1.4240	28.575	1.1250	3.6	0.14	3.2	0.13	196	226	35.3	**570**	**563**	28.6	1.13	83.0	3.27	77.0	3.03	112.0	4.41	120.0	4.72	0.36	1.65	0.91	45.8	28.5	1.61
	2.6875	130.175	5.1250	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	246	267	41.8	**642**	**633**	30.3	1.19	84.0	3.31	79.0	3.11	116.0	4.57	124.0	4.88	0.36	1.66	0.91	57.4	35.5	1.62
	2.6875	136.525	5.3750	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	246	267	41.8	**642**	**632**	30.3	1.19	84.0	3.31	79.0	3.11	118.0	4.65	125.0	4.92	0.36	1.66	0.91	57.4	35.5	1.62
	2.6875	136.525	5.3750	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	284	308	46.1	**H414245**	**H414210**	30.3	1.19	86.0	3.39	82.0	3.23	121.0	4.76	129.0	5.08	0.36	1.67	0.92	70.0	43.1	1.62
	2.6875	136.525	5.3750	41.275	1.6250	41.275	1.6250	31.750	1.2500	7.1	0.28	3.2	0.13	302	308	48.1	**H414245A**	**H414210**	30.3	1.19	89.0	3.50	83.0	3.27	121.0	4.76	129.0	5.08	0.36	1.67	0.92	70.0	43.1	1.62
	2.6875	136.525	5.3750	46.038	1.8125	46.038	1.8125	36.512	1.4375	3.6	0.14	3.2	0.13	290	369	49.6	**H715343**	**H715311**	37.0	1.46	90.0	3.54	84.0	3.31	118.0	4.65	132.0	5.20	0.47	1.27	0.70	67.8	54.8	1.24
	2.6875	152.400	6.0000	47.625	1.8750	46.038	1.8125	31.750	1.2500	3.6	0.14	3.2	0.13	306	278	38.3	**9185**	**9121**	44.5	1.75	94.0	3.70	81.5	3.21	130.0	5.12	145.0	5.71	0.66	0.91	0.50	71.3	79.9	0.89
69.850	2.7500	98.425	3.8750	13.495	0.5313	13.495	0.5313	9.525	0.3750	1.6	0.06	1.6	0.06	49.1	59.8	8.45	**LL713049**	**LL713010**	18.4	0.72	77.0	3.03	74.0	2.91	92.0	3.62	94.5	3.72	0.44	1.37	0.75	11.1	8.35	1.33
	2.7500	112.712	4.4375	22.225	0.8750	21.996	0.8660	15.875	0.6250	1.6	0.06	0.8	0.03	115	127	19.4	**LM613449**	**LM613410**	21.9	0.86	78.0	3.07	76.0	2.99	104.0	4.09	107.0	4.21	0.42	1.44	0.79	26.4	18.8	1.41
	2.7500	112.712	4.4375	25.400	1.0000	25.400	1.0000	19.050	0.7500	1.6	0.06	3.2	0.13	122	155	23.3	**29675**	**29620**	26.2	1.03	80.0	3.15	77.0	3.03	101.0	3.98	109.0	4.29	0.49	1.23	0.68	28.1	23.4	1.20
	2.7500	112.712	4.4375	25.400	1.0000	25.400	1.0000	19.050	0.7500	1.6	0.06	3.2	0.13	122	155	23.3	**29676**	**29620**	26.2	1.03	80.0	3.15	77.0	3.03	101.0	3.98	109.0	4.29	0.49	1.23	0.68	28.1	23.4	1.20
	2.7500	117.475	4.6250	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	3.2	0.13	148	179	27.4	**33275**	**33462**	27.8	1.09	84.0	3.31	77.0	3.03	104.0	4.09	112.0	4.41	0.44	1.38	0.76	34.4	25.6	1.34
	2.7500	120.000	4.7244	29.002	1.1418	29.007	1.1420	23.444	0.9230	3.6	0.14	3.2	0.13	148	161	25.0	**482**	**472A**	24.9	0.98	83.0	3.27	77.0	3.03	106.0	4.17	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.7500	120.000	4.7244	29.002	1.1418	29.007	1.1420	23.444	0.9230	4.8	0.19	3.2	0.13	148	161	25.0	**482A**	**472A**	24.9	0.98	86.0	3.39	77.0	3.03	106.0	4.17	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.7500	120.000	4.7244	29.794	1.1730	29.007	1.1420	24.237	0.9542	3.6	0.14	2.0	0.08	148	161	25.0	**482**	**472**	25.7	1.01	83.0	3.27	77.0	3.03	108.0	4.25	113.0	4.45	0.38	1.56	0.86	34.5	22.7	1.52
	2.7500	120.000	4.7244	32.545	1.2813	32.545	1.2813	26.195	1.0313	3.6	0.14	3.2	0.13	189	218	33.9	**47487R**	**47420**	26.6	1.05	84.0	3.31	78.0	3.07	107.0	4.21	114.0	4.49	0.36	1.67	0.92	43.7	26.9	1.62
	2.7500	120.650	4.7500	32.545	1.2813	32.545	1.2813	26.195	1.0313	3.6	0.14	0.8	0.03	189	218	33.9	**47487R**	**47423**	26.6	1.05	84.0	3.31	78.0	3.07	109.0	4.29	114.0	4.49	0.36	1.67	0.92	43.7	26.9	1.62

Note 1) SP indicates the specially chamfered from.

TS type

d (69.850) ~ (73.025) mm
(2.7500) ~ (2.8750) inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

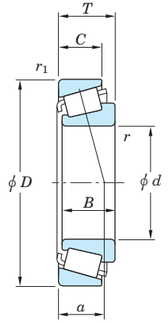
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

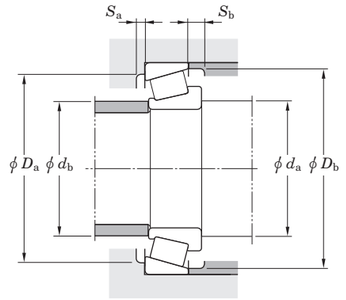
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)					Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	(500 rpm for 3 000 Hrs.) Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	C_r	C_{0r}	C_u			mm	inch	mm	inch	mm	inch	mm	inch						
69.850	2.7500	123.825	4.8750	30.162	1.1875	29.007	1.1420	24.605	0.9687	3.6	0.14	3.2	0.13	148	161	25.0	**482**	**472X**	26.0	1.02	83.0	3.27	77.0	3.03	109.0	4.29	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.7500	127.000	5.0000	36.512	1.4375	36.170	1.4240	28.575	1.1250	3.6	0.14	3.2	0.13	196	226	35.3	**566**	**563**	28.6	1.13	85.0	3.35	78.0	3.07	112.0	4.41	120.0	4.72	0.36	1.65	0.91	45.8	28.5	1.61
	2.7500	127.000	5.0000	36.512	1.4375	36.170	1.4240	28.575	1.1250	0.8	0.03	3.2	0.13	196	226	35.3	**566S**	**563**	28.6	1.13	79.0	3.11	78.0	3.07	112.0	4.41	120.0	4.72	0.36	1.65	0.91	45.8	28.5	1.61
	2.7500	127.000	5.0000	36.512	1.4375	36.512	1.4375	26.988	1.0625	3.6	0.14	1.6	0.06	209	235	36.2	**HM813846**	**HM813811**	32.9	1.30	88.0	3.46	81.0	3.19	113.0	4.45	121.0	4.76	0.50	1.20	0.66	48.6	41.7	1.17
	2.7500	130.175	5.1250	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	246	267	41.8	**643**	**633**	30.3	1.19	86.0	3.39	80.0	3.15	116.0	4.57	124.0	4.88	0.36	1.66	0.91	57.4	35.5	1.62
	2.7500	136.525	5.3750	46.038	1.8125	46.038	1.8125	36.512	1.4375	3.6	0.14	3.2	0.13	290	369	49.6	**H715344**	**H715311**	37.0	1.46	92.0	3.62	85.0	3.35	118.0	4.65	132.0	5.20	0.47	1.27	0.70	67.8	54.8	1.24
	2.7500	146.050	5.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	261	301	45.3	**655**	**653**	33.4	1.31	88.0	3.46	82.0	3.23	131.0	5.16	139.0	5.47	0.41	1.47	0.81	60.9	42.6	1.43
	2.7500	149.225	5.8750	53.975	2.1250	54.229	2.1350	44.450	1.7500	5.2	0.20	3.2	0.13	357	404	54.4	**6454**	**6420**	39.3	1.55	94.0	3.70	85.0	3.35	129.0	5.08	141.0	5.55	0.36	1.66	0.91	83.9	51.9	1.62
	2.7500	149.225	5.8750	53.975	2.1250	54.229	2.1350	44.450	1.7500	6.4	0.25	3.2	0.13	357	404	54.4	**6484**	**6420**	39.3	1.55	95.0	3.74	85.0	3.35	129.0	5.08	141.0	5.55	0.36	1.66	0.91	83.9	51.9	1.62
	2.7500	150.089	5.9090	44.450	1.7500	46.672	1.8375	36.512	1.4375	5.2	0.20	3.2	0.13	330	368	50.1	**744AR**	**742**	32.4	1.28	92.0	3.62	82.0	3.23	134.0	5.28	142.0	5.59	0.33	1.84	1.01	77.3	43.0	1.80
	2.7500	150.089	5.9090	44.450	1.7500	46.672	1.8375	36.512	1.4375	3.6	0.14	3.2	0.13	330	368	50.1	**745AR**	**742**	32.4	1.28	88.0	3.46	82.0	3.23	134.0	5.28	142.0	5.59	0.33	1.84	1.01	77.3	43.0	1.80
	2.7500	168.275	6.6250	53.975	2.1250	56.363	2.2190	41.275	1.6250	3.6	0.14	3.2	0.13	429	467	62.1	**835R**	**832**	35.0	1.38	91.0	3.58	84.0	3.31	149.0	5.87	155.0	6.10	0.30	2.00	1.10	101	51.6	1.95
69.952	2.7540	121.442	4.7812	24.608	0.9688	23.012	0.9060	17.462	0.6875	2.0	0.08	2.0	0.08	113	127	19.4	**34274**	**34478**	26.8	1.06	81.0	3.19	78.0	3.07	110.0	4.33	116.0	4.57	0.45	1.33	0.73	26.0	20.0	1.30
70.000	2.7559	120.000	4.7244	29.002	1.1418	29.007	1.1420	23.444	0.9230	2.0	0.08	3.2	0.13	148	161	25.0	**484**	**472A**	24.9	0.98	80.0	3.15	77.0	3.03	106.0	4.17	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
	2.7559	125.052	4.9233	23.731	0.9343	23.012	0.9060	16.401	0.6457	2.0	0.08	2.0	0.08	113	127	19.4	**34275**	**34492A**	25.9	1.02	82.0	3.23	78.0	3.07	112.0	4.41	118.0	4.65	0.45	1.33	0.73	26.0	20.0	1.30
70.637	2.7810	112.712	4.4375	25.400	1.0000	25.400	1.0000	19.050	0.7500	3.6	0.14	3.2	0.13	122	155	23.3	**29681**	**29620**	26.2	1.03	84.0	3.31	79.0	3.11	101.0	3.98	109.0	4.29	0.49	1.23	0.68	28.1	23.4	1.20
	2.7810	120.650	4.7500	25.400	1.0000	25.400	1.0000	19.050	0.7500	1.2	0.05	3.2	0.13	122	155	23.3	**29680**	**29630**	26.2	1.03	80.0	3.15	78.0	3.07	104.0	4.09	113.0	4.45	0.49	1.23	0.68	28.1	23.4	1.20
71.438	2.8125	117.475	4.6250	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	3.2	0.13	148	179	27.4	**33281**	**33462**	27.8	1.09	85.0	3.35	79.0	3.11	104.0	4.09	112.0	4.41	0.44	1.38	0.76	34.4	25.6	1.34
	2.8125	120.000	4.7244	32.545	1.2813	32.545	1.2813	26.195	1.0313	3.6	0.14	3.2	0.13	189	218	33.9	**47490R**	**47420**	26.6	1.05	86.0	3.39	79.0	3.11	107.0	4.21	114.0	4.49	0.36	1.67	0.92	43.7	26.9	1.62
	2.8125	127.000	5.0000	36.512	1.4375	36.170	1.4240	28.575	1.1250	3.6	0.14	3.2	0.13	196	226	35.3	**567A**	**563**	28.6	1.13	86.0	3.39	80.0	3.15	112.0	4.41	120.0	4.72	0.36	1.65	0.91	45.8	28.5	1.61
	2.8125	127.000	5.0000	36.512	1.4375	36.170	1.4240	28.575	1.1250	6.4	0.25	3.2	0.13	196	226	35.3	**567S**	**563**	28.6	1.13	92.0	3.62	80.0	3.15	112.0	4.41	120.0	4.72	0.36	1.65	0.91	45.8	28.5	1.61
	2.8125	127.000	5.0000	36.512	1.4375	36.512	1.4375	26.988	1.0625	3.6	0.14	1.6	0.06	209	235	36.2	**HM813849**	**HM813811**	32.9	1.30	89.0	3.50	81.9	3.22	113.0	4.45	121.0	4.76	0.50	1.20	0.66	48.6	41.7	1.17
	2.8125	130.175	5.1250	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	246	267	41.8	**644**	**633**	30.3	1.19	87.0	3.43	81.0	3.19	116.0	4.57	124.0	4.88	0.36	1.66	0.91	57.4	35.5	1.62
	2.8125	130.175	5.1250	41.275	1.6250	41.275	1.6250	31.750	1.2500	6.4	0.25	3.2	0.13	246	267	41.8	**645**	**633**	30.3	1.19	93.0	3.66	81.0	3.19	116.0	4.57	124.0	4.88	0.36	1.66	0.91	57.4	35.5	1.62
	2.8125	133.350	5.2500	30.162	1.1875	29.769	1.1720	22.225	0.8750	3.6	0.14	3.2	0.13	167	198	30.0	**495S**	**492A**	29.8	1.17	88.0	3.46	82.0	3.23	120.0	4.72	128.0	5.04	0.44	1.35	0.74	38.8	29.4	1.32
	2.8125	133.350	5.2500	33.338	1.3125	33.338	1.3125	26.195	1.0313	3.6	0.14	0.8	0.03	193	245	37.2	**47675R**	**47620A**	29.2	1.15	88.0	3.46	82.0	3.23	121.0	4.76	128.0	5.04	0.40	1.48	0.82	44.7	30.9	1.45
	2.8125	136.525	5.3750	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	284	308	46.1	**H414249**	**H414210**	30.3	1.19	89.0	3.50	83.3	3.28	121.0	4.76	129.0	5.08	0.36	1.67	0.92	70.0	43.1	1.62
	2.8125	136.525	5.3750	46.038	1.8125	46.038	1.8125	36.512	1.4375	3.6	0.14	3.2	0.13	290	369	49.6	**H715345**	**H715311**	37.0	1.46	93.0	3.66	87.0	3.43	118.0	4.65	132.0	5.20	0.47	1.27	0.70	67.8	54.8	1.24
73.000	2.8740	120.000	4.7244	29.002	1.1418	29.007	1.1420	23.444	0.9230	2.0	0.08	3.2	0.13	148	161	25.0	**486X**	**472A**	24.9	0.98	83.0	3.27	78.0	3.07	106.0	4.17	114.0	4.49	0.38	1.56	0.86	34.5	22.7	1.52
73.025	2.8750	112.712	4.4375	25.400	1.0000	25.400	1.0000	19.050	0.7500	3.6	0.14	3.2	0.13	122	155	23.3	**29685**	**29620**	26.2	1.03	86.0	3.39	80.0	3.15	101.0	3.98	109.0	4.29	0.49	1.23	0.68	28.1	23.4	1.20
	2.8750	117.475	4.6250	25.400	1.0000	25.400	1.0000	19.050	0.7500	3.6	0.14	3.2	0.13	127	166	25.1	**LM814845**	**LM814810**	27.6	1.09	87.0	3.43	81.0	3.19	105.0	4.13	113.0	4.45	0.51	1.18	0.65	29.2	25.4	1.15
	2.8750	117.475	4.6250	30.162	1.1875	30.162	1.1875	23.812	0.9375	3.6	0.14	3.2	0.13	148	179	27.4	**33287**	**33462**	27.8	1.09	87.0	3.43	80.0	3.15	104.0	4.09	112.0	4.41	0.44	1.38	0.76	34.4	25.6	1.34
	2.8750	125.412	4.9375	25.400	1.0000	25.400	1.0000	19.845	0.7813	3.6	0.14	1.6	0.06	126	162	24.4	**27680**	**27620**	24.7	0.97	88.0	3.46	82.0	3.23	115.0	4.53	120.0	4.72	0.42	1.44	0.79	29.2	20.8	1.41
	2.8750	127.000	5.0000	30.162	1.1875	31.000	1.2205	22.225	0.8750	3.6	0.14	3.2	0.13	179	225	32.3	**42683**	**42620**	27.1	1.07	88.0	3.46	81.0	3.19	114.0	4.49	121.0	4.76	0.42	1.43	0.79	41.4	29.6	1.40
	2.8750	127.000	5.0000	36.512	1.4375	36.170	1.4240	28.575	1.1250	3.6	0.14	3.2	0.13	196	226	35.3	**567**	**563**	28.6	1.13	88.0	3.46	81.0	3.19	112.0	4.41	120.0	4.72	0.36	1.65	0.91	45.8	28.5	1.61
	2.8750	139.992	5.5115	36.512	1.4375	36.098	1.4212	28.575	1.1250	3.6	0.14	3.2	0.13	220	262	39.8	**576R**	**572**	31.0	1.22	90.0	3.54	83.0	3.27	125.0	4.92	133.0	5.24	0.40	1.49	0.82	51.2	35.3	1.45
	2.8750	146.050	5.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	261	301	45.3	**657**	**653**	33.4	1.31	90.0	3.54	85.0	3.35	131.0	5.16	139.0	5.47	0.41	1.47	0.81	60.9	42.6	1.43
	2.8750	149.225	5.8750	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	261	301	45.3	**657**	**652A**	33.4	1.31	90.0	3.54	85.0	3.35	132.0	5.20	141.0	5.55	0.41	1.47	0.81	60.9	42.6	1.43

Note 1) SP indicates the specially chamfered from.

TS type

d (73.025) ~ (76.200) mm
(2.8750) ~ (3.0000) inch





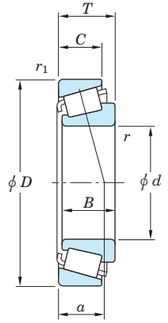
$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

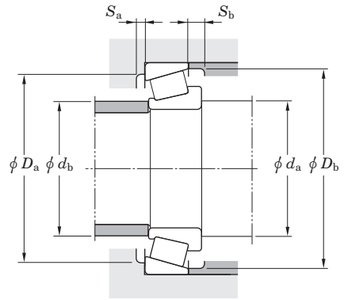
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)					Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	(500 rpm for 3 000 Hrs.) Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	C_r	C_{0r}	C_u			mm	inch	mm	inch	mm	inch	mm	inch						
73.025	2.8750	149.225	5.8750	53.975	2.1250	54.229	2.1350	44.450	1.7500	3.6	0.14	3.2	0.13	357	404	54.4	**6460**	**6420**	39.3	1.55	93.0	3.66	87.0	3.43	129.0	5.08	141.0	5.55	0.36	1.66	0.91	83.9	51.9	1.62
	2.8750	150.089	5.9090	44.450	1.7500	46.672	1.8375	36.512	1.4375	3.6	0.14	3.2	0.13	330	368	50.1	**744R**	**742**	32.4	1.28	91.0	3.58	85.0	3.35	134.0	5.28	142.0	5.59	0.33	1.84	1.01	77.3	43.0	1.80
	2.8750	152.400	6.0000	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	261	301	45.3	**657**	**652**	33.4	1.31	90.0	3.54	85.0	3.35	134.0	5.28	141.0	5.55	0.41	1.47	0.81	60.9	42.6	1.43
	2.8750	159.995	6.2990	47.625	1.8750	48.260	1.9000	38.100	1.5000	3.6	0.14	0.8	0.03	342	391	52.4	**762**	**752A**	35.5	1.40	92.0	3.62	97.0	3.82	146.0	5.75	149.0	5.87	0.34	1.76	0.97	80.0	46.6	1.72
	2.8750	161.925	6.3750	47.625	1.8750	48.260	1.9000	38.100	1.5000	3.6	0.14	3.2	0.13	342	391	52.4	**762**	**752**	35.5	1.40	92.0	3.62	97.0	3.82	144.0	5.67	150.0	5.91	0.34	1.76	0.97	80.0	46.6	1.72
73.817	2.9062	112.712	4.4375	25.400	1.0000	25.400	1.0000	19.050	0.7500	1.6	0.06	3.2	0.13	122	155	23.3	**29688**	**29620**	26.2	1.03	83.0	3.27	81.0	3.19	101.0	3.98	109.0	4.29	0.49	1.23	0.68	28.1	23.4	1.20
	2.9062	127.000	5.0000	36.512	1.4375	36.170	1.4240	28.575	1.1250	0.8	0.03	3.2	0.13	196	226	35.3	**568**	**563**	28.6	1.13	83.0	3.27	82.0	3.23	112.0	4.41	120.0	4.72	0.36	1.65	0.91	45.8	28.5	1.61
74.612	2.9375	139.992	5.5115	36.512	1.4375	36.098	1.4212	28.575	1.1250	3.6	0.14	3.2	0.13	220	262	39.8	**577R**	**572**	31.0	1.22	91.0	3.58	85.0	3.35	125.0	4.92	133.0	5.24	0.40	1.49	0.82	51.2	35.3	1.45
	2.9375	146.050	5.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	261	301	45.3	**658**	**653**	33.4	1.31	92.0	3.62	86.0	3.39	131.0	5.16	139.0	5.47	0.41	1.47	0.81	60.9	42.6	1.43
	2.9375	150.000	5.9055	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.0	0.12	261	301	45.3	**658**	**653X**	33.4	1.31	92.0	3.62	86.0	3.39	133.0	5.24	141.0	5.55	0.41	1.47	0.81	60.9	42.6	1.43
74.976	2.9518	121.442	4.7812	24.608	0.9688	23.012	0.9060	17.462	0.6875	2.0	0.08	2.0	0.08	113	127	19.4	**34294**	**34478**	26.8	1.06	85.0	3.35	83.0	3.27	110.0	4.33	116.0	4.57	0.45	1.33	0.73	26.0	20.0	1.30
74.986	2.9522	127.000	5.0000	30.162	1.1875	31.000	1.2205	22.225	0.8750	2.4	0.09	3.2	0.13	179	225	32.3	**42686X**	**42620**	27.1	1.07	85.0	3.35	81.0	3.19	114.0	4.49	121.0	4.76	0.42	1.43	0.79	41.4	29.6	1.40
74.988	2.9523	127.000	5.0000	30.162	1.1875	31.000	1.2205	22.225	0.8750	6.4	0.25	3.2	0.13	179	225	32.3	**42686**	**42620**	27.1	1.07	95.0	3.74	84.0	3.31	114.0	4.49	121.0	4.76	0.42	1.43	0.79	41.4	29.6	1.40
75.000	2.9528	121.442	4.7812	24.608	0.9688	23.012	0.9060	17.462	0.6875	2.4	0.09	2.0	0.08	113	127	19.4	**34295**	**34478**	26.8	1.06	86.0	3.39	83.0	3.27	110.0	4.33	116.0	4.57	0.45	1.33	0.73	26.0	20.0	1.30
	2.9528	161.925	6.3750	53.975	2.1250	55.100	2.1693	42.862	1.6875	3.0	0.12	3.2	0.13	395	471	61.4	**6555R**	**6535**	41.0	1.61	95.0	3.74	85.0	3.35	141.0	5.55	154.0	6.06	0.40	1.50	0.82	92.9	63.5	1.46
76.200	3.0000	121.442	4.7812	24.608	0.9688	23.012	0.9060	17.462	0.6875	3.6	0.14	2.0	0.08	113	127	19.4	**34301**	**34478**	26.8	1.06	89.0	3.50	83.0	3.27	110.0	4.33	116.0	4.57	0.45	1.33	0.73	26.0	20.0	1.30
	3.0000	125.412	4.9375	25.400	1.0000	25.400	1.0000	19.845	0.7813	3.6	0.14	1.6	0.06	126	162	24.4	**27684**	**27620**	24.7	0.97	91.0	3.58	84.0	3.31	115.0	4.53	120.0	4.72	0.42	1.44	0.79	29.2	20.8	1.41
	3.0000	127.000	5.0000	26.988	1.0625	23.012	0.9060	19.842	0.7812	2.0	0.08	3.2	0.13	113	127	19.4	**34300**	**34500**	29.2	1.15	86.0	3.39	83.0	3.27	112.0	4.41	118.0	4.65	0.45	1.33	0.73	26.0	20.0	1.30
	3.0000	127.000	5.0000	30.162	1.1875	31.000	1.2205	22.225	0.8750	3.6	0.14	3.2	0.13	179	225	32.3	**42687**	**42620**	27.1	1.07	90.0	3.54	84.0	3.31	114.0	4.49	121.0	4.76	0.42	1.43	0.79	41.4	29.6	1.40
	3.0000	127.000	5.0000	30.162	1.1875	31.000	1.2205	22.225	0.8750	6.4	0.25	3.2	0.13	179	225	32.3	**42688**	**42620**	27.1	1.07	96.0	3.78	84.0	3.31	114.0	4.49	121.0	4.76	0.42	1.43	0.79	41.4	29.6	1.40
	3.0000	129.975	5.1171	33.249	1.3090	31.000	1.2205	27.000	1.0630	3.6	0.14	2.4	0.09	179	225	32.3	**42687**	**42624**	30.1	1.19	90.0	3.54	84.0	3.31	114.0	4.49	121.0	4.76	0.42	1.43	0.79	41.4	29.6	1.40
	3.0000	133.350	5.2500	30.162	1.1875	29.769	1.1720	22.225	0.8750	6.4	0.25	3.2	0.13	167	198	30.0	**495AX**	**492A**	29.8	1.17	98.0	3.86	86.0	3.39	120.0	4.72	128.0	5.04	0.44	1.35	0.74	38.8	29.4	1.32
	3.0000	133.350	5.2500	33.338	1.3125	33.338	1.3125	26.195	1.0313	6.4	0.25	3.2	0.13	193	245	37.2	**47678R**	**47620**	29.2	1.15	97.0	3.82	90.0	3.54	119.0	4.69	128.0	5.04	0.40	1.48	0.82	44.7	30.9	1.45
	3.0000	133.350	5.2500	33.338	1.3125	33.338	1.3125	26.195	1.0313	3.6	0.14	0.8	0.03	193	245	37.2	**47679R**	**47620A**	29.2	1.15	91.0	3.58	85.0	3.35	121.0	4.76	128.0	5.04	0.40	1.48	0.82	44.7	30.9	1.45
	3.0000	133.350	5.2500	33.338	1.3125	33.338	1.3125	26.195	1.0313	0.8	0.03	3.2	0.13	193	245	37.2	**47680R**	**47620**	29.2	1.15	86.0	3.39	85.0	3.35	119.0	4.69	128.0	5.04	0.40	1.48	0.82	44.7	30.9	1.45
	3.0000	135.733	5.3438	44.450	1.7500	46.101	1.8150	34.925	1.3750	3.6	0.14	3.2	0.13	267	337	51.0	**5760**	**5735**	33.0	1.30	94.0	3.70	88.0	3.46	119.0	4.69	130.0	5.12	0.41	1.48	0.81	62.5	43.4	1.44
	3.0000	136.525	5.3750	30.162	1.1875	29.769	1.1720	22.225	0.8750	3.6	0.14	3.2	0.13	167	198	30.0	**495A**	**493**	29.8	1.17	92.0	3.62	86.0	3.39	122.0	4.80	130.0	5.12	0.44	1.35	0.74	38.8	29.4	1.32
	3.0000	139.992	5.5115	36.512	1.4375	36.098	1.4212	28.575	1.1250	3.6	0.14	3.2	0.13	220	262	39.8	**575R**	**572**	31.0	1.22	92.0	3.62	86.0	3.39	125.0	4.92	133.0	5.24	0.40	1.49	0.82	51.2	35.3	1.45
	3.0000	139.992	5.5115	36.512	1.4375	36.098	1.4212	28.575	1.1250	6.7	0.26	3.2	0.13	220	262	39.8	**575SR**	**572**	31.0	1.22	99.0	3.90	86.0	3.39	125.0	4.92	133.0	5.24	0.40	1.49	0.82	51.2	35.3	1.45
	3.0000	147.638	5.8125	35.717	1.4062	36.322	1.4300	26.192	1.0312	3.6	0.14	0.8	0.03	230	287	42.5	**590A**	**592XE**	33.4	1.31	95.0	3.74	89.0	3.50	135.0	5.31	142.0	5.59	0.44	1.36	0.75	53.5	40.4	1.32
	3.0000	149.225	5.8750	53.975	2.1250	54.229	2.1350	44.450	1.7500	3.6	0.14	3.2	0.13	357	404	54.4	**6461**	**6420**	39.3	1.55	96.0	3.78	89.5	3.52	129.0	5.08	141.0	5.55	0.36	1.66	0.91	83.9	51.9	1.62
	3.0000	149.225	5.8750	53.975	2.1250	54.229	2.1350	44.450	1.7500	9.5	0.37	3.2	0.13	357	404	54.4	**6461A**	**6420**	39.3	1.55	105.0	4.13	90.0	3.54	129.0	5.08	141.0	5.55	0.36	1.66	0.91	83.9	51.9	1.62
	3.0000	149.225	5.8750	53.975	2.1250	54.229	2.1350	44.450	1.7500	6.4	0.25	3.2	0.13	357	404	54.4	**6466**	**6420**	39.3	1.55	100.0	3.94	90.0	3.54	129.0	5.08	141.0	5.55	0.36	1.66	0.91	83.9	51.9	1.62
	3.0000	150.089	5.9090	44.450	1.7500	46.672	1.8375	36.512	1.4375	3.6	0.14	3.2	0.13	330	368	50.1	**748SR**	**742**	32.4	1.28	93.0	3.66	87.0	3.43	134.0	5.28	142.0	5.59	0.33	1.84	1.01	77.3	43.0	1.80
	3.0000	152.400	6.0000	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	261	301	45.3	**659**	**652**	33.4	1.31	93.0	3.66	87.0	3.43	134.0	5.28	141.0	5.55	0.41	1.47	0.81	60.9	42.6	1.43
	3.0000	159.995	6.2990	47.625	1.8750	48.260	1.9000	38.100	1.5000	3.6	0.14	0.8	0.03	342	391	52.4	**755**	**752A**	35.5	1.40	95.0	3.74	88.0	3.46	146.0	5.75	149.0	5.87	0.34	1.76	0.97	80.0	46.6	1.72
	3.0000	160.338	6.3125	53.975	2.1250	55.100	2.1693	44.450	1.7500	6.4	0.25	3.2	0.13	395	471	61.4	**6575R**	**6521**	41.0	1.61	104.0	4.09	94.0	3.70	141.0	5.55	154.0	6.06	0.40	1.50	0.82	92.9	63.5	1.46
	3.0000	161.925	6.3750	53.975	2.1250	55.100	2.1693	42.862	1.6875	6.4	0.25	0.8	0.03	395	471	61.4	**6575R**	**6536**	41.0	1.61	104.0	4.09	92.0	3.62	144.0	5.67	154.0	6.06	0.40	1.50	0.82	92.9	63.5	1.46

Note 1) SP indicates the specially chamfered from.

TS type
d (76.200) ~ (82.550) mm
(3.0000) ~ (3.2500) inch





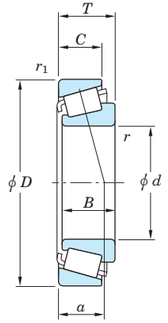
$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

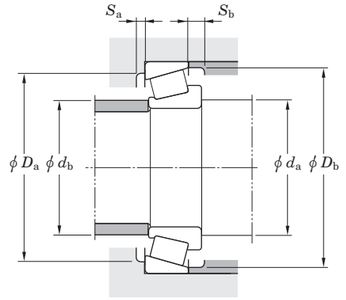
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Con-stant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
76.200	3.0000	161.925	6.3750	53.975	2.1250	55.100	2.1693	42.862	1.6875	3.6	0.14	3.2	0.13	395	471	61.4	**6576R**	**6535**	41.0	1.61	99.0	3.90	89.0	3.50	141.0	5.55	154.0	6.06	0.40	1.50	0.82	92.9	63.5	1.46
	3.0000	168.275	6.6250	47.625	1.8750	48.260	1.9000	38.100	1.5000	3.6	0.14	3.2	0.13	342	391	52.4	**755**	**753**	35.5	1.40	95.0	3.74	88.0	3.46	147.0	5.79	150.0	5.91	0.34	1.76	0.97	80.0	46.6	1.72
	3.0000	169.850	6.6870	62.705	2.4687	63.830	2.5130	44.450	1.7500	3.6	0.14	3.2	0.13	395	471	61.4	**6554R**	**6520**	41.0	1.61	99.0	3.90	89.0	3.50	147.0	5.79	162.0	6.38	0.40	1.50	0.82	92.9	63.5	1.46
	3.0000	190.500	7.5000	57.150	2.2500	57.531	2.2650	46.038	1.8125	3.6	0.14	3.2	0.13	549	602	76.9	**HH221430**	**HH221410**	42.5	1.67	101.0	3.98	95.0	3.74	171.0	6.73	179.0	7.05	0.33	1.79	0.99	129	73.6	1.75
77.356	3.0455	121.442	4.7812	24.608	0.9688	23.012	0.9060	17.462	0.6875	3.6	0.14	2.0	0.08	113	127	19.4	**34304**	**34478**	26.8	1.06	90.0	3.54	85.0	3.35	110.0	4.33	116.0	4.57	0.45	1.33	0.73	26.0	20.0	1.30
77.788	3.0625	117.475	4.6250	25.400	1.0000	25.400	1.0000	19.050	0.7500	3.6	0.14	3.2	0.13	127	166	25.1	**LM814849**	**LM814810**	27.6	1.09	91.0	3.58	85.0	3.35	105.0	4.13	113.0	4.45	0.51	1.18	0.65	29.2	25.4	1.15
	3.0625	121.442	4.7812	24.608	0.9688	23.012	0.9060	17.462	0.6875	3.6	0.14	2.0	0.08	113	127	19.4	**34306**	**34478**	26.8	1.06	90.0	3.54	84.0	3.31	110.0	4.33	116.0	4.57	0.45	1.33	0.73	26.0	20.0	1.30
	3.0625	121.442	4.7812	24.608	0.9688	23.012	0.9060	17.462	0.6875	6.4	0.25	2.0	0.08	113	127	19.4	**34307**	**34478**	26.8	1.06	96.0	3.78	84.0	3.31	110.0	4.33	116.0	4.57	0.45	1.33	0.73	26.0	20.0	1.30
	3.0625	127.000	5.0000	30.162	1.1875	31.000	1.2205	22.225	0.8750	3.6	0.14	3.2	0.13	179	225	32.3	**42690**	**42620**	27.1	1.07	91.0	3.58	85.0	3.35	114.0	4.49	121.0	4.76	0.42	1.43	0.79	41.4	29.6	1.40
	3.0625	133.350	5.2500	30.162	1.1875	29.769	1.1720	22.225	0.8750	3.6	0.14	3.2	0.13	167	198	30.0	**495AS**	**492A**	29.8	1.17	93.0	3.66	87.0	3.43	120.0	4.72	128.0	5.04	0.44	1.35	0.74	38.8	29.4	1.32
	3.0625	135.733	5.3438	44.450	1.7500	46.101	1.8150	34.925	1.3750	3.6	0.14	3.2	0.13	267	337	51.0	**5795**	**5735**	33.0	1.30	96.0	3.78	89.0	3.50	119.0	4.69	130.0	5.12	0.41	1.48	0.81	62.5	43.4	1.44
	3.0625	146.050	5.7500	33.338	1.3125	34.925	1.3750	26.195	1.0313	3.6	0.14	3.2	0.13	223	293	43.2	**47880R**	**47820**	32.6	1.28	93.0	3.66	87.0	3.43	131.0	5.16	140.0	5.51	0.45	1.34	0.74	51.6	39.5	1.31
79.375	3.1250	146.050	5.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	261	301	45.3	**661**	**653**	33.4	1.31	96.0	3.78	90.0	3.54	131.0	5.16	139.0	5.47	0.41	1.47	0.81	60.9	42.6	1.43
	3.1250	147.638	5.8125	35.717	1.4062	36.322	1.4300	26.192	1.0312	3.6	0.14	3.2	0.13	230	287	42.5	**595A**	**592XS**	33.4	1.31	98.0	3.86	91.0	3.58	133.0	5.24	142.0	5.59	0.44	1.36	0.75	53.5	40.4	1.32
	3.1250	150.089	5.9090	44.450	1.7500	46.672	1.8375	36.512	1.4375	3.6	0.14	3.2	0.13	330	368	50.1	**750R**	**742**	32.4	1.28	96.0	3.78	90.0	3.54	134.0	5.28	142.0	5.59	0.33	1.84	1.01	77.3	43.0	1.80
	3.1250	161.925	6.3750	47.625	1.8750	48.260	1.9000	38.100	1.5000	7.9	0.31	3.2	0.13	342	391	52.4	**756A**	**752**	35.5	1.40	106.0	4.17	91.0	3.58	144.0	5.67	150.0	5.91	0.34	1.76	0.97	80.0	46.6	1.72
	3.1250	190.500	7.5000	57.150	2.2500	57.531	2.2650	46.038	1.8125	3.6	0.14	3.2	0.13	549	602	76.9	**HH221431**	**HH221410**	42.5	1.67	103.0	4.06	97.0	3.82	171.0	6.73	179.0	7.05	0.33	1.79	0.99	129	73.6	1.75
79.985	3.1490	136.525	5.3750	30.162	1.1875	29.769	1.1720	22.225	0.8750	3.6	0.14	3.2	0.13	167	198	30.0	**496X**	**493**	29.8	1.17	94.0	3.70	88.0	3.46	122.0	4.80	130.0	5.12	0.44	1.35	0.74	38.8	29.4	1.32
	3.1490	139.992	5.5115	36.512	1.4375	36.098	1.4212	28.575	1.1250	3.6	0.14	3.2	0.13	220	262	39.8	**578R**	**572**	31.0	1.22	95.0	3.74	89.0	3.50	125.0	4.92	133.0	5.24	0.40	1.49	0.82	51.2	35.3	1.45
	3.1490	152.400	6.0000	39.688	1.5625	36.322	1.4300	30.162	1.1875	3.6	0.14	3.2	0.13	230	287	42.5	**590**	**592A**	37.1	1.46	98.0	3.86	92.0	3.62	135.0	5.31	144.0	5.67	0.44	1.36	0.75	53.5	40.4	1.32
80.000	3.1496	150.089	5.9090	44.450	1.7500	46.672	1.8375	36.512	1.4375	3.0	0.12	3.2	0.13	330	368	50.1	**748R**	**742**	32.4	1.28	95.0	3.74	91.0	3.58	134.0	5.28	142.0	5.59	0.33	1.84	1.01	77.3	43.0	1.80
	3.1496	161.925	6.3750	53.975	2.1250	55.100	2.1693	42.862	1.6875	3.0	0.12	3.2	0.13	395	471	61.4	**6556R**	**6535**	41.0	1.61	99.0	3.90	89.0	3.50	141.0	5.55	154.0	6.06	0.40	1.50	0.82	92.9	63.5	1.46
	3.1496	168.275	6.6250	53.975	2.1250	56.363	2.2190	41.275	1.6250	3.0	0.12	3.2	0.13	429	467	62.1	**838XR**	**832**	35.0	1.38	93.0	3.66	92.0	3.62	149.0	5.87	155.0	6.10	0.30	2.00	1.10	101	51.6	1.95
	3.1496	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	3.0	0.12	3.2	0.13	482	565	72.4	**864XR**	**854**	39.9	1.57	100.0	3.94	95.0	3.74	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
	3.1496	200.000	7.8740	52.761	2.0772	49.212	1.9375	34.925	1.3750	3.6	0.14	3.2	0.13	433	471	58.8	**98316**	**98788**	54.5	2.15	111.0	4.37	105.0	4.13	174.0	6.85	188.0	7.40	0.63	0.95	0.52	101	109	0.93
80.962	3.1875	133.350	5.2500	30.162	1.1875	29.769	1.1720	22.225	0.8750	3.6	0.14	3.2	0.13	167	198	30.0	**496**	**492A**	29.8	1.17	95.0	3.74	89.0	3.50	120.0	4.72	128.0	5.04	0.44	1.35	0.74	38.8	29.4	1.32
	3.1875	133.350	5.2500	33.338	1.3125	33.338	1.3125	26.195	1.0313	3.6	0.14	3.2	0.13	193	245	37.2	**47681R**	**47620**	29.2	1.15	95.0	3.74	89.0	3.50	119.0	4.69	128.0	5.04	0.40	1.48	0.82	44.7	30.9	1.45
	3.1875	133.350	5.2500	33.338	1.3125	33.338	1.3125	26.195	1.0313	3.6	0.14	0.8	0.03	193	245	37.2	**47681R**	**47620A**	29.2	1.15	95.0	3.74	89.0	3.50	121.0	4.76	128.0	5.04	0.40	1.48	0.82	44.7	30.9	1.45
	3.1875	133.350	5.2500	39.688	1.5625	39.688	1.5625	32.545	1.2813	3.6	0.14	3.2	0.13	222	306	45.9	**HM516447**	**HM516410**	32.2	1.27	97.0	3.82	91.0	3.58	118.0	4.65	128.0	5.04	0.40	1.49	0.82	51.8	35.6	1.46
	3.1875	139.992	5.5115	36.512	1.4375	36.098	1.4212	28.575	1.1250	3.6	0.14	3.2	0.13	220	262	39.8	**581R**	**572**	31.0	1.22	96.0	3.78	90.0	3.54	125.0	4.92	133.0	5.24	0.40	1.49	0.82	51.2	35.3	1.45
	3.1875	146.050	5.7500	38.100	1.5000	38.100	1.5000	31.750	1.2500	3.6	0.14	3.2	0.13	261	301	45.3	**662**	**653**	30.2	1.19	97.0	3.82	90.0	3.54	131.0	5.16	139.0	5.47	0.41	1.47	0.81	60.9	42.6	1.43
	3.1875	150.089	5.9090	44.450	1.7500	46.672	1.8375	36.512	1.4375	5.2	0.20	3.2	0.13	330	368	50.1	**740R**	**742**	32.4	1.28	101.0	3.98	91.0	3.58	134.0	5.28	142.0	5.59	0.33	1.84	1.01	77.3	43.0	1.80
81.699	3.2165	136.525	5.3750	30.162	1.1875	29.769	1.1720	22.225	0.8750	3.6	0.14	3.2	0.13	167	198	30.0	**496AS**	**493**	29.8	1.17	96.0	3.78	90.0	3.54	122.0	4.80	130.0	5.12	0.44	1.35	0.74	38.8	29.4	1.32
82.550	3.2500	125.412	4.9375	25.400	1.0000	25.400	1.0000	19.845	0.7813	3.6	0.14	1.6	0.06	126	162	24.4	**27687**	**27620**	24.7	0.97	96.0	3.78	89.0	3.50	115.0	4.53	120.0	4.72	0.42	1.44	0.79	29.2	20.8	1.41
	3.2500	133.350	5.2500	30.162	1.1875	29.769	1.1720	22.225	0.8750	3.6	0.14	3.2	0.13	167	198	30.0	**495**	**492A**	29.8	1.17	97.0	3.82	90.0	3.54	120.0	4.72	128.0	5.04	0.44	1.35	0.74	38.8	29.4	1.32
	3.2500	133.350	5.2500	33.338	1.3125	29.769	1.1720	25.400	1.0000	3.6	0.14	3.2	0.13	167	198	30.0	**495**	**492**	33.0	1.30	97.0	3.82	90.0	3.54	120.0	4.72	128.0	5.04	0.44	1.35	0.74	38.8	29.4	1.32
	3.2500	133.350	5.2500	33.338	1.3125	33.338	1.3125	26.195	1.0313	0.8	0.03	0.8	0.03	193	245	37.2	**47685R**	**47620A**	29.2	1.15	91.0	3.58	90.0	3.54	121.0	4.76	128.0	5.04	0.40	1.48	0.82	44.7	30.9	1.45

Note 1) SP indicates the specially chamfered from.

TS type
d (82.550) ~ (85.725) mm
(3.2500) ~ (3.3750) inch





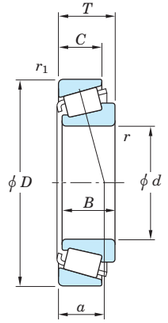
$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

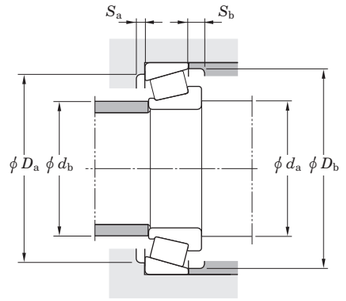
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	(500 rpm for 3 000 Hrs.) Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
82.550	3.2500	133.350	5.2500	33.338	1.3125	33.338	1.3125	26.195	1.0313	3.6	0.14	0.8	0.03	193	245	37.2	**47686R**	**47620A**	29.2	1.15	97.0	3.82	90.0	3.54	121.0	4.76	128.0	5.04	0.40	1.48	0.82	44.7	30.9	1.45
	3.2500	133.350	5.2500	33.338	1.3125	33.338	1.3125	26.195	1.0313	6.7	0.26	0.8	0.03	193	245	37.2	**47687R**	**47620A**	29.2	1.15	103.0	4.06	90.0	3.54	121.0	4.76	128.0	5.04	0.40	1.48	0.82	44.7	30.9	1.45
	3.2500	133.350	5.2500	39.688	1.5625	39.688	1.5625	32.545	1.2813	6.7	0.26	3.2	0.13	222	306	45.9	**HM516448**	**HM516410**	32.2	1.27	105.0	4.13	92.0	3.62	118.0	4.65	128.0	5.04	0.40	1.49	0.82	51.8	35.6	1.46
	3.2500	133.350	5.2500	39.688	1.5625	39.688	1.5625	32.545	1.2813	3.6	0.14	3.2	0.13	222	306	45.9	**HM516449**	**HM516410**	32.2	1.27	99.0	3.90	92.0	3.62	118.0	4.65	128.0	5.04	0.40	1.49	0.82	51.8	35.6	1.46
	3.2500	139.700	5.5000	36.512	1.4375	36.098	1.4212	28.575	1.1250	3.6	0.14	3.2	0.13	220	262	39.8	**580R**	**572X**	31.0	1.22	98.0	3.86	91.0	3.58	125.0	4.92	133.0	5.24	0.40	1.49	0.82	51.2	35.3	1.45
	3.2500	139.700	5.5000	36.512	1.4375	36.098	1.4212	28.575	1.1250	6.7	0.26	3.2	0.13	220	262	39.8	**582R**	**572X**	31.0	1.22	104.0	4.09	91.0	3.58	125.0	4.92	133.0	5.24	0.40	1.49	0.82	51.2	35.3	1.45
	3.2500	139.992	5.5115	36.512	1.4375	36.098	1.4212	28.575	1.1250	3.6	0.14	3.2	0.13	220	262	39.8	**580R**	**572**	31.0	1.22	98.0	3.86	91.0	3.58	125.0	4.92	133.0	5.24	0.40	1.49	0.82	51.2	35.3	1.45
	3.2500	139.992	5.5115	36.512	1.4375	36.098	1.4212	28.575	1.1250	6.7	0.26	3.2	0.13	220	262	39.8	**582R**	**572**	31.0	1.22	104.0	4.09	91.0	3.58	125.0	4.92	133.0	5.24	0.40	1.49	0.82	51.2	35.3	1.45
	3.2500	142.138	5.5960	42.862	1.6875	42.862	1.6875	34.133	1.3438	3.6	0.14	3.2	0.13	276	351	52.4	**HM617045**	**HM617010**	35.2	1.39	100.0	3.94	93.0	3.66	125.0	4.92	137.0	5.39	0.43	1.39	0.76	64.4	47.5	1.35
	3.2500	146.050	5.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	261	301	45.3	**663**	**653**	33.4	1.31	99.0	3.90	92.0	3.62	131.0	5.16	139.0	5.47	0.41	1.47	0.81	60.9	42.6	1.43
	3.2500	146.050	5.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	6.7	0.26	3.2	0.13	261	301	45.3	**663A**	**653**	33.4	1.31	105.0	4.13	92.0	3.62	131.0	5.16	139.0	5.47	0.41	1.47	0.81	60.9	42.6	1.43
	3.2500	150.000	5.9055	35.992	1.4170	36.322	1.4300	27.000	1.0630	3.6	0.14	3.0	0.12	230	287	42.5	**595**	**593X**	33.4	1.31	100.0	3.94	93.0	3.66	134.0	5.28	142.0	5.59	0.44	1.36	0.75	53.5	40.4	1.32
	3.2500	150.089	5.9090	44.450	1.7500	46.672	1.8375	36.512	1.4375	3.6	0.14	3.2	0.13	330	368	50.1	**749AR**	**742**	32.4	1.28	99.0	3.90	93.0	3.66	134.0	5.28	142.0	5.59	0.33	1.84	1.01	77.3	43.0	1.80
	3.2500	150.089	5.9090	44.450	1.7500	46.672	1.8375	36.512	1.4375	6.7	0.26	3.2	0.13	330	368	50.1	**750AR**	**742**	32.4	1.28	106.0	4.17	93.0	3.66	134.0	5.28	142.0	5.59	0.33	1.84	1.01	77.3	43.0	1.80
	3.2500	161.925	6.3750	47.625	1.8750	48.260	1.9000	38.100	1.5000	3.6	0.14	3.2	0.13	342	391	52.4	**757**	**752**	35.5	1.40	100.0	3.94	94.0	3.70	144.0	5.67	150.0	5.91	0.34	1.76	0.97	80.0	46.6	1.72
	3.2500	161.925	6.3750	53.975	2.1250	55.100	2.1693	42.862	1.6875	3.6	0.14	3.2	0.13	395	471	61.4	**6559R**	**6535**	41.0	1.61	104.0	4.09	98.0	3.86	141.0	5.55	154.0	6.06	0.40	1.50	0.82	92.9	63.5	1.46
	3.2500	168.275	6.6250	53.975	2.1250	56.363	2.2190	41.275	1.6250	0.8	0.03	3.2	0.13	429	467	62.1	**839R**	**832**	35.0	1.38	95.0	3.74	94.0	3.70	149.0	5.87	155.0	6.10	0.30	2.00	1.10	101	51.6	1.95
	3.2500	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	3.2	0.13	3.2	0.13	482	565	72.4	**867XR**	**854**	39.9	1.57	103.0	4.06	98.0	3.86	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
83.345	3.2813	125.412	4.9375	25.400	1.0000	25.400	1.0000	19.845	0.7813	0.8	0.03	1.6	0.06	126	162	24.4	**27689**	**27620**	24.7	0.97	90.0	3.54	90.0	3.54	115.0	4.53	120.0	4.72	0.42	1.44	0.79	29.2	20.8	1.41
	3.2813	125.412	4.9375	25.400	1.0000	25.400	1.0000	19.845	0.7813	3.6	0.14	1.6	0.06	126	162	24.4	**27690**	**27620**	24.7	0.97	96.0	3.78	90.0	3.54	115.0	4.53	120.0	4.72	0.42	1.44	0.79	29.2	20.8	1.41
	3.2813	125.412	4.9375	25.400	1.0000	25.400	1.0000	19.845	0.7813	6.4	0.25	1.6	0.06	126	162	24.4	**27691**	**27620**	24.7	0.97	102.0	4.02	90.0	3.54	115.0	4.53	120.0	4.72	0.42	1.44	0.79	29.2	20.8	1.41
	3.2813	133.350	5.2500	33.338	1.3125	33.338	1.3125	26.195	1.0313	3.6	0.14	3.2	0.13	193	245	37.2	**47688R**	**47620**	29.2	1.15	97.0	3.82	90.0	3.54	119.0	4.69	128.0	5.04	0.40	1.48	0.82	44.7	30.9	1.45
84.138	3.3125	133.350	5.2500	30.162	1.1875	29.769	1.1720	22.225	0.8750	3.6	0.14	3.2	0.13	167	198	30.0	**498**	**492A**	29.8	1.17	98.0	3.86	91.0	3.58	120.0	4.72	128.0	5.04	0.44	1.35	0.74	38.8	29.4	1.32
	3.3125	149.225	5.8750	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	261	301	45.3	**664**	**652A**	33.4	1.31	100.0	3.94	95.0	3.74	132.0	5.20	141.0	5.55	0.41	1.47	0.81	60.9	42.6	1.43
	3.3125	152.400	6.0000	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	261	301	45.3	**664**	**652**	33.4	1.31	100.0	3.94	95.0	3.74	134.0	5.28	141.0	5.55	0.41	1.47	0.81	60.9	42.6	1.43
84.963	3.3450	161.925	6.3750	53.975	2.1250	55.100	2.1693	42.862	1.6875	3.6	0.14	3.2	0.13	395	471	61.4	**6578R**	**6535**	41.0	1.61	109.0	4.29	98.0	3.86	141.0	5.55	154.0	6.06	0.40	1.50	0.82	92.9	63.5	1.46
84.976	3.3455	136.525	5.3750	30.162	1.1875	29.769	1.1720	22.225	0.8750	3.6	0.14	3.2	0.13	167	198	30.0	**499A**	**493**	29.8	1.17	98.0	3.86	92.0	3.62	122.0	4.80	130.0	5.12	0.44	1.35	0.74	38.8	29.4	1.32
85.000	3.3465	152.400	6.0000	39.688	1.5625	36.322	1.4300	30.162	1.1875	3.2	0.13	3.2	0.13	230	287	42.5	**596X**	**592A**	37.1	1.46	101.0	3.98	96.0	3.78	135.0	5.31	144.0	5.67	0.44	1.36	0.75	53.5	40.4	1.32
	3.3465	152.400	6.0000	39.688	1.5625	36.322	1.4300	30.162	1.1875	3.0	0.12	3.2	0.13	230	287	42.5	**599X**	**592A**	37.1	1.46	100.0	3.94	96.0	3.78	135.0	5.31	144.0	5.67	0.44	1.36	0.75	53.5	40.4	1.32
	3.3465	161.925	6.3750	53.975	2.1250	55.100	2.1693	42.862	1.6875	3.0	0.12	3.2	0.13	395	471	61.4	**6557R**	**6535**	41.0	1.61	95.0	3.74	85.0	3.35	141.0	5.55	154.0	6.06	0.40	1.50	0.82	92.9	63.5	1.46
	3.3465	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	3.0	0.12	3.2	0.13	482	565	72.4	**865XR**	**854**	39.9	1.57	105.0	4.13	100.0	3.94	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
	3.3465	200.000	7.8740	52.761	2.0772	49.212	1.9375	34.925	1.3750	3.6	0.14	3.2	0.13	433	471	58.8	**98335**	**98788**	54.5	2.15	115.0	4.53	109.0	4.29	174.0	6.85	188.0	7.40	0.63	0.95	0.52	101	109	0.93
85.026	3.3475	150.089	5.9090	44.450	1.7500	46.672	1.8375	36.512	1.4375	3.6	0.14	3.2	0.13	330	368	50.1	**749R**	**742**	32.4	1.28	101.0	3.98	95.0	3.74	134.0	5.28	142.0	5.59	0.33	1.84	1.01	77.3	43.0	1.80
	3.3475	150.089	5.9090	44.450	1.7500	46.672	1.8375	36.512	1.4375	5.2	0.20	3.2	0.13	330	368	50.1	**749SR**	**742**	32.4	1.28	104.0	4.09	95.0	3.74	134.0	5.28	142.0	5.59	0.33	1.84	1.01	77.3	43.0	1.80
85.725	3.3750	133.350	5.2500	30.162	1.1875	29.769	1.1720	22.225	0.8750	3.6	0.14	3.2	0.13	167	198	30.0	**497**	**492A**	29.8	1.17	99.0	3.90	93.0	3.66	120.0	4.72	128.0	5.04	0.44	1.35	0.74	38.8	29.4	1.32
	3.3750	136.525	5.3750	30.162	1.1875	29.769	1.1720	22.225	0.8750	6.4	0.25	3.2	0.13	167	198	30.0	**497A**	**493**	29.8	1.17	105.0	4.13	93.0	3.66	122.0	4.80	130.0	5.12	0.44	1.35	0.74	38.8	29.4	1.32
	3.3750	142.138	5.5960	42.862	1.6875	42.862	1.6875	34.133	1.3438	1.6	0.06	3.2	0.13	276	351	52.4	**HM617048**	**HM617010**	35.2	1.39	98.0	3.86	92.0	3.62	125.0	4.92	137.0	5.39	0.43	1.39	0.76	64.4	47.5	1.35
	3.3750	142.138	5.5960	42.862	1.6875	42.862	1.6875	34.133	1.3438	4.8	0.19	3.2	0.13	276	351	52.4	**HM617049**	**HM617010**	35.2	1.39	106.0	4.17	95.7	3.77	125.0	4.92	137.0	5.39	0.43	1.39	0.76	64.4	47.5	1.35

Note 1) SP indicates the specially chamfered from.

TS type
d (85.725) ~ 89.992 mm
(3.3750) ~ 3.5430 inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

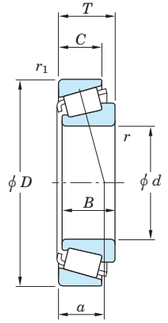
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
85.725	3.3750	146.050	5.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	3.6	0.14	3.2	0.13	261	301	45.3	**665**	**653**	33.4	1.31	102.0	4.02	95.0	3.74	131.0	5.16	139.0	5.47	0.41	1.47	0.81	60.9	42.6	1.43
	3.3750	146.050	5.7500	41.275	1.6250	41.275	1.6250	31.750	1.2500	6.4	0.25	3.2	0.13	261	301	45.3	**665A**	**653**	33.4	1.31	107.0	4.21	95.0	3.74	131.0	5.16	139.0	5.47	0.41	1.47	0.81	60.9	42.6	1.43
	3.3750	152.400	6.0000	39.688	1.5625	36.322	1.4300	30.162	1.1875	3.6	0.14	3.2	0.13	230	287	42.5	**596**	**592A**	37.1	1.46	102.0	4.02	96.0	3.78	135.0	5.31	144.0	5.67	0.44	1.36	0.75	53.5	40.4	1.32
	3.3750	161.925	6.3750	47.625	1.8750	48.260	1.9000	38.100	1.5000	3.6	0.14	3.2	0.13	342	391	52.4	**758**	**752**	35.5	1.40	103.0	4.06	97.0	3.82	144.0	5.67	150.0	5.91	0.34	1.76	0.97	80.0	46.6	1.72
	3.3750	161.925	6.3750	62.705	2.4687	63.830	2.5130	42.862	1.6875	6.7	0.26	3.2	0.13	395	471	61.4	**6553R**	**6535**	49.8	1.96	113.0	4.45	98.0	3.86	141.0	5.55	154.0	6.06	0.40	1.50	0.82	92.9	63.5	1.46
	3.3750	168.275	6.6250	41.275	1.6250	41.275	1.6250	30.162	1.1875	3.6	0.14	3.2	0.13	282	349	50.4	**677**	**672**	38.6	1.52	105.0	4.13	99.0	3.90	149.0	5.87	160.0	6.30	0.47	1.28	0.70	65.8	52.9	1.24
	3.3750	168.275	6.6250	53.975	2.1250	56.363	2.2190	41.275	1.6250	3.6	0.14	3.2	0.13	429	467	62.1	**841R**	**832**	35.0	1.38	104.0	4.09	97.0	3.82	149.0	5.87	155.0	6.10	0.30	2.00	1.10	101	51.6	1.95
	3.3750	170.045	6.6947	41.275	1.6250	41.275	1.6250	30.162	1.1875	3.6	0.14	2.4	0.09	282	349	50.4	**677**	**673SA**	38.6	1.52	105.0	4.13	99.0	3.90	151.0	5.94	160.0	6.30	0.47	1.28	0.70	65.8	52.9	1.24
87.312	3.4375	123.825	4.8750	20.638	0.8125	20.638	0.8125	16.670	0.6563	1.6	0.06	1.6	0.06	102	145	21.5	**L217847**	**L217810**	20.7	0.81	96.0	3.78	93.0	3.66	116.0	4.57	119.0	4.69	0.33	1.82	1.00	23.5	13.2	1.77
	3.4375	136.525	5.3750	30.162	1.1875	29.769	1.1720	22.225	0.8750	3.6	0.14	3.2	0.13	167	198	30.0	**495X**	**493**	29.8	1.17	100.0	3.94	94.0	3.70	122.0	4.80	130.0	5.12	0.44	1.35	0.74	38.8	29.4	1.32
	3.4375	152.400	6.0000	39.688	1.5625	36.322	1.4300	30.162	1.1875	3.6	0.14	3.2	0.13	230	287	42.5	**596S**	**592A**	37.1	1.46	103.0	4.06	97.0	3.82	135.0	5.31	144.0	5.67	0.44	1.36	0.75	53.5	40.4	1.32
	3.4375	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	7.9	0.31	3.2	0.13	482	565	72.4	**869R**	**854**	39.9	1.57	117.0	4.61	102.0	4.02	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
	3.4375	190.500	7.5000	57.150	2.2500	57.531	2.2650	46.038	1.8125	7.9	0.31	3.2	0.13	549	602	76.9	**HH221432**	**HH221410**	42.5	1.67	118.0	4.65	103.0	4.06	171.0	6.73	179.0	7.05	0.33	1.79	0.99	129	73.6	1.75
88.824	3.4970	161.925	6.3750	62.705	2.4687	63.830	2.5130	42.862	1.6875	3.6	0.14	3.2	0.13	395	471	61.4	**6552XR**	**6535**	49.8	1.96	109.0	4.29	98.0	3.86	141.0	5.55	154.0	6.06	0.40	1.50	0.82	92.9	63.5	1.46
88.900	3.5000	123.825	4.8750	20.638	0.8125	20.638	0.8125	16.670	0.6563	1.6	0.06	1.6	0.06	102	145	21.5	**L217849**	**L217810**	20.7	0.81	97.0	3.82	94.0	3.70	116.0	4.57	119.0	4.69	0.33	1.82	1.00	23.5	13.2	1.77
	3.5000	146.050	5.7500	33.338	1.3125	34.925	1.3750	26.195	1.0313	3.6	0.14	3.2	0.13	223	293	43.2	**47885R**	**47820**	32.6	1.28	104.0	4.09	98.0	3.86	131.0	5.16	140.0	5.51	0.45	1.34	0.74	51.6	39.5	1.31
	3.5000	147.638	5.8125	35.717	1.4062	36.322	1.4300	26.192	1.0312	3.6	0.14	0.8	0.03	230	287	42.5	**593**	**592XE**	33.4	1.31	104.0	4.09	98.0	3.86	135.0	5.31	142.0	5.59	0.44	1.36	0.75	53.5	40.4	1.32
	3.5000	147.638	5.8125	35.717	1.4062	36.322	1.4300	26.192	1.0312	6.4	0.25	0.8	0.03	230	287	42.5	**593A**	**592XE**	33.4	1.31	110.0	4.33	98.0	3.86	135.0	5.31	142.0	5.59	0.44	1.36	0.75	53.5	40.4	1.32
	3.5000	152.400	6.0000	39.688	1.5625	36.322	1.4300	33.338	1.3125	3.6	0.14	3.2	0.13	230	287	42.5	**593**	**592**	37.1	1.46	104.0	4.09	98.0	3.86	135.0	5.31	144.0	5.67	0.44	1.36	0.75	53.5	40.4	1.32
	3.5000	152.400	6.0000	39.688	1.5625	39.688	1.5625	30.162	1.1875	6.4	0.25	3.2	0.13	311	359	53.5	**HM518445**	**HM518410**	33.1	1.30	110.0	4.33	98.0	3.86	135.0	5.31	146.0	5.75	0.40	1.49	0.82	72.3	49.6	1.46
	3.5000	159.995	6.2990	47.625	1.8750	48.260	1.9000	38.100	1.5000	7.1	0.28	0.8	0.03	342	391	52.4	**766**	**752A**	35.5	1.40	113.0	4.45	99.0	3.90	146.0	5.75	149.0	5.87	0.34	1.76	0.97	80.0	46.6	1.72
	3.5000	160.096	6.3030	30.124	1.1860	30.162	1.1875	22.301	0.8780	2.4	0.09	3.2	0.13	207	221	32.8	**69350X**	**69630**	30.6	1.20	103.0	4.06	97.0	3.82	143.0	5.63	149.0	5.87	0.42	1.42	0.78	47.7	34.5	1.38
	3.5000	161.925	6.3750	47.625	1.8750	48.260	1.9000	38.100	1.5000	3.6	0.14	3.2	0.13	342	391	52.4	**759**	**752**	35.5	1.40	106.0	4.17	99.0	3.90	144.0	5.67	150.0	5.91	0.34	1.76	0.97	80.0	46.6	1.72
	3.5000	161.925	6.3750	47.625	1.8750	48.260	1.9000	38.100	1.5000	7.1	0.28	3.2	0.13	342	391	52.4	**766**	**752**	35.5	1.40	113.0	4.45	99.0	3.90	144.0	5.67	150.0	5.91	0.34	1.76	0.97	80.0	46.6	1.72
	3.5000	161.925	6.3750	53.975	2.4687	55.100	2.1693	42.862	1.6875	3.6	0.14	3.2	0.13	395	471	61.4	**6580R**	**6535**	49.8	1.96	109.0	4.29	98.0	3.86	141.0	5.55	154.0	6.06	0.40	1.50	0.82	92.9	63.5	1.46
	3.5000	161.925	6.3750	62.705	2.4687	63.830	2.5130	42.862	1.6875	3.6	0.14	3.2	0.13	395	471	61.4	**6552R**	**6535**	49.8	1.96	109.0	4.29	98.0	3.86	141.0	5.55	154.0	6.06	0.40	1.50	0.82	92.9	63.5	1.46
	3.5000	168.275	6.6250	41.275	1.6250	41.275	1.6250	30.162	1.1875	3.6	0.14	3.2	0.13	282	349	50.4	**679**	**672**	38.6	1.52	107.0	4.21	101.0	3.98	149.0	5.87	160.0	6.30	0.47	1.28	0.70	65.8	52.9	1.24
	3.5000	180.975	7.1250	47.625	1.8750	48.006	1.8900	38.100	1.5000	4.8	0.19	3.2	0.13	362	438	56.6	**775**	**772**	39.5	1.56	111.0	4.37	103.0	4.06	161.0	6.34	168.0	6.61	0.39	1.56	0.86	84.5	55.7	1.52
	3.5000	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	7.9	0.31	3.2	0.13	482	565	72.4	**855R**	**854**	40.0	1.57	118.0	4.65	103.0	4.06	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
	3.5000	190.500	7.5000	57.150	2.2500	57.531	2.2650	46.038	1.8125	7.9	0.31	3.2	0.13	549	602	76.9	**HH221434**	**HH221410**	42.5	1.67	120.0	4.72	105.0	4.13	171.0	6.73	179.0	7.05	0.33	1.79	0.99	129	73.6	1.75
	3.5000	200.000	7.8740	52.761	2.0772	49.212	1.9375	34.925	1.3750	3.6	0.14	3.2	0.13	433	471	58.8	**98350**	**98788**	54.5	2.15	118.0	4.65	112.0	4.41	174.0	6.85	188.0	7.40	0.63	0.95	0.52	101	109	0.93
	3.5000	200.025	7.8750	61.912	2.4375	57.531	2.2650	49.212	1.9375	7.9	0.31	3.2	0.13	482	565	72.4	**855R**	**854X**	44.7	1.76	118.0	4.65	103.0	4.06	173.0	6.81	173.0	6.81	0.33	1.79	0.99	113	64.6	1.75
89.090	3.5075	152.400	6.0000	39.688	1.5625	36.322	1.4300	30.162	1.1875	3.6	0.14	3.2	0.13	230	287	42.5	**593S**	**592A**	37.1	1.46	104.0	4.09	98.0	3.86	135.0	5.31	144.0	5.67	0.44	1.36	0.75	53.5	40.4	1.32
89.814	3.5360	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	7.9	0.31	3.2	0.13	482	565	72.4	**857XR**	**854**	39.9	1.57	119.0	4.69	104.0	4.09	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
89.891	3.5390	168.275	6.6250	53.975	2.1250	56.363	2.2190	41.275	1.6250	3.6	0.14	3.2	0.13	429	467	62.1	**850AR**	**832**	35.0	1.38	107.0	4.21	101.0	3.98	149.0	5.87	155.0	6.10	0.30	2.00	1.10	101	51.6	1.95
89.974	3.5423	146.975	5.7864	40.000	1.5748	40.000	1.5748	32.500	1.2795	7.1	0.28	3.6	0.14	259	310	46.6	**HM218248**	**HM218210**	30.8	1.21	112.0	4.41	99.0	3.90	133.0	5.24	141.0	5.55	0.33	1.80	0.99	60.4	34.4	1.76
89.992	3.5430	160.096	6.3030	30.124	1.1860	30.162	1.1875	22.301	0.8780	2.4	0.09	3.2	0.13	207	221	32.8	**69354**	**69630**	30.6	1.20	103.0	4.06	97.0	3.82	143.0	5.63	149.0	5.87	0.42	1.42	0.78	47.7	34.5	1.38

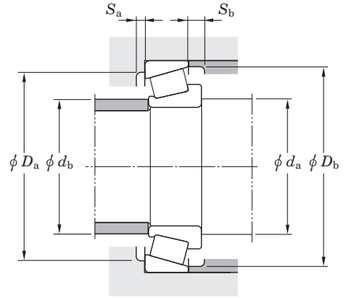
Note 1) SP indicates the specially chamfered from.

TS type

d 90.000 ~ 98.425 mm

3.5433 ~ 3.8750 inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

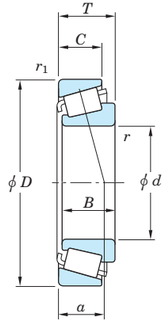
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

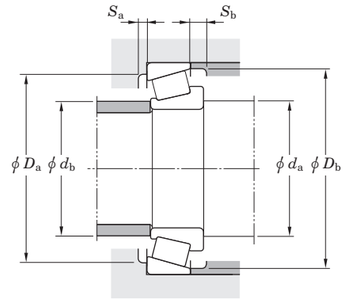
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1^{1)}$ (min.)					Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	(500 rpm for 3 000 Hrs.) Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	C_r	C_{0r}	C_u			mm	inch	mm	inch	mm	inch	mm	inch						
90.000	3.5433	147.638	5.8125	35.717	1.4062	36.322	1.4300	26.192	1.0312	3.0	0.12	0.8	0.03	230	287	42.5	**597X**	**592XE**	33.4	1.31	104.0	4.09	99.0	3.90	135.0	5.31	142.0	5.59	0.44	1.36	0.75	53.5	40.4	1.32
	3.5433	160.000	6.2992	53.975	2.1250	55.100	2.1693	44.450	1.7500	3.0	0.12	3.0	0.12	395	471	61.4	**6581XR**	**6525X**	41.0	1.61	102.0	4.02	98.0	3.86	141.0	5.55	153.5	6.04	0.40	1.50	0.82	92.9	63.5	1.46
	3.5433	161.925	6.3750	53.975	2.1250	55.100	2.1693	42.862	1.6875	3.0	0.12	3.2	0.13	395	471	61.4	**6581XR**	**6535**	41.0	1.61	102.0	4.02	98.0	3.86	141.0	5.55	154.0	6.06	0.40	1.50	0.82	92.9	63.5	1.46
90.488	3.5625	161.925	6.3750	47.625	1.8750	48.260	1.9000	38.100	1.5000	3.6	0.14	3.2	0.13	342	391	52.4	**760**	**752**	35.5	1.40	107.0	4.21	101.0	3.98	144.0	5.67	150.0	5.91	0.34	1.76	0.97	80.0	46.6	1.72
92.075	3.6250	130.175	5.1250	20.638	0.8125	21.432	0.8438	16.670	0.6563	3.6	0.14	1.6	0.06	121	167	24.7	**L319245**	**L319210**	22.2	0.87	107.0	4.21	101.0	3.98	122.0	4.80	125.0	4.92	0.35	1.72	0.95	27.7	16.5	1.68
	3.6250	146.050	5.7500	33.338	1.3125	34.925	1.3750	26.195	1.0313	3.6	0.14	3.2	0.13	223	293	43.2	**47890R**	**47820**	32.6	1.28	107.0	4.21	101.0	3.98	131.0	5.16	140.0	5.51	0.45	1.34	0.74	51.6	39.5	1.31
	3.6250	147.638	5.8125	35.717	1.4062	36.322	1.4300	26.192	1.0312	3.6	0.14	0.8	0.03	230	287	42.5	**598**	**592XE**	33.4	1.31	107.0	4.21	101.0	3.98	135.0	5.31	142.0	5.59	0.44	1.36	0.75	53.5	40.4	1.32
	3.6250	147.638	5.8125	35.717	1.4062	36.322	1.4300	26.192	1.0312	6.4	0.25	0.8	0.03	230	287	42.5	**598A**	**592XE**	33.4	1.31	113.0	4.45	101.0	3.98	135.0	5.31	142.0	5.59	0.44	1.36	0.75	53.5	40.4	1.32
	3.6250	168.275	6.6250	41.275	1.6250	41.275	1.6250	30.162	1.1875	3.6	0.14	3.2	0.13	282	349	50.4	**681**	**672**	38.6	1.52	110.0	4.33	104.0	4.09	149.0	5.87	160.0	6.30	0.47	1.28	0.70	65.8	52.9	1.24
	3.6250	168.275	6.6250	41.275	1.6250	41.275	1.6250	30.162	1.1875	6.4	0.25	3.2	0.13	282	349	50.4	**681A**	**672**	38.6	1.52	116.0	4.57	104.0	4.09	149.0	5.87	160.0	6.30	0.47	1.28	0.70	65.8	52.9	1.24
	3.6250	180.975	7.1250	47.625	1.8750	48.006	1.8900	38.100	1.5000	3.6	0.14	3.2	0.13	362	438	56.6	**778**	**772**	39.5	1.56	111.0	4.37	105.0	4.13	161.0	6.34	168.0	6.61	0.39	1.56	0.86	84.5	55.7	1.52
	3.6250	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	7.9	0.31	3.2	0.13	482	565	72.4	**857R**	**854**	39.9	1.57	121.0	4.76	106.0	4.17	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
	3.6250	190.500	7.5000	57.150	2.2500	57.531	2.2650	46.038	1.8125	7.9	0.31	3.2	0.13	549	602	76.9	**HH221438**	**HH221410**	42.5	1.67	121.0	4.76	106.0	4.17	171.0	6.73	179.0	7.05	0.33	1.79	0.99	129	73.6	1.75
93.662	3.6875	147.638	5.8125	35.717	1.4062	36.322	1.4300	26.192	1.0312	3.6	0.14	0.8	0.03	230	287	42.5	**597**	**592XE**	33.4	1.31	109.0	4.29	102.0	4.02	135.0	5.31	142.0	5.59	0.44	1.36	0.75	53.5	40.4	1.32
94.976	3.7392	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	3.6	0.14	3.2	0.13	482	565	72.4	**867AR**	**854**	39.9	1.57	114.0	4.49	108.0	4.25	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
95.000	3.7402	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	6.4	0.25	3.2	0.13	482	565	72.4	**862R**	**854**	39.9	1.57	120.0	4.72	108.0	4.25	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
95.250	3.7500	128.588	5.0625	15.875	0.6250	15.083	0.5938	11.908	0.4688	1.6	0.06	1.6	0.06	72.6	93.0	13.1	**LL319349**	**LL319310**	20.3	0.80	103.0	4.06	100.0	3.94	122.0	4.80	125.0	4.92	0.35	1.71	0.94	16.4	9.85	1.67
	3.7500	130.175	5.1250	20.638	0.8125	21.432	0.8438	16.670	0.6563	1.6	0.06	1.6	0.06	121	167	24.7	**L319249**	**L319210**	22.2	0.87	107.0	4.21	101.0	3.98	122.0	4.80	125.0	4.92	0.35	1.72	0.95	27.7	16.5	1.68
	3.7500	146.050	5.7500	33.338	1.3125	34.925	1.3750	26.195	1.0313	3.6	0.14	3.2	0.13	223	293	43.2	**47896R**	**47820**	32.6	1.28	110.0	4.33	103.0	4.06	131.0	5.16	140.0	5.51	0.45	1.34	0.74	51.6	39.5	1.31
	3.7500	147.638	5.8125	35.717	1.4062	36.322	1.4300	26.192	1.0312	3.6	0.14	0.8	0.03	230	287	42.5	**594**	**592XE**	33.4	1.31	110.0	4.33	104.0	4.09	135.0	5.31	142.0	5.59	0.44	1.36	0.75	53.5	40.4	1.32
	3.7500	147.638	5.8125	35.717	1.4062	36.322	1.4300	26.192	1.0312	5.2	0.20	0.8	0.03	230	287	42.5	**594A**	**592XE**	33.4	1.31	113.0	4.45	104.0	4.09	135.0	5.31	142.0	5.59	0.44	1.36	0.75	53.5	40.4	1.32
	3.7500	157.162	6.1875	36.512	1.4375	36.116	1.4219	26.195	1.0313	3.6	0.14	3.2	0.13	227	288	41.7	**52375**	**52618**	36.0	1.42	112.0	4.41	105.0	4.13	142.0	5.59	153.0	6.02	0.47	1.26	0.69	52.7	42.8	1.23
	3.7500	168.275	6.6250	41.275	1.6250	41.275	1.6250	30.162	1.1875	3.6	0.14	3.2	0.13	282	349	50.4	**683**	**672**	38.6	1.52	113.0	4.45	106.0	4.17	149.0	5.87	160.0	6.30	0.47	1.28	0.70	65.8	52.9	1.24
	3.7500	180.975	7.1250	47.625	1.8750	48.006	1.8900	38.100	1.5000	3.6	0.14	3.2	0.13	362	438	56.6	**776**	**772**	39.5	1.56	114.0	4.49	107.0	4.21	161.0	6.34	168.0	6.61	0.39	1.56	0.86	84.5	55.7	1.52
	3.7500	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	7.9	0.31	3.2	0.13	482	565	72.4	**864R**	**854**	39.9	1.57	123.0	4.84	108.0	4.25	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
	3.7500	190.500	7.5000	57.150	2.2500	57.531	2.2650	46.038	1.8125	7.9	0.31	3.2	0.13	549	602	76.9	**HH221440**	**HH221410**	42.5	1.67	125.0	4.92	110.0	4.33	171.0	6.73	179.0	7.05	0.33	1.79	0.99	129	73.6	1.75
96.838	3.8125	148.430	5.8437	28.575	1.1250	28.971	1.1406	21.433	0.8438	3.6	0.14	3.0	0.12	179	225	33.0	**42381**	**42584**	31.9	1.26	110.0	4.33	104.0	4.09	134.0	5.28	142.0	5.59	0.49	1.22	0.67	41.4	34.8	1.19
98.425	3.8750	160.000	6.2992	36.512	1.4375	36.116	1.4219	26.195	1.0313	3.6	0.14	3.0	0.12	227	288	41.7	**52387**	**52630X**	36.0	1.42	114.0	4.49	108.0	4.25	144.0	5.67	154.0	6.06	0.47	1.26	0.69	52.7	42.8	1.23
	3.8750	161.925	6.3750	36.512	1.4375	36.116	1.4219	26.195	1.0313	3.6	0.14	3.2	0.13	227	288	41.7	**52387**	**52637**	36.0	1.42	114.0	4.49	108.0	4.25	144.0	5.67	154.0	6.06	0.47	1.26	0.69	52.7	42.8	1.23
	3.8750	161.925	6.3750	39.688	1.5625	36.116	1.4219	29.370	1.1563	3.6	0.14	3.2	0.13	227	288	41.7	**52387**	**52638**	39.2	1.54	114.0	4.49	108.0	4.25	144.0	5.67	154.0	6.06	0.47	1.26	0.69	52.7	42.8	1.23
	3.8750	168.275	6.6250	41.275	1.6250	41.275	1.6250	30.162	1.1875	3.6	0.14	3.2	0.13	282	349	50.4	**685**	**672**	38.6	1.52	116.0	4.57	109.0	4.29	149.0	5.87	160.0	6.30	0.47	1.28	0.70	65.8	52.9	1.24
	3.8750	180.975	7.1250	47.625	1.8750	48.006	1.8900	38.100	1.5000	3.6	0.14	3.2	0.13	362	438	56.6	**779**	**772**	39.5	1.56	116.0	4.57	110.0	4.33	161.0	6.34	168.0	6.61	0.39	1.56	0.86	84.5	55.7	1.52
	3.8750	184.150	7.2500	63.500	2.5000	63.500	2.5000	52.388	2.0625	6.4	0.25	3.2	0.13	557	687	86.9	**HH421246**	**HH421210**	46.2	1.82	127.0	5.00	115.0	4.53	163.0	6.42	176.0	6.93	0.37	1.60	0.88	131	83.5	1.56
	3.8750	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	3.6	0.14	3.2	0.13	482	565	72.4	**866R**	**854**	39.9	1.57	118.0	4.65	111.0	4.37	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
	3.8750	190.500	7.5000	57.150	2.2500	57.531	2.2650	46.038	1.8125	3.6	0.14	3.2	0.13	549	602	76.9	**HH221442**	**HH221410**	42.5	1.67	119.0	4.69	113.0	4.45	171.0	6.73	179.0	7.05	0.33	1.79	0.99	129	73.6	1.75
	3.8750	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	3.6	0.14	3.2	0.13	641	699	87.1	**HH224332**	**HH224310**	47.6	1.87	122.0	4.80	117.0	4.61	192.0	7.56	202.0	7.95	0.33	1.84	1.01	151	84.2	1.80

Note 1) SP indicates the specially chamfered from.

TS type

d 99.975 ~ 107.950 mm
3.9360 ~ 4.2500 inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

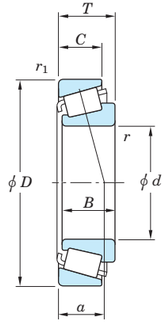
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Con-stant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
99.975	3.9360	156.975	6.1801	42.000	1.6535	42.000	1.6535	34.000	1.3386	7.9	0.31	3.6	0.14	308	396	58.3	**HM220149**	**HM220110**	32.4	1.28	123.0	4.84	108.0	4.25	142.0	5.59	151.0	5.94	0.33	1.80	0.99	71.8	40.8	1.76
	3.9360	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	3.6	0.14	3.2	0.13	641	699	87.1	**HH224334**	**HH224310**	47.6	1.87	122.0	4.80	117.0	4.61	192.0	7.56	202.0	7.95	0.33	1.84	1.01	151	84.2	1.80
99.982	3.9363	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	6.4	0.25	3.2	0.13	482	565	72.4	**863R**	**854**	39.9	1.57	125.0	4.92	103.0	4.06	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
	3.9363	190.500	7.5000	57.150	2.2500	57.531	2.2650	46.038	1.8125	6.4	0.25	3.2	0.13	549	602	76.9	**HH221447**	**HH221410**	42.5	1.67	126.0	4.96	114.0	4.49	171.0	6.73	179.0	7.05	0.33	1.79	0.99	129	73.6	1.75
100.000	3.9370	180.975	7.1250	47.625	1.8750	48.006	1.8900	38.100	1.5000	3.6	0.14	3.2	0.13	362	438	56.6	**783**	**772**	39.5	1.56	118.0	4.65	111.0	4.37	161.0	6.34	168.0	6.61	0.39	1.56	0.86	84.5	55.7	1.52
	3.9370	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	6.0	0.24	3.2	0.13	482	565	72.4	**863XR**	**854**	39.9	1.57	122.0	4.80	117.0	4.61	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
	3.9370	200.000	7.8740	52.761	2.0772	49.213	1.9375	34.925	1.3750	3.6	0.14	3.2	0.13	433	471	58.8	**98394X**	**98788**	54.7	2.15	126.0	4.96	120.5	4.75	174.0	6.85	188.0	7.40	0.63	0.95	0.52	101	109	0.93
100.012	3.9375	157.162	6.1875	36.512	1.4375	36.116	1.4219	26.195	1.0313	3.6	0.14	3.2	0.13	227	288	41.7	**52393**	**52618**	36.0	1.42	113.0	4.45	115.0	4.53	142.0	5.59	153.0	6.02	0.47	1.26	0.69	52.7	42.8	1.23
101.600	4.0000	157.162	6.1875	36.512	1.4375	36.116	1.4219	26.195	1.0313	3.6	0.14	3.2	0.13	227	288	41.7	**52400**	**52618**	36.0	1.42	114.0	4.49	115.0	4.53	142.0	5.59	153.0	6.02	0.47	1.26	0.69	52.7	42.8	1.23
	4.0000	157.162	6.1875	36.512	1.4375	36.116	1.4219	26.195	1.0313	7.9	0.31	3.2	0.13	227	288	41.7	**52401**	**52618**	36.0	1.42	126.0	4.96	111.0	4.37	142.0	5.59	153.0	6.02	0.47	1.26	0.69	52.7	42.8	1.23
	4.0000	161.925	6.3750	36.513	1.4375	36.116	1.4219	26.195	1.0313	3.6	0.14	3.2	0.13	227	288	41.7	**52400**	**52637**	36.0	1.42	117.0	4.61	111.0	4.37	144.0	5.67	154.0	6.06	0.47	1.26	0.69	52.7	42.8	1.23
	4.0000	168.275	6.6250	41.275	1.6250	41.275	1.6250	30.162	1.1875	3.6	0.14	3.2	0.13	282	349	50.4	**687**	**672**	38.6	1.52	114.0	4.49	115.0	4.53	146.0	5.75	157.0	6.18	0.47	1.28	0.70	65.8	52.9	1.24
	4.0000	180.975	7.1250	47.625	1.8750	48.006	1.8900	38.100	1.5000	3.6	0.14	3.2	0.13	362	438	56.6	**780**	**772**	39.5	1.56	114.0	4.49	120.0	4.72	156.0	6.14	165.0	6.50	0.39	1.56	0.86	84.5	55.7	1.52
	4.0000	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	9.5	0.37	3.2	0.13	482	565	72.4	**860R**	**854**	39.9	1.57	126.0	4.96	114.0	4.49	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
	4.0000	190.500	7.5000	57.150	2.2500	57.531	2.2650	44.450	1.7500	7.9	0.31	3.2	0.13	482	565	72.4	**861R**	**854**	39.9	1.57	129.0	5.08	114.0	4.49	170.0	6.69	174.0	6.85	0.33	1.79	0.99	113	64.6	1.75
	4.0000	190.500	7.5000	57.150	2.2500	57.531	2.2650	46.038	1.8125	7.9	0.31	3.2	0.13	549	602	76.9	**HH221449**	**HH221410**	42.5	1.67	123.0	4.84	119.0	4.69	168.0	6.61	178.0	7.01	0.33	1.79	0.99	129	73.6	1.75
	4.0000	200.000	7.8740	52.761	2.0772	49.212	1.9375	34.925	1.3750	3.6	0.14	3.2	0.13	433	471	58.8	**98400**	**98788**	54.5	2.15	114.0	4.49	123.0	4.84	170.0	6.69	185.0	7.28	0.63	0.95	0.52	101	109	0.93
	4.0000	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	7.1	0.28	3.2	0.13	563	674	84.1	**941**	**932**	47.6	1.87	121.0	4.76	135.0	5.31	181.0	7.13	192.0	7.56	0.33	1.84	1.01	133	73.9	1.80
	4.0000	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	7.1	0.28	3.2	0.13	641	699	87.1	**HH224335**	**HH224310**	47.6	1.87	121.0	4.76	134.0	5.28	189.0	7.44	201.0	7.91	0.33	1.84	1.01	151	84.2	1.80
104.775	4.1250	180.975	7.1250	47.625	1.8750	48.006	1.8900	38.100	1.5000	3.6	0.14	3.2	0.13	362	438	56.6	**782**	**772**	39.5	1.56	117.0	4.61	120.0	4.72	156.0	6.14	165.0	6.50	0.39	1.56	0.86	84.5	55.7	1.52
	4.1250	180.975	7.1250	47.625	1.8750	48.006	1.8900	38.100	1.5000	6.4	0.25	3.2	0.13	362	438	56.6	**786**	**772**	39.5	1.56	123.0	4.84	120.0	4.72	156.0	6.14	165.0	6.50	0.39	1.56	0.86	84.5	55.7	1.52
	4.1250	180.975	7.1250	47.625	1.8750	48.006	1.8900	38.100	1.5000	7.1	0.28	3.2	0.13	362	438	56.6	**787**	**772**	39.5	1.56	129.0	5.08	116.0	4.57	161.0	6.34	168.0	6.61	0.39	1.56	0.86	84.5	55.7	1.52
	4.1250	190.500	7.5000	47.625	1.8750	49.212	1.9375	34.925	1.3750	3.6	0.14	3.2	0.13	381	483	60.9	**71412**	**71750**	40.9	1.61	117.0	4.61	131.0	5.16	167.0	6.57	177.0	6.97	0.42	1.44	0.79	89.0	63.3	1.41
106.362	4.1875	165.100	6.5000	36.512	1.4375	36.512	1.4375	26.988	1.0625	3.6	0.14	3.2	0.13	245	325	46.3	**56418R**	**56650**	38.6	1.52	122.0	4.80	116.0	4.57	149.0	5.87	159.0	6.26	0.50	1.21	0.66	56.7	48.2	1.18
	4.1875	165.100	6.5000	36.513	1.4375	36.513	1.4375	26.988	1.0625	3.6	0.14	3.2	0.13	231	300	42.9	**56418**	**56650**	38.5	1.52	122.0	4.80	116.0	4.57	149.0	5.87	159.0	6.26	0.50	1.21	0.66	53.7	45.7	1.18
107.950	4.2500	146.050	5.7500	21.432	0.8438	21.432	0.8438	16.670	0.6563	1.6	0.06	1.6	0.06	108	167	23.5	**L521949R**	**L521910**	26.2	1.03	116.0	4.57	114.0	4.49	136.0	5.35	141.0	5.55	0.39	1.53	0.84	24.8	16.7	1.49
	4.2500	158.750	6.2500	23.020	0.9063	21.438	0.8440	15.875	0.6250	3.6	0.14	3.2	0.13	130	169	23.9	**37425**	**37625**	36.5	1.44	121.0	4.76	121.0	4.76	141.0	5.55	148.0	5.83	0.61	0.99	0.54	29.7	30.8	1.97
	4.2500	159.987	6.2987	34.925	1.3750	34.925	1.3750	26.988	1.0625	3.6	0.14	3.2	0.13	231	319	45.8	**LM522546**	**LM522510**	32.9	1.30	122.0	4.80	116.0	4.57	146.0	5.75	154.0	6.06	0.40	1.50	0.82	53.4	36.5	1.46
	4.2500	161.925	6.3750	23.020	0.9063	21.438	0.8440	15.875	0.6250	3.6	0.14	3.2	0.13	130	169	23.9	**37425**	**37637**	36.5	1.44	122.0	4.80	115.0	4.53	145.0	5.71	152.0	5.98	0.61	0.99	0.54	29.7	30.8	0.97
	4.2500	161.925	6.3750	34.925	1.3750	34.925	1.3750	26.988	1.0625	3.6	0.14	3.2	0.13	216	293	41.8	**48190**	**48120**	39.1	1.54	121.0	4.76	120.0	4.72	145.0	5.71	154.0	6.06	0.51	1.19	0.65	50.3	43.4	1.16
	4.2500	165.100	6.5000	36.512	1.4375	36.512	1.4375	26.988	1.0625	3.6	0.14	3.2	0.13	245	325	46.3	**56425R**	**56650**	38.6	1.52	123.0	4.84	117.0	4.61	149.0	5.87	159.0	6.26	0.50	1.21	0.66	56.7	48.2	1.18
	4.2500	165.100	6.5000	36.513	1.4375	36.513	1.4375	26.988	1.0625	3.6	0.14	3.2	0.13	231	300	42.9	**56425**	**56650**	38.5	1.52	123.0	4.84	117.0	4.61	149.0	5.87	159.0	6.26	0.50	1.21	0.66	53.7	45.7	1.18
	4.2500	168.275	6.6250	36.512	1.4375	36.512	1.4375	26.988	1.0625	3.6	0.14	3.2	0.13	245	325	46.3	**56425R**	**56662**	38.6	1.52	123.0	4.84	117.0	4.61	150.0	5.91	160.0	6.30	0.50	1.21	0.66	56.7	48.2	1.18
	4.2500	190.500	7.5000	47.625	1.8750	49.212	1.9375	34.925	1.3750	3.6	0.14	3.2	0.13	381	483	60.9	**71425**	**71750**	40.9	1.61	121.0	4.76	131.0	5.16	167.0	6.57	177.0	6.97	0.42	1.44	0.79	89.0	63.3	1.41
	4.2500	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	13.5	0.53	3.2	0.13	563	674	84.1	**935**	**932**	47.6	1.87	148.0	5.83	122.0	4.80	187.0	7.36	193.0	7.60	0.33	1.84	1.01	133	73.9	1.80
	4.2500	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	7.9	0.31	3.2	0.13	563	674	84.1	**936**	**932**	47.6	1.87	137.0	5.39	122.0	4.80	187.0	7.36	193.0	7.60	0.33	1.84	1.01	133	73.9	1.80
	4.2500	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	7.9	0.31	3.2	0.13	641	699	87.1	**HH224340**	**HH224310**	47.6	1.87	129.0	5.08	134.0	5.28	189.0	7.44	201.0	7.91	0.33	1.84	1.01	151	84.2	1.80

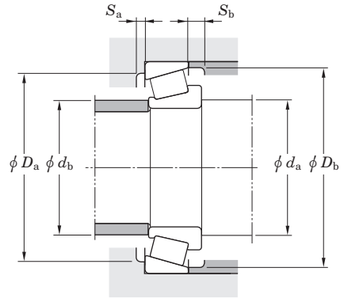
Note 1) SP indicates the specially chamfered from.

TS type

d 109.538 ~ 123.825 mm

4.3125 ~ 4.8750 inch





$P = XF_r + YF_a$
$P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$

$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

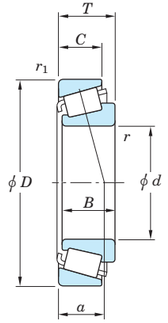
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch					
109.538	4.3125	158.750	6.2500	23.020	0.9063	21.438	0.8440	15.875	0.6250	3.6	0.14	3.2	0.13	130	169	23.9	**37431**	**37625**	36.5	1.44	123.0	4.84	116.0	4.57	143.0	5.63	152.0	5.98	0.61	0.99	0.54	29.7	30.8	0.97
109.952	4.3288	190.500	7.5000	47.625	1.8750	49.212	1.9375	34.925	1.3750	3.6	0.14	3.2	0.13	381	483	60.9	**71432**	**71750**	40.9	1.61	129.0	5.08	123.0	4.84	171.0	6.73	181.0	7.13	0.42	1.44	0.79	89.0	63.3	1.41
109.987	4.3302	159.987	6.2987	34.925	1.3750	34.925	1.3750	26.988	1.0625	7.9	0.31	3.2	0.13	231	319	45.8	**LM522548**	**LM522510**	32.9	1.30	131.0	5.16	121.0	4.76	146.0	5.75	154.0	6.06	0.40	1.50	0.82	53.4	36.5	1.46
	4.3302	159.987	6.2987	34.925	1.3750	34.925	1.3750	26.988	1.0625	3.6	0.14	3.2	0.13	231	319	45.8	**LM522549**	**LM522510**	32.9	1.30	123.0	4.84	121.0	4.76	146.0	5.75	154.0	6.06	0.40	1.50	0.82	53.4	36.5	1.46
109.992	4.3304	177.800	7.0000	41.275	1.6250	41.275	1.6250	30.162	1.1875	3.6	0.14	3.2	0.13	294	380	53.4	**64433R**	**64700**	42.8	1.69	128.0	5.04	121.0	4.76	160.0	6.30	172.6	6.80	0.52	1.16	0.64	68.4	60.3	1.13
110.000	4.3307	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	6.4	0.25	3.2	0.13	563	674	84.1	**942**	**932**	47.6	1.87	136.0	5.35	124.0	4.88	187.0	7.36	193.0	7.60	0.33	1.84	1.01	133	73.9	1.80
111.125	4.3750	190.500	7.5000	47.625	1.8750	49.212	1.9375	34.925	1.3750	3.6	0.14	3.2	0.13	381	483	60.9	**71437**	**71750**	40.9	1.61	129.0	5.08	123.0	4.84	171.0	6.73	181.0	7.13	0.42	1.44	0.79	89.0	63.3	1.41
111.917	4.4062	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	13.5	0.53	3.2	0.13	563	674	84.1	**947**	**932**	47.6	1.87	151.0	5.94	125.0	4.92	187.0	7.36	193.0	7.60	0.33	1.84	1.01	133	73.9	1.80
114.046	4.4900	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	7.1	0.28	3.2	0.13	563	674	84.1	**938S**	**932**	47.6	1.87	141.0	5.55	128.0	5.04	187.0	7.36	193.0	7.60	0.33	1.84	1.01	133	73.9	1.80
114.300	4.5000	152.400	6.0000	21.433	0.8438	21.433	0.8438	16.670	0.6563	1.6	0.06	1.6	0.06	121	197	27.3	**L623149**	**L623110**	27.7	1.09	130.0	5.12	120.0	4.72	143.0	5.63	148.0	5.83	0.41	1.45	0.80	27.5	19.4	1.42
	4.5000	155.575	6.1250	21.433	0.8438	21.433	0.8438	21.433	0.8438	1.6	0.06	1.6	0.06	121	197	27.3	**L623149**	**L623114**	27.7	1.09	130.0	5.12	120.0	4.72	143.0	5.63	149.0	5.87	0.41	1.45	0.80	27.5	19.4	1.42
	4.5000	177.800	7.0000	41.275	1.6250	41.275	1.6250	30.162	1.1875	3.6	0.14	3.2	0.13	294	380	53.4	**64450R**	**64700**	42.8	1.69	131.0	5.16	125.0	4.92	160.0	6.30	172.0	6.77	0.52	1.16	0.64	68.4	60.3	1.13
	4.5000	180.975	7.1250	34.925	1.3750	31.750	1.2500	25.400	1.0000	3.6	0.14	3.2	0.13	216	247	35.1	**68450**	**68712**	40.6	1.60	127.0	5.00	131.0	5.16	161.0	6.34	170.0	6.69	0.50	1.21	0.66	49.7	42.2	1.18
	4.5000	190.500	7.5000	47.625	1.8750	49.212	1.9375	34.925	1.3750	3.6	0.14	3.2	0.13	381	483	60.9	**71450**	**71750**	40.9	1.61	127.0	5.00	131.0	5.16	167.0	6.57	177.0	6.97	0.42	1.44	0.79	89.0	63.3	1.41
	4.5000	206.375	8.1250	66.675	2.6250	66.675	2.6250	53.975	2.1250	7.1	0.28	3.2	0.13	563	674	84.1	**938**	**930**	47.6	1.87	141.0	5.55	128.0	5.04	184.0	7.24	193.0	7.60	0.33	1.84	1.01	133	73.9	1.79
	4.5000	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	7.1	0.28	3.2	0.13	563	674	84.1	**938**	**932**	47.6	1.87	141.0	5.55	128.0	5.04	187.0	7.36	193.0	7.60	0.33	1.84	1.01	133	73.9	1.80
	4.5000	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	13.5	0.53	3.2	0.13	563	674	84.1	**939**	**932**	47.6	1.87	153.0	6.02	127.0	5.00	187.0	7.36	193.0	7.60	0.33	1.84	1.01	133	73.9	1.80
	4.5000	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	7.1	0.28	3.2	0.13	641	699	87.1	**HH224346**	**HH224310**	47.6	1.87	134.0	5.28	134.0	5.28	189.0	7.44	201.0	7.91	0.33	1.84	1.01	151	84.2	1.80
	4.5000	273.050	10.7500	82.550	3.2500	82.550	3.2500	53.975	2.1250	6.4	0.25	6.4	0.25	885	898	104	**HH926744**	**HH926710**	76.1	3.00	133.0	5.24	151.0	5.94	230.0	9.06	252.0	9.92	0.63	0.95	0.52	208	225	0.93
114.976	4.5266	212.725	8.3750	66.675	2.6250	66.675	2.6250	53.975	2.1250	7.1	0.28	3.2	0.13	641	699	87.1	**HH224349**	**HH224310**	47.6	1.87	135.0	5.31	134.0	5.28	189.0	7.44	201.0	7.91	0.33	1.84	1.01	151	84.2	1.80
115.087	4.5310	190.500	7.5000	47.625	1.8750	49.212	1.9375	34.925	1.3750	3.6	0.14	3.2	0.13	381	483	60.9	**71453**	**71750**	40.9	1.61	133.0	5.24	126.0	4.96	171.0	6.73	181.0	7.13	0.42	1.44	0.79	89.0	63.3	1.41
	4.5310	190.500	7.5000	47.625	1.8750	49.212	1.9375	34.925	1.3750	7.9	0.31	3.2	0.13	381	483	60.9	**71455**	**71750**	40.9	1.61	136.0	5.35	131.0	5.16	167.0	6.57	177.0	6.97	0.42	1.44	0.79	89.0	63.3	1.41
117.475	4.6250	179.975	7.0856	34.925	1.3750	31.750	1.2500	25.400	1.0000	3.6	0.14	0.8	0.03	216	247	35.1	**68462**	**68709**	40.7	1.60	132.0	5.20	125.0	4.90	165.0	6.50	172.0	6.77	0.50	1.21	0.66	49.7	42.2	1.18
	4.6250	180.975	7.1250	34.925	1.3750	31.750	1.2500	25.400	1.0000	3.6	0.14	3.2	0.13	216	247	35.1	**68462**	**68712**	40.6	1.60	130.0	5.12	131.0	5.16	161.0	6.34	170.0	6.69	0.50	1.21	0.66	49.7	42.2	1.18
	4.6250	180.975	7.1250	34.925	1.3750	31.750	1.2500	25.400	1.0000	7.9	0.31	3.2	0.13	216	247	35.1	**68463**	**68712**	40.6	1.60	141.0	5.55	125.0	4.92	163.0	6.42	172.0	6.77	0.50	1.21	0.66	49.7	42.2	1.18
120.650	4.7500	174.625	6.8750	35.720	1.4063	36.513	1.4375	27.783	1.0938	3.6	0.14	1.6	0.06	260	362	51.2	**M224749**	**M224710**	32.1	1.26	135.0	5.31	129.0	5.08	162.0	6.38	168.0	6.61	0.33	1.80	0.99	60.1	34.2	1.76
	4.7500	190.500	7.5000	46.038	1.8125	46.038	1.8125	34.925	1.3750	3.6	0.14	1.6	0.06	393	512	63.9	**HM624749**	**HM624710**	41.6	1.64	146.0	5.75	132.0	5.20	174.0	6.85	184.0	7.24	0.43	1.41	0.77	91.4	66.7	1.37
	4.7500	199.974	7.8730	46.038	1.8125	46.038	1.8125	34.925	1.3750	3.6	0.14	1.6	0.06	393	512	63.9	**HM624749**	**HM624716**	41.6	1.64	146.0	5.75	132.0	5.20	174.0	6.85	184.0	7.24	0.43	1.41	0.77	91.4	66.7	1.37
	4.7500	206.375	8.1250	47.625	1.8750	47.625	1.8750	34.925	1.3750	3.2	0.13	3.2	0.13	409	548	67.2	**795**	**792**	45.7	1.80	139.0	5.47	134.0	5.28	186.0	7.32	198.0	7.80	0.46	1.31	0.72	95.2	74.6	1.27
	4.7500	234.950	9.2500	63.500	2.5000	63.500	2.5000	49.213	1.9375	6.4	0.25	3.2	0.13	656	826	100	**95475**	**95925**	49.9	1.96	149.0	5.87	137.0	5.39	209.0	8.23	217.0	8.54	0.37	1.62	0.89	154	97.1	1.58
	4.7500	254.000	10.0000	77.788	3.0625	82.550	3.2500	61.912	2.4375	9.5	0.37	6.4	0.25	895	1 050	125	**HH228340**	**HH228310**	54.3	2.14	158.0	6.22	142.0	5.59	223.0	8.78	234.0	9.21	0.32	1.87	1.03	211	116	1.82
	4.7500	273.050	10.7500	82.550	3.2500	82.550	3.2500	53.975	2.1250	6.4	0.25	6.4	0.25	885	898	104	**HH926749**	**HH926710**	76.2	3.00	168.0	6.61	147.5	5.80	230.0	9.06	253.0	9.97	0.63	0.95	0.52	208	225	0.92
	4.7500	279.400	11.0000	82.550	3.2500	82.550	3.2500	53.975	2.1250	6.4	0.25	6.4	0.25	885	898	104	**HH926749**	**HH926716**	76.1	3.00	168.0	6.61	147.0	5.79	233.0	9.17	253.0	9.96	0.63	0.95	0.52	208	225	0.93
123.825	4.8750	182.563	7.1875	39.688	1.5625	38.100	1.5000	33.338	1.3125	3.6	0.14	3.2	0.13	284	429	59.8	**48286**	**48220**	34.1	1.34	139.0	5.47	133.0	5.24	168.0	6.61	176.0	6.93	0.31	1.97	1.08	65.8	34.3	1.92

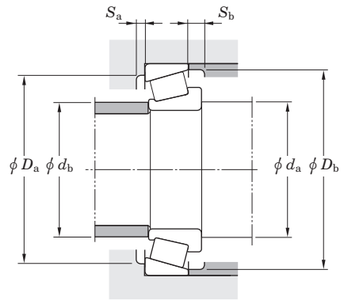
Note 1) SP indicates the specially chamfered from.

TS type

d 127.000 ~ 255.600 mm

5.0000 ~ 10.0630 inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

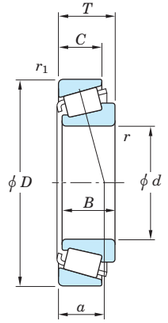
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)					Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	(500 rpm for 3 000 Hrs.) Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	C_r	C_{0r}	C_u			mm	inch	mm	inch	mm	inch	mm	inch						
127.000	5.0000	165.895	6.5313	18.258	0.7188	17.463	0.6875	13.495	0.5313	1.6	0.06	1.6	0.06	114	166	22.5	**LL225749**	**LL225710**	24.3	0.96	135.0	5.31	133.0	5.24	156.0	6.14	160.0	6.30	0.33	1.80	0.99	25.9	14.7	1.76
	5.0000	169.863	6.6875	25.400	1.0000	26.195	1.0313	20.638	0.8125	1.6	0.06	1.6	0.06	165	250	34.8	**L225849**	**L225810**	27.6	1.09	136.0	5.35	134.0	5.28	160.0	6.30	164.0	6.46	0.33	1.80	0.99	37.9	21.6	1.76
	5.0000	180.975	7.1250	25.400	1.0000	26.195	1.0313	20.638	0.8125	1.6	0.06	1.6	0.06	165	250	34.8	**L225849**	**L225818**	27.6	1.09	136.0	5.35	134.0	5.28	164.0	6.46	166.0	6.54	0.33	1.80	0.99	37.9	21.6	1.76
	5.0000	182.563	7.1875	39.688	1.5625	38.100	1.5000	33.338	1.3125	3.6	0.14	3.2	0.13	284	429	59.8	**48290**	**48220**	34.1	1.34	141.0	5.55	135.0	5.31	168.0	6.61	176.0	6.93	0.31	1.97	1.08	65.8	34.3	1.92
	5.0000	196.850	7.7500	46.038	1.8125	46.038	1.8125	38.100	1.5000	3.6	0.14	3.2	0.13	390	561	68.7	**67388**	**67322**	39.7	1.56	144.0	5.67	138.0	5.43	180.0	7.09	189.0	7.44	0.34	1.74	0.96	90.6	53.3	1.70
	5.0000	203.200	8.0000	46.038	1.8125	46.038	1.8125	38.100	1.5000	3.6	0.14	3.2	0.13	390	561	68.7	**67388**	**67320**	39.7	1.56	144.0	5.67	138.0	5.43	183.0	7.20	191.0	7.52	0.34	1.74	0.96	90.6	53.3	1.70
	5.0000	215.900	8.5000	47.625	1.8750	47.625	1.8750	34.925	1.3750	3.6	0.14	3.2	0.13	403	549	66.1	**74500**	**74850**	49.7	1.96	148.0	5.83	141.0	5.55	196.0	7.72	208.0	8.19	0.49	1.23	0.68	94.0	78.3	1.20
	5.0000	234.950	9.2500	63.500	2.5000	63.500	2.5000	49.213	1.9375	6.4	0.25	3.2	0.13	656	826	100	**95500**	**95925**	49.9	1.96	154.0	6.06	142.0	5.59	209.0	8.23	217.0	8.54	0.37	1.62	0.89	154	97.1	1.58
	5.0000	254.000	10.0000	77.788	3.0625	82.550	3.2500	61.912	2.4375	9.5	0.37	6.4	0.25	895	1 050	125	**HH228349**	**HH228310**	54.3	2.14	164.0	6.46	148.0	5.83	223.0	8.78	234.0	9.21	0.32	1.87	1.03	211	116	1.82
128.588	5.0625	206.375	8.1250	47.625	1.8750	47.625	1.8750	34.925	1.3750	3.2	0.13	3.2	0.13	409	548	67.2	**799**	**792**	45.7	1.80	146.0	5.75	140.0	5.51	186.0	7.32	198.0	7.80	0.46	1.31	0.72	95.2	74.6	1.27
130.000	5.1181	206.375	8.1250	47.625	1.8750	47.625	1.8750	34.925	1.3750	3.6	0.14	3.2	0.13	409	548	67.2	**797**	**792**	45.7	1.80	148.0	5.83	141.0	5.55	186.0	7.32	198.0	7.80	0.46	1.31	0.72	95.2	74.6	1.27
133.350	5.2500	177.008	6.9688	25.400	1.0000	26.195	1.0313	20.638	0.8125	1.6	0.06	1.6	0.06	176	278	38.2	**L327249**	**L327210**	29.1	1.15	142.0	5.59	145.0	5.71	164.0	6.46	171.0	6.73	0.35	1.72	0.95	40.4	24.1	1.68
142.875	5.6250	200.025	7.8750	41.275	1.6250	39.688	1.5625	34.130	1.3437	7.9	0.31	3.3	0.13	307	491	66.5	**48684**	**48620**	38.4	1.51	166.0	6.54	151.0	5.94	185.0	7.28	193.0	7.60	0.34	1.78	0.98	71.3	41.0	1.74
	5.6250	200.025	7.8750	41.275	1.6250	39.688	1.5625	34.130	1.3437	3.6	0.14	3.3	0.13	307	491	66.5	**48685**	**48620**	38.4	1.51	156.0	6.14	157.0	6.18	182.0	7.17	192.0	7.56	0.34	1.78	0.98	71.3	41.0	1.74
158.750	6.4800	225.425	8.8750	41.275	1.6250	39.688	1.5625	33.338	1.3125	3.6	0.14	3.2	0.13	323	568	73.8	**46780R**	**46720**	44.0	1.73	176.0	6.93	169.0	6.65	209.0	8.23	218.0	8.58	0.38	1.57	0.86	74.6	48.9	1.53
165.100	6.5000	225.425	8.8750	41.275	1.6250	39.688	1.5625	33.338	1.3125	7.9	0.31	3.2	0.13	323	568	73.8	**46790AR**	**46720**	44.0	1.73	181.0	7.13	174.0	6.85	209.0	8.23	218.0	8.58	0.38	1.57	0.86	74.6	48.9	1.53
	6.5000	225.425	8.8750	41.275	1.6250	39.688	1.5625	33.338	1.3125	3.6	0.14	3.2	0.13	323	568	73.8	**46790R**	**46720**	44.0	1.73	181.0	7.13	174.0	6.85	209.0	8.23	218.0	8.58	0.38	1.57	0.86	74.6	48.9	1.53
166.688	6.5625	225.425	8.8750	41.275	1.6250	39.688	1.5625	33.338	1.3125	3.6	0.14	3.2	0.13	323	568	73.8	**46792R**	**46720**	44.0	1.73	182.0	7.17	175.0	6.89	209.0	8.23	218.0	8.58	0.38	1.57	0.86	74.6	48.9	1.53
171.450	6.7500	222.250	8.7500	25.400	1.0000	24.608	0.9688	19.050	0.7500	1.6	0.06	1.6	0.06	197	299	38.7	**L435049**	**L435010**	36.0	1.42	181.0	7.13	179.0	7.05	211.0	8.31	215.0	8.46	0.38	1.60	0.88	44.9	28.8	1.56
196.850	7.7500	254.000	10.0000	28.575	1.1250	27.783	1.0938	21.433	0.8438	1.6	0.06	1.6	0.06	236	387	48.2	**L540049**	**L540010**	43.1	1.70	206.0	8.11	214.0	8.43	238.0	9.37	245.0	9.65	0.40	1.51	0.83	53.5	36.3	1.47
212.725	8.3750	336.550	13.2500	65.088	2.5625	65.088	2.5625	50.800	2.0000	6.4	0.25	3.2	0.13	887	1 380	150	**M246932**	**M246910**	59.9	2.36	238.0	9.37	229.0	9.02	313.0	12.32	322.0	12.68	0.33	1.80	0.99	206	117	1.76
220.878	8.6960	317.500	12.5000	47.625	1.8750	52.388	2.0625	36.513	1.4375	3.2	0.13	3.2	0.13	611	928	103	**LM245833**	**LM245810**	50.5	1.99	234.0	9.21	253.0	9.96	296.0	11.65	304.0	11.97	0.33	1.80	0.99	141	80.0	1.76
228.600	9.0000	358.775	14.1250	71.438	2.8125	71.438	2.8125	53.975	2.1250	3.6	0.14	3.2	0.13	968	1 590	166	**M249732**	**M249710**	64.4	2.54	242.0	9.53	279.0	10.98	330.0	12.99	343.0	13.50	0.33	1.80	0.99	225	128	1.76
230.188	9.0625	317.500	12.5000	47.625	1.8750	52.388	2.0625	36.513	1.4375	3.2	0.13	3.2	0.13	611	928	103	**LM245846**	**LM245810**	50.5	1.99	242.0	9.53	238.0	9.37	309.0	12.17	312.0	12.28	0.33	1.80	0.99	141	80.0	1.76
231.775	9.1250	317.500	12.5000	47.625	1.8750	52.388	2.0625	36.513	1.4375	3.2	0.13	3.2	0.13	611	928	103	**LM245848**	**LM245810**	50.5	1.99	244.0	9.61	240.0	9.45	309.0	12.17	312.0	12.28	0.33	1.80	0.99	141	80.0	1.76
	9.1250	336.550	13.2500	65.088	2.5625	65.088	2.5625	50.800	2.0000	6.4	0.25	3.2	0.13	887	1 380	150	**M246942**	**M246910**	59.9	2.36	258.0	10.16	249.0	9.80	313.0	12.32	322.0	12.68	0.33	1.80	0.99	206	117	1.76
	9.1250	336.550	13.2500	65.088	2.5625	69.850	2.7500	50.800	2.0000	6.4	0.25	3.2	0.13	887	1 380	150	**M246943**	**M246910**	59.9	2.36	258.0	10.16	249.0	9.80	313.0	12.32	322.0	12.68	0.33	1.80	0.99	206	117	1.76
	9.1250	358.775	14.1250	71.438	2.8125	71.438	2.8125	53.975	2.1250	6.4	0.25	3.2	0.13	968	1 590	166	**M249734**	**M249710**	64.4	2.54	258.0	10.16	253.0	9.96	335.0	13.19	343.0	13.50	0.33	1.80	0.99	225	128	1.76
237.330	9.3437	336.550	13.2500	65.088	2.5625	65.088	2.5625	50.800	2.0000	6.4	0.25	3.2	0.13	887	1 380	150	**M246949**	**M246910**	59.9	2.36	262.0	10.31	253.0	9.96	313.0	12.32	322.0	12.68	0.33	1.80	0.99	206	117	1.76
	9.3437	358.775	14.1250	71.438	2.8125	71.438	2.8125	53.975	2.1250	6.4	0.25	3.2	0.13	968	1 590	166	**M249736**	**M249710**	64.4	2.54	262.0	10.31	258.0	10.16	335.0	13.19	343.0	13.50	0.33	1.80	0.99	225	128	1.76
254.000	10.0000	358.775	14.1250	71.438	2.8125	71.438	2.8125	53.975	2.1250	3.6	0.14	3.2	0.13	968	1 590	166	**M249749**	**M249710**	64.4	2.54	268.0	10.55	279.0	10.98	330.0	12.99	343.0	13.50	0.33	1.80	0.99	225	128	1.76
255.600	10.0630	342.900	13.5000	57.150	2.2500	63.500	2.5000	44.450	1.7500	1.6	0.06	3.2	0.13	764	1 280	135	**M349547**	**M349510**	60.1	2.37	279.0	10.98	267.0	10.51	322.0	12.68	333.0	13.11	0.35	1.73	0.95	177	105	1.68

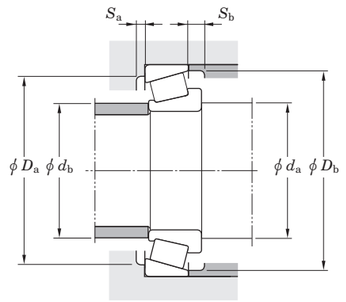
Note 1) SP indicates the specially chamfered from.

TS type

d 257.175~ 1 092.200 mm

10.1250 ~ 43.0000 inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

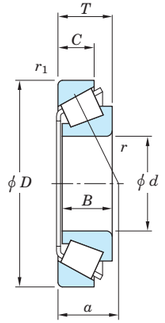
Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions						Constant	Axial load factors		Reference rating (kN)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	(500 rpm for 3 000 Hrs.) Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
257.175	10.1250	342.900	13.5000	57.150	2.2500	57.150	2.2500	44.450	1.7500	6.4	0.25	3.2	0.13	764	1 280	135	**M349549**	**M349510**	60.1	2.37	276.0	10.87	276.0	10.87	320.0	12.60	330.0	12.99	0.35	1.73	0.95	177	105	1.68
	10.1250	358.775	14.1250	71.438	2.8125	76.200	3.0000	53.975	2.1250	1.6	0.06	3.2	0.13	968	1 590	166	**M249747**	**M249710**	64.4	2.54	276.0	10.87	272.0	10.71	335.0	13.19	343.0	13.50	0.33	1.80	0.99	225	128	1.76
292.100	11.5000	374.650	14.7500	47.625	1.8750	47.625	1.8750	34.925	1.3750	3.6	0.14	3.2	0.13	587	971	111	**L555249**	**L555210**	64.7	2.55	306.0	12.05	309.0	12.17	351.0	13.82	360.0	14.17	0.40	1.49	0.82	136	93.2	1.46
431.800	17.0000	533.400	21.0000	46.038	1.8125	46.038	1.8125	34.925	1.3750	3.2	0.13	3.2	0.13	698	1 380	143	**80385**	**80325**	69.1	2.72	450.0	17.72	446.0	17.56	510.0	20.08	510.0	20.08	0.31	1.96	1.08	160	83.3	1.91
450.850	17.7500	603.250	23.7500	85.725	3.3750	84.138	3.3125	60.325	2.3750	6.4	0.25	3.2	0.13	1 730	3 170	290	**LM770945**	**LM770910**	116.0	4.57	484.0	19.06	474.0	18.66	570.0	22.44	584.0	22.99	0.45	1.32	0.73	401	311	1.29
457.200	18.0000	573.088	22.5625	74.613	2.9375	74.613	2.9375	57.150	2.2500	6.4	0.25	6.4	0.25	1 380	2 930	263	**L570649**	**L570610**	100.4	3.95	485.0	19.09	475.0	18.70	543.0	21.38	558.0	21.97	0.40	1.49	0.82	319	219	1.45
	18.0000	596.900	23.5000	76.200	3.0000	73.025	2.8750	53.975	2.1250	9.5	0.37	3.2	0.13	1 410	2 620	243	**EE244180**	**244235**	103.1	4.06	494.0	19.45	478.0	18.82	567.0	22.32	570.5	22.47	0.40	1.48	0.82	325	225	1.44
479.425	18.8750	679.450	26.7500	128.588	5.0625	128.588	5.0625	101.600	4.0000	6.4	0.25	6.4	0.25	3 100	5 550	476	**M272749**	**M272710**	122.2	4.81	516.0	20.31	507.0	19.96	633.0	24.92	649.5	25.57	0.33	1.80	0.99	726	413	1.76
482.600	19.0000	634.873	24.9950	80.963	3.1875	80.963	3.1875	63.500	2.5000	6.4	0.25	3.2	0.13	1 660	3 290	292	**EE243190**	**243250**	100.0	3.94	516.0	20.31	510.0	20.08	603.0	23.74	609.5	24.00	0.34	1.75	0.96	382	224	1.70
488.950	19.2500	634.873	24.9950	84.138	3.3125	84.138	3.3125	61.913	2.4375	6.4	0.25	3.2	0.13	1 800	3 420	307	**LM772748**	**LM772710**	124.5	4.90	522.0	20.55	510.0	20.08	600.0	23.62	613.5	24.15	0.47	1.27	0.70	418	338	1.24
	19.2500	660.400	26.0000	93.663	3.6875	94.458	3.7188	69.850	2.7500	6.4	0.25	6.4	0.25	2 260	3 960	357	**EE640192**	**640260**	98.4	3.87	522.0	20.55	513.0	20.20	624.0	24.57	630.5	24.82	0.31	1.95	1.07	524	275	1.91
498.475	19.6250	634.873	24.9950	80.963	3.1875	80.963	3.1875	63.500	2.5000	6.4	0.25	3.2	0.13	1 660	3 290	292	**EE243196**	**243250**	100.0	3.94	528.0	20.79	522.0	20.55	603.0	23.74	609.5	24.00	0.34	1.75	0.96	382	224	1.70
536.575	21.1250	761.873	29.9950	146.050	5.7500	146.050	5.7500	114.300	4.5000	6.4	0.25	6.4	0.25	4 120	7 190	595	**M276449**	**M276410**	135.7	5.34	576.0	22.68	570.0	22.44	711.0	27.99	725.5	28.57	0.33	1.80	0.99	966	549	1.76
539.750	21.2500	635.000	25.0000	50.800	2.0000	50.800	2.0000	38.100	1.5000	6.4	0.25	6.4	0.25	943	1 970	175	**LL575349**	**LL575310**	101.4	3.99	564.0	22.20	555.0	21.85	612.0	24.09	621.0	24.45	0.41	1.48	0.81	215	149	1.44
549.097	21.6180	692.150	27.2500	80.963	3.1875	80.962	3.1875	61.913	2.4375	6.4	0.25	6.4	0.25	1 760	3 700	325	**L476548**	**L476510**	113.6	4.47	579.0	22.80	570.0	22.44	657.0	25.87	666.0	26.22	0.38	1.59	0.88	407	262	1.55
549.275	21.6250	692.150	27.2500	80.963	3.1875	80.963	3.1875	61.913	2.4375	6.4	0.25	6.4	0.25	1 760	3 700	325	**L476549**	**L476510**	113.6	4.47	579.0	22.80	570.0	22.44	657.0	25.87	666.0	26.22	0.38	1.59	0.88	407	262	1.55
584.200	23.0000	685.800	27.0000	49.213	1.9375	49.213	1.9375	34.925	1.3750	3.6	0.14	3.2	0.13	908	1 930	172	**LL778149**	**LL778110**	113.8	4.48	603.0	23.74	600.0	23.62	663.0	26.10	669.0	26.34	0.44	1.36	0.75	206	155	1.33
609.600	24.0000	762.000	30.0000	95.250	3.7500	92.075	3.6250	71.438	2.8125	6.4	0.25	6.4	0.25	2 140	4 510	379	**L879947**	**L879910**	153.0	6.02	642.0	25.28	633.0	24.92	720.0	28.35	743.0	29.25	0.49	1.23	0.67	496	416	1.19
	24.0000	787.400	31.0000	93.663	3.6875	93.663	3.6875	69.850	2.7500	6.4	0.25	6.4	0.25	2 480	4 970	420	**EE649240**	**649310**	126.9	5.00	642.0	25.28	633.0	24.92	747.0	29.41	756.0	29.76	0.37	1.61	0.89	574	365	1.57
759.924	29.9183	889.000	35.0000	88.900	3.5000	88.900	3.5000	71.999	2.8346	3.2	0.13	3.2	0.13	2 330	5 630	451	**L183448**	**L183410**	123.1	4.85	783.0	30.83	780.0	30.71	864.0	34.02	872.0	34.33	0.31	1.97	1.08	537	280	1.91
1092.200	43.0000	1320.800	52.0000	95.250	3.7500	88.900	3.5000	69.850	2.7500	6.4	0.25	6.4	0.25	3 330	7 140	540	**EE776430**	**776520**	170.5	6.71	1 135.0	44.69	1 130.0	44.49	1 260.0	49.61	1 280.5	50.41	0.57	1.05	0.58	761	746	1.02

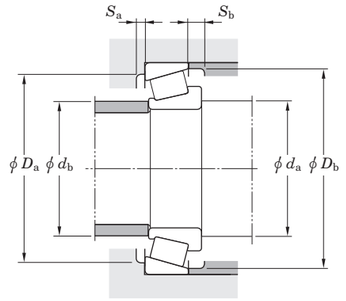
Note 1) SP indicates the specially chamfered from.

Koyo

TSS type

d 15.875 ~ (44.450) mm
0.6250 ~ (1.7500) inch



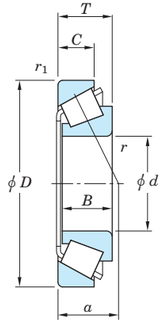


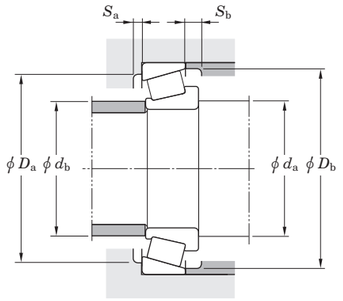
$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Con-stant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		r (min.)		r_1 (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
15.875	0.6250	42.862	1.6875	14.288	0.5625	14.288	0.5625	9.525	0.3750	1.6	0.06	1.6	0.06	22.2	17.7	2.30	**11590**	**11520**	13.1	0.52	24.5	0.96	22.5	0.89	34.5	1.36	39.5	1.56	0.70	0.85	0.47	5.15	6.15	0.83
23.812	0.9375	65.088	2.5625	22.225	0.8750	21.463	0.8450	15.875	0.6250	1.6	0.06	1.6	0.06	59.7	51.7	7.10	**23092**	**23256**	20.1	0.79	38.5	1.52	34.5	1.36	53.0	2.09	61.0	2.40	0.73	0.82	0.45	13.8	17.3	0.80
24.384	0.9600	79.375	3.1250	25.400	1.0000	24.074	0.9478	17.462	0.6875	0.8	0.03	1.6	0.06	86.9	72.5	10.5	**43096**	**43312**	23.7	0.93	40.5	1.59	39.5	1.56	62.0	2.44	68.0	2.68	0.67	0.90	0.49	20.1	23.0	0.88
25.000	0.9842	65.088	2.5625	22.225	0.8750	21.463	0.8450	15.875	0.6250	1.6	0.06	1.6	0.06	59.7	51.7	7.10	**23098**	**23256**	20.1	0.79	39.0	1.54	34.5	1.36	53.0	2.09	61.0	2.40	0.73	0.82	0.45	13.8	17.3	0.80
25.400	1.0000	65.088	2.5625	22.225	0.8750	21.463	0.8450	15.875	0.6250	1.6	0.06	1.6	0.06	59.7	51.7	7.10	**23100**	**23256**	20.1	0.79	39.0	1.54	34.5	1.36	53.0	2.09	61.0	2.40	0.73	0.82	0.45	13.8	17.3	0.80
28.575	1.1250	79.375	3.1250	25.400	1.0000	24.074	0.9478	17.462	0.6875	0.8	0.03	1.6	0.06	86.9	72.5	10.5	**43112**	**43312**	23.7	0.93	42.5	1.67	41.5	1.63	67.0	2.64	74.0	2.91	0.67	0.90	0.49	20.1	23.0	0.88
29.987	1.1806	79.375	3.1250	25.400	1.0000	24.074	0.9478	17.462	0.6875	1.6	0.06	1.6	0.06	86.9	72.5	10.5	**43117**	**43312**	23.7	0.93	45.0	1.77	42.0	1.65	62.0	2.44	68.0	2.68	0.67	0.90	0.49	20.1	23.0	0.88
30.162	1.1875	79.375	3.1250	25.400	1.0000	24.074	0.9478	17.462	0.6875	1.6	0.06	1.6	0.06	86.9	72.5	10.5	**43118**	**43312**	23.7	0.93	45.0	1.77	42.0	1.65	62.0	2.44	68.0	2.68	0.67	0.90	0.49	20.1	23.0	0.88
31.750	1.2500	79.375	3.1250	25.400	1.0000	24.074	0.9478	17.462	0.6875	1.6	0.06	1.6	0.06	86.9	72.5	10.5	**43125**	**43312**	23.7	0.93	44.0	1.73	41.5	1.63	62.0	2.44	68.0	2.68	0.67	0.90	0.49	20.1	23.0	0.88
	1.2500	88.501	3.4843	25.400	1.0000	23.698	0.9330	17.462	0.6875	1.6	0.06	1.6	0.06	94.0	84.4	12.3	**44126**	**44348**	28.0	1.10	49.0	1.93	46.0	1.81	75.0	2.95	84.0	3.31	0.78	0.77	0.42	21.8	29.1	0.75
33.338	1.3125	79.375	3.1250	25.400	1.0000	24.074	0.9478	17.462	0.6875	3.6	0.14	1.6	0.06	86.9	72.5	10.5	**43131**	**43312**	23.7	0.93	51.0	2.01	48.0	1.89	62.0	2.44	68.0	2.68	0.67	0.90	0.49	20.1	23.0	0.88
	1.3125	79.375	3.1250	25.400	1.0000	24.074	0.9478	17.462	0.6875	2.0	0.08	1.6	0.06	86.9	72.5	10.5	**43132**	**43312**	23.7	0.93	48.0	1.89	42.0	1.65	62.0	2.44	73.0	2.87	0.67	0.90	0.49	20.1	23.0	0.88
	1.3125	88.501	3.4843	25.400	1.0000	23.698	0.9330	17.462	0.6875	2.0	0.08	1.6	0.06	94.0	84.4	12.3	**44131**	**44348**	28.0	1.10	51.0	2.01	48.0	1.89	75.0	2.95	84.0	3.31	0.78	0.77	0.42	21.8	29.1	0.75
36.512	1.4375	88.501	3.4843	25.400	1.0000	23.698	0.9330	17.462	0.6875	2.4	0.09	1.6	0.06	94.0	84.4	12.3	**44143**	**44348**	30.0	1.18	54.0	2.13	50.0	1.97	75.0	2.95	84.0	3.31	0.78	0.77	0.42	21.8	29.1	0.75
38.100	1.5000	88.501	3.4843	25.400	1.0000	23.698	0.9330	17.462	0.6875	2.4	0.09	1.6	0.06	94.0	84.4	12.3	**44150**	**44348**	28.0	1.10	55.0	2.17	51.0	2.01	75.0	2.95	84.0	3.31	0.78	0.77	0.42	21.8	29.1	0.75
	1.5000	95.250	3.7500	30.958	1.2188	28.301	1.1142	20.638	0.8125	1.6	0.06	0.8	0.03	111	98.4	14.4	**53150**	**53375**	30.0	1.18	55.0	2.17	52.5	2.07	81.0	3.19	89.0	3.50	0.74	0.81	0.45	25.7	32.6	0.79
	1.5000	95.250	3.7500	30.958	1.2188	28.575	1.1250	22.225	0.8750	3.6	0.14	0.8	0.03	124	120	17.4	**HM903241**	**HM903210**	30.8	1.21	61.0	2.40	54.0	2.13	81.0	3.19	91.0	3.58	0.74	0.81	0.45	29.0	36.6	0.79
	1.5000	98.425	3.8750	30.958	1.2188	28.301	1.1142	20.638	0.8125	1.6	0.06	0.8	0.03	111	98.4	14.4	**53150**	**53387**	30.0	1.18	55.0	2.17	53.0	2.09	82.0	3.23	91.0	3.58	0.74	0.81	0.45	25.7	32.6	0.79
39.688	1.5625	88.501	3.4843	25.400	1.0000	23.698	0.9330	17.462	0.6875	2.4	0.09	1.6	0.06	94.0	84.4	12.3	**44156**	**44348**	28.0	1.10	56.0	2.20	51.0	2.01	75.0	2.95	84.0	3.31	0.78	0.77	0.42	21.8	29.1	0.75
	1.5625	88.501	3.4843	25.400	1.0000	23.698	0.9330	17.462	0.6875	3.6	0.14	1.6	0.06	94.0	84.4	12.3	**44158**	**44348**	28.0	1.10	58.0	2.28	51.0	2.01	75.0	2.95	84.0	3.31	0.78	0.77	0.42	21.8	29.1	0.75
40.000	1.5748	88.501	3.4843	25.400	1.0000	23.698	0.9330	17.462	0.6875	2.4	0.09	1.6	0.06	94.0	84.4	12.3	**44157**	**44348**	28.0	1.10	56.0	2.20	51.0	2.01	75.0	2.95	84.0	3.31	0.78	0.77	0.42	21.8	29.1	0.75
41.275	1.6250	88.501	3.4843	25.400	1.0000	23.698	0.9330	17.462	0.6875	2.4	0.09	1.6	0.06	94.0	84.4	12.3	**44162**	**44348**	28.0	1.10	57.0	2.24	51.0	2.01	75.0	2.95	84.0	3.31	0.78	0.77	0.42	21.8	29.1	0.75
	1.6250	92.075	3.6250	26.195	1.0313	23.812	0.9375	16.670	0.6563	3.6	0.14	1.6	0.06	97.1	89.9	13.1	**M903345**	**M903310**	30.1	1.19	60.0	2.36	54.0	2.13	78.0	3.07	88.0	3.46	0.83	0.72	0.40	22.5	32.0	0.70
	1.6250	95.250	3.7500	30.958	1.2188	28.575	1.1250	22.225	0.8750	3.6	0.14	0.8	0.03	124	120	17.4	**HM903245**	**HM903210**	30.8	1.21	63.0	2.48	54.0	2.13	81.0	3.19	91.0	3.58	0.74	0.81	0.45	29.0	36.6	0.79
	1.6250	98.425	3.8750	30.958	1.2188	28.301	1.1142	20.638	0.8125	1.6	0.06	0.8	0.03	111	98.4	14.4	**53162**	**53387**	30.0	1.18	57.0	2.24	52.5	2.07	82.0	3.23	91.0	3.58	0.74	0.81	0.45	25.7	32.6	0.79
44.450	1.7500	95.250	3.7500	30.958	1.2188	28.301	1.1142	20.638	0.8125	3.6	0.14	0.8	0.03	111	98.4	14.4	**53177**	**53375**	30.0	1.18	63.0	2.48	52.5	2.07	81.0	3.19	89.0	3.50	0.74	0.81	0.45	25.7	32.6	0.79
	1.7500	95.250	3.7500	30.958	1.2188	28.301	1.1142	20.638	0.8125	2.0	0.08	0.8	0.03	111	98.4	14.4	**53178**	**53375**	30.0	1.18	60.0	2.36	52.5	2.07	81.0	3.19	89.0	3.50	0.74	0.81	0.45	25.7	32.6	0.79
	1.7500	95.250	3.7500	30.958	1.2188	28.575	1.1250	22.225	0.8750	3.6	0.14	0.8	0.03	124	120	17.4	**HM903249**	**HM903210**	30.8	1.21	65.0	2.56	54.0	2.13	81.0	3.19	91.0	3.58	0.74	0.81	0.45	29.0	36.6	0.79
	1.7500	98.425	3.8750	30.958	1.2188	28.301	1.1142	20.638	0.8125	1.2	0.05	1.6	0.06	111	98.4	14.4	**53176**	**53387X**	30.0	1.18	59.0	2.32	52.5	2.07	82.0	3.23	91.0	3.58	0.74	0.81	0.45	25.7	32.6	0.79
	1.7500	101.600	4.0000	30.958	1.2188	28.301	1.1142	20.638	0.8125	2.0	0.08	0.8	0.03	111	98.4	14.4	**53178**	**53398**	30.0	1.18	60.0	2.36	52.5	2.07	82.0	3.23	91.0	3.58	0.74	0.81	0.45	25.7	32.6	0.79
	1.7500	111.125	4.3750	30.162	1.1875	26.909	1.0594	20.638	0.8125	3.6	0.14	3.2	0.13	139	150	21.8	**55175CR**	**55437**	36.6	1.44	67.0	2.64	60.0	2.36	92.0	3.62	105.0	4.13	0.88	0.68	0.37	32.3	48.8	0.66
	1.7500	111.125	4.3750	30.162	1.1875	26.909	1.0594	20.638	0.8125	0.8	0.03	3.2	0.13	139	150	21.8	**55176CR**	**55437**	36.6	1.44	54.0	2.13	52.0	2.05	92.0	3.62	105.0	4.13	0.88	0.68	0.37	32.3	48.8	0.66
	1.7500	111.125	4.3750	30.162	1.1875	28.575	1.1250	20.638	0.8125	0.8	0.03	3.2	0.13	134	142	20.7	**HM907635**	**HM907614**	37.2	1.46	64.0	2.52	65.5	2.58	91.0	3.58	105.0	4.13	0.88	0.68	0.37	31.2	47.1	0.66

TSS type
d (44.450) ~ 68.262 mm
(1.7500) ~ 2.6875 inch





$P = XF_r + YF_a$
$P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$

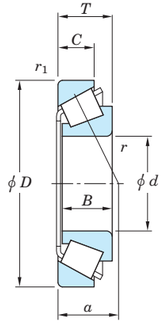
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

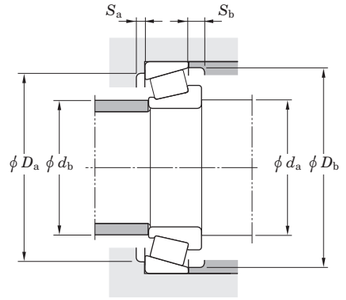
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		r (min.)		r_1 (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
44.450	1.7500	112.712	4.4375	30.162	1.1875	26.909	1.0594	20.638	0.8125	3.6	0.14	3.2	0.13	122	119	17.5	**55175**	**55443**	36.6	1.44	67.0	2.64	60.0	2.36	92.0	3.62	106.0	4.17	0.88	0.68	0.37	28.5	43.0	0.66
44.988	1.7712	95.250	3.7500	30.958	1.2188	28.575	1.1250	22.225	0.8750	3.6	0.14	0.8	0.03	124	120	17.4	**HM903248**	**HM903210**	30.8	1.21	65.0	2.56	54.0	2.13	81.0	3.19	91.0	3.58	0.74	0.81	0.45	29.0	36.6	0.79
47.625	1.8750	111.125	4.3750	30.162	1.1875	26.909	1.0594	20.638	0.8125	3.6	0.14	3.2	0.13	122	119	17.5	**55187**	**55437**	36.6	1.44	69.0	2.72	62.0	2.44	92.0	3.62	105.0	4.13	0.88	0.68	0.37	28.5	43.0	0.66
	1.8750	111.125	4.3750	30.162	1.1875	26.909	1.0594	20.638	0.8125	3.6	0.14	3.2	0.13	139	150	21.8	**55187CR**	**55437**	36.6	1.44	69.0	2.72	62.0	2.44	92.0	3.62	105.0	4.13	0.88	0.68	0.37	32.3	48.8	0.66
	1.8750	111.125	4.3750	30.162	1.1875	28.575	1.1250	20.638	0.8125	3.6	0.14	3.2	0.13	134	142	20.7	**HM907639**	**HM907614**	37.2	1.46	72.0	2.83	65.0	2.56	91.0	3.58	105.0	4.13	0.88	0.68	0.37	31.2	47.1	0.66
	1.8750	123.825	4.8750	36.512	1.4375	32.791	1.2910	25.400	1.0000	3.6	0.14	3.2	0.13	176	166	24.8	**72187**	**72487**	38.0	1.50	72.0	2.83	66.0	2.60	102.0	4.02	116.0	4.57	0.74	0.81	0.45	41.2	51.9	0.79
49.974	1.9675	111.125	4.3750	30.162	1.1875	26.909	1.0594	20.638	0.8125	3.6	0.14	3.2	0.13	122	119	17.5	**55196**	**55437**	36.6	1.44	71.0	2.80	64.0	2.52	92.0	3.62	105.0	4.13	0.88	0.68	0.37	28.5	43.0	0.66
	1.9675	111.125	4.3750	30.162	1.1875	26.909	1.0594	20.638	0.8125	2.0	0.08	3.2	0.13	122	119	17.5	**55197**	**55437**	36.6	1.44	68.0	2.68	64.0	2.52	92.0	3.62	105.0	4.13	0.88	0.68	0.37	28.5	43.0	0.66
50.800	2.0000	111.125	4.3750	30.162	1.1875	26.909	1.0594	20.638	0.8125	3.6	0.14	3.2	0.13	122	119	17.5	**55200**	**55437**	36.6	1.44	71.0	2.80	64.0	2.52	92.0	3.62	105.0	4.13	0.88	0.68	0.37	28.5	43.0	0.66
	2.0000	111.125	4.3750	30.162	1.1875	26.909	1.0594	20.638	0.8125	3.6	0.14	3.2	0.13	139	150	21.8	**55200CR**	**55437**	36.6	1.44	71.0	2.80	64.0	2.52	92.0	3.62	105.0	4.13	0.88	0.68	0.37	32.3	48.8	0.66
	2.0000	111.125	4.3750	30.162	1.1875	28.575	1.1250	20.638	0.8125	3.6	0.14	3.2	0.13	134	142	20.7	**HM907643**	**HM907614**	37.2	1.46	74.0	2.91	65.5	2.58	91.0	3.58	105.0	4.13	0.88	0.68	0.37	31.2	47.1	0.66
	2.0000	123.825	4.8750	36.512	1.4375	32.791	1.2910	25.400	1.0000	3.6	0.14	3.2	0.13	176	166	24.8	**72200**	**72487**	38.0	1.50	74.0	2.91	66.0	2.60	102.0	4.02	116.0	4.57	0.74	0.81	0.45	41.2	51.9	0.79
	2.0000	123.825	4.8750	36.512	1.4375	32.791	1.2910	25.400	1.0000	3.6	0.14	3.2	0.13	194	190	28.4	**72200C**	**72487**	38.0	1.50	74.0	2.91	66.0	2.60	102.0	4.02	116.0	4.57	0.74	0.81	0.45	45.2	57.0	0.79
52.388	2.0625	111.125	4.3750	30.162	1.1875	26.909	1.0594	20.638	0.8125	3.6	0.14	3.2	0.13	122	119	17.5	**55206**	**55437**	36.6	1.44	72.0	2.83	64.0	2.52	92.0	3.62	105.0	4.13	0.88	0.68	0.37	28.5	43.0	0.66
53.975	2.1250	123.825	4.8750	36.512	1.4375	32.791	1.2910	25.400	1.0000	3.6	0.14	3.2	0.13	176	166	24.8	**72212**	**72487**	38.0	1.50	77.0	3.03	66.0	2.60	102.0	4.02	116.0	4.57	0.74	0.81	0.45	41.2	51.9	0.79
	2.1250	123.825	4.8750	36.512	1.4375	32.791	1.2910	25.400	1.0000	3.6	0.14	3.2	0.13	194	190	28.4	**72212C**	**72487**	38.0	1.50	77.0	3.03	66.0	2.60	102.0	4.02	116.0	4.57	0.74	0.81	0.45	45.2	57.0	0.79
	2.1250	127.000	5.0000	36.512	1.4375	32.791	1.2910	25.400	1.0000	3.6	0.14	3.2	0.13	176	166	24.8	**72212**	**72500**	38.0	1.50	77.0	3.03	66.0	2.60	102.0	4.02	116.0	4.57	0.74	0.81	0.45	41.2	51.9	0.79
	2.1250	130.175	5.1250	36.512	1.4375	33.338	1.3125	23.812	0.9375	3.6	0.14	3.2	0.13	191	181	27.3	**HM911242R**	**HM911210**	41.8	1.65	79.0	3.11	74.0	2.91	109.0	4.29	124.0	4.88	0.82	0.73	0.40	44.3	62.1	0.71
	2.1250	136.525	5.3750	36.512	1.4375	33.236	1.3085	23.520	0.9260	0.8	0.03	3.2	0.13	188	177	26.8	**78214**	**78537**	46.2	1.82	75.0	2.95	77.0	3.03	115.0	4.53	130.0	5.12	0.87	0.69	0.38	43.6	64.6	0.68
	2.1250	140.030	5.5130	36.512	1.4375	33.236	1.3085	23.520	0.9260	3.6	0.14	2.4	0.09	188	177	26.8	**78215**	**78551**	46.2	1.82	81.0	3.19	75.0	2.95	117.0	4.61	132.0	5.20	0.87	0.69	0.38	43.6	64.6	0.68
55.562	2.1875	123.825	4.8750	36.512	1.4375	32.791	1.2910	25.400	1.0000	3.6	0.14	3.2	0.13	176	166	24.8	**72218**	**72487**	38.0	1.50	78.0	3.07	66.0	2.60	102.0	4.02	116.0	4.57	0.74	0.81	0.45	41.2	51.9	0.79
57.150	2.2500	123.825	4.8750	36.512	1.4375	32.791	1.2910	25.400	1.0000	3.6	0.14	3.2	0.13	176	166	24.8	**72225**	**72487**	38.0	1.50	80.0	3.15	66.0	2.60	102.0	4.02	116.0	4.57	0.74	0.81	0.45	41.2	51.9	0.79
	2.2500	123.825	4.8750	36.512	1.4375	32.791	1.2910	25.400	1.0000	3.6	0.14	3.2	0.13	194	190	28.4	**72225C**	**72487**	38.0	1.50	80.0	3.15	66.0	2.60	102.0	4.02	116.0	4.57	0.74	0.81	0.45	45.2	57.0	0.79
	2.2500	136.525	5.3750	36.512	1.4375	33.236	1.3085	23.520	0.9260	3.6	0.14	3.2	0.13	188	177	26.8	**78225**	**78537**	46.2	1.82	83.0	3.27	77.0	3.03	115.0	4.53	130.0	5.12	0.87	0.69	0.38	43.6	64.6	0.68
	2.2500	140.030	5.5130	36.512	1.4375	33.236	1.3085	23.520	0.9260	3.6	0.14	2.4	0.09	188	177	26.8	**78225**	**78551**	46.2	1.82	83.0	3.27	77.0	3.03	117.0	4.61	132.0	5.20	0.87	0.69	0.38	43.6	64.6	0.68
60.325	2.3750	130.175	5.1250	36.512	1.4375	33.338	1.3125	23.812	0.9375	5.2	0.20	3.2	0.13	191	181	27.3	**HM911245R**	**HM911210**	41.8	1.65	87.0	3.43	74.5	2.93	109.0	4.29	124.0	4.88	0.82	0.73	0.40	44.3	62.1	0.71
	2.3750	136.525	5.3750	36.512	1.4375	33.236	1.3085	23.520	0.9260	5.2	0.20	3.2	0.13	188	177	26.8	**78238**	**78537**	46.2	1.82	83.0	3.27	75.0	2.95	115.0	4.53	130.0	5.12	0.87	0.69	0.38	43.6	64.6	0.68
	2.3750	140.030	5.5130	36.512	1.4375	33.236	1.3085	23.520	0.9260	5.2	0.20	2.4	0.09	188	177	26.8	**78238**	**78551**	46.2	1.82	83.0	3.27	75.0	2.95	117.0	4.61	132.0	5.20	0.87	0.69	0.38	43.6	64.6	0.68
61.912	2.4375	130.175	5.1250	36.512	1.4375	33.338	1.3125	23.812	0.9375	3.6	0.14	3.2	0.13	191	181	27.3	**HM911249R**	**HM911210**	41.8	1.65	88.0	3.46	75.0	2.95	109.0	4.29	123.5	4.86	0.82	0.73	0.40	44.3	62.1	0.71
	2.4375	146.050	5.7500	41.275	1.6250	39.688	1.5625	25.400	1.0000	3.6	0.14	3.2	0.13	252	237	35.4	**H913842R**	**H913810**	45.6	1.80	90.0	3.54	82.5	3.25	124.0	4.88	138.0	5.43	0.78	0.77	0.42	58.7	78.5	0.75
63.500	2.5000	136.525	5.3750	36.512	1.4375	33.236	1.3085	23.520	0.9260	2.4	0.09	3.2	0.13	188	177	26.8	**78250**	**78537**	46.2	1.82	85.0	3.35	79.0	3.11	115.0	4.53	130.0	5.12	0.87	0.69	0.38	43.6	64.6	0.68
64.988	2.5586	136.525	5.3750	36.512	1.4375	32.923	1.2962	23.520	0.9260	3.6	0.14	3.2	0.13	188	177	26.8	**78255X**	**78537**	46.2	1.82	89.0	3.50	79.0	3.11	115.0	4.53	130.0	5.12	0.87	0.69	0.38	43.6	64.6	0.68
66.675	2.6250	177.800	7.0000	57.150	2.2500	53.975	2.1250	37.308	1.4688	3.6	0.14	3.2	0.13	418	372	48.4	**HH914449**	**HH914412**	57.9	2.28	106.0	4.17	85.5	3.37	146.0	5.75	165.0	6.50	0.80	0.75	0.41	97.3	133	0.73
68.262	2.6875	161.925	6.3750	49.212	1.9375	46.038	1.8125	31.750	1.2500	3.6	0.14	3.2	0.13	307	286	39.1	**9278R**	**9220**	50.2	1.98	95.0	3.74	85.0	3.35	138.0	5.43	153.0	6.02	0.71	0.85	0.47	71.6	86.8	0.83

TSS type

d 69.850 ~ 342.900 mm
2.7500 ~ 13.5000 inch



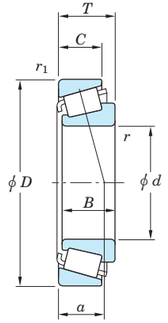


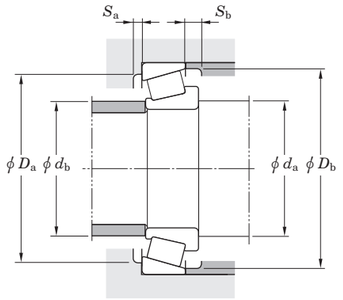
$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		r (min.)		r_1 (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
69.850	2.7500	146.050	5.7500	41.275	1.6250	39.688	1.5625	25.400	1.0000	3.6	0.14	3.2	0.13	252	237	35.4	**H913849R**	**H913810**	45.6	1.80	95.0	3.74	82.5	3.25	124.0	4.88	138.0	5.43	0.78	0.77	0.42	58.7	78.5	0.75
69.914	2.7525	171.450	6.7500	49.212	1.9375	46.038	1.8125	31.750	1.2500	3.6	0.14	3.2	0.13	329	320	42.4	**9382R**	**9321**	55.1	2.17	105.0	4.13	98.0	3.86	147.0	5.79	164.0	6.46	0.76	0.79	0.43	76.9	100	0.77
76.200	3.0000	161.925	6.3750	49.212	1.9375	46.038	1.8125	31.750	1.2500	3.6	0.14	3.2	0.13	307	286	39.1	**9285R**	**9220**	50.2	1.98	103.0	4.06	90.5	3.56	138.0	5.43	153.0	6.02	0.71	0.85	0.47	71.6	86.8	0.83
	3.0000	177.800	7.0000	52.388	2.0625	46.038	1.8125	34.925	1.3750	3.6	0.14	3.2	0.13	329	320	42.4	**9380R**	**9320**	55.1	2.17	117.0	4.61	98.2	3.87	148.0	5.83	164.0	6.46	0.76	0.79	0.43	76.9	100	0.77
	3.0000	177.800	7.0000	52.388	2.0625	50.800	2.0000	34.925	1.3750	3.6	0.14	3.2	0.13	329	320	42.4	**9378R**	**9320**	55.1	2.17	117.0	4.61	98.2	3.87	148.0	5.83	164.0	6.46	0.76	0.79	0.43	76.9	100	0.77
84.138	3.3125	171.450	6.7500	49.212	1.9375	46.038	1.8125	31.750	1.2500	3.6	0.14	3.2	0.13	329	320	42.4	**9385R**	**9321**	55.1	2.17	111.0	4.37	98.0	3.86	147.0	5.79	164.0	6.46	0.76	0.79	0.43	76.9	100	0.77
96.838	3.8125	188.913	7.4375	50.800	2.0000	46.038	1.8125	31.750	1.2500	3.6	0.14	3.2	0.13	330	357	43.2	**90381**	**90744**	63.0	2.48	125.0	4.92	113.0	4.44	161.0	6.34	179.5	7.06	0.87	0.69	0.38	77	115	0.67
101.600	4.0000	250.825	9.8750	76.200	3.0000	73.025	2.8750	50.800	2.0000	6.4	0.25	6.4	0.25	685	691	81.3	**HH923649**	**HH923610**	74.0	2.91	149.0	5.87	131.0	5.16	207.0	8.15	229.0	9.02	0.71	0.85	0.47	162	196	0.83
	4.0000	250.825	9.8750	76.200	3.0000	73.025	2.8750	50.800	2.0000	6.4	0.25	3.2	0.13	685	691	81.3	**HH923649**	**HH923611**	74.0	2.91	149.0	5.87	131.0	5.16	210.0	8.27	229.0	9.02	0.71	0.85	0.47	162	196	0.83
111.125	4.3750	214.313	8.4375	55.563	2.1875	52.388	2.0625	39.688	1.5625	3.6	0.14	3.2	0.13	506	578	70.6	**H924045**	**H924010**	62.3	2.45	139.0	5.47	131.0	5.16	186.0	7.32	205.0	8.07	0.67	0.89	0.49	118	137	0.87
114.300	4.5000	228.600	9.0000	53.975	2.1250	49.428	1.9460	38.100	1.5000	3.6	0.14	3.2	0.13	540	651	77.1	**HM926740**	**HM926710**	67.9	2.67	146.0	5.75	142.0	5.59	200.0	7.87	219.0	8.62	0.74	0.81	0.45	126	159	0.79
127.000	5.0000	228.600	9.0000	53.975	2.1250	49.428	1.9460	38.100	1.5000	3.6	0.14	3.2	0.13	540	651	77.1	**HM926747**	**HM926710**	68.1	2.68	156.0	6.14	143.0	5.63	200.0	7.87	219.0	8.63	0.74	0.81	0.45	126	159	0.79
	5.0000	304.800	12.0000	88.900	3.5000	82.550	3.2500	57.150	2.2500	6.4	0.25	6.4	0.25	987	1 060	119	**HH932132**	**HH932110**	92.1	3.63	182.0	7.17	172.0	6.77	260.0	10.24	288.0	11.34	0.73	0.82	0.45	233	290	0.80
127.792	5.0312	228.600	9.0000	53.975	2.1250	49.428	1.9460	38.100	1.5000	3.6	0.14	3.2	0.13	540	651	77.1	**HM926749**	**HM926710**	68.1	2.68	156.0	6.14	143.0	5.63	200.0	7.87	219.0	8.63	0.74	0.81	0.45	126	159	0.79
146.050	5.7500	304.800	12.0000	88.900	3.5000	82.550	3.2500	57.150	2.2500	6.4	0.25	6.4	0.25	987	1 060	119	**HH932145**	**HH932110**	92.1	3.63	195.0	7.68	174.5	6.87	260.0	10.24	288.0	11.34	0.73	0.82	0.45	233	290	0.80
155.575	6.1250	330.200	13.0000	85.725	3.3750	79.375	3.1250	53.975	2.1250	6.4	0.25	6.4	0.25	1 080	1 210	131	**H936340**	**H936310**	103.8	4.09	209.0	8.23	192.5	7.58	282.0	11.10	311.5	12.26	0.81	0.74	0.41	255	352	0.72
168.275	6.6250	330.200	13.0000	85.725	3.3750	79.375	3.1250	53.975	2.1250	6.4	0.25	6.4	0.25	1 080	1 210	131	**H936349**	**H936310**	103.8	4.09	218.0	8.58	192.5	7.58	282.0	11.10	311.5	12.26	0.81	0.74	0.41	255	352	0.72
	6.6250	342.900	13.5000	85.725	3.3750	79.375	3.1250	53.975	2.1250	6.4	0.25	6.4	0.25	1 080	1 210	131	**H936349**	**H936316**	103.8	4.09	218.0	8.58	192.5	7.58	287.0	11.30	311.5	12.26	0.81	0.74	0.41	255	352	0.72
177.800	7.0000	428.625	16.8750	106.362	4.1875	95.250	3.7500	61.912	2.4375	6.4	0.25	6.4	0.25	1 340	1 390	145	**EE350701**	**351687**	118.7	4.67	230.0	9.06	221.0	8.70	365.0	14.37	383.0	15.08	0.76	0.79	0.44	318	411	0.77
190.500	7.5000	428.625	16.8750	106.363	4.1875	95.250	3.7500	61.913	2.4375	6.4	0.25	6.4	0.25	1 340	1 390	145	**EE350750**	**351687**	118.7	4.67	240.0	9.45	237.0	9.33	365.0	14.37	383.0	15.08	0.76	0.79	0.44	318	411	0.77
203.200	8.0000	482.600	19.0000	117.475	4.6250	95.250	3.7500	73.025	2.8750	6.4	0.25	6.4	0.25	1 810	2 060	209	**EE380080**	**380190**	152.8	6.02	280.0	11.02	260.0	10.24	402.0	15.83	428.5	16.87	0.87	0.69	0.38	426	631	0.67
241.300	9.5000	508.000	20.0000	117.475	4.6250	95.250	3.7500	73.025	2.8750	6.4	0.25	6.4	0.25	1 550	1 800	178	**EE390095**	**390200**	168.1	6.62	297.0	11.69	288.0	11.34	423.0	16.65	456.0	17.96	0.94	0.64	0.35	366	587	0.62
254.000	10.0000	533.400	21.0000	133.350	5.2500	120.650	4.7500	77.788	3.0625	6.4	0.25	6.4	0.25	2 230	2 800	262	**HH953749**	**HH953710**	180.8	7.12	328.0	12.91	306.5	12.06	455.0	17.91	495.5	19.51	0.94	0.64	0.35	528	846	0.62
317.500	12.5000	622.300	24.5000	147.638	5.8125	131.763	5.1875	82.550	3.2500	14.3	0.56	12.7	0.50	2 790	3 490	316	**H961649**	**H961610**	210.5	8.29	410.0	16.14	373.0	14.69	531.0	20.91	581.5	22.90	0.94	0.64	0.35	659	1 060	0.62
342.900	13.5000	457.098	17.9960	66.675	2.6250	63.500	2.5000	46.038	1.8125	3.2	0.13	3.2	0.13	914	1 670	159	**LM961548**	**LM961510**	122.3	4.81	367.0	14.45	363.0	14.29	423.0	16.65	443.0	17.44	0.71	0.84	0.46	212	258	0.82

TS type
Metric "J" series
d 38.000 ~ 200.000 mm
1.4961 ~ 7.8740 inch





$P = XF_r + YF_a$ $P_0 = 0.5\,F_r + Y_0F_a$ or $P_0 = F_r$			
$F_a / F_r \leqq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

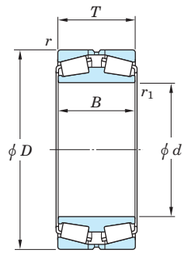
Note) The Values of "e" "Y_1" and "Y_0" are given in the table below.

Boundary dimensions														Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.		Load center		Mounting dimensions								Constant	Axial load factors		Reference rating (kN) (500 rpm for 3 000 Hrs.)		Factor
d		D		T		B		C		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u	Cone (Inner ring)	Cup (Outer ring)	a		d_a		d_b		D_a		D_b		e	Y_1	Y_0	Radial	Axial	K
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch					
38.000	1.4961	63.000	2.4803	17.000	0.6693	17.000	0.6693	13.500	0.5315	SP	SP	SP	SP	54.7	58.2	8.25	**JL69349**	**JL69310**	14.6	0.57	49.0	1.93	41.0	1.61	60.0	2.36	59.5	2.34	0.42	1.44	0.79	12.6	8.95	1.41
50.000	1.9685	82.000	3.2283	21.501	0.8465	21.501	0.8465	17.000	0.6693	3.0	0.12	0.5	0.02	90.0	97.9	14.7	**JLM104948**	**JLM104910**	16.2	0.64	60.0	2.36	55.0	2.17	76.0	2.99	78.0	3.07	0.31	1.97	1.08	20.8	10.8	1.92
	1.9685	90.000	3.5433	28.000	1.1024	28.000	1.1024	23.000	0.9055	3.0	0.12	2.5	0.10	132	138	21.1	**JM205149**	**JM205110**	20.2	0.80	62.0	2.44	57.0	2.24	80.0	3.15	85.0	3.35	0.33	1.82	1.00	30.6	17.2	1.78
	1.9685	105.000	4.1339	37.000	1.4567	36.000	1.4173	29.000	1.1417	3.0	0.12	2.8	0.11	186	205	30.6	**JHM807045**	**JHM807012**	29.4	1.16	69.0	2.72	63.0	2.48	90.0	3.54	100.0	3.94	0.49	1.23	0.68	43.5	36.3	1.20
55.000	2.1654	90.000	3.5433	23.000	0.9055	23.000	0.9055	18.500	0.7283	1.6	0.06	0.5	0.02	102	115	17.2	**JLM506849**	**JLM506810**	20.1	0.79	63.0	2.48	61.0	2.40	82.0	3.23	86.0	3.39	0.40	1.49	0.82	23.6	16.2	1.46
	2.1654	95.000	3.7402	29.000	1.1417	29.000	1.1417	23.500	0.9252	1.6	0.06	2.8	0.11	138	150	23.0	**JM207049**	**JM207010**	21.3	0.84	64.0	2.52	62.0	2.44	85.0	3.35	91.0	3.58	0.33	1.79	0.99	32.0	18.3	1.75
	2.1654	110.000	4.3307	39.000	1.5354	39.000	1.5354	32.000	1.2598	3.0	0.12	2.5	0.10	220	224	34.7	**JH307749**	**JH307710**	26.8	1.06	71.0	2.80	64.0	2.52	97.0	3.82	104.0	4.09	0.35	1.73	0.95	51.5	30.5	1.69
60.000	2.3622	95.000	3.7402	24.000	0.9449	24.000	0.9449	19.000	0.7480	5.0	0.20	2.5	0.10	108	125	18.9	**JLM508748**	**JLM508710**	21.2	0.83	75.0	2.95	66.0	2.60	85.0	3.35	91.0	3.58	0.40	1.49	0.82	25.0	17.2	1.46
65.000	2.5591	105.000	4.1339	24.000	0.9449	23.000	0.9055	18.500	0.7283	3.0	0.12	1.0	0.04	120	129	19.6	**JLM710949**	**JLM710910**	23.8	0.94	77.0	3.03	71.0	2.80	96.0	3.78	101.0	3.98	0.45	1.32	0.73	27.7	21.4	1.29
	2.5591	110.000	4.3307	28.000	1.1024	28.000	1.1024	22.500	0.8858	3.0	0.12	2.8	0.11	170	191	29.4	**JM511946**	**JM511910**	24.5	0.96	78.0	3.07	72.0	2.83	99.0	3.90	105.0	4.13	0.40	1.49	0.82	39.3	27.0	1.46
	2.5591	120.000	4.7244	39.000	1.5354	38.500	1.5157	32.000	1.2598	3.0	0.12	2.8	0.11	236	255	39.7	**JH211749**	**JH211710**	27.9	1.10	80.0	3.15	74.0	2.91	107.0	4.21	114.0	4.49	0.34	1.78	0.98	55.2	31.8	1.74
	2.5591	120.000	4.7244	39.000	1.5354	38.500	1.5157	32.000	1.2598	7.1	0.28	2.8	0.11	236	255	39.7	**JH211749A**	**JH211710**	27.9	1.10	88.0	3.46	74.0	2.91	107.0	4.21	114.0	4.49	0.34	1.78	0.98	55.2	31.8	1.74
70.000	2.7559	110.000	4.3307	26.000	1.0236	25.000	0.9843	20.500	0.8071	1.0	0.04	2.5	0.10	129	158	23.9	**JLM813049**	**JLM813010**	26.1	1.03	78.0	3.07	77.0	3.03	98.0	3.86	106.0	4.17	0.49	1.23	0.68	29.8	24.8	1.20
	2.7559	115.000	4.5276	29.000	1.1417	29.000	1.1417	23.000	0.9055	3.0	0.12	2.5	0.10	155	173	26.6	**JM612949**	**JM612910**	26.2	1.03	83.0	3.27	77.0	3.03	103.0	4.06	111.0	4.37	0.43	1.39	0.77	36.0	26.5	1.36
75.000	2.9528	115.000	4.5276	25.000	0.9843	25.000	0.9843	19.000	0.7480	3.0	0.12	2.8	0.11	127	151	23.0	**JLM714149**	**JLM714110**	25.5	1.00	87.0	3.43	81.0	3.19	104.0	4.09	111.0	4.37	0.46	1.31	0.72	29.4	23.0	1.28
	2.9528	120.000	4.7244	31.000	1.2205	29.500	1.1614	25.000	0.9843	3.0	0.12	2.8	0.11	182	216	33.2	**JM714249**	**JM714210**	30.0	1.18	88.0	3.46	82.9	3.26	108.0	4.25	115.0	4.53	0.44	1.35	0.74	42.2	32.1	1.32
	2.9528	145.000	5.7087	51.000	2.0079	51.000	2.0079	42.000	1.6535	3.0	0.12	2.5	0.10	362	412	55.2	**JH415647**	**JH415610**	36.6	1.44	94.0	3.70	89.0	3.50	129.0	5.08	139.0	5.47	0.36	1.66	0.91	85.1	52.7	1.62
80.000	3.1496	130.000	5.1181	35.000	1.3780	34.000	1.3386	28.500	1.1220	3.2	0.13	2.5	0.10	211	256	39.3	**JM515649**	**JM515610**	29.6	1.17	94.0	3.70	88.0	3.46	117.0	4.61	125.0	4.92	0.39	1.54	0.85	49.2	32.6	1.51
85.000	3.3465	130.000	5.1181	30.000	1.1811	29.000	1.1417	24.000	0.9449	3.0	0.12	2.5	0.10	179	228	34.5	**JM716649**	**JM716610**	29.1	1.15	98.0	3.86	92.0	3.62	117.0	4.61	125.0	4.92	0.44	1.35	0.74	41.3	31.4	1.32
	3.3465	140.000	5.5118	39.000	1.5354	38.000	1.4961	31.500	1.2402	3.0	0.12	2.5	0.10	254	308	46.4	**JHM516849**	**JHM516810**	32.8	1.29	100.0	3.94	93.9	3.70	125.0	4.92	134.0	5.28	0.41	1.47	0.81	59.5	41.4	1.44
	3.3465	150.000	5.9055	46.000	1.8110	46.000	1.8110	38.000	1.4961	3.0	0.12	2.5	0.10	342	390	53.1	**JH217249**	**JH217210**	33.6	1.32	101.0	3.98	95.2	3.75	134.0	5.28	142.0	5.59	0.33	1.80	0.99	80.3	45.6	1.76
90.000	3.5433	145.000	5.7087	35.000	1.3780	34.000	1.3386	27.000	1.0630	3.0	0.12	2.5	0.10	244	291	43.5	**JM718149**	**JM718110**	32.7	1.29	105.0	4.13	99.0	3.90	131.0	5.16	139.0	5.47	0.44	1.35	0.74	56.8	43.1	1.32
	3.5433	155.000	6.1024	44.000	1.7323	44.000	1.7323	35.500	1.3976	3.0	0.12	2.5	0.10	363	407	54.8	**JHM318448**	**JHM318410**	34.5	1.36	106.0	4.17	100.0	3.94	140.0	5.51	148.0	5.83	0.34	1.76	0.97	84.5	49.3	1.72
95.000	3.7402	150.000	5.9055	35.000	1.3780	34.000	1.3386	27.000	1.0630	3.0	0.12	2.5	0.10	235	294	43.4	**JM719149**	**JM719113**	33.5	1.32	109.0	4.29	104.0	4.09	135.0	5.31	143.0	5.63	0.44	1.36	0.75	54.5	41.2	1.32
100.000	3.9370	155.000	6.1024	36.000	1.4173	35.000	1.3780	28.000	1.1024	3.0	0.12	2.5	0.10	256	328	47.7	**JM720249**	**JM720210**	35.6	1.40	110.0	4.33	110.0	4.33	139.0	5.47	150.0	5.91	0.47	1.27	0.70	59.5	48.1	1.24
	3.9370	160.000	6.2992	41.000	1.6142	40.000	1.5748	32.000	1.2598	3.0	0.12	2.5	0.10	298	378	54.6	**JHM720249**	**JHM720210**	38.3	1.51	110.0	4.33	111.0	4.37	143.0	5.63	153.0	6.02	0.47	1.28	0.70	69.6	56.0	1.24
110.000	4.3307	165.000	6.4961	35.000	1.3780	35.000	1.3780	26.500	1.0433	3.0	0.12	2.5	0.10	245	325	46.3	**JM822049**	**JM822010**	38.1	1.50	121.0	4.76	121.0	4.76	148.0	5.83	157.0	6.18	0.50	1.21	0.66	56.7	48.2	1.18
	4.3307	180.000	7.0866	47.000	1.8504	46.000	1.8110	38.000	1.4961	3.0	0.12	2.5	0.10	385	487	62.3	**JHM522649**	**JHM522610**	40.6	1.60	121.0	4.76	125.0	4.92	160.0	6.30	171.0	6.73	0.41	1.48	0.81	90.1	62.5	1.44
170.000	6.6929	230.000	9.0551	39.000	1.5354	38.000	1.4961	31.000	1.2205	3.0	0.12	2.5	0.10	363	558	72.8	**JHM534149**	**JHM534110**	43.6	1.72	181.0	7.13	184.0	7.24	214.0	8.43	226.0	8.90	0.38	1.57	0.86	83.9	55.0	1.53
	6.6929	240.000	9.4488	46.000	1.8110	44.500	1.7520	37.000	1.4567	3.0	0.12	2.5	0.10	443	666	77.1	**JM734449**	**JM734410**	50.6	1.99	181.0	7.13	184.0	7.24	220.0	8.66	235.0	9.25	0.44	1.37	0.75	103	76.9	1.34
180.000	7.0866	250.000	9.8425	47.000	1.8504	45.000	1.7717	37.000	1.4567	3.0	0.12	2.5	0.10	456	705	81.7	**JM736149**	**JM736110**	55.2	2.17	191.0	7.52	193.0	7.60	230.0	9.06	242.0	9.53	0.48	1.25	0.69	106	87.1	1.22
190.000	7.4803	260.000	10.2362	46.000	1.8110	44.000	1.7323	36.500	1.4370	3.0	0.12	2.5	0.10	461	723	81.4	**JM738249**	**JM738210**	56.0	2.20	201.0	7.91	203.0	7.99	240.0	9.45	253.0	9.96	0.48	1.26	0.69	107	87.2	1.23
200.000	7.8740	300.000	11.8110	65.000	2.5591	62.000	2.4409	51.000	2.0079	3.6	0.14	2.5	0.10	773	1 140	124	**JHM840449**	**JHM840410**	72.1	2.84	213.0	8.39	218.0	8.58	270.0	10.63	289.0	11.38	0.52	1.15	0.63	181	161	1.12

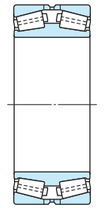
Note 1) SP indicates the specially chamfered from.

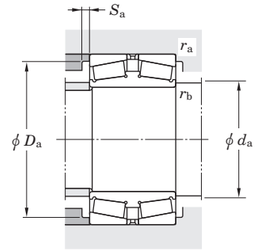
TDI type

d 104.775 ~ (206.375) mm
4.1250 ~ (8.1250) inch



Design 1


Design 1-P

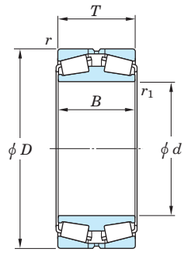


Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)		Bearing No.	Design	Mounting dimensions												Constant	Axial load factors		
d		D		B		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u				d_a (max.)		D_a (max.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch							mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
104.775	4.1250	180.975	7.1250	102.362	4.0300	101.600	4.0000	3.200	0.1260	1.600	0.0630	620	876	113		**782D/772**	1	120.000	4.7244	166.000	6.5354	156.000	6.1417	4.400	0.1732	3.200	0.1260	1.600	0.0630	0.39	1.75	2.61	1.71
127.000	5.0000	182.563	7.1875	76.200	3.0000	76.200	3.0000	3.200	0.1260	1.600	0.0630	487	858	120		**48290D/48220**	1	141.000	5.5512	171.000	6.7323	167.000	6.5748	3.800	0.1496	3.200	0.1260	1.600	0.0630	0.31	2.21	3.29	2.16
	5.0000	234.950	9.2500	139.700	5.5000	152.400	6.0000	3.200	0.1260	5.200	0.2047	1 120	1 650	200		**95499D/95925**	1	151.000	5.9449	223.000	8.7795	205.000	8.0709	8.000	0.3150	3.200	0.1260	5.200	0.2047	0.37	1.83	2.72	1.79
	5.0000	254.000	10.0000	161.925	6.3750	171.450	6.7500	6.400	0.2520	3.200	0.1260	1 480	2 010	240		**EE153053D/153100**	1	154.000	6.0630	236.000	9.2913	218.000	8.5827	11.000	0.4331	6.400	0.2520	3.200	0.1260	0.32	2.10	3.13	2.05
130.005	5.1183	215.900	8.5000	123.825	4.8750	123.825	4.8750	3.200	0.1260	1.600	0.0630	691	1 100	132		**74510D/74850**	1	154.000	6.0630	204.000	8.0315	194.000	7.6378	5.000	0.1969	3.200	0.1260	1.600	0.0630	0.49	1.38	2.06	1.35
133.350	5.2500	196.850	7.7500	92.075	3.6250	92.075	3.6250	3.200	0.1260	1.600	0.0630	669	1 120	137		**67390D/67322**	1	146.000	5.7480	185.000	7.2835	181.000	7.1260	5.000	0.1969	3.200	0.1260	1.600	0.0630	0.34	1.96	2.92	1.92
	5.2500	203.200	8.0000	92.075	3.6250	92.075	3.6250	3.200	0.1260	1.600	0.0630	669	1 120	137		**67390D/67320**	1	146.000	5.7480	191.000	7.5197	181.000	7.1260	5.000	0.1969	3.200	0.1260	1.600	0.0630	0.34	1.96	2.92	1.92
136.525	5.3750	190.500	7.5000	77.788	3.0625	77.788	3.0625	3.200	0.1260	1.600	0.0630	505	944	129		**48393D/48320**	1	150.000	5.9055	179.000	7.0472	175.000	6.8898	4.700	0.1850	3.200	0.1260	1.600	0.0630	0.32	2.10	3.13	2.06
	5.3750	225.425	8.8750	120.650	4.7500	120.650	4.7500	3.200	0.1260	1.600	0.0630	1 020	1 610	194		**H228649D/H228610**	1	156.000	6.1417	214.000	8.4252	202.000	7.9528	6.000	0.2362	3.200	0.1260	1.600	0.0630	0.33	2.03	3.02	1.98
	5.3750	225.425	8.8750	120.650	4.7500	120.650	4.7500	3.200	0.1260	1.600	0.0630	1 020	1 610	194		**45T272312**	1	155.000	6.1024	211.000	8.3071	201.000	7.9134	6.000	0.2362	3.200	0.1260	1.600	0.0630	0.33	2.03	3.02	1.98
139.700	5.5000	200.025	7.8750	77.788	3.0625	75.408	2.9688	3.300	0.1299	0.800	0.0315	527	982	133		**48680D/48620**	1	155.000	6.1024	188.000	7.4016	183.000	7.2047	4.000	0.1575	3.300	0.1299	0.800	0.0315	0.34	2.01	2.99	1.96
149.225	5.8750	254.000	10.0000	120.650	4.7500	120.650	4.7500	3.200	0.1260	1.600	0.0630	1 180	1 830	215		**99587D/99100**	1	172.000	6.7717	242.000	9.5276	224.000	8.8189	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.41	1.66	2.47	1.62
152.400	6.0000	222.250	8.7500	84.138	3.3125	84.138	3.3125	1.600	0.0630	1.600	0.0630	678	1 190	159		**M231649D/M231610**	1	168.000	6.6142	214.000	8.4252	202.000	7.9528	6.000	0.2362	1.600	0.0630	1.600	0.0630	0.33	2.03	3.02	1.98
	6.0000	254.000	10.0000	133.350	5.2500	133.350	5.2500	3.200	0.1260	1.600	0.0630	1 180	1 830	215		**99600D/99100**	1	172.000	6.7717	242.000	9.5276	224.000	8.8189	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.41	1.66	2.47	1.62
	6.0000	254.000	10.0000	158.750	6.2500	158.750	6.2500	3.200	0.1260	1.600	0.0630	1 180	1 830	215		**99603D/99100**	1	172.000	6.7717	242.000	9.5276	224.000	8.8189	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.41	1.66	2.47	1.62
177.800	7.0000	247.650	9.7500	90.488	3.5625	90.488	3.5625	3.200	0.1260	1.600	0.0630	741	1 400	160		**67790D/67720**	1	190.000	7.4803	236.000	9.2913	227.000	8.9370	5.000	0.1969	3.200	0.1260	1.600	0.0630	0.44	1.54	2.29	1.50
	7.0000	279.400	11.0000	112.710	4.4374	112.713	4.4375	3.200	0.1260	1.600	0.0630	1 040	1 640	187		**82680D/82620**	1	197.000	7.7559	268.000	10.5512	252.000	9.9213	7.000	0.2756	3.200	0.1260	1.600	0.0630	0.52	1.29	1.92	1.26
	7.0000	285.750	11.2500	106.360	4.1874	106.363	4.1875	3.200	0.1260	1.600	0.0630	956	1 430	165		**EE91700D/91112**	1	201.000	7.9134	274.000	10.7874	252.000	9.9213	4.000	0.1575	3.200	0.1260	1.600	0.0630	0.43	1.57	2.34	1.53
	7.0000	288.925	11.3750	123.825	4.8750	123.825	4.8750	3.200	0.1260	1.600	0.0630	1 180	1 920	216		**94706D/94113**	1	201.000	7.9134	277.000	10.9055	255.000	10.0394	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.47	1.44	2.15	1.41
	7.0000	288.925	11.3750	123.825	4.8750	123.825	4.8750	3.200	0.1260	1.600	0.0630	1 430	1 950	245		**HM237546D/HM237510**	1	201.000	7.9134	277.000	10.9055	261.000	10.2756	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.32	2.12	3.15	2.07
	7.0000	288.925	11.3750	158.750	6.2500	158.750	6.2500	3.200	0.1260	1.600	0.0630	1 430	1 950	245		**HM237546DD/HM237510**	1	201.000	7.9134	277.500	10.9252	261.000	10.2756	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.32	2.12	3.15	2.07
	7.0000	304.800	12.0000	109.438	4.3086	114.300	4.5000	3.200	0.1260	3.200	0.1260	1 220	1 690	199		**EE280700D/281200**	1	208.000	8.1890	293.000	11.5354	272.000	10.7087	7.000	0.2756	3.200	0.1260	3.200	0.1260	0.36	1.87	2.79	1.83
187.325	7.3750	269.875	10.6250	101.600	4.0000	101.600	4.0000	3.200	0.1260	1.600	0.0630	880	1 610	183		**M238849D/M238810**	1	207.000	8.1496	258.000	10.1575	246.000	9.6850	5.000	0.1969	3.200	0.1260	1.600	0.0630	0.33	2.03	3.02	1.98
	7.3750	319.964	12.5970	168.275	6.6250	161.925	6.3750	4.800	0.1890	3.200	0.1260	1 610	2 450	271		**EE222074D/222126**	1	212.000	8.3465	305.000	12.0079	281.000	11.0630	4.000	0.1575	4.800	0.1890	3.200	0.1260	0.40	1.68	2.50	1.64
	7.3750	319.964	12.5970	168.275	6.6250	161.925	6.3750	4.800	0.1890	3.200	0.1260	1 830	2 530	285		**H239649D/H239610**	1	212.000	8.3465	305.000	12.0079	287.000	11.2992	5.000	0.1969	4.800	0.1890	3.200	0.1260	0.32	2.12	3.15	2.07
	7.3750	320.675	12.6250	168.275	6.6250	161.925	6.3750	4.800	0.1890	3.200	0.1260	1 610	2 450	271		**EE222074D/222128**	1	212.000	8.3465	306.000	12.0472	281.000	11.0630	4.000	0.1575	4.800	0.1890	3.200	0.1260	0.40	1.68	2.50	1.64
	7.3750	320.675	12.6250	168.275	6.6250	161.925	6.3750	4.800	0.1890	3.200	0.1260	1 830	2 530	285		**H239649D/H239612**	1	212.000	8.3465	306.000	12.0472	287.000	11.2992	5.000	0.1969	4.800	0.1890	3.200	0.1260	0.32	2.12	3.15	2.07
190.500	7.5000	365.049	14.3720	158.750	6.2500	152.400	6.0000	3.200	0.1260	3.200	0.1260	2 020	2 920	319		**EE420750D/421437**	1	239.000	9.4094	353.000	13.8976	317.000	12.4803	6.000	0.2362	3.200	0.1260	3.200	0.1260	0.40	1.68	2.50	1.64
	7.5000	368.300	14.5000	158.750	6.2500	152.400	6.0000	3.200	0.1260	3.200	0.1260	2 020	2 920	319		**EE420750D/421450**	1	239.000	9.4094	356.000	14.0157	317.000	12.4803	6.000	0.2362	3.200	0.1260	3.200	0.1260	0.40	1.68	2.50	1.64
199.975	7.8730	317.500	12.5000	133.350	5.2500	133.350	5.2500	3.200	0.1260	6.400	0.2520	1 300	2 270	244		**93788D/93125**	1	223.000	8.7795	306.000	12.0472	279.000	10.9843	7.000	0.2756	3.200	0.1260	6.400	0.2520	0.52	1.29	1.92	1.26
203.200	8.0000	317.500	12.5000	123.825	4.8750	123.825	4.8750	3.200	0.1260	1.600	0.0630	1 300	2 270	244		**93800D/93125**	1	223.000	8.7795	305.000	12.0079	278.000	10.9449	7.000	0.2756	3.200	0.1260	1.600	0.0630	0.52	1.29	1.92	1.26
	8.0000	317.500	12.5000	133.350	5.2500	133.350	5.2500	3.200	0.1260	6.400	0.2520	1 300	2 270	244		**93801D/93125**	1	223.000	8.7795	305.000	12.0079	279.000	10.9843	7.000	0.2756	3.200	0.1260	6.400	0.2520	0.52	1.29	1.92	1.26
	8.0000	365.049	14.3720	158.750	6.2500	152.400	6.0000	3.200	0.1260	3.200	0.1260	2 020	2 920	319		**EE420800D/421437**	1	239.000	9.4094	352.000	13.8583	317.000	12.4803	6.000	0.2362	3.200	0.1260	3.200	0.1260	0.40	1.68	2.50	1.64
	8.0000	368.300	14.5000	158.750	6.2500	152.400	6.0000	3.200	0.1260	3.200	0.1260	2 020	2 920	319		**EE420800D/421450**	1	239.000	9.4094	355.000	13.9764	317.000	12.4803	6.000	0.2362	3.200	0.1260	3.200	0.1260	0.40	1.68	2.50	1.64
206.375	8.1250	282.575	11.1250	87.313	3.4375	87.313	3.4375	3.200	0.1260	0.800	0.0315	749	1 410	155		**67985D/67920**	1	220.000	8.6614	270.000	10.6299	260.000	10.2362	7.000	0.2756	3.200	0.1260	0.800	0.0315	0.51	1.33	1.97	1.30

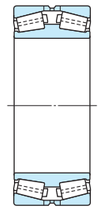
Note 1) SP indicates the specially chamfered from.

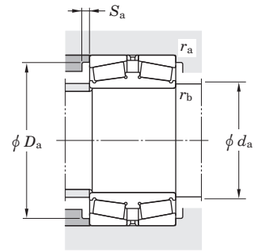
TDI type

d (206.375) ~ 266.700 mm
(8.1250) ~ 10.5000 inch



Design 1


Design 1-P

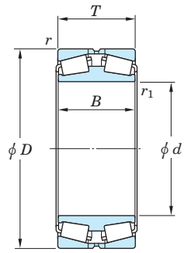


Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)		Bearing No.	De-sign	Mounting dimensions												Con-stant	Axial load factors		
d		D		B		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)								d_a (max.)		D_a (max.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)					
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	C_r	C_{0r}	C_u				mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	e	Y_2	Y_3	Y_0
206.375	8.1250	336.550	13.2500	180.975	7.1250	184.150	7.2500	3.200	0.1260	1.600	0.0630	2 230	3 800	400		**H242649D/H242610**	1	233.000	9.1732	324.000	12.7559	301.000	11.8504	9.000	0.3543	3.200	0.1260	1.600	0.0630	0.33	2.03	3.02	1.98
215.900	8.5000	285.750	11.2500	85.725	3.3750	85.725	3.3750	3.200	0.1260	0.800	0.0315	766	1 560	190		**LM742749D/LM742710**	1	228.000	8.9764	273.000	10.7480	266.000	10.4724	6.000	0.2362	3.200	0.1260	0.800	0.0315	0.48	1.40	2.09	1.37
	8.5000	288.925	11.3750	85.750	3.3760	85.725	3.3750	3.200	0.1260	0.800	0.0315	766	1 560	190		**LM742749D/LM742714**	1	228.000	8.9764	276.000	10.8661	266.000	10.4724	6.000	0.2362	3.200	0.1260	0.800	0.0315	0.48	1.40	2.09	1.37
216.103	8.5080	330.200	13.0000	130.175	5.1250	127.000	5.0000	3.200	0.1260	1.600	0.0630	1 430	2 360	255		**9974D/9920**	1	237.000	9.3307	317.000	12.4803	301.000	11.8504	7.000	0.2756	3.200	0.1260	1.600	0.0630	0.55	1.22	1.82	1.19
	8.5080	330.200	13.0000	152.400	6.0000	142.875	5.6250	3.200	0.1260	3.200	0.1260	1 430	2 360	255		**9977D/9920**	1	239.000	9.4094	317.000	12.4803	301.000	11.8504	7.000	0.2756	3.200	0.1260	3.200	0.1260	0.55	1.22	1.82	1.19
218.000	8.5827	314.325	12.3750	115.888	4.5625	115.888	4.5625	3.200	0.1260	1.600	0.0630	1 400	2 550	281		**45T443112**	1	240.000	9.4488	304.000	11.9685	289.000	11.3780	9.000	0.3543	3.200	0.1260	1.600	0.0630	0.33	2.03	3.02	1.98
219.075	8.6250	358.775	14.1250	196.850	7.7500	200.025	7.8750	6.400	0.2520	1.600	0.0630	2 660	4 580	469		**H244849D/H244810**	1	245.000	9.6457	340.000	13.3858	320.000	12.5984	9.000	0.3543	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
220.663	8.6875	314.325	12.3750	115.888	4.5625	115.888	4.5625	3.200	0.1260	1.600	0.0630	1 320	2 450	269		**M244249D/M244210**	1	241.000	9.4882	301.000	11.8504	289.000	11.3780	5.000	0.1969	3.200	0.1260	1.600	0.0630	0.33	2.03	3.02	1.98
228.600	9.0000	400.050	15.7500	139.700	5.5000	139.700	5.5000	3.200	0.1260	3.200	0.1260	1 960	2 950	318		**EE529091D/529157**	1	277.000	10.9055	387.000	15.2362	352.000	13.8583	6.000	0.2362	3.200	0.1260	3.200	0.1260	0.31	2.19	3.25	2.14
	9.0000	431.800	17.0000	177.800	7.0000	177.800	7.0000	6.000	0.2362	6.000	0.2362	2 980	4 280	447		**45T464318D**	1-P	280.000	11.0236	403.000	15.8661	377.000	14.8425	10.000	0.3937	5.000	0.1969	5.000	0.1969	0.40	1.68	2.50	1.64
	9.0000	431.800	17.0000	177.800	7.0000	177.800	7.0000	6.000	0.2362	6.000	0.2362	2 980	4 280	447		**45T464318D**	1-P	279.000	10.9843	403.000	15.8661	377.000	14.8425	10.000	0.3937	6.000	0.2362	6.000	0.2362	0.40	1.68	2.50	1.64
234.950	9.2500	327.025	12.8750	93.663	3.6875	93.663	3.6875	3.200	0.1260	1.600	0.0630	1 000	1 860	200		**8576D/8520**	1	256.000	10.0787	314.000	12.3622	300.000	11.8110	7.000	0.2756	3.200	0.1260	1.600	0.0630	0.41	1.66	2.47	1.62
	9.2500	384.175	15.1250	209.550	8.2500	209.550	8.2500	6.400	0.2520	1.600	0.0630	3 120	5 370	542		**H247549D/H247510**	1-P	262.000	10.3150	365.000	14.3701	342.000	13.4646	8.000	0.3150	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
241.300	9.5000	355.524	13.9970	109.525	4.3120	109.525	4.3120	SP	SP	SP	SP	1 190	2 050	224		**45T483611**	1	267.000	10.5118	336.000	13.2283	319.000	12.5591	6.000	0.2362	2.500	0.0984	2.000	0.0787	0.35	1.91	2.84	1.86
	9.5000	355.600	14.0000	92.710	3.6500	92.862	3.6560	3.200	0.1260	1.600	0.0630	1 090	1 850	203		**EE170951D/171400**	1	278.000	10.9449	343.000	13.5039	328.000	12.9134	10.000	0.3937	3.200	0.1260	1.600	0.0630	0.36	1.86	2.77	1.82
	9.5000	368.300	14.5000	92.710	3.6500	92.862	3.6560	3.200	0.1260	1.600	0.0630	1 090	1 850	203		**EE170951D/171450**	1	278.000	10.9449	355.000	13.9764	328.000	12.9134	10.000	0.3937	3.200	0.1260	1.600	0.0630	0.36	1.86	2.77	1.82
241.478	9.5070	349.148	13.7460	107.950	4.2500	107.950	4.2500	3.200	0.1260	1.600	0.0630	1 190	2 050	224		**EE127097D/127135**	1	268.000	10.5512	336.000	13.2283	320.000	12.5984	7.000	0.2756	3.200	0.1260	1.600	0.0630	0.35	1.91	2.84	1.86
244.475	9.6250	327.025	12.8750	92.075	3.6250	92.075	3.6250	3.200	0.1260	1.600	0.0630	985	1 890	203		**LM247748D/LM247710**	1	265.000	10.4331	314.000	12.3622	306.000	12.0472	7.000	0.2756	3.200	0.1260	1.600	0.0630	0.32	2.10	3.13	2.06
	9.6250	381.000	15.0000	146.050	5.7500	146.050	5.7500	4.800	0.1890	3.200	0.1260	1 690	2 930	306		**EE126096D/126150**	1	269.000	10.5906	365.000	14.3701	337.000	13.2677	5.000	0.1969	4.800	0.1890	3.200	0.1260	0.52	1.31	1.95	1.28
247.650	9.7500	400.050	15.7500	119.060	4.6874	114.300	4.5000	6.400	0.2520	1.600	0.0630	1 630	2 570	274		**EE220975D/221575**	1	292.000	11.4961	381.000	15.0000	360.000	14.1732	6.000	0.2362	6.400	0.2520	1.600	0.0630	0.39	1.71	2.54	1.67
	9.7500	406.400	16.0000	215.900	8.5000	219.075	8.6250	6.400	0.2520	3.200	0.1260	3 490	6 250	612		**HH249949D/HH249910**	1-P	279.000	10.9843	387.000	15.2362	362.000	14.2520	11.000	0.4331	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
254.000	10.0000	355.600	14.0000	92.710	3.6500	92.862	3.6560	3.200	0.1260	1.600	0.0630	1 090	1 850	203		**EE171000D/171400**	1	278.000	10.9449	343.000	13.5039	328.000	12.9134	10.000	0.3937	3.200	0.1260	1.600	0.0630	0.36	1.86	2.77	1.82
	10.0000	358.775	14.1250	130.175	5.1250	130.175	5.1250	3.200	0.1260	3.200	0.1260	1 660	3 170	333		**M249748D/M249710**	1	277.000	10.9055	346.000	13.6220	330.100	12.9961	8.000	0.3150	3.200	0.1260	3.200	0.1260	0.33	2.03	3.02	1.98
	10.0000	368.300	14.5000	92.710	3.6500	92.862	3.6560	3.200	0.1260	1.600	0.0630	1 090	1 850	203		**EE171000D/171450**	1	278.000	10.9449	355.000	13.9764	328.000	12.9134	10.000	0.3937	3.200	0.1260	1.600	0.0630	0.36	1.86	2.77	1.82
	10.0000	438.150	17.2500	165.100	6.5000	165.100	6.5000	6.400	0.2520	3.200	0.1260	2 960	4 370	454		**EE738101D/738172**	1	298.000	11.7323	410.000	16.1417	394.000	15.5118	12.000	0.4724	6.400	0.2520	3.200	0.1260	0.36	1.88	2.81	1.84
	10.0000	444.500	17.5000	133.350	5.2500	133.350	5.2500	6.400	0.2520	3.200	0.1260	1 850	2 770	294		**EE822101D/822175**	1	311.000	12.2441	425.000	16.7323	393.000	15.4724	7.000	0.2756	6.400	0.2520	3.200	0.1260	0.42	1.62	2.42	1.59
260.350	10.2500	365.125	14.3750	107.950	4.2500	107.950	4.2500	6.400	0.2520	3.200	0.1260	1 210	2 150	231		**EE134102D/134143**	1	283.000	11.1417	346.000	13.6220	334.700	13.1772	8.000	0.3150	6.400	0.2520	3.200	0.1260	0.37	1.80	2.69	1.76
	10.2500	400.050	15.7500	119.060	4.6874	114.300	4.5000	6.400	0.2520	6.400	0.2520	1 630	2 570	274		**EE221025D/221575**	1	292.000	11.4961	381.000	15.0000	360.000	14.1732	6.000	0.2362	6.400	0.2520	6.400	0.2520	0.39	1.71	2.54	1.67
	10.2500	419.100	16.5000	155.575	6.1250	158.750	6.2500	3.200	0.1260	3.200	0.1260	2 110	3 520	363		**EE435103D/435165**	1	286.000	11.2598	405.000	15.9449	369.000	14.5276	5.500	0.2165	3.200	0.1260	3.200	0.1260	0.60	1.12	1.66	1.09
	10.2500	422.275	16.6250	152.400	6.0000	139.700	5.5000	3.200	0.1260	3.600	0.1417	2 180	3 360	355		**HM252347D/HM252310**	1	306.000	12.0472	409.000	16.1024	385.000	15.1575	1.000	0.0394	3.200	0.1260	3.600	0.1417	0.33	2.03	3.02	1.98
	10.2500	422.275	16.6250	155.575	6.1250	152.400	6.0000	3.200	0.1260	6.400	0.2520	2 180	3 360	355		**HM252348D/HM252310**	1	304.000	11.9685	409.000	16.1024	385.000	15.1575	1.000	0.0394	3.200	0.1260	6.400	0.2520	0.33	2.03	3.02	1.98
	10.2500	431.724	16.9970	148.433	5.8438	152.400	6.0000	3.600	0.1417	6.400	0.2520	2 180	3 360	355		**HM252348D/HM252315**	1	304.000	11.9685	418.000	16.4567	385.000	15.1575	4.000	0.1575	3.600	0.1417	6.400	0.2520	0.33	2.03	3.02	1.98
266.700	10.5000	355.600	14.0000	107.950	4.2500	109.538	4.3125	3.200	0.1260	1.600	0.0630	1 300	2 550	267		**LM451349D/LM451310**	1	285.000	11.2205	343.000	13.5039	332.000	13.0709	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.36	1.87	2.79	1.83
	10.5000	393.700	15.5000	130.175	5.1250	130.175	5.1250	6.400	0.2520	3.200	0.1260	1 590	3 090	325		**EE275106D/275155**	1	309.000	12.1654	374.000	14.7244	365.000	14.3701	5.000	0.1969	6.400	0.2520	3.200	0.1260	0.40	1.68	2.50	1.64

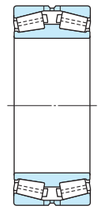
Note 1) SP indicates the specially chamfered from.

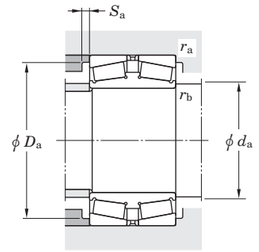
TDI type

d 269.875 ~ 355.600 mm
10.6250 ~ 14.0000 inch



Design 1


Design 1-P

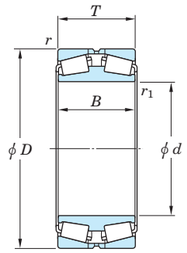


Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)		Bearing No.	Design	Mounting dimensions												Constant	Axial load factors		
d		D		B		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)								d_a (max.)		D_a (max.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)					
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	C_r	C_{0r}	C_u				mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	e	Y_2	Y_3	Y_0
269.875	10.6250	381.000	15.0000	136.525	5.3750	136.525	5.3750	3.200	0.1260	3.200	0.1260	1 840	3 350	349		**M252349D/M252310**	1	291.000	11.4567	368.000	14.4882	351.000	13.8189	6.000	0.2362	3.200	0.1260	3.200	0.1260	0.33	2.03	3.02	1.98
276.225	10.8750	393.700	15.5000	130.175	5.1250	130.175	5.1250	6.400	0.2520	1.600	0.0630	1 590	3 090	325		**EE275109D/275155**	1	309.000	12.1654	374.000	14.7244	365.000	14.3701	5.000	0.1969	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
	10.8750	406.400	16.0000	122.240	4.8126	130.175	5.1250	6.400	0.2520	1.600	0.0630	1 590	3 090	325		**EE275109D/275160**	1	309.000	12.1654	387.000	15.2362	366.000	14.4094	9.000	0.3543	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
279.400	11.0000	393.700	15.5000	127.000	5.0000	127.000	5.0000	6.400	0.2520	1.600	0.0630	1 510	2 780	287		**EE135111D/135155**	1	305.000	12.0079	374.000	14.7244	361.000	14.2126	9.000	0.3543	6.400	0.2520	1.600	0.0630	0.38	1.77	2.64	1.73
	11.0000	457.200	18.0000	244.475	9.6250	244.475	9.6250	6.400	0.2520	1.600	0.0630	4 150	7 540	713		**HH255149D/HH255110**	1	315.000	12.4016	438.000	17.2441	407.000	16.0236	11.000	0.4331	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
	11.0000	482.600	19.0000	177.800	7.0000	177.800	7.0000	4.800	0.1890	4.800	0.1890	2 660	3 980	399		**45T564818A**	1-P	309.000	12.1654	460.000	18.1102	424.000	16.6929	6.500	0.2559	4.800	0.1890	4.800	0.1890	0.80	0.85	1.26	0.83
279.578	11.0070	380.898	14.9960	117.475	4.6250	117.475	4.6250	3.200	0.1260	1.600	0.0630	1 420	2 820	286		**LM654644D/LM654610**	1	303.000	11.9291	368.000	14.4882	357.000	14.0551	7.000	0.2756	3.200	0.1260	1.600	0.0630	0.43	1.57	2.34	1.53
285.750	11.2500	380.898	14.9960	117.475	4.6250	117.475	4.6250	3.200	0.1260	1.600	0.0630	1 420	2 820	286		**LM654648D/LM654610**	1	303.000	11.9291	368.000	14.4882	357.000	14.0551	7.000	0.2756	3.200	0.1260	1.600	0.0630	0.43	1.57	2.34	1.53
288.925	11.3750	406.400	16.0000	144.463	5.6875	144.463	5.6875	3.200	0.1260	3.200	0.1260	2 160	4 420	445		**M255449D/M255410**	1	316.000	12.4409	394.000	15.5118	374.000	14.7244	8.000	0.3150	3.200	0.1260	3.200	0.1260	0.34	2.00	2.97	1.95
292.100	11.5000	422.275	16.6250	130.175	5.1250	130.175	5.1250	3.200	0.1260	6.400	0.2520	1 980	3 410	358		**EE330116D/330166**	1	321.000	12.6378	409.000	16.1024	388.000	15.2756	7.000	0.2756	3.200	0.1260	6.400	0.2520	0.32	2.11	3.14	2.06
299.974	11.8100	438.048	17.2460	133.350	5.2500	134.938	5.3125	4.800	0.1890	3.200	0.1260	1 690	3 230	325		**EE129119D/129172**	1	339.000	13.3465	422.000	16.6142	401.000	15.7874	7.000	0.2756	4.800	0.1890	3.200	0.1260	0.40	1.68	2.50	1.64
300.038	11.8125	422.275	16.6250	150.813	5.9375	150.813	5.9375	3.200	0.1260	3.200	0.1260	2 130	4 030	409		**HM256849D/HM256810**	1	324.000	12.7559	408.000	16.0630	389.000	15.3150	7.000	0.2756	3.200	0.1260	3.200	0.1260	0.34	2.00	2.98	1.96
303.213	11.9375	495.300	19.5000	263.525	10.3750	263.525	10.3750	6.400	0.2520	3.200	0.1260	5 020	9 340	858		**HH258249D/HH258210**	1-P	342.000	13.4646	475.000	18.7008	442.000	17.4016	8.000	0.3150	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
304.648	11.9940	438.048	17.2460	131.763	5.1875	131.763	5.1875	3.200	0.1260	3.200	0.1260	1 890	3 450	350		**EE329117D/329172**	1	337.000	13.2677	424.000	16.6929	400.000	15.7480	10.000	0.3937	3.200	0.1260	3.200	0.1260	0.33	2.04	3.04	2.00
304.800	12.0000	419.100	16.5000	130.175	5.1250	130.175	5.1250	6.400	0.2520	1.600	0.0630	1 770	3 480	350		**M257149D/M257110**	1	331.000	13.0315	399.000	15.7087	388.000	15.2756	7.000	0.2756	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
	12.0000	444.500	17.5000	111.125	4.3750	107.950	4.2500	1.600	0.0630	7.900	0.3110	1 550	2 760	288		**EE291200D/291750**	1	344.000	13.5433	434.000	17.0866	404.000	15.9055	11.000	0.4331	1.600	0.0630	7.900	0.3110	0.38	1.79	2.66	1.75
	12.0000	495.300	19.5000	171.450	6.7500	165.100	6.5000	6.400	0.2520	3.200	0.1260	2 740	4 680	461		**EE724121D/724195**	1	355.000	13.9764	475.000	18.7008	439.000	17.2835	6.000	0.2362	6.400	0.2520	3.200	0.1260	0.40	1.68	2.50	1.64
304.902	12.0040	412.648	16.2460	128.588	5.0625	128.588	5.0625	3.200	0.1260	3.200	0.1260	1 870	3 340	373		**M257248D/M257210**	1	330.000	12.9921	399.000	15.7087	386.000	15.1969	6.000	0.2362	3.200	0.1260	3.200	0.1260	0.32	2.12	3.15	2.07
305.003	12.0080	438.048	17.2460	133.350	5.2500	134.938	5.3125	4.800	0.1890	3.200	0.1260	1 690	3 230	325		**EE129123D/129172**	1	339.000	13.3465	421.000	16.5748	401.000	15.7874	7.000	0.2756	4.800	0.1890	3.200	0.1260	0.40	1.68	2.50	1.64
305.054	12.0100	499.948	19.6830	200.000	7.8740	200.000	7.8740	6.400	0.2520	3.200	0.1260	3 530	5 820	565		**HM858548D/HM858511**	1	343.000	13.5039	480.000	18.8976	447.000	17.5984	10.000	0.3937	6.400	0.2520	3.200	0.1260	0.49	1.36	2.03	1.33
317.500	12.5000	447.675	17.6250	158.750	6.2500	158.750	6.2500	3.300	0.1299	1.600	0.0630	2 400	4 770	465		**HM259049D/HM259010**	1	346.000	13.6220	434.000	17.0866	412.000	16.2205	10.000	0.3937	3.300	0.1299	1.600	0.0630	0.33	2.02	3.00	1.97
333.375	13.1250	469.900	18.5000	166.688	6.5625	166.688	6.5625	3.200	0.1260	3.200	0.1260	2 900	5 680	548		**HM261049D/HM261010**	1-P	360.000	14.1732	456.000	17.9528	433.000	17.0472	8.000	0.3150	3.200	0.1260	3.200	0.1260	0.33	2.02	3.00	1.97
342.900	13.5000	533.400	21.0000	139.690	5.4996	146.050	5.7500	3.200	0.1260	3.200	0.1260	2 350	3 580	362		**EE971355D/972100**	1	392.000	15.4331	520.000	20.4724	483.000	19.0157	8.000	0.3150	3.200	0.1260	3.200	0.1260	0.33	2.03	3.02	1.98
	13.5000	533.400	21.0000	146.050	5.7500	139.690	5.4996	6.400	0.2520	6.400	0.2520	2 770	4 550	453		**45T695315A**	1	393.000	15.4724	505.000	19.8819	484.000	19.0551	11.000	0.4331	6.400	0.2520	6.400	0.2520	0.33	2.03	3.02	1.98
343.052	13.5060	457.098	17.9960	120.650	4.7500	120.650	4.7500	SP	SP	SP	SP	1 780	3 470	340		**45T694612**	1	363.000	14.2913	438.000	17.2441	425.000	16.7323	7.000	0.2756	2.000	0.0787	0.800	0.0315	0.47	1.43	2.12	1.40
346.075	13.6250	488.950	19.2500	174.625	6.8750	174.625	6.8750	3.200	0.1260	3.200	0.1260	2 890	5 800	553		**HM262749D/HM262710**	1	378.000	14.8819	475.000	18.7008	450.000	17.7165	8.000	0.3150	3.200	0.1260	3.200	0.1260	0.33	2.02	3.00	1.97
347.663	13.6875	469.900	18.5000	138.113	5.4375	138.113	5.4375	3.200	0.1260	3.200	0.1260	2 240	4 520	439		**M262449D/M262410**	1	374.000	14.7244	456.000	17.9528	437.000	17.2047	9.000	0.3543	3.200	0.1260	3.200	0.1260	0.33	2.03	3.02	1.98
355.600	14.0000	444.500	17.5000	112.713	4.4375	114.300	4.5000	3.200	0.1260	1.600	0.0630	1 390	3 450	332		**L163149D/L163110**	1	377.000	14.8425	431.000	16.9685	418.000	16.4567	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.31	2.20	3.27	2.15
	14.0000	482.600	19.0000	133.350	5.2500	128.588	5.0625	3.200	0.1260	1.600	0.0630	1 910	3 510	346		**LM763449D/LM763410**	1	381.000	15.0000	469.000	18.4646	451.000	17.7559	4.000	0.1575	3.200	0.1260	1.600	0.0630	0.47	1.43	2.14	1.40
	14.0000	501.650	19.7500	127.000	5.0000	111.125	4.3750	3.200	0.1260	3.200	0.1260	1 700	3 280	322		**EE231401D/231975**	1	405.000	15.9449	488.000	19.2126	466.000	18.3465	2.000	0.0787	3.200	0.1260	3.200	0.1260	0.44	1.53	2.28	1.50

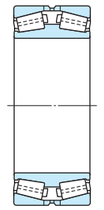
Note 1) SP indicates the specially chamfered from.

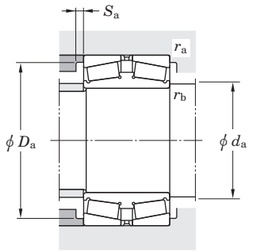
TDI type

d 368.300 ~ 536.575 mm
14.5000 ~ 21.1250 inch



Design 1


Design 1-P

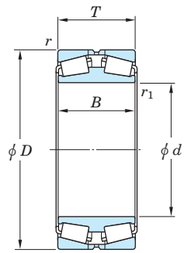


Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.	Design	Mounting dimensions										Constant	Axial load factors		
d		D		B		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u			d_a (max.)		D_a (max.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
368.300	14.5000	523.875	20.6250	185.738	7.3125	185.738	7.3125	6.400	0.2520	3.200	0.1260	3 420	6 780	644	**HM265049D/HM265010**	1-P	403.000	15.8661	500.000	19.6850	484.000	19.0551	7.000	0.2756	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
	14.5000	609.600	24.0000	254.000	10.0000	279.400	11.0000	6.400	0.2520	3.200	0.1260	5 420	9 060	813	**EE321146D/321240**	1	416.000	16.3780	585.000	23.0315	545.000	21.4567	7.000	0.2756	6.400	0.2520	3.200	0.1260	0.36	1.90	2.83	1.86
374.574	14.7470	546.100	21.5000	193.675	7.6250	193.675	7.6250	6.400	0.2520	3.200	0.1260	4 090	8 430	773	**HM266445D/HM266410**	1-P	418.000	16.4567	525.000	20.6693	505.000	19.8819	10.000	0.3937	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
384.175	15.1250	546.100	21.5000	193.675	7.6250	193.675	7.6250	6.400	0.2520	3.200	0.1260	4 090	8 430	773	**HM266449D/HM266410**	1-P	418.000	16.4567	525.000	20.6693	505.000	19.8819	10.000	0.3937	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
393.700	15.5000	546.100	21.5000	141.288	5.5625	120.650	4.7500	6.400	0.2520	3.200	0.1260	1 860	3 810	357	**EE234157D/234215**	1	437.000	17.2047	525.000	20.6693	497.600	19.5906	1.000	0.0394	6.400	0.2520	3.200	0.1260	0.48	1.42	2.11	1.39
	15.5000	546.100	21.5000	138.113	5.4375	138.113	5.4375	6.400	0.2520	1.600	0.0630	2 300	4 700	445	**LM767745D/LM767710**	1	435.000	17.1260	525.000	20.6693	510.000	20.0787	9.000	0.3543	6.400	0.2520	1.600	0.0630	0.48	1.42	2.11	1.39
400.000	15.7480	650.000	25.5906	250.000	9.8425	250.000	9.8425	SP	SP	SP	SP	5 860	9 790	868	**45T806525**	1-P	460.000	18.1102	620.000	24.4094	585.000	23.0315	13.000	0.5118	5.000	0.1969	5.000	0.1969	0.39	1.74	2.59	1.70
406.400	16.0000	546.100	21.5000	141.288	5.5625	120.650	4.7500	6.400	0.2520	1.600	0.0630	1 860	3 810	357	**EE234161D/234215**	1	437.000	17.2047	520.000	20.4724	497.600	19.5906	1.000	0.0394	6.400	0.2520	1.600	0.0630	0.48	1.42	2.11	1.39
	16.0000	546.100	21.5000	138.113	5.4375	138.113	5.4375	6.400	0.2520	1.600	0.0630	2 300	4 700	445	**LM767749D/LM767710**	1	435.000	17.1260	520.000	20.4724	510.000	20.0787	9.000	0.3543	6.400	0.2520	1.600	0.0630	0.48	1.42	2.11	1.39
415.925	16.3750	590.550	23.2500	209.550	8.2500	209.550	8.2500	6.400	0.2520	3.200	0.1260	4 240	8 930	803	**M268749D/M268710**	1-P	456.000	17.9528	565.000	22.2441	545.000	21.4567	9.000	0.3543	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
	16.3750	590.550	23.2500	209.550	8.2500	209.550	8.2500	6.400	0.2520	3.200	0.1260	4 590	9 070	818	**45T835921A**	1-P	451.000	17.7559	562.000	22.1260	548.000	21.5748	12.000	0.4724	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
419.227	16.5050	736.448	28.9940	406.400	16.0000	406.400	16.0000	6.400	0.2520	6.400	0.2520	10 900	19 000	1 540	**EE323166D/323290**	1-P	480.100	18.9016	710.000	27.9528	655.000	25.7874	9.000	0.3543	6.400	0.2520	6.400	0.2520	0.37	1.80	2.69	1.76
431.800	17.0000	635.000	25.0000	173.038	6.8125	173.038	6.8125	6.400	0.2520	6.400	0.2520	3 960	6 870	647	**EE931170D/931250**	1-P	482.000	18.9764	610.000	24.0157	585.000	23.0315	8.000	0.3150	6.400	0.2520	6.400	0.2520	0.32	2.10	3.13	2.06
431.902	17.0040	685.698	26.9960	254.000	10.0000	253.873	9.9950	6.400	0.2520	3.200	0.1260	6 420	11 600	1 000	**EE328172D/328269**	1-P	484.000	19.0551	660.000	25.9843	620.000	24.4094	11.000	0.4331	6.400	0.2520	3.200	0.1260	0.40	1.68	2.50	1.64
432.003	17.0080	609.524	23.9970	152.400	6.0000	152.400	6.0000	6.400	0.2520	3.600	0.1417	3 260	6 060	567	**EE736173D/736238**	1	473.000	18.6220	585.000	23.0315	565.000	22.2441	8.000	0.3150	6.400	0.2520	3.600	0.1417	0.35	1.95	2.90	1.91
447.675	17.6250	635.000	25.0000	223.838	8.8125	223.838	8.8125	6.400	0.2520	3.200	0.1260	4 920	10 500	917	**M270748D/M270710**	1-P	491.000	19.3307	610.000	24.0157	585.000	23.0315	8.000	0.3150	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
	17.6250	635.000	25.0000	223.838	8.8125	223.838	8.8125	6.400	0.2520	3.200	0.1260	4 920	10 500	917	**M270749D/M270710**	1-P	491.000	19.3307	610.000	24.0157	585.000	23.0315	8.000	0.3150	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
457.200	18.0000	596.900	23.5000	133.350	5.2500	130.175	5.1250	3.200	0.1260	1.600	0.0630	2 410	5 230	486	**EE244181D/244235**	1	488.000	19.2126	580.000	22.8346	555.000	21.8504	7.000	0.2756	3.200	0.1260	1.600	0.0630	0.40	1.67	2.48	1.63
	18.0000	596.900	23.5000	136.525	5.3750	133.350	5.2500	3.200	0.1260	1.600	0.0630	2 420	5 110	476	**L770849D/L770810**	1	488.000	19.2126	580.000	22.8346	560.000	22.0472	7.000	0.2756	3.200	0.1260	1.600	0.0630	0.47	1.43	2.12	1.40
	18.0000	660.400	26.0000	155.572	6.1249	155.575	6.1250	6.400	0.2520	3.200	0.1260	2 900	5 260	482	**EE737179D/737260**	1	500.000	19.6850	635.000	25.0000	600.000	23.6220	7.000	0.2756	6.400	0.2520	3.200	0.1260	0.37	1.80	2.69	1.76
479.425	18.8750	679.450	26.7500	238.125	9.3750	238.125	9.3750	6.400	0.2520	3.200	0.1260	5 200	10 800	924	**57567**	1	520.000	20.4724	655.000	25.7874	630.000	24.8031	7.000	0.2756	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
	18.8750	679.450	26.7500	238.125	9.3750	238.125	9.3750	6.400	0.2520	3.200	0.1260	5 310	11 100	952	**M272749D/M272710**	1-P	520.000	20.4724	655.000	25.7874	630.000	24.8031	7.000	0.2756	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
	18.8750	679.450	26.7500	238.125	9.3750	238.125	9.3750	6.400	0.2520	4.600	0.1811	5 740	11 600	1 000	**45T966824**	1-P	522.000	20.5512	651.000	25.6299	629.000	24.7638	12.500	0.4921	6.400	0.2520	SP	SP	0.33	2.03	3.02	1.98
482.600	19.0000	615.950	24.2500	158.750	6.2500	158.750	6.2500	6.400	0.2520	3.200	0.1260	3 040	7 110	639	**LM272249D/LM272210**	1	510.000	20.0787	590.000	23.2283	585.000	23.0315	8.000	0.3150	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
489.026	19.2530	634.873	24.9950	153.988	6.0625	153.988	6.0625	3.200	0.1260	3.200	0.1260	3 090	6 840	613	**LM772749D/LM772710**	1	510.000	20.0787	620.000	24.4094	595.000	23.4252	9.000	0.3543	3.200	0.1260	3.200	0.1260	0.47	1.43	2.12	1.40
501.650	19.7500	711.200	28.0000	250.825	9.8750	250.825	9.8750	6.400	0.2520	3.200	0.1260	5 890	12 400	1 040	**2TR502**	1	515.000	20.2756	683.000	26.8898	656.000	25.8268	10.000	0.3937	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
	19.7500	711.200	28.0000	250.825	9.8750	250.825	9.8750	6.400	0.2520	3.200	0.1260	6 150	12 800	1 100	**M274149D/M274110**	1-P	545.000	21.4567	685.000	26.9685	655.000	25.7874	10.000	0.3937	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
508.000	20.0000	762.000	30.0000	219.075	8.6250	219.075	8.6250	6.400	0.2520	6.400	0.2520	5 690	9 970	888	**EE531201D/531300**	1-P	560.000	22.0472	740.000	29.1339	695.000	27.3622	11.000	0.4331	6.400	0.2520	6.400	0.2520	0.38	1.78	2.65	1.74
	20.0000	838.200	33.0000	266.700	10.5000	266.700	10.5000	9.500	0.3740	6.400	0.2520	7 160	11 700	1 000	**EE426201D/426330**	1-P	580.000	22.8346	810.000	31.8898	755.000	29.7244	7.000	0.2756	9.500	0.3740	6.400	0.2520	0.48	1.41	2.10	1.38
519.113	20.4375	736.600	29.0000	258.763	10.1875	258.763	10.1875	6.400	0.2520	3.200	0.1260	6 630	13 600	1 140	**M275349D/M275310**	1-P	560.000	22.0472	710.000	27.9528	680.000	26.7717	10.000	0.3937	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
536.575	21.1250	761.873	29.9950	269.875	10.6250	269.875	10.6250	6.400	0.2520	3.200	0.1260	7 050	14 400	1 190	**M276449D/M276410**	1-P	575.000	22.6378	740.000	29.1339	700.000	27.5591	9.000	0.3543	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
	21.1250	761.873	29.9950	269.875	10.6250	269.875	10.6250	6.400	0.2520	3.200	0.1260	6 520	1 300	1 090	**2TR537**	1-P	578.000	22.7559	733.000	28.8583	700.000	27.5591	1.500	0.0591	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98

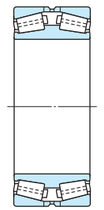
Note 1) SP indicates the specially chamfered from.

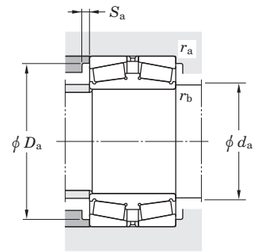
TDI type

d 555.625 ~ 939.800 mm
21.8750 ~ 37.0000 inch



Design 1


Design 1-P



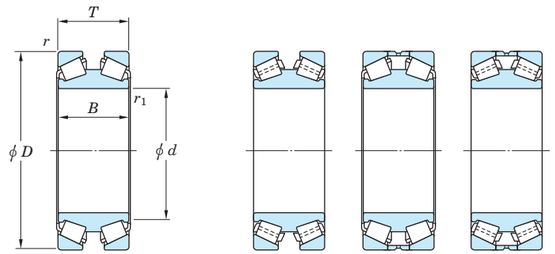
Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)		Bearing No.	Design	Mounting dimensions										Constant	Axial load factors		
d		D		B		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u				d_a (max.)		D_a (max.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch							mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
555.625	21.8750	698.500	27.5000	165.100	6.5000	165.100	6.5000	6.400	0.2520	3.200	0.1260	3 580	8 510	737		**2TR555**	1-P	569.000	22.4016	670.000	26.3780	662.000	26.0630	10.000	0.3937	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
558.800	22.0000	736.600	29.0000	196.850	7.7500	196.850	7.7500	6.400	0.2520	3.200	0.1260	4 500	9 870	854		**LM377449D/LM377410**	1-P	595.000	23.4252	710.000	27.9528	690.000	27.1654	9.000	0.3543	6.400	0.2520	3.200	0.1260	0.35	1.95	2.90	1.91
	22.0000	736.600	29.0000	196.850	7.7500	196.850	7.7500	6.400	0.2520	3.200	0.1260	4 800	10 800	923		**2TR559J**	1-P	595.000	23.4252	708.000	27.8740	689.000	27.1260	10.500	0.4134	6.400	0.2520	3.200	0.1260	0.35	1.95	2.90	1.91
571.500	22.5000	812.800	32.0000	285.750	11.2500	285.750	11.2500	6.400	0.2520	3.200	0.1260	8 150	17 500	1 400		**M278749D/M278710**	1-P	620.000	24.4094	790.000	31.1024	750.000	29.5276	11.000	0.4331	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
	22.5000	812.800	32.0000	285.750	11.2500	285.750	11.2500	6.400	0.2520	3.200	0.1260	7 190	16 300	1 300		**2TR572C**	1	629.000	24.7638	784.000	30.8661	743.000	29.2520	6.500	0.2559	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
595.313	23.4375	844.550	33.2500	296.863	11.6875	296.863	11.6875	6.400	0.2520	3.200	0.1260	8 500	18 500	1 460		**M280049D/M280010**	1-P	650.000	25.5906	820.000	32.2835	785.000	30.9055	7.000	0.2756	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
609.600	24.0000	787.400	31.0000	171.450	6.7500	171.450	6.7500	6.400	0.2520	3.200	0.1260	4 260	9 940	840		**EE649241D/649310**	1-P	645.000	25.3937	760.000	29.9213	740.000	29.1339	12.000	0.4724	6.400	0.2520	3.200	0.1260	0.37	1.82	2.70	1.78
635.000	25.0000	901.700	35.5000	317.500	12.5000	317.500	12.5000	6.400	0.2520	3.200	0.1260	9 370	19 900	1 540		**M281049D/M281010**	1-P	690.000	27.1654	870.000	34.2520	840.000	33.0709	7.000	0.2756	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
	25.0000	939.800	37.0000	304.800	12.0000	304.800	12.0000	6.500	0.2559	4.000	0.1575	9 890	19 800	1 540		**2TR635D**	1-P	653.000	25.7087	911.000	35.8661	863.000	33.9764	16.000	0.6299	5.000	0.1969	3.000	0.1181	0.33	2.03	3.02	1.98
	25.0000	939.800	37.0000	304.800	12.0000	304.800	12.0000	6.500	0.2559	4.000	0.1575	9 890	19 800	1 540		**2TR635D**	1-P	710.000	27.9528	911.000	35.8661	863.000	33.9764	15.500	0.6102	6.500	0.2559	4.000	0.1575	0.33	2.03	3.02	1.98
682.625	26.8750	965.200	38.0000	338.138	13.3125	338.138	13.3125	6.400	0.2520	3.200	0.1260	11 500	25 400	1 910		**2TR683**	1-P	744.000	29.2913	937.000	36.8898	894.000	35.1969	15.500	0.6102	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
685.800	27.0000	876.300	34.5000	171.450	6.7500	168.275	6.6250	6.400	0.2520	3.200	0.1260	4 400	10 800	880		**EE655271D/655345**	1-P	730.000	28.7402	850.000	33.4646	830.000	32.6772	9.000	0.3543	6.400	0.2520	3.200	0.1260	0.42	1.62	2.42	1.59
711.200	28.0000	914.400	36.0000	149.225	5.8750	149.225	5.8750	6.400	0.2520	3.200	0.1260	3 780	8 930	747		**EE755281D/755360**	1-P	770.000	30.3150	890.000	35.0394	870.000	34.2520	8.000	0.3150	6.400	0.2520	3.200	0.1260	0.38	1.78	2.65	1.74
714.375	28.1250	1 016.000	40.0000	339.725	13.3750	339.725	13.3750	6.400	0.2520	3.200	0.1260	12 200	26 100	1 940		**M383240D/M383210**	1-P	775.000	30.5118	990.000	38.9764	940.000	37.0079	14.000	0.5512	6.400	0.2520	3.200	0.1260	0.35	1.92	2.86	1.88
730.250	28.7500	1 035.050	40.7500	365.125	14.3750	365.125	14.3750	6.400	0.2520	3.200	0.1260	12 300	27 100	2 000		**M283449D/M283410**	1-P	790.000	31.1024	1 010.000	39.7638	960.000	37.7953	10.000	0.3937	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
749.300	29.5000	990.600	39.0000	293.000	11.5354	293.000	11.5354	6.400	0.2520	3.200	0.1260	9 820	23 900	1 780		**LM283649D/LM283610**	1-P	800.000	31.4961	960.000	37.7953	930.000	36.6142	12.000	0.4724	6.400	0.2520	3.200	0.1260	0.32	2.12	3.15	2.07
762.000	30.0000	1 079.500	42.5000	381.000	15.0000	381.000	15.0000	12.700	0.5000	4.800	0.1890	13 900	31 300	2 270		**M284249D/M284210**	1-P	830.000	32.6772	1 040.000	40.9449	1 000.000	39.3701	11.000	0.4331	12.700	0.5000	4.800	0.1890	0.33	2.03	3.02	1.98
825.500	32.5000	1 168.400	46.0000	409.575	16.1250	409.575	16.1250	12.700	0.5000	4.800	0.1890	16 300	36 200	2 550		**M285848D/M285810**	1-P	890.000	35.0394	1 130.000	44.4882	1 090.000	42.9134	15.000	0.5906	12.700	0.5000	4.800	0.1890	0.33	2.03	3.02	1.98
863.600	34.0000	1 130.300	44.5000	323.850	12.7500	323.850	12.7500	12.700	0.5000	4.800	0.1890	12 000	29 800	2 130		**LM286249D/LM286210**	1-P	920.000	36.2205	1 090.000	42.9134	1 070.000	42.1260	15.000	0.5906	12.700	0.5000	4.800	0.1890	0.32	2.08	3.10	2.04
	34.0000	1 219.200	48.0000	438.150	17.2500	425.450	16.7500	12.700	0.5000	4.800	0.1890	17 900	42 300	2 910		**EE547341D/547480**	1-P	940.000	37.0079	1 180.000	46.4567	1 130.000	44.4882	9.000	0.3543	12.700	0.5000	4.800	0.1890	0.33	2.03	3.02	1.98
939.800	37.0000	1 333.500	52.5000	463.550	18.2500	463.550	18.2500	12.700	0.5000	4.800	0.1890	21 000	47 700	3 210		**LM287849D/LM287810**	1-P	1 020.000	40.1575	1 290.000	50.7874	1 240.000	48.8189	15.000	0.5906	12.700	0.5000	4.800	0.1890	0.33	2.03	3.02	1.98

Note 1) SP indicates the specially chamfered from.

TDIS type

d 228.600 ~ 685.800 mm

9.0000 ~ 27.0000 inch

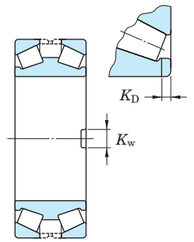


Design 1

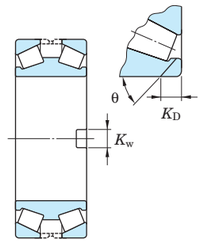
Design 1-P

Design 2

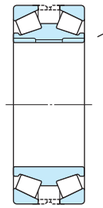
Design 2-P



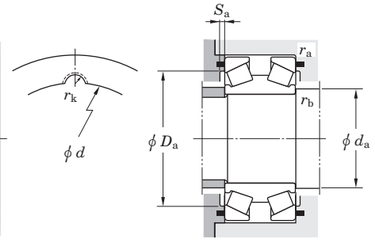
Face key way : A



Face key way : B



Bore key way : C

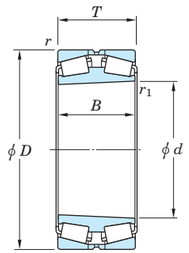


Boundary dimensions						Radial			Axial			Bearing No.	De-sign		Mounting dimensions						Face key way					Bore key way	Con-stant	Axial load factors		
						Basic load ratings (kN)		Fatigue load limit (kN)	Basic load ratings (kN)		Fatigue load limit (kN)				d_a (max.)	D_a (max.)	D_a (min.)	S_a (min.)	r_a (max.)	r_b (max.)	Type	K_w	K_D	θ	qty×Position	R_k				
d	D	B	T	$r^{1)}$ (min.)	$r_1{}^{1)}$ (min.)	C_r	C_{0r}	C_u	C_r	C_{0r}	C_u				mm	mm	mm	mm	mm	mm		mm	mm	deg		mm	e	Y_2	Y_3	Y_0
inch	inch	inch	inch	inch	inch										inch	inch	inch	inch	inch	inch		inch	inch			inch				
228.600	431.800	177.800	177.800	6.000	SP	2 440	3 400	348	2 140	4 530	467	**45T464318A-1**	2-P		259.000	377.000	342.000	8.500	5.000	5.000	A	35	15	—	1×2	—	0.88	0.76	1.14	0.75
9.0000	17.0000	7.0000	7.0000	0.2362	SP										10.1969	14.8425	13.4646	0.3346	0.1969	0.1969		1.3780	0.5906							
260.350	419.100	155.575	158.750	3.200	3.200	2 210	3 710	378	1 320	3 370	344	**45T524216**	2		291.000	374.000	349.000	7.500	3.000	3.000	B	40.2	18	45	1×2	—	0.60	1.12	1.67	1.10
10.2500	16.5000	6.1250	6.2500	0.1260	0.1260										11.4567	14.7244	13.7402	0.2953	0.1181	0.1181		1.5827	0.7087							
273.050	393.700	130.175	130.175	6.400	1.600	1 480	2 760	281	1 030	2 930	298	**45T553913**	2		292.000	359.000	337.000	7.500	5.000	1.500	—	—	—	—	—	—	0.70	0.97	1.44	0.94
10.7500	15.5000	5.1250	5.1250	0.2520	0.0630										11.4961	14.1339	13.2677	0.2953	0.1969	0.0591										
279.400	482.600	177.800	177.800	4.800	4.800	2 660	3 980	399	2 110	4 800	482	**45T564818B**	1-P		310.000	424.000	392.000	6.500	4.000	4.000	A	40	12	—	1×2	—	0.80	0.85	1.26	0.83
11.0000	19.0000	7.0000	7.0000	0.1890	0.1890										12.2047	16.6929	15.4331	0.2559	0.1575	0.1575		1.5748	0.4724							
365.600	514.350	140.000	140.000	4.000	SP	1 740	3 730	348	1 500	4 910	456	**45T735114A**	1		394.000	457.000	428.000	5.500	3.000	2.500	B	40	20	45	2×2	—	0.87	0.78	1.16	0.76
14.3937	20.2500	5.5118	5.5118	0.1575	SP										15.5118	17.9921	16.8504	0.2165	0.1181	0.0984		1.5748	0.7874							
374.650	501.650	120.650	130.175	6.000	3.300	1 590	3 160	303	1 370	4 160	397	**45T755013A**	1		399.000	463.000	436.000	2.500	5.000	3.000	B	50	10	—	1×2	—	0.87	0.78	1.16	0.76
14.7500	19.7500	4.7500	5.1250	0.2362	0.1299										15.7087	18.2283	17.1654	0.0984	0.1969	0.1181		1.9685	0.3937							
406.400	546.100	138.112	138.112	6.400	SP	1 870	3 920	368	1 610	5 160	482	**45T815514**	1		436.000	502.000	474.000	5.000	5.000	3.000	A	50	11	—	1×2	—	0.87	0.78	1.16	0.76
16.0000	21.5000	5.4375	5.4375	0.2520	SP										17.1654	19.7638	18.6614	0.1969	0.1969	0.1181		1.9685	0.4331							
482.600	733.501	200.025	200.000	6.400	6.400	3 690	7 100	611	4 000	11 600	1 010	**45T977320C**	1-P		513.000	651.000	603.000	5.000	5.000	5.000	B+C	50.8	38.1	45	2×2	8.05	1.09	0.62	0.92	0.61
19.0000	28.8780	7.8750	7.8740	0.2520	0.2520										20.1969	25.6299	23.7402	0.1969	0.1969	0.1969		2.0000	1.5000			0.3169				
482.600	733.501	200.025	200.000	17.500	6.400	3 690	7 100	611	4 000	11 600	1 010	**45T977320D**	1-P		513.000	651.000	603.000	5.000	10.000	5.000	A	50.8	19.05	—	2×2	—	1.09	0.62	0.92	0.61
19.0000	28.8780	7.8750	7.8740	0.6890	0.2520										20.1969	25.6299	23.7402	0.1969	0.3937	0.1969		2.0000	0.7500							
482.600	733.501	200.025	200.000	17.500	6.400	3 690	7 100	611	4 000	11 600	1 010	**45T977320J**	1-P		513.000	651.000	603.000	5.000	10.000	5.000	A	50.8	19.05	—	1×2	—	1.09	0.62	0.92	0.61
19.0000	28.8780	7.8750	7.8740	0.6890	0.2520										20.1969	25.6299	23.7402	0.1969	0.3937	0.1969		2.0000	0.7500							
509.998	733.500	200.020	200.020	5.000	6.000	4 030	8 000	696	3 270	9 880	859	**2TR510L-1**	1-P		560.000	667.000	630.000	3.500	4.000	5.000	B	50.8	38.1	45	2×2	—	0.81	0.83	1.23	0.81
20.0787	28.8780	7.8748	7.8748	0.1969	0.2362										22.0472	26.2598	24.8031	0.1378	0.1575	0.1969		2.0000	1.5000							
660.000	814.000	176.212	176.212	6.400	SP	3 280	8 780	709	2 280	9 340	752	**2TR660C**	1		686.000	766.000	735.000	5.000	5.000	2.500	B	50	20	45	1×2	—	0.70	0.97	1.44	0.94
25.9843	32.0472	6.9375	6.9375	0.2520	SP										27.0079	30.1575	28.9370	0.1969	0.1969	0.0984		1.9685	0.7874							
685.800	939.800	235.000	228.600	SP	SP	6 160	12 800	1 030	4 690	14 900	1 190	**2TR686A**	1-P		730.000	868.000	827.000	8.500	1.000	3.000	B	63.6	38.5	45	1×2	—	0.76	0.88	1.31	0.86
27.0000	37.0000	9.2520	9.0000	SP	SP										28.7402	34.1732	32.5591	0.3346	0.0394	0.1181		2.5039	1.5157							
685.800	939.800	234.950	227.810	6.400	SP	5 500	13 000	1 020	4 740	17 200	1 340	**2TR686C**	1-P		745.000	865.000	819.000	6.500	5.000	3.000	B	80	38.1	45	2×2	—	0.87	0.78	1.16	0.76
27.0000	37.0000	9.2500	8.9689	0.2520	SP										29.3307	34.0551	32.2441	0.2559	0.1969	0.1181		3.1496	1.5000							

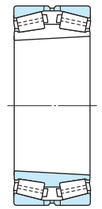
Note 1) SP indicates the specially chamfered from.

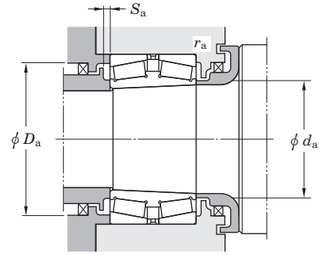
TDIT type

d 127.000 ~ 406.400 mm
5.0000 ~ 16.0000 inch



Design 1

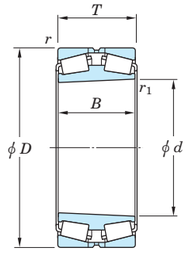

Design 1-P



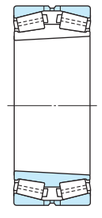
Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)		Bearing No.	De-sign	Mounting dimensions												Con-stant	Axial load factors		
d		D		B		T		r (min.)		r_1 (min.)		C_r	C_{0r}	C_u				d_a (max.)		D_a (max.)		D_a (min.)		S_a (min.)		r_a (max.)		r_b (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch							mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
127.000	5.0000	182.563	7.1875	76.200	3.0000	76.200	3.0000	3.200	0.1260	1.600	0.0630	487	858	120		**48290TD/48220**	1	141.000	5.5512	171.000	6.7323	166.000	6.5354	3.800	0.1496	3.200	0.1260	1.600	0.0630	0.31	2.21	3.29	2.16
133.350	5.2500	196.850	7.7500	92.075	3.6250	92.075	3.6250	3.200	0.1260	1.600	0.0630	669	1 120	137		**67390TD/67322**	1	146.000	5.7480	185.000	7.2835	180.000	7.0866	5.000	0.1969	3.200	0.1260	1.600	0.0630	0.34	1.96	2.92	1.92
136.525	5.3750	215.900	8.5000	123.825	4.8750	123.825	4.8750	3.200	0.1260	1.600	0.0630	691	1 100	132		**74539TD/74850**	1	154.000	6.0630	204.000	8.0315	193.000	7.5984	5.000	0.1969	3.200	0.1260	1.600	0.0630	0.49	1.38	2.06	1.35
142.875	5.6250	200.025	7.8750	74.613	2.9375	77.788	3.0625	3.300	0.1299	0.800	0.0315	527	982	133		**48685TD/48620**	1	156.000	6.1417	188.000	7.4016	182.000	7.1654	4.000	0.1575	3.300	0.1299	0.800	0.0315	0.34	2.01	2.99	1.96
147.638	5.8125	241.300	9.5000	132.334	5.2100	133.351	5.2500	3.200	0.1260	1.600	0.0630	904	1 460	171		**82581TD/82950**	1	166.000	6.5354	229.000	9.0157	211.000	8.3071	7.000	0.2756	3.200	0.1260	1.600	0.0630	0.44	1.53	2.27	1.49
152.400	6.0000	254.000	10.0000	120.650	4.7500	120.650	4.7500	3.200	0.1260	1.600	0.0630	1 180	1 830	215		**99600TD/99100**	1	172.000	6.7717	242.000	9.5276	223.000	8.7795	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.41	1.66	2.47	1.62
165.100	6.5000	269.875	10.6250	146.050	5.7500	146.050	5.7500	3.200	0.1260	1.600	0.0630	1 430	2 220	252		**H234649TD/H234610**	1	187.000	7.3622	258.000	10.1575	243.000	9.5669	5.000	0.1969	3.200	0.1260	1.600	0.0630	0.33	2.03	3.02	1.98
180.975	7.1250	288.925	11.3750	158.750	6.2500	158.750	6.2500	3.200	0.1260	1.600	0.0630	1 180	1 920	216		**94713TD/94113**	1	201.000	7.9134	277.000	10.9055	255.000	10.0394	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.47	1.44	2.15	1.41
	7.1250	288.925	11.3750	158.750	6.2500	158.750	6.2500	3.200	0.1260	1.600	0.0630	1 430	1 950	245		**HM237549TD/HM237510**	1	201.000	7.9134	277.000	10.9055	260.000	10.2362	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.32	2.12	3.15	2.07
190.500	7.5000	365.049	14.3720	152.400	6.0000	158.750	6.2500	3.200	0.1260	3.200	0.1260	2 020	2 920	319		**EE420750TD/421437**	1	239.000	9.4094	353.000	13.8976	317.000	12.4803	6.000	0.2362	3.200	0.1260	3.200	0.1260	0.40	1.68	2.50	1.64
198.438	7.8125	282.575	11.1250	87.313	3.4375	87.313	3.4375	3.200	0.1260	0.800	0.0315	749	1 410	155		**67980TD/67920**	1	220.000	8.6614	271.000	10.6693	259.000	10.1969	7.000	0.2756	3.200	0.1260	0.800	0.0315	0.51	1.33	1.97	1.30
209.550	8.2500	317.500	12.5000	184.150	7.2500	184.150	7.2500	3.200	0.1260	1.600	0.0630	1 300	2 270	244		**93826TD/93125**	1	223.000	8.7795	306.000	12.0472	278.000	10.9449	7.000	0.2756	3.200	0.1260	1.600	0.0630	0.52	1.29	1.92	1.26
219.075	8.6250	358.775	14.1250	200.025	7.8750	196.850	7.7500	6.400	0.2520	1.600	0.0630	2 660	4 580	469		**H244848TD/H244810**	1	245.000	9.6457	340.000	13.3858	319.000	12.5591	9.000	0.3543	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
222.250	8.7500	355.600	14.0000	130.175	5.1250	127.000	5.0000	3.200	0.1260	1.600	0.0630	1 410	2 630	278		**96876TD/96140**	1	253.000	9.9606	343.000	13.5039	312.000	12.2835	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.59	1.14	1.70	1.12
252.413	9.9375	358.775	14.1250	139.700	5.5000	130.175	5.1250	3.200	0.1260	1.600	0.0630	1 660	3 170	333		**M249746TD/M249710**	1	275.000	10.8268	346.000	13.6220	330.000	12.9921	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.33	2.03	3.02	1.98
263.525	10.3750	400.050	15.7500	192.088	7.5625	196.848	7.7499	6.400	0.2520	1.600	0.0630	1 630	2 570	274		**EE221039TD/221575**	1	292.000	11.4961	381.000	15.0000	359.000	14.1339	6.000	0.2362	6.400	0.2520	1.600	0.0630	0.39	1.71	2.54	1.67
266.700	10.5000	355.600	14.0000	109.538	4.3125	107.950	4.2500	3.200	0.1260	1.600	0.0630	1 300	2 550	267		**LM451349TD/LM451310**	1	285.000	11.2205	343.000	13.5039	332.000	13.0709	8.000	0.3150	3.200	0.1260	1.600	0.0630	0.36	1.87	2.79	1.83
280.000	11.0236	406.400	16.0000	206.375	8.1250	206.375	8.1250	3.200	0.1260	3.200	0.1260	1 650	2 950	307		**EE128113TD/128160**	1	308.000	12.1260	394.000	15.5118	368.000	14.4882	7.000	0.2756	3.200	0.1260	3.200	0.1260	0.39	1.75	2.61	1.71
288.925	11.3750	406.400	16.0000	144.463	5.6875	144.463	5.6875	3.200	0.1260	3.200	0.1260	2 160	4 420	445		**M255449TD/M255410**	1	316.000	12.4409	394.000	15.5118	373.000	14.6850	8.000	0.3150	3.200	0.1260	3.200	0.1260	0.34	2.00	2.97	1.95
303.213	11.9375	495.300	19.5000	263.525	10.3750	263.525	10.3750	6.400	0.2520	3.200	0.1260	5 020	9 340	858		**HH258249TD/HH258210**	1-P	342.000	13.4646	476.000	18.7402	441.000	17.3622	8.000	0.3150	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
333.375	13.1250	469.900	18.5000	166.688	6.5625	166.688	6.5625	3.200	0.1260	3.200	0.1260	2 900	5 680	548		**HM261049TD/HM261010**	1-P	360.000	14.1732	456.000	17.9528	432.000	17.0079	8.000	0.3150	3.200	0.1260	3.200	0.1260	0.33	2.02	3.00	1.97
	13.1250	523.875	20.6250	185.738	7.3125	185.738	7.3125	6.400	0.2520	3.200	0.1260	3 420	6 780	644		**HM265032TD/HM265010**	1-P	403.000	15.8661	500.000	19.6850	483.000	19.0157	7.000	0.2756	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
344.091	13.5469	488.950	19.2500	184.150	7.2500	174.625	6.8750	3.200	0.1260	3.200	0.1260	2 890	5 800	553		**HM262746TD/HM262710**	1	376.000	14.8031	475.000	18.7008	450.000	17.7165	8.000	0.3150	3.200	0.1260	3.200	0.1260	0.33	2.02	3.00	1.97
346.075	13.6250	488.950	19.2500	174.625	6.8750	174.625	6.8750	3.200	0.1260	3.200	0.1260	2 890	5 800	553		**HM262749TD/HM262710**	1	378.000	14.8819	475.000	18.7008	450.000	17.7165	8.000	0.3150	3.200	0.1260	3.200	0.1260	0.33	2.02	3.00	1.97
368.300	14.5000	523.875	20.6250	185.738	7.3125	185.738	7.3125	6.400	0.2520	3.200	0.1260	3 420	6 780	644		**HM265049TD/HM265010**	1-P	403.000	15.8661	500.000	19.6850	483.000	19.0157	7.000	0.2756	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
384.175	15.1250	546.100	21.5000	193.675	7.6250	193.675	7.6250	6.400	0.2520	3.200	0.1260	4 090	8 430	773		**HM266449TD/HM266410**	1-P	418.000	16.4567	525.000	20.6693	505.000	19.8819	10.000	0.3937	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
406.400	16.0000	590.550	23.2500	209.550	8.2500	209.550	8.2500	6.400	0.2520	3.200	0.1260	4 240	8 930	803		**M268743TD/M268710**	1-P	456.000	17.9528	570.000	22.4409	545.000	21.4567	9.000	0.3543	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98

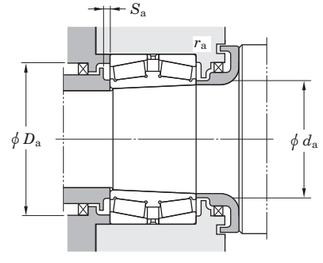
TDIT type

d 415.925 ~ 519.113 mm
16.3750 ~ 20.4375 inch



Design 1

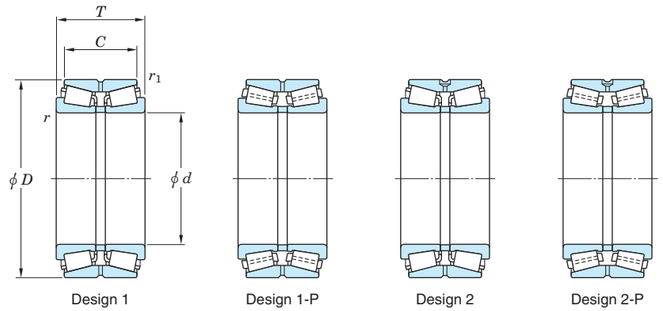

Design 1-P



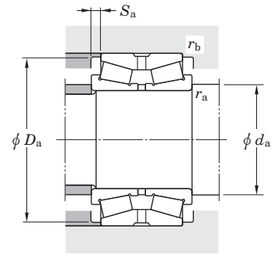
Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)		Bearing No.	Design	Mounting dimensions												Constant	Axial load factors		
d		D		B		T		r (min.)		r_1 (min.)		C_r	C_{0r}	C_u				d_a (max.)		D_a (max.)		D_a (min.)		S_a (min.)		r_a (max.)		r_b (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch							mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
415.925	16.3750	590.550	23.2500	209.550	8.2500	209.550	8.2500	6.400	0.2520	3.200	0.1260	4 240	8 930	803		**M268749TD/M268710**	1-P	456.000	17.9528	570.000	22.4409	545.000	21.4567	9.000	0.3543	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
447.675	17.6250	635.000	25.0000	223.838	8.8125	223.838	8.8125	6.400	0.2520	3.200	0.1260	4 920	10 500	917		**M270749TD/M270710**	1-P	491.000	19.3307	610.000	24.0157	585.000	23.0315	8.000	0.3150	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
479.425	18.8750	679.450	26.7500	238.125	9.3750	238.125	9.3750	6.400	0.2520	3.200	0.1260	5 310	11 100	952		**M272749TD/M272710**	1-P	520.000	20.4724	655.000	25.7874	630.000	24.8031	7.000	0.2756	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
501.650	19.7500	711.200	28.0000	250.825	9.8750	250.825	9.8750	6.400	0.2520	3.200	0.1260	6 150	12 800	1 100		**M274149TD/M274110**	1-P	545.000	21.4567	690.000	27.1654	655.000	25.7874	10.000	0.3937	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98
519.113	20.4375	736.600	29.0000	258.763	10.1875	258.763	10.1875	6.400	0.2520	3.200	0.1260	6 630	13 600	1 140		**M275349TD/M275310**	1-P	560.000	22.0472	710.000	27.9528	680.000	26.7717	10.000	0.3937	6.400	0.2520	3.200	0.1260	0.33	2.03	3.02	1.98

TDO · TDOS type

d 73.025 ~ (133.350) mm
2.8750 ~ (5.2500) inch



Design 1 | Design 1-P | Design 2 | Design 2-P

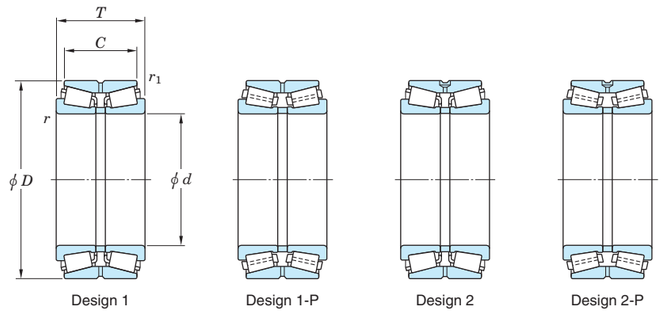


Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.	Design	Mounting dimensions										Constant	Axial load factors		
d		D		C		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u			d_a (min.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
73.025	2.8750	127.000	5.0000	65.088	2.5625	80.963	3.1875	1.600	0.0630	3.600	0.1417	337	453	71.0	**567/563D**	1	92.000	3.6220	118.000	4.6457	8.000	0.3150	1.600	0.0630	3.600	0.1417	0.36	1.86	2.76	1.81
76.200	3.0000	161.925	6.3750	70.637	2.7810	105.562	4.1560	0.800	0.0315	3.600	0.1417	526	573	78.0	**9285R/9220D**	1	95.000	3.7402	152.000	5.9843	17.500	0.6890	0.800	0.0315	3.600	0.1417	0.71	0.95	1.42	0.93
80.963	3.1875	136.525	5.3750	53.975	2.1250	69.850	2.7500	0.800	0.0315	3.600	0.1417	287	396	60.0	**496/493D**	1	99.000	3.8976	127.000	5.0000	8.000	0.3150	0.800	0.0315	3.600	0.1417	0.44	1.52	2.26	1.49
88.900	3.5000	152.400	6.0000	63.500	2.5000	82.550	3.2500	0.800	0.0315	3.600	0.1417	395	575	85.0	**593/592D**	1	107.000	4.2126	140.000	5.5118	9.600	0.3780	0.800	0.0315	3.600	0.1417	0.44	1.53	2.27	1.49
	3.5000	171.450	6.7500	95.250	3.7500	114.300	4.5000	0.800	0.0315	3.600	0.1417	591	779	103	**46T191710**	1	107.000	4.2126	158.000	6.2205	9.600	0.3780	0.800	0.0315	3.600	0.1417	0.37	1.84	2.74	1.80
95.250	3.7500	149.225	5.8750	52.388	2.0625	66.672	2.6249	0.800	0.0315	3.000	0.1181	307	449	66.0	**42375/587D**	1	110.000	4.3307	140.000	5.5118	7.200	0.2835	0.800	0.0315	3.000	0.1181	0.49	1.37	2.04	1.34
100.000	3.9370	304.800	12.0000	127.000	5.0000	184.160	7.2504	SP	SP	SP	SP	1 490	1 630	187	**46T203018**	1	117.000	4.6063	285.000	11.2205	28.000	1.1024	4.000	0.1575	2.000	0.0787	0.80	0.85	1.26	0.83
101.600	4.0000	168.275	6.6250	69.850	2.7500	92.075	3.6250	0.800	0.0315	3.600	0.1417	484	698	101	**687/672D**	1	120.000	4.7244	156.000	6.1417	11.200	0.4409	0.800	0.0315	3.600	0.1417	0.47	1.43	2.14	1.40
	4.0000	200.025	7.8750	80.216	3.1581	115.888	4.5625	2.400	0.0945	3.600	0.1417	743	941	118	**98400/98789D**	1	120.000	4.7244	185.000	7.2835	17.900	0.7047	2.400	0.0945	3.600	0.1417	0.63	1.07	1.59	1.04
104.775	4.1250	180.975	7.1250	85.725	3.3750	104.775	4.1250	1.600	0.0630	3.600	0.1417	620	876	113	**782/774D**	1	123.000	4.8425	165.000	6.4961	9.600	0.3780	1.600	0.0630	3.600	0.1417	0.39	1.75	2.61	1.71
105.000	4.1339	190.000	7.4803	70.000	2.7559	88.000	3.4646	SP	SP	SP	SP	530	632	84.0	**46T211909**	1	117.000	4.6063	178.000	7.0079	9.000	0.3543	2.000	0.0787	0.800	0.0315	0.42	1.60	2.38	1.56
107.950	4.2500	146.050	5.7500	39.688	1.5625	49.213	1.9375	0.800	0.0315	1.600	0.0630	186	334	47.0	**L521949R/L521910D**	1	117.000	4.6063	138.000	5.4331	4.800	0.1890	0.800	0.0315	1.600	0.0630	0.39	1.72	2.56	1.68
111.125	4.3750	214.313	8.4375	84.138	3.3125	115.888	4.5625	1.600	0.0630	3.600	0.1417	868	1 160	141	**H924045/H924010D**	1	130.000	5.1181	202.000	7.9528	15.900	0.6260	1.600	0.0630	3.600	0.1417	0.67	1.00	1.49	0.98
114.300	4.5000	212.725	8.3750	117.475	4.6250	142.875	5.6250	1.600	0.0630	7.100	0.2795	965	1 350	168	**938/932D**	1	143.000	5.6299	192.000	7.5591	12.700	0.5000	1.600	0.0630	7.100	0.2795	0.33	2.07	3.09	2.03
127.000	5.0000	169.975	6.6919	49.213	1.9375	58.738	2.3125	1.600	0.0630	1.000	0.0394	282	501	69.6	**L225849/L225812D**	1	136.000	5.3543	162.000	6.3780	4.800	0.1890	1.600	0.0630	1.000	0.0394	0.33	2.03	3.02	1.98
	5.0000	182.563	7.1875	73.025	2.8750	85.725	3.3750	3.600	0.1417	0.800	0.0315	487	858	120	**48290/48220D**	1	140.000	5.5118	174.000	6.8504	6.400	0.2520	3.600	0.1417	0.800	0.0315	0.31	2.21	3.29	2.16
	5.0000	196.850	7.7500	85.725	3.3750	101.600	4.0000	3.600	0.1417	0.800	0.0315	669	1 120	137	**67388/67322D**	1	140.000	5.5118	189.000	7.4409	7.900	0.3110	3.600	0.1417	0.800	0.0315	0.34	1.96	2.92	1.92
	5.0000	200.025	7.8750	85.725	3.3750	101.600	4.0000	3.600	0.1417	0.800	0.0315	669	1 120	137	**67388/67325D**	1	140.000	5.5118	189.000	7.4409	7.900	0.3110	3.600	0.1417	0.800	0.0315	0.34	1.96	2.92	1.92
	5.0000	215.900	8.5000	80.963	3.1875	106.363	4.1875	3.600	0.1417	1.600	0.0630	691	1 100	132	**74500/74851D**	1	140.000	5.5118	205.000	8.0709	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.49	1.38	2.06	1.35
	5.0000	228.600	9.0000	84.138	3.3125	115.888	4.5625	3.600	0.1417	2.400	0.0945	700	918	111	**97500/97901D**	1	140.000	5.5118	213.000	8.3858	15.900	0.6260	3.600	0.1417	2.400	0.0945	0.74	0.92	1.36	0.90
	5.0000	228.600	9.0000	84.138	3.3125	115.888	4.5625	3.600	0.1417	2.400	0.0945	925	1 300	154	**HM926747/HM926710D**	1	140.000	5.5118	219.000	8.6220	15.900	0.6260	3.600	0.1417	2.400	0.0945	0.74	0.92	1.36	0.90
	5.0000	234.950	9.2500	114.300	4.5000	142.875	5.6250	6.400	0.2520	1.600	0.0630	1 120	1 650	200	**95500/95927D**	1	145.000	5.7087	217.000	8.5433	14.300	0.5630	6.400	0.2520	1.600	0.0630	0.37	1.83	2.72	1.79
127.792	5.0312	228.600	9.0000	84.138	3.3125	115.888	4.5625	3.600	0.1417	2.400	0.0945	925	1 300	154	**HM926749/HM926710D**	1	140.000	5.5118	219.000	8.6220	15.900	0.6260	3.600	0.1417	2.400	0.0945	0.74	0.92	1.36	0.90
128.588	5.0625	206.375	8.1250	82.550	3.2500	107.950	4.2500	3.200	0.1260	0.800	0.0315	702	1 100	134	**799/792D**	1	140.000	5.5118	195.000	7.6772	12.700	0.5000	3.200	0.1260	0.800	0.0315	0.46	1.47	2.19	1.44
130.000	5.1181	206.375	8.1250	82.550	3.2500	107.950	4.2500	3.600	0.1417	0.800	0.0315	702	1 100	134	**797/792D**	1	143.000	5.6299	195.000	7.6772	12.700	0.5000	3.600	0.1417	0.800	0.0315	0.46	1.47	2.19	1.44
130.175	5.1250	196.850	7.7500	85.725	3.3750	101.600	4.0000	3.600	0.1417	0.800	0.0315	669	1 120	137	**67389/67322D**	1	143.000	5.6299	189.000	7.4409	7.900	0.3110	3.600	0.1417	0.800	0.0315	0.34	1.96	2.92	1.92
	5.1250	206.375	8.1250	82.550	3.2500	107.950	4.2500	3.600	0.1417	0.800	0.0315	702	1 100	134	**799A/792D**	1	143.000	5.6299	195.000	7.6772	12.700	0.5000	3.600	0.1417	0.800	0.0315	0.46	1.47	2.19	1.44
133.350	5.2500	177.008	6.9688	47.625	1.8750	57.150	2.2500	1.600	0.0630	0.800	0.0315	302	557	76.4	**L327249/L327210D**	1	142.000	5.5906	169.000	6.6535	4.800	0.1890	1.600	0.0630	0.800	0.0315	0.35	1.94	2.89	1.90
	5.2500	190.500	7.5000	73.025	2.8750	85.725	3.3750	3.600	0.1417	0.800	0.0315	505	944	129	**48385/48320D**	1	146.000	5.7480	182.000	7.1654	6.400	0.2520	3.600	0.1417	0.800	0.0315	0.32	2.10	3.13	2.06
	5.2500	196.850	7.7500	85.725	3.3750	101.600	4.0000	3.600	0.1417	0.800	0.0315	669	1 120	137	**67390/67322D**	1	146.000	5.7480	189.000	7.4409	7.900	0.3110	3.600	0.1417	0.800	0.0315	0.34	1.96	2.92	1.92
	5.2500	196.850	7.7500	85.725	3.3750	101.600	4.0000	7.900	0.3110	0.800	0.0315	669	1 120	137	**67391/67322D**	1	155.000	6.1024	189.000	7.4409	7.900	0.3110	7.900	0.3110	0.800	0.0315	0.34	1.96	2.92	1.92
	5.2500	200.025	7.8750	85.725	3.3750	101.600	4.0000	3.600	0.1417	0.800	0.0315	669	1 120	137	**67390/67325D**	1	146.000	5.7480	189.000	7.4409	7.900	0.3110	3.600	0.1417	0.800	0.0315	0.34	1.96	2.92	1.92

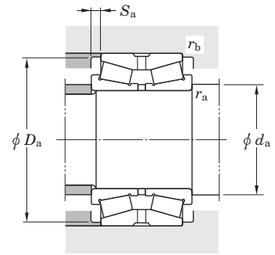
Note 1) SP indicates the specially chamfered from.

TDO · TDOS type

d (133.350) ~ (165.100) mm
(5.2500) ~ (6.5000) inch



Design 1 | Design 1-P | Design 2 | Design 2-P

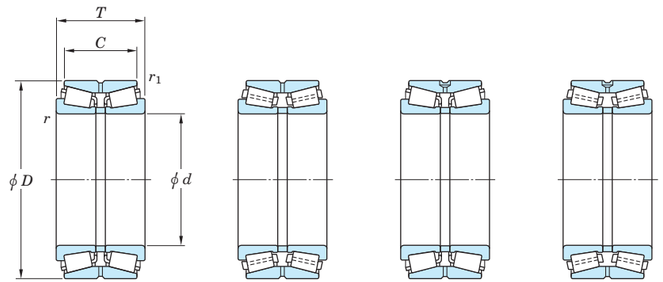


Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)		Bearing No.	Design	Mounting dimensions										Constant	Axial load factors		
d		D		C		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u				d_a (min.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch							mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
133.350	5.2500	215.900	8.5000	80.963	3.1875	106.363	4.1875	3.600	0.1417	1.600	0.0630	691	1 100	132		**74525/74851D**	1	146.000	5.7480	205.000	8.0709	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.49	1.38	2.06	1.35
	5.2500	234.950	9.2500	114.300	4.5000	142.875	5.6250	9.500	0.3740	1.600	0.0630	1 120	1 650	200		**95525/95927D**	1	158.000	6.2205	217.000	8.5433	14.300	0.5630	9.500	0.3740	1.600	0.0630	0.37	1.83	2.72	1.79
	5.2500	234.950	9.2500	114.300	4.5000	142.875	5.6250	4.700	0.1850	1.600	0.0630	1 120	1 650	200		**95528/95927D**	1	148.000	5.8268	217.000	8.5433	14.300	0.5630	4.700	0.1850	1.600	0.0630	0.37	1.83	2.72	1.79
136.525	5.3750	190.500	7.5000	73.025	2.8750	85.725	3.3750	3.600	0.1417	0.800	0.0315	505	944	129		**48393/48320D**	1	149.000	5.8661	182.000	7.1654	6.400	0.2520	3.600	0.1417	0.800	0.0315	0.32	2.10	3.13	2.06
	5.3750	215.900	8.5000	80.963	3.1875	106.363	4.1875	3.600	0.1417	1.600	0.0630	691	1 100	132		**74537/74851D**	1	149.000	5.8661	205.000	8.0709	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.49	1.38	2.06	1.35
	5.3750	228.600	9.0000	98.425	3.8750	123.825	4.8750	3.600	0.1417	1.600	0.0630	947	1 460	175		**896/892D**	1	149.000	5.8661	215.000	8.4646	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.42	1.60	2.39	1.57
139.700	5.5000	215.900	8.5000	80.963	3.1875	106.363	4.1875	3.600	0.1417	1.600	0.0630	691	1 100	132		**74550/74851D**	1	152.000	5.9843	205.000	8.0709	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.49	1.38	2.06	1.35
	5.5000	215.900	8.5000	80.963	3.1875	106.363	4.1875	6.400	0.2520	1.600	0.0630	691	1 100	132		**74550A/74851D**	1	158.000	6.2205	205.000	8.0709	12.700	0.5000	6.400	0.2520	1.600	0.0630	0.49	1.38	2.06	1.35
	5.5000	228.600	9.0000	98.425	3.8750	123.825	4.8750	3.600	0.1417	1.600	0.0630	947	1 460	175		**898/892D**	1	152.000	5.9843	215.000	8.4646	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.42	1.60	2.39	1.57
	5.5000	228.600	9.0000	98.425	3.8750	123.825	4.8750	6.400	0.2520	1.600	0.0630	947	1 460	175		**898A/892D**	1	158.000	6.2205	215.000	8.4646	12.700	0.5000	6.400	0.2520	1.600	0.0630	0.42	1.60	2.39	1.57
	5.5000	236.538	9.3125	106.363	4.1875	131.763	5.1875	3.600	0.1417	1.600	0.0630	904	1 460	171		**82550/82932D**	1	152.000	5.9843	225.000	8.8583	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.44	1.53	2.27	1.49
	5.5000	236.538	9.3125	106.363	4.1875	131.763	5.1875	3.600	0.1417	1.600	0.0630	1 080	1 660	198		**HM231132/HM231111D**	1	152.000	5.9843	223.000	8.7795	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.32	2.12	3.15	2.07
	5.5000	254.000	10.0000	111.125	4.3750	149.225	5.8750	7.100	0.2795	1.600	0.0630	1 180	1 830	215		**99550/99102D**	1	159.000	6.2598	237.000	9.3307	19.100	0.7520	7.100	0.2795	1.600	0.0630	0.41	1.66	2.47	1.62
	5.5000	307.975	12.1250	155.575	6.1250	200.025	7.8750	9.500	0.3740	2.400	0.0945	2 180	2 900	331		**HH234031/HH234011D**	1	164.000	6.4567	285.000	11.2205	22.200	0.8740	9.500	0.3740	2.400	0.0945	0.33	2.07	3.08	2.02
142.875	5.6250	200.025	7.8750	73.025	2.8750	87.315	3.4376	7.900	0.3110	0.800	0.0315	527	982	133		**48684/48620D**	1	164.000	6.4567	191.000	7.5197	7.100	0.2795	7.900	0.3110	0.800	0.0315	0.34	2.01	2.99	1.96
	5.6250	200.025	7.8750	73.025	2.8750	87.315	3.4376	3.600	0.1417	0.800	0.0315	527	982	133		**48685/48620D**	1	156.000	6.1417	191.000	7.5197	7.100	0.2795	3.600	0.1417	0.800	0.0315	0.34	2.01	2.99	1.96
	5.6250	236.538	9.3125	106.363	4.1875	131.763	5.1875	3.600	0.1417	1.600	0.0630	904	1 460	171		**82562/82932D**	1	156.000	6.1417	225.000	8.8583	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.44	1.53	2.27	1.49
146.050	5.7500	193.675	7.6250	53.975	2.1250	65.085	2.5624	1.600	0.0630	0.800	0.0315	402	750	101		**36690/36620D**	1	155.000	6.1024	186.000	7.3228	5.600	0.2205	1.600	0.0630	0.800	0.0315	0.37	1.83	2.73	1.79
	5.7500	193.675	7.6250	53.975	2.1250	65.085	2.5624	4.800	0.1890	0.800	0.0315	402	750	101		**36691/36620D**	1	161.000	6.3386	186.000	7.3228	5.600	0.2205	4.800	0.1890	0.800	0.0315	0.37	1.83	2.73	1.79
	5.7500	236.538	9.3125	106.363	4.1875	131.763	5.1875	3.600	0.1417	1.600	0.0630	904	1 460	171		**82576/82932D**	1	159.000	6.2598	225.000	8.8583	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.44	1.53	2.27	1.49
	5.7500	236.538	9.3125	106.363	4.1875	131.763	5.1875	3.600	0.1417	1.600	0.0630	1 080	1 660	198		**HM231140/HM231111D**	1	159.000	6.2598	223.000	8.7795	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.32	2.12	3.15	2.07
	5.7500	254.000	10.0000	111.125	4.3750	149.225	5.8750	7.100	0.2795	1.600	0.0630	1 180	1 830	215		**99575/99102D**	1	166.000	6.5354	237.000	9.3307	19.100	0.7520	7.100	0.2795	1.600	0.0630	0.41	1.66	2.47	1.62
	5.7500	268.288	10.5625	125.413	4.9375	160.338	6.3125	6.400	0.2520	1.600	0.0630	1 410	2 090	239		**EE107057/107105D**	1	164.000	6.4567	249.000	9.8031	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.39	1.74	2.59	1.70
	5.7500	304.800	12.0000	97.633	3.8438	135.733	5.3438	3.200	0.1260	1.600	0.0630	1 280	1 600	195		**EE750576/751204D**	1-P	158.000	6.2205	268.000	10.5512	19.100	0.7520	3.200	0.1260	1.600	0.0630	0.33	2.03	3.02	1.98
149.225	5.8750	236.538	9.3125	106.363	4.1875	131.763	5.1875	3.600	0.1417	1.600	0.0630	904	1 460	171		**82587/82932D**	1	162.000	6.3780	225.000	8.8583	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.44	1.53	2.27	1.49
	5.8750	236.538	9.3125	106.363	4.1875	131.763	5.1875	6.400	0.2520	1.600	0.0630	1 080	1 660	198		**HM231148/HM231111D**	1	167.000	6.5748	223.000	8.7795	12.700	0.5000	6.400	0.2520	1.600	0.0630	0.32	2.12	3.15	2.07
	5.8750	236.538	9.3125	106.363	4.1875	131.763	5.1875	3.600	0.1417	1.600	0.0630	1 080	1 660	198		**HM231149/HM231111D**	1	162.000	6.3780	223.000	8.7795	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.32	2.12	3.15	2.07
150.813	5.9375	244.475	9.6250	79.375	3.1250	107.950	4.2500	3.600	0.1417	1.600	0.0630	694	989	131		**81593/81963D**	1	163.000	6.4173	227.000	8.9370	14.300	0.5630	3.600	0.1417	1.600	0.0630	0.35	1.93	2.88	1.89
152.400	6.0000	222.250	8.7500	76.200	3.0000	100.010	3.9374	3.600	0.1417	0.800	0.0315	678	1 190	159		**M231649/M231610D**	1	165.000	6.4961	210.000	8.2677	11.900	0.4685	3.600	0.1417	0.800	0.0315	0.33	2.03	3.02	1.98
	6.0000	244.475	9.6250	79.375	3.1250	107.950	4.2500	3.600	0.1417	1.600	0.0630	694	989	131		**81600/81963D**	1	165.000	6.4961	227.000	8.9370	14.300	0.5630	3.600	0.1417	1.600	0.0630	0.35	1.93	2.88	1.89
	6.0000	254.000	10.0000	111.125	4.3750	149.225	5.8750	7.100	0.2795	1.600	0.0630	1 180	1 830	215		**99600/99102D**	1	172.000	6.7717	237.000	9.3307	19.100	0.7520	7.100	0.2795	1.600	0.0630	0.41	1.66	2.47	1.62
	6.0000	268.288	10.5625	125.413	4.9375	160.338	6.3125	6.400	0.2520	1.600	0.0630	1 410	2 090	239		**EE107060/107105D**	1	171.000	6.7323	249.000	9.8031	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.39	1.74	2.59	1.70
	6.0000	307.975	12.1250	146.050	5.7500	200.025	7.8750	9.500	0.3740	2.400	0.0945	1 700	2 300	268		**EE450601/451215D**	1	177.000	6.9685	275.000	10.8268	27.000	1.0630	9.500	0.3740	2.400	0.0945	0.33	2.07	3.09	2.03
	6.0000	307.975	12.1250	155.575	6.1250	200.025	7.8750	9.500	0.3740	2.400	0.0945	2 180	2 900	331		**HH234048/HH234011D**	1	177.000	6.9685	285.000	11.2205	22.200	0.8740	9.500	0.3740	2.400	0.0945	0.33	2.07	3.08	2.02
158.750	6.2500	225.425	8.8750	69.850	2.7500	85.725	3.3750	3.600	0.1417	0.800	0.0315	554	1 140	148		**46780R/46720D**	1	171.000	6.7323	215.000	8.4646	7.900	0.3110	3.600	0.1417	0.800	0.0315	0.38	1.76	2.62	1.72
160.325	6.3120	288.925	11.3750	111.125	4.3750	142.875	5.6250	7.100	0.2795	1.600	0.0630	1 350	1 950	223		**HM237532/HM237510D**	1	180.000	7.0866	271.000	10.6693	15.900	0.6260	7.100	0.2795	1.600	0.0630	0.32	2.12	3.15	2.07
165.100	6.5000	215.900	8.5000	47.625	1.8750	58.740	2.3126	1.600	0.0630	0.800	0.0315	331	600	78.1		**L433749/L433710D**	1	174.000	6.8504	207.000	8.1496	5.600	0.2205	1.600	0.0630	0.800	0.0315	0.36	1.85	2.76	1.81

Note 1) SP indicates the specially chamfered from.

TDO · TDOS type

d (165.100) ~ 187.325 mm
(6.5000) ~ 7.3750 inch

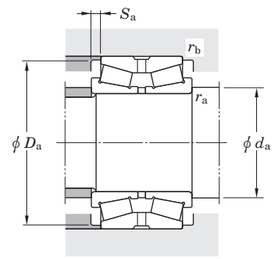


Design 1

Design 1-P

Design 2

Design 2-P



Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)		Bearing No.	Design[2]	Mounting dimensions										Constant	Axial load factors		
d		D		C		T		r[1] (min.)		r_1[1] (min.)		C_r	C_{0r}	C_u				d_a (min.)		D_a (min.)		S_a (min.)		r_a (max.)		r_b[1] (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch							mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
165.100	6.5000	225.425	8.8750	69.850	2.7500	85.725	3.3750	3.600	0.1417	0.800	0.0315	554	1 140	148		**46790R/46720D**	1	177.300	6.9803	215.000	8.4646	7.900	0.3110	3.600	0.1417	0.800	0.0315	0.38	1.76	2.62	1.72
	6.5000	247.650	9.7500	84.138	3.3125	103.188	4.0625	3.600	0.1417	0.800	0.0315	741	1 400	160		**67780/67720D**	1	178.000	7.0079	238.000	9.3701	9.500	0.3740	3.600	0.1417	0.800	0.0315	0.44	1.54	2.29	1.50
	6.5000	254.000	10.0000	76.200	3.0000	101.600	4.0000	4.800	0.1890	1.600	0.0630	815	1 240	162		**M235145/M235113D**	1	180.000	7.0866	240.000	9.4488	12.700	0.5000	4.800	0.1890	1.600	0.0630	0.32	2.12	3.15	2.07
	6.5000	288.925	11.3750	111.125	4.3750	142.875	5.6250	7.100	0.2795	1.600	0.0630	1 180	1 920	216		**94649/94114D**	1	185.000	7.2835	270.000	10.6299	15.900	0.6260	7.100	0.2795	1.600	0.0630	0.47	1.44	2.15	1.41
	6.5000	288.925	11.3750	111.125	4.3750	142.875	5.6250	7.100	0.2795	1.600	0.0630	1 430	2 090	245		**HM237535/HM237510D**	1	185.000	7.2835	271.000	10.6693	15.900	0.6260	7.100	0.2795	1.600	0.0630	0.32	2.12	3.15	2.07
	6.5000	288.925	11.3750	114.300	4.5000	146.050	5.7500	7.100	0.2795	1.600	0.0630	1 430	2 090	245		**HM237535/HM237511XD**	1	185.000	7.2835	271.000	10.6693	15.900	0.6260	7.100	0.2795	1.600	0.0630	0.32	2.12	3.15	2.07
168.275	6.6250	247.650	9.7500	84.138	3.3125	103.188	4.0625	3.600	0.1417	0.800	0.0315	741	1 400	160		**67782/67720D**	1	181.000	7.1260	238.000	9.3701	9.500	0.3740	3.600	0.1417	0.800	0.0315	0.44	1.54	2.29	1.50
	6.6250	250.000	9.8425	84.140	3.3126	103.190	4.0626	SP	SP	SP	SP	880	1 410	185		**46T342510**	1	180.300	7.0984	236.000	9.2913	9.500	0.3740	2.000	0.0787	0.500	0.0197	0.33	2.03	3.02	1.98
	6.6250	250.000	9.8425	84.140	3.3126	103.190	4.0626	0.800	0.0315	3.500	0.1378	880	1 410	185		**46T342510**	1	187.000	7.3622	235.000	9.2520	9.600	0.3780	0.800	0.0315	3.500	0.1378	0.33	2.03	3.02	1.98
	6.6250	360.000	14.1732	130.000	5.1181	190.000	7.4803	SP	SP	SP	SP	2 020	2 570	280		**46T343619**	1	186.100	7.3268	339.000	13.3465	30.000	1.1811	4.000	0.1575	1.000	0.0394	0.80	0.85	1.26	0.83
	6.6250	360.000	14.1732	130.000	5.1181	190.000	7.4803	1.600	0.0630	6.400	0.2520	2 020	2 570	280		**46T343619**	1	197.000	7.7559	338.000	13.3071	30.000	1.1811	1.600	0.0630	6.400	0.2520	0.80	0.85	1.26	0.83
170.000	6.6929	254.000	10.0000	76.200	3.0000	101.600	4.0000	4.800	0.1890	1.600	0.0630	815	1 240	162		**M235149/M235113D**	1	185.000	7.2835	240.000	9.4488	12.700	0.5000	4.800	0.1890	1.600	0.0630	0.32	2.12	3.15	2.07
171.450	6.7500	288.925	11.3750	111.125	4.3750	142.875	5.6250	7.100	0.2795	1.600	0.0630	1 180	1 920	216		**94675/94114D**	1	191.000	7.5197	270.000	10.6299	15.900	0.6260	7.100	0.2795	1.600	0.0630	0.47	1.44	2.15	1.41
174.625	6.8750	247.650	9.7500	84.138	3.3125	103.188	4.0625	7.900	0.3110	0.800	0.0315	741	1 400	160		**67786/67720D**	1	196.000	7.7165	238.000	9.3701	9.500	0.3740	7.900	0.3110	0.800	0.0315	0.44	1.54	2.29	1.50
	6.8750	247.650	9.7500	84.138	3.3125	103.188	4.0625	3.600	0.1417	0.800	0.0315	741	1 400	160		**67787/67720D**	1	187.000	7.3622	238.000	9.3701	9.500	0.3740	3.600	0.1417	0.800	0.0315	0.44	1.54	2.29	1.50
	6.8750	288.925	11.3750	111.125	4.3750	142.875	5.6250	7.100	0.2795	1.600	0.0630	1 180	1 920	216		**94687/94114D**	1	194.000	7.6378	270.000	10.6299	15.900	0.6260	7.100	0.2795	1.600	0.0630	0.47	1.44	2.15	1.41
	6.8750	288.925	11.3750	111.125	4.3750	142.875	5.6250	7.100	0.2795	1.600	0.0630	1 350	1 950	223		**HM237542/HM237510D**	1	194.000	7.6378	271.000	10.6693	15.900	0.6260	7.100	0.2795	1.600	0.0630	0.32	2.12	3.15	2.07
177.800	7.0000	227.013	8.9375	52.388	2.0625	66.672	2.6249	1.600	0.0630	0.800	0.0315	381	805	102		**36990/36920D**	1	186.000	7.3228	220.000	8.6614	7.100	0.2795	1.600	0.0630	0.800	0.0315	0.44	1.53	2.28	1.50
	7.0000	247.650	9.7500	84.138	3.3125	103.188	4.0625	3.600	0.1417	0.800	0.0315	741	1 400	160		**67790/67720D**	1	190.000	7.4803	238.000	9.3701	9.500	0.3740	3.600	0.1417	0.800	0.0315	0.44	1.54	2.29	1.50
	7.0000	247.650	9.7500	84.138	3.3125	103.188	4.0625	10.400	0.4094	0.800	0.0315	741	1 400	160		**67791/67720D**	1	204.000	8.0315	238.000	9.3701	9.500	0.3740	10.400	0.4094	0.800	0.0315	0.44	1.54	2.29	1.50
	7.0000	269.875	10.6250	93.663	3.6875	119.063	4.6875	3.600	0.1417	1.600	0.0630	880	1 610	183		**M238840/M238810D**	1	190.000	7.4803	255.000	10.0394	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.33	2.03	3.02	1.98
	7.0000	285.750	11.2500	92.075	3.6250	136.525	5.3750	6.400	0.2520	1.600	0.0630	956	1 430	165		**EE91702/91113XD**	1*	196.000	7.7165	264.000	10.3937	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.43	1.57	2.34	1.53
	7.0000	288.925	11.3750	111.125	4.3750	142.875	5.6250	7.100	0.2795	1.600	0.0630	1 180	1 920	216		**94700/94114D**	1	197.000	7.7559	270.000	10.6299	15.900	0.6260	7.100	0.2795	1.600	0.0630	0.47	1.44	2.15	1.41
	7.0000	288.925	11.3750	111.125	4.3750	142.875	5.6250	7.100	0.2795	1.600	0.0630	1 350	1 950	223		**HM237545/HM237510D**	1	197.000	7.7559	271.000	10.6693	15.900	0.6260	7.100	0.2795	1.600	0.0630	0.32	2.12	3.15	2.07
	7.0000	288.925	11.3750	114.300	4.5000	146.050	5.7500	7.100	0.2795	1.600	0.0630	1 350	1 950	223		**HM237545/HM237511XD**	1*	197.000	7.7559	271.000	10.6693	15.900	0.6260	7.100	0.2795	1.600	0.0630	0.32	2.12	3.15	2.07
	7.0000	304.800	12.0000	98.425	3.8750	147.838	5.8204	6.400	0.2520	1.600	0.0630	1 220	1 600	199		**EE280702/281201D**	1	196.000	7.7165	282.000	11.1024	24.700	0.9724	6.400	0.2520	1.600	0.0630	0.36	1.87	2.79	1.83
	7.0000	320.675	12.6250	138.112	5.4375	185.738	7.3125	3.600	0.1417	1.600	0.0630	1 610	2 450	271		**EE222070/222127D**	1	190.000	7.4803	298.000	11.7323	23.800	0.9370	3.600	0.1417	1.600	0.0630	0.40	1.68	2.50	1.64
	7.0000	320.675	12.6250	138.113	5.4375	185.738	7.3125	3.600	0.1417	1.600	0.0630	1 830	2 530	285		**H239640/H239612D**	1	190.000	7.4803	301.000	11.8504	23.800	0.9370	3.600	0.1417	1.600	0.0630	0.32	2.12	3.15	2.07
179.975	7.0856	317.500	12.5000	111.125	4.3750	146.050	5.7500	3.600	0.1417	1.600	0.0630	1 300	2 270	244		**93708/93127D**	1	193.000	7.5984	295.000	11.6142	17.500	0.6890	3.600	0.1417	1.600	0.0630	0.52	1.29	1.92	1.26
	7.0856	319.976	12.5975	111.125	4.3750	146.050	5.7500	3.600	0.1417	1.600	0.0630	1 300	2 270	244		**93708/93128XD**	1*	193.000	7.5984	295.000	11.6142	17.500	0.6890	3.600	0.1417	1.600	0.0630	0.52	1.29	1.92	1.26
184.150	7.2500	266.700	10.5000	84.138	3.3125	103.188	4.0625	3.600	0.1417	0.800	0.0315	769	1 520	169		**67883/67820D**	1	197.000	7.7559	257.000	10.1181	9.500	0.3740	3.600	0.1417	0.800	0.0315	0.48	1.41	2.11	1.38
	7.2500	288.925	11.3750	111.120	4.3748	142.880	5.6252	SP	SP	SP	SP	1 220	1 920	214		**46T372914**	1	203.200	8.0000	276.000	10.8661	15.900	0.6260	4.000	0.1575	SP	SP	0.40	1.68	2.50	1.64
	7.2500	288.925	11.3750	111.120	4.3748	142.880	5.6252	1.600	0.0630	7.000	0.2756	1 220	1 920	214		**46T372914**	1	213.000	8.3858	275.000	10.8268	15.900	0.6260	1.600	0.0630	7.000	0.2756	0.40	1.68	2.50	1.64
187.325	7.3750	266.700	10.5000	84.138	3.3125	103.188	4.0625	3.600	0.1417	0.800	0.0315	769	1 520	169		**67884/67820D**	1	200.000	7.8740	257.000	10.1181	9.500	0.3740	3.600	0.1417	0.800	0.0315	0.48	1.41	2.11	1.38
	7.3750	269.875	10.6250	93.663	3.6875	119.063	4.6875	3.600	0.1417	1.600	0.0630	880	1 610	183		**M238849/M238810D**	1	200.000	7.8740	255.000	10.0394	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.33	2.03	3.02	1.98
	7.3750	282.575	11.1250	79.375	3.1250	107.950	4.2500	3.600	0.1417	1.600	0.0630	880	1 450	182		**87737/87112D**	1	200.000	7.8740	267.000	10.5118	14.300	0.5630	3.600	0.1417	1.600	0.0630	0.42	1.62	2.42	1.59
	7.3750	320.675	12.6250	138.113	5.4375	185.738	7.3125	5.600	0.2205	1.600	0.0630	1 830	2 530	285		**H239649/H239612D**	1	204.000	8.0315	301.000	11.8504	23.800	0.9370	5.600	0.2205	1.600	0.0630	0.32	2.12	3.15	2.07

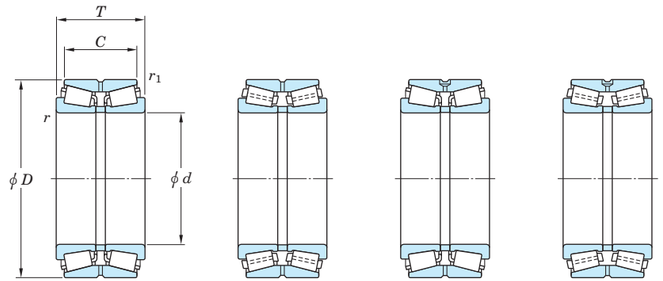
Note 1) SP indicates the specially chamfered from.

2) * means no lubrication holes or grooves on double cup.

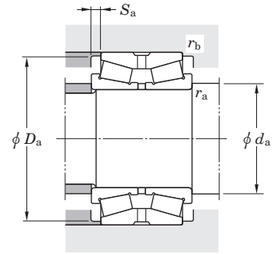
TDO · TDOS type

d 190.500 ~ (228.600) mm

7.5000 ~ (9.0000) inch



Design 1 | Design 1-P | Design 2 | Design 2-P

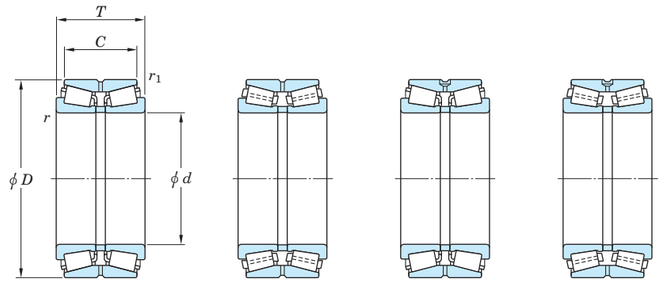


Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.	Design	Mounting dimensions										Constant	Axial load factors		
d		D		C		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u			d_a (min.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
190.500	7.5000	266.700	10.5000	84.138	3.3125	103.188	4.0625	3.600	0.1417	0.800	0.0315	769	1 520	169	**67885/67820D**	1	203.000	7.9921	257.000	10.1181	9.500	0.3740	3.600	0.1417	0.800	0.0315	0.48	1.41	2.11	1.38
	7.5000	282.575	11.1250	79.375	3.1250	107.950	4.2500	3.600	0.1417	1.600	0.0630	880	1 450	182	**87750/87112D**	1	203.000	7.9921	267.000	10.5118	14.300	0.5630	3.600	0.1417	1.600	0.0630	0.42	1.62	2.42	1.59
	7.5000	317.500	12.5000	111.125	4.3750	146.050	5.7500	4.300	0.1693	1.600	0.0630	1 300	2 270	244	**93750/93127D**	1	205.000	8.0709	295.000	11.6142	17.500	0.6890	4.300	0.1693	1.600	0.0630	0.52	1.29	1.92	1.26
	7.5000	368.300	14.5000	136.525	5.3750	193.675	7.6250	6.400	0.2520	1.600	0.0630	2 020	2 920	319	**EE420751/421451D**	1	209.000	8.2283	334.000	13.1496	28.600	1.1260	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
193.675	7.6250	282.575	11.1250	79.375	3.1250	107.950	4.2500	3.600	0.1417	1.600	0.0630	880	1 450	182	**87762/87112D**	1	206.000	8.1102	267.000	10.5118	14.300	0.5630	3.600	0.1417	1.600	0.0630	0.42	1.62	2.42	1.59
196.850	7.7500	254.000	10.0000	47.625	1.8750	61.910	2.4374	1.600	0.0630	0.800	0.0315	404	773	96.5	**L540049/L540010D**	1	206.000	8.1102	244.000	9.6063	7.100	0.2795	1.600	0.0630	0.800	0.0315	0.40	1.70	2.53	1.66
	7.7500	257.175	10.1250	66.675	2.6250	85.725	3.3750	3.600	0.1417	0.800	0.0315	576	1 260	157	**LM739749/LM739710D**	1	210.000	8.2677	247.000	9.7244	9.500	0.3740	3.600	0.1417	0.800	0.0315	0.45	1.51	2.25	1.48
200.025	7.8750	317.500	12.5000	111.125	4.3750	146.050	5.7500	4.300	0.1693	1.600	0.0630	1 300	2 270	244	**93787/93127D**	1	215.000	8.4646	294.500	11.5945	17.500	0.6890	4.300	0.1693	1.600	0.0630	0.52	1.29	1.92	1.26
	7.8750	355.600	14.0000	111.125	4.3750	152.400	6.0000	6.700	0.2638	1.600	0.0630	1 560	2 610	280	**EE130787/131401D**	1	220.000	8.6614	330.000	12.9921	20.600	0.8110	6.700	0.2638	1.600	0.0630	0.33	2.04	3.04	2.00
	7.8750	384.175	15.1250	193.675	7.6250	238.125	9.3750	6.400	0.2520	1.600	0.0630	3 120	5 370	542	**H247535/H247510D**	1-P	219.000	8.6220	362.000	14.2520	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
203.200	8.0000	276.225	10.8750	73.025	2.8750	90.485	3.5624	3.600	0.1417	0.800	0.0315	804	1 430	179	**LM241149/LM241110D**	1	217.000	8.5433	265.000	10.4331	8.700	0.3425	3.600	0.1417	0.800	0.0315	0.32	2.12	3.15	2.07
	8.0000	282.575	11.1250	82.550	3.2500	101.600	4.0000	3.600	0.1417	0.800	0.0315	749	1 410	155	**67983/67920D**	1	217.000	8.5433	272.000	10.7087	9.500	0.3740	3.600	0.1417	0.800	0.0315	0.51	1.33	1.97	1.30
	8.0000	292.100	11.5000	101.600	4.0000	125.415	4.9376	3.600	0.1417	1.600	0.0630	1 170	2 050	230	**M241547/M241510D**	1	217.000	8.5433	278.000	10.9449	11.900	0.4685	3.600	0.1417	1.600	0.0630	0.33	2.03	3.02	1.98
	8.0000	317.500	12.5000	111.125	4.3750	146.050	5.7500	4.300	0.1693	1.600	0.0630	1 300	2 270	244	**93800/93127D**	1	218.000	8.5827	295.000	11.6142	17.500	0.6890	4.300	0.1693	1.600	0.0630	0.52	1.29	1.92	1.26
	8.0000	317.500	12.5000	111.125	4.3750	146.050	5.7500	7.900	0.3110	1.600	0.0630	1 300	2 270	244	**93800A/93127D**	1	225.000	8.8583	295.000	11.6142	17.500	0.6890	7.900	0.3110	1.600	0.0630	0.52	1.29	1.92	1.26
	8.0000	368.300	14.5000	136.525	5.3750	193.675	7.6250	3.200	0.1260	1.600	0.0630	2 020	2 920	319	**EE420801/421451D**	1	216.000	8.5039	334.000	13.1496	28.600	1.1260	3.200	0.1260	1.600	0.0630	0.40	1.68	2.50	1.64
	8.0000	406.400	16.0000	127.000	5.0000	196.850	7.7500	6.400	0.2520	3.200	0.1260	2 050	2 920	303	**EE114080/114161D**	1	222.000	8.7402	368.000	14.4882	34.900	1.3740	6.400	0.2520	3.200	0.1260	0.79	0.85	1.27	0.83
204.788	8.0625	292.100	11.5000	101.600	4.0000	125.415	4.9376	3.600	0.1417	1.600	0.0630	1 170	2 050	230	**M241549/M241510D**	1	218.000	8.5827	278.000	10.9449	11.900	0.4685	3.600	0.1417	1.600	0.0630	0.33	2.03	3.02	1.98
206.375	8.1250	282.575	11.1250	82.550	3.2500	101.600	4.0000	3.600	0.1417	0.800	0.0315	749	1 410	155	**67985/67920D**	1	220.000	8.6614	271.500	10.6890	9.500	0.3740	3.600	0.1417	0.800	0.0315	0.51	1.33	1.97	1.30
	8.1250	317.500	12.5000	88.900	3.5000	127.000	5.0000	4.000	0.1575	1.600	0.0630	944	1 450	166	**EE132084/132126D**	1	221.000	8.7008	293.000	11.5354	19.100	0.7520	4.000	0.1575	1.600	0.0630	0.31	2.15	3.21	2.11
	8.1250	336.550	13.2500	169.863	6.6875	211.138	8.3125	3.200	0.1260	1.600	0.0630	2 230	3 800	400	**H242649/H242610DC**	2	219.000	8.6220	318.000	12.5197	20.600	0.8110	3.200	0.1260	1.600	0.0630	0.33	2.03	3.02	1.98
209.550	8.2500	282.575	11.1250	82.550	3.2500	101.600	4.0000	3.600	0.1417	0.800	0.0315	749	1 410	155	**67989/67920D**	1	223.000	8.7795	272.000	10.7087	9.500	0.3740	3.600	0.1417	0.800	0.0315	0.51	1.33	1.97	1.30
	8.2500	317.500	12.5000	111.125	4.3750	146.050	5.7500	4.300	0.1693	1.600	0.0630	1 300	2 270	244	**93825/93127D**	1	225.000	8.8583	295.000	11.6142	17.500	0.6890	4.300	0.1693	1.600	0.0630	0.52	1.29	1.92	1.26
	8.2500	333.375	13.1250	114.300	4.5000	149.225	5.8750	6.400	0.2520	1.600	0.0630	1 520	2 480	265	**HM743345/HM743310D**	1	229.000	9.0157	316.000	12.4409	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.44	1.54	2.29	1.50
212.725	8.3750	285.750	11.2500	76.200	3.0000	98.425	3.8750	3.600	0.1417	0.800	0.0315	766	1 560	190	**LM742745/LM742710D**	1	226.000	8.8976	277.000	10.9055	11.100	0.4370	3.600	0.1417	0.800	0.0315	0.48	1.40	2.09	1.37
215.900	8.5000	285.750	11.2500	76.200	3.0000	98.425	3.8750	3.600	0.1417	0.800	0.0315	766	1 560	190	**LM742749/LM742710D**	1	230.000	9.0551	277.000	10.9055	11.100	0.4370	3.600	0.1417	0.800	0.0315	0.48	1.40	2.09	1.37
	8.5000	406.400	16.0000	147.638	5.8125	195.263	7.6875	6.400	0.2520	1.600	0.0630	2 420	3 480	370	**EE820085/820161D**	1	235.000	9.2520	372.000	14.6457	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.39	1.71	2.55	1.67
219.075	8.6250	358.775	14.1250	181.440	7.1433	196.850	7.7500	SP	SP	SP	SP	2 080	3 590	376	**46T443620**	2	237.900	9.3661	338.000	13.3071	7.700	0.3031	4.000	0.1575	1.000	0.0394	0.33	2.03	3.02	1.98
220.663	8.6875	314.325	12.3750	106.363	4.1875	131.763	5.1875	6.400	0.2520	1.600	0.0630	1 320	2 450	269	**M244249/M244210D**	1	240.000	9.4488	299.000	11.7717	12.700	0.5000	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
225.425	8.8750	355.600	14.0000	111.125	4.3750	152.400	6.0000	6.700	0.2638	1.600	0.0630	1 560	2 610	280	**EE130889/131401D**	1	245.000	9.6457	330.000	12.9921	20.600	0.8110	6.700	0.2638	1.600	0.0630	0.33	2.04	3.04	2.00
228.397	8.9920	431.800	17.0000	111.125	4.3750	196.850	7.7500	6.400	0.2520	3.200	0.1260	2 140	2 890	304	**EE113089/113171D**	1-P	248.000	9.7638	397.000	15.6299	42.900	1.6890	6.400	0.2520	3.200	0.1260	0.88	0.76	1.14	0.75
228.460	8.9945	431.800	17.0000	111.125	4.3750	196.850	7.7500	6.400	0.2520	3.200	0.1260	2 140	2 890	304	**EE113091/113171D**	1-P	248.000	9.7638	397.000	15.6299	42.900	1.6890	6.400	0.2520	3.200	0.1260	0.88	0.76	1.14	0.75
228.600	9.0000	327.025	12.8750	82.550	3.2500	114.300	4.5000	6.400	0.2520	1.600	0.0630	1 000	1 860	200	**8573/8520D**	1	248.000	9.7638	310.000	12.2047	15.900	0.6260	6.400	0.2520	1.600	0.0630	0.41	1.66	2.47	1.62
	9.0000	355.600	14.0000	111.125	4.3750	152.400	6.0000	7.100	0.2795	1.600	0.0630	1 410	2 630	278	**96900/96140D**	1	249.000	9.8031	332.000	13.0709	20.600	0.8110	7.100	0.2795	1.600	0.0630	0.59	1.14	1.70	1.12

Note 1) SP indicates the specially chamfered from.

TDO · TDOS type

d (228.600) ~ (254.000) mm
(9.0000) ~ (10.0000) inch

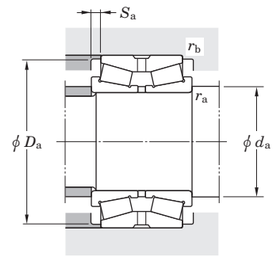


Design 1

Design 1-P

Design 2

Design 2-P

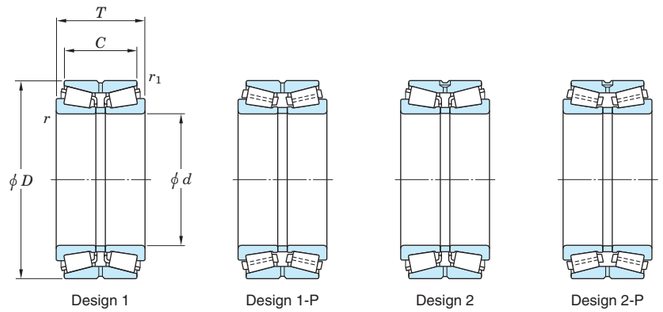


Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.	Design	Mounting dimensions										Constant	Axial load factors		
d		D		C		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u			d_a (min.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
228.600	9.0000	355.600	14.0000	111.125	4.3750	152.400	6.0000	6.700	0.2638	1.600	0.0630	1 560	2 610	280	**EE130902/131401D**	1	248.000	9.7638	330.000	12.9921	20.600	0.8110	6.700	0.2638	1.600	0.0630	0.33	2.04	3.04	2.00
	9.0000	355.600	14.0000	114.300	4.5000	152.400	6.0000	6.400	0.2520	1.600	0.0630	1 660	2 740	295	**HM746646/HM746610D**	1	248.000	9.7638	339.000	13.3465	19.100	0.7520	6.400	0.2520	1.600	0.0630	0.47	1.43	2.12	1.40
	9.0000	358.775	14.1250	117.475	4.6250	152.400	6.0000	3.600	0.1417	1.600	0.0630	1 660	3 170	333	**M249732/M249710D**	1	242.000	9.5276	343.000	13.5039	17.500	0.6890	3.600	0.1417	1.600	0.0630	0.33	2.03	3.02	1.98
	9.0000	400.050	15.7500	136.525	5.3750	187.325	7.3750	10.400	0.4094	1.600	0.0630	2 130	3 210	338	**EE430900/431576D**	1	256.000	10.0787	374.000	14.7244	25.400	1.0000	10.400	0.4094	1.600	0.0630	0.44	1.54	2.29	1.50
	9.0000	425.450	16.7500	158.750	6.2500	209.550	8.2500	7.100	0.2795	1.600	0.0630	2 530	3 950	411	**EE700091/700168D**	1	249.000	9.8031	382.000	15.0394	25.400	1.0000	7.100	0.2795	1.600	0.0630	0.33	2.03	3.02	1.98
	9.0000	488.950	19.2500	220.000	8.6614	345.000	13.5827	SP	SP	SP	SP	4 560	7 010	614	**46T464935B**	1-P	246.600	9.7087	465.000	18.3071	62.500	2.4606	4.000	0.1575	1.000	0.0394	0.94	0.72	1.07	0.70
	9.0000	488.950	19.2500	220.000	8.6614	345.000	13.5827	2.000	0.0787	6.000	0.2362	4 560	7 010	614	**46T464935B**	1-P	257.000	10.1181	464.000	18.2677	62.500	2.4606	2.000	0.0787	6.000	0.2362	0.94	0.72	1.07	0.70
	9.0000	488.950	19.2500	152.400	6.0000	254.000	10.0000	1.600	0.0630	6.400	0.2520	3 470	4 540	446	**HH949549/HH949510D**	1-P	257.000	10.1181	455.000	17.9134	50.800	2.0000	1.600	0.0630	6.400	0.2520	0.94	0.72	1.07	0.70
231.775	9.1250	358.775	14.1250	117.475	4.6250	152.400	6.0000	6.400	0.2520	1.600	0.0630	1 660	3 170	333	**M249734/M249710D**	1	251.000	9.8819	343.000	13.5039	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
234.950	9.2500	327.025	12.8750	82.550	3.2500	114.300	4.5000	6.400	0.2520	1.600	0.0630	1 000	1 860	200	**8575/8520D**	1	254.000	10.0000	310.000	12.2047	15.900	0.6260	6.400	0.2520	1.600	0.0630	0.41	1.66	2.47	1.62
	9.2500	355.600	14.0000	111.125	4.3750	152.400	6.0000	7.100	0.2795	1.600	0.0630	1 410	2 630	278	**96925/96140D**	1	256.000	10.0787	332.000	13.0709	20.600	0.8110	7.100	0.2795	1.600	0.0630	0.59	1.14	1.70	1.12
	9.2500	384.175	15.1250	193.675	7.6250	238.125	9.3750	6.400	0.2520	1.600	0.0630	3 120	5 370	542	**H247548/H247510D**	1-P	254.000	10.0000	362.000	14.2520	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
	9.2500	384.175	15.1250	193.675	7.6250	238.125	9.3750	6.400	0.2520	1.600	0.0630	3 120	5 370	542	**H247549/H247510D**	1-P	254.000	10.0000	362.000	14.2520	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
237.330	9.3437	358.775	14.1250	117.475	4.6250	152.400	6.0000	6.400	0.2520	1.600	0.0630	1 660	3 170	333	**M249736/M249710D**	1	257.000	10.1181	343.000	13.5039	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
241.300	9.5000	327.025	12.8750	82.550	3.2500	114.300	4.5000	6.400	0.2520	1.600	0.0630	1 000	1 860	200	**8578/8520D**	1	261.000	10.2756	310.000	12.2047	15.900	0.6260	6.400	0.2520	1.600	0.0630	0.41	1.66	2.47	1.62
	9.5000	349.148	13.7460	101.600	4.0000	127.000	5.0000	6.400	0.2520	1.600	0.0630	1 190	2 050	224	**EE127095/127136D**	1	261.000	10.2756	330.000	12.9921	12.700	0.5000	6.400	0.2520	1.600	0.0630	0.35	1.91	2.84	1.86
	9.5000	355.498	13.9960	101.600	4.0000	127.000	5.0000	6.400	0.2520	1.600	0.0630	1 190	2 050	224	**EE127095/127139D**	1	261.000	10.2756	330.000	12.9921	12.700	0.5000	6.400	0.2520	1.600	0.0630	0.35	1.91	2.84	1.86
	9.5000	368.300	14.5000	85.725	3.3750	120.650	4.7500	6.400	0.2520	1.600	0.0630	1 090	1 850	203	**EE170950/171451D**	1	261.000	10.2756	336.000	13.2283	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.36	1.86	2.77	1.82
	9.5000	393.700	15.5000	109.538	4.3125	157.163	6.1875	6.400	0.2520	1.600	0.0630	1 590	3 090	325	**EE275095/275156D**	1	261.000	10.2756	378.000	14.8819	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
	9.5000	406.400	16.0000	107.950	4.2500	155.575	6.1250	6.400	0.2520	1.600	0.0630	1 590	3 090	325	**EE275095/275161D**	1	261.000	10.2756	378.000	14.8819	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
	9.5000	406.400	16.0000	184.150	7.2500	215.900	8.5000	6.400	0.2520	1.600	0.0630	2 950	4 810	494	**H249148/H249111D**	1	261.000	10.2756	385.000	15.1575	15.900	0.6260	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
	9.5000	444.500	17.5000	158.750	6.2500	209.550	8.2500	6.400	0.2520	1.600	0.0630	2 750	3 960	408	**EE923095/923176D**	1	261.000	10.2756	407.000	16.0236	25.400	1.0000	6.400	0.2520	1.600	0.0630	0.34	2.01	2.99	1.96
	9.5000	488.950	19.2500	196.850	7.7500	254.000	10.0000	6.400	0.2520	1.600	0.0630	3 610	5 570	553	**EE295950/295192D**	1	261.000	10.2756	446.000	17.5591	28.600	1.1260	6.400	0.2520	1.600	0.0630	0.31	2.18	3.24	2.13
244.475	9.6250	380.898	14.9960	127.000	5.0000	171.450	6.7500	6.400	0.2520	1.600	0.0630	1 690	2 930	306	**EE126097/126149D**	1	264.000	10.3937	357.000	14.0551	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.52	1.31	1.95	1.28
	9.6250	381.000	15.0000	127.000	5.0000	171.450	6.7500	6.400	0.2520	1.600	0.0630	1 690	2 930	306	**EE126097/126151D**	1	264.000	10.3937	357.000	14.0551	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.52	1.31	1.95	1.28
247.650	9.7500	368.300	14.5000	85.725	3.3750	120.650	4.7500	6.400	0.2520	1.600	0.0630	1 090	1 850	203	**EE170975/171451D**	1	267.000	10.5118	336.000	13.2283	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.36	1.86	2.77	1.82
	9.7500	406.400	16.0000	203.200	8.0000	247.650	9.7500	6.400	0.2520	1.600	0.0630	3 490	6 250	612	**HH249949/HH249910D**	1-P	267.000	10.5118	383.000	15.0787	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
249.250	9.8130	380.898	14.9960	127.000	5.0000	171.450	6.7500	6.400	0.2520	1.600	0.0630	1 690	2 930	306	**EE126098/126149D**	1	269.000	10.5906	357.000	14.0551	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.52	1.31	1.95	1.28
	9.8130	381.000	15.0000	127.000	5.0000	171.450	6.7500	6.400	0.2520	1.600	0.0630	1 690	2 930	306	**EE126098/126151D**	1	269.000	10.5906	357.000	14.0551	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.52	1.31	1.95	1.28
254.000	10.0000	347.663	13.6875	69.850	2.7500	101.600	4.0000	3.600	0.1417	1.600	0.0630	1 010	1 690	192	**LM249748/LM249710D**	1	268.000	10.5512	332.000	13.0709	15.900	0.6260	3.600	0.1417	1.600	0.0630	0.33	2.03	3.02	1.98
	10.0000	358.775	14.1250	117.475	4.6250	152.400	6.0000	3.600	0.1417	1.600	0.0630	1 660	3 170	333	**M249749/M249710D**	1	268.000	10.5512	343.000	13.5039	17.500	0.6890	3.600	0.1417	1.600	0.0630	0.33	2.03	3.02	1.98
	10.0000	365.125	14.3750	98.425	3.8750	130.175	5.1250	6.400	0.2520	1.600	0.0630	1 210	2 150	231	**EE134100/134144D**	1	273.000	10.7480	346.000	13.6220	15.900	0.6260	6.400	0.2520	1.600	0.0630	0.37	1.80	2.69	1.76
	10.0000	393.700	15.5000	109.538	4.3125	157.163	6.1875	6.400	0.2520	1.600	0.0630	1 590	3 090	325	**EE275100/275156D**	1	273.000	10.7480	378.000	14.8819	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
	10.0000	406.400	16.0000	107.950	4.2500	155.575	6.1250	6.400	0.2520	1.600	0.0630	1 590	3 090	325	**EE275100/275161D**	1	273.000	10.7480	378.000	14.8819	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
	10.0000	422.275	16.6250	128.588	5.0625	173.038	6.8125	6.700	0.2638	1.600	0.0630	2 180	3 360	355	**HM252343/HM252311D**	1	274.000	10.7874	398.000	15.6693	22.200	0.8740	6.700	0.2638	1.600	0.0630	0.33	2.03	3.02	1.98
	10.0000	422.275	16.6250	128.588	5.0625	173.038	6.8125	6.700	0.2638	1.600	0.0630	2 180	3 360	355	**HM252344/HM252311D**	1	274.000	10.7874	398.000	15.6693	22.200	0.8740	6.700	0.2638	1.600	0.0630	0.33	2.03	3.02	1.98
	10.0000	422.275	16.6250	139.700	5.5000	178.592	7.0312	6.700	0.2638	1.600	0.0630	2 180	3 360	355	**HM252343/HM252310D**	1	274.000	10.7874	400.000	15.7480	19.400	0.7638	6.700	0.2638	1.600	0.0630	0.33	2.03	3.02	1.98
	10.0000	422.275	16.6250	139.700	5.5000	178.592	7.0312	6.700	0.2638	1.600	0.0630	2 180	3 360	355	**HM252344/HM252310D**	1	274.000	10.7874	400.000	15.7480	19.400	0.7638	6.700	0.2638	1.600	0.0630	0.33	2.03	3.02	1.98

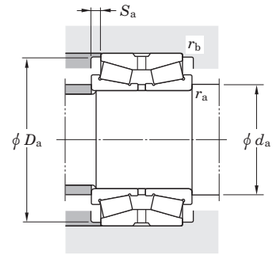
Note 1) SP indicates the specially chamfered from.

TDO · TDOS type

d (254.000) ~ 292.100 mm
(10.0000) ~ 11.5000 inch



Design 1 | Design 1-P | Design 2 | Design 2-P

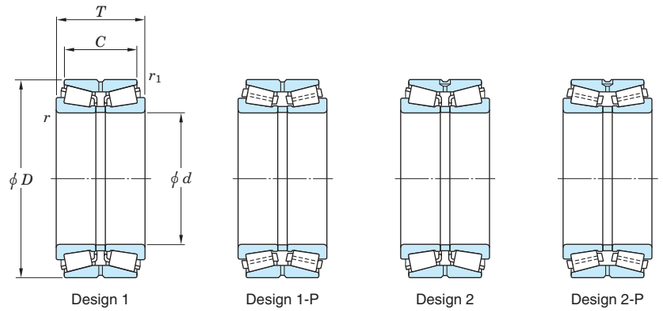


Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)		Bearing No.	Design	Mounting dimensions										Constant	Axial load factors		
d		D		C		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)								d_a (min.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)					
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	C_r	C_{0r}	C_u				mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	e	Y_2	Y_3	Y_0
254.000	10.0000	431.724	16.9970	128.588	5.0625	173.038	6.8125	6.700	0.2638	1.600	0.0630	2 180	3 360	355		**HM252343/HM252315D**	1	274.000	10.7874	398.000	15.6693	22.200	0.8740	6.700	0.2638	1.600	0.0630	0.33	2.03	3.02	1.98
	10.0000	431.724	16.9970	128.588	5.0625	173.038	6.8125	6.700	0.2638	1.600	0.0630	2 180	3 360	355		**HM252344/HM252315D**	1	274.000	10.7874	398.000	15.6693	22.200	0.8740	6.700	0.2638	1.600	0.0630	0.33	2.03	3.02	1.98
	10.0000	533.400	21.0000	165.100	6.5000	276.225	10.8750	6.400	0.2520	1.600	0.0630	3 820	5 600	524		**HH953749/HH953710D**	1-P	273.000	10.7480	496.000	19.5276	55.600	2.1890	6.400	0.2520	1.600	0.0630	0.94	0.72	1.07	0.70
260.350	10.2500	365.125	14.3750	98.425	3.8750	130.175	5.1250	6.400	0.2520	1.600	0.0630	1 210	2 150	231		**EE134102/134144D**	1	280.000	11.0236	355.000	13.9764	15.900	0.6260	6.400	0.2520	1.600	0.0630	0.37	1.80	2.69	1.76
	10.2500	400.050	15.7500	107.950	4.2500	155.575	6.1250	9.500	0.3740	1.600	0.0630	1 630	2 570	274		**EE221026/221576D**	1	286.000	11.2598	372.000	14.6457	23.800	0.9370	9.500	0.3740	1.600	0.0630	0.39	1.71	2.54	1.67
	10.2500	422.275	16.6250	128.588	5.0625	173.038	6.8125	6.700	0.2638	1.600	0.0630	2 180	3 360	355		**HM252348/HM252311D**	1	280.000	11.0236	398.000	15.6693	22.200	0.8740	6.700	0.2638	1.600	0.0630	0.33	2.03	3.02	1.98
	10.2500	422.275	16.6250	139.700	5.5000	178.592	7.0312	6.700	0.2638	1.600	0.0630	2 180	3 360	355		**HM252348/HM252310D**	1	280.000	11.0236	400.000	15.7480	19.400	0.7638	6.700	0.2638	1.600	0.0630	0.33	2.03	3.02	1.98
	10.2500	422.275	16.6250	139.700	5.5000	178.592	7.0312	6.700	0.2638	1.600	0.0630	2 180	3 360	355		**HM252349/HM252310D**	1	280.000	11.0236	400.000	15.7480	19.400	0.7638	6.700	0.2638	1.600	0.0630	0.33	2.03	3.02	1.98
	10.2500	431.724	16.9970	128.588	5.0625	173.038	6.8125	6.700	0.2638	1.600	0.0630	2 180	3 360	355		**HM252348/HM252315D**	1	280.000	11.0236	398.000	15.6693	22.200	0.8740	6.700	0.2638	1.600	0.0630	0.33	2.03	3.02	1.98
	10.2500	431.724	16.9970	128.588	5.0625	173.038	6.8125	6.700	0.2638	1.600	0.0630	2 180	3 360	355		**HM252349/HM252315D**	1	280.000	11.0236	398.000	15.6693	22.200	0.8740	6.700	0.2638	1.600	0.0630	0.33	2.03	3.02	1.98
	10.2500	488.950	19.2500	196.850	7.7500	254.000	10.0000	6.400	0.2520	1.600	0.0630	3 610	5 570	553		**EE295102/295192D**	1	280.000	11.0236	446.000	17.5591	28.600	1.1260	6.400	0.2520	1.600	0.0630	0.31	2.18	3.24	2.13
263.525	10.3750	355.600	14.0000	101.600	4.0000	127.000	5.0000	3.600	0.1417	1.600	0.0630	1 300	2 550	267		**LM451345/LM451310D**	1	277.000	10.9055	343.000	13.5039	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.36	1.87	2.79	1.83
266.700	10.5000	355.600	14.0000	101.600	4.0000	127.000	5.0000	3.600	0.1417	1.600	0.0630	1 300	2 550	267		**LM451349/LM451310D**	1	280.000	11.0236	343.000	13.5039	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.36	1.87	2.79	1.83
	10.5000	357.200	14.0630	101.600	4.0000	127.000	5.0000	3.600	0.1417	1.600	0.0630	1 300	2 550	267		**LM451349/LM451312D**	1	280.000	11.0236	343.000	13.5039	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.36	1.87	2.79	1.83
	10.5000	393.700	15.5000	109.538	4.3125	157.163	6.1875	6.400	0.2520	1.600	0.0630	1 590	3 090	325		**EE275105/275156D**	1	286.000	11.2598	378.000	14.8819	23.800	0.9370	6.400	0.2520	1.500	0.0591	0.40	1.68	2.50	1.64
	10.5000	406.400	16.0000	107.950	4.2500	155.575	6.1250	6.400	0.2520	1.600	0.0630	1 590	3 090	325		**EE275105/275161D**	1	286.000	11.2598	378.000	14.8819	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
	10.5000	422.275	16.6250	139.700	5.5000	178.598	7.0314	6.700	0.2638	1.600	0.0630	2 110	3 420	352		**EE551050/551663D**	1	287.000	11.2992	390.000	15.3543	19.400	0.7638	6.700	0.2638	1.600	0.0630	0.33	2.03	3.02	1.98
	10.5000	431.724	16.9970	128.588	5.0625	173.038	6.8125	6.700	0.2638	1.600	0.0630	2 110	3 420	352		**EE551050/551701D**	1	287.000	11.2992	389.000	15.3150	22.200	0.8740	6.700	0.2638	1.600	0.0630	0.33	2.03	3.02	1.98
269.875	10.6250	381.000	15.0000	123.825	4.8750	158.750	6.2500	6.400	0.2520	1.600	0.0630	1 840	3 350	349		**M252349/M252310D**	1	289.000	11.3780	364.000	14.3307	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
273.050	10.7500	393.700	15.5000	109.538	4.3125	157.163	6.1875	6.400	0.2520	1.600	0.0630	1 590	3 090	325		**EE275108/275156D**	1	292.000	11.4961	378.000	14.8819	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
	10.7500	406.400	16.0000	107.950	4.2500	155.575	6.1250	6.400	0.2520	1.600	0.0630	1 590	3 090	325		**EE275108/275161D**	1	292.000	11.4961	378.000	14.8819	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
273.060	10.7504	422.280	16.6252	177.800	7.0000	178.592	7.0312	3.100	0.1220	8.000	0.3150	2 180	3 360	355		**46T554218**	1	310.000	12.2047	407.000	16.0236	0.400	0.0157	4.000	0.1575	8.000	0.3150	0.33	2.03	3.02	1.98
279.400	11.0000	469.900	18.5000	149.225	5.8750	200.025	7.8750	9.500	0.3740	1.600	0.0630	2 650	4 370	437		**EE722110/722186D**	1	305.000	12.0079	431.000	16.9685	25.400	1.0000	9.500	0.3740	1.600	0.0630	0.38	1.79	2.67	1.75
	11.0000	488.950	19.2500	196.850	7.7500	254.000	10.0000	1.200	0.0472	1.600	0.0630	3 610	5 570	553		**EE295110/295192D**	1	288.000	11.3386	446.000	17.5591	28.600	1.1260	1.200	0.0472	1.600	0.0630	0.31	2.18	3.24	2.13
279.982	11.0229	380.898	14.9960	107.950	4.2500	139.700	5.5000	3.600	0.1417	1.600	0.0630	1 420	2 820	286		**LM654642/LM654610D**	1	294.000	11.5748	371.000	14.6063	15.900	0.6260	3.600	0.1417	1.600	0.0630	0.43	1.57	2.34	1.53
280.000	11.0236	406.400	16.0000	117.475	4.6250	149.225	5.8750	6.400	0.2520	1.600	0.0630	1 650	2 950	307		**EE128112/128160D**	1	299.000	11.7717	383.000	15.0787	15.900	0.6260	6.400	0.2520	1.600	0.0630	0.39	1.75	2.61	1.71
	11.0236	406.400	16.0000	117.475	4.6250	149.225	5.8750	6.400	0.2520	1.600	0.0630	1 650	2 950	307		**EE128114/128160D**	1	299.000	11.7717	383.000	15.0787	15.900	0.6260	6.400	0.2520	1.600	0.0630	0.39	1.75	2.61	1.71
280.192	11.0312	406.400	16.0000	85.725	3.3750	120.650	4.7500	6.700	0.2638	1.600	0.0630	1 120	1 980	209		**EE101103/101601D**	1	300.000	11.8110	375.000	14.7638	17.500	0.6890	6.700	0.2638	1.600	0.0630	0.41	1.66	2.47	1.62
	11.0312	406.400	16.0000	117.475	4.6250	149.225	5.8750	6.700	0.2638	1.600	0.0630	1 650	2 950	307		**EE128111/128160D**	1	300.000	11.8110	383.000	15.0787	15.900	0.6260	6.700	0.2638	1.600	0.0630	0.39	1.75	2.61	1.71
285.750	11.2500	358.775	14.1250	53.975	2.1250	76.200	3.0000	3.600	0.1417	1.600	0.0630	516	1 070	122		**545112/545142D**	1	299.000	11.7717	345.000	13.5827	11.100	0.4370	3.600	0.1417	1.600	0.0630	0.49	1.38	2.06	1.35
	11.2500	380.898	14.9960	107.950	4.2500	139.700	5.5000	3.600	0.1417	1.600	0.0630	1 420	2 820	286		**LM654649/LM654610D**	1	299.000	11.7717	371.000	14.6063	15.900	0.6260	3.600	0.1417	1.600	0.0630	0.43	1.57	2.34	1.53
	11.2500	501.650	19.7500	120.650	4.7500	203.200	8.0000	6.400	0.2520	3.200	0.1260	2 440	3 460	345		**EE147112/147198D**	1	305.000	12.0079	467.000	18.3858	41.300	1.6260	6.400	0.2520	3.200	0.1260	0.83	0.81	1.20	0.79
288.925	11.3750	406.400	16.0000	130.175	5.1250	165.100	6.5000	6.400	0.2520	1.600	0.0630	2 160	4 420	445		**M255449/M255410D**	1	308.000	12.1260	388.000	15.2756	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.34	2.00	2.97	1.95
292.100	11.5000	374.650	14.7500	79.375	3.1250	104.775	4.1250	3.600	0.1417	1.600	0.0630	1 010	1 940	222		**L555249/L555210D**	1	306.000	12.0472	361.000	14.2126	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.40	1.68	2.50	1.64
	11.5000	469.900	18.5000	149.225	5.8750	200.025	7.8750	9.500	0.3740	1.600	0.0630	2 650	4 370	437		**EE722115/722186D**	1	318.000	12.5197	431.000	16.9685	25.400	1.0000	9.500	0.3740	1.600	0.0630	0.38	1.79	2.67	1.75
	11.5000	558.800	22.0000	222.250	8.7500	298.450	11.7500	6.400	0.2520	1.600	0.0630	5 060	8 000	746		**EE790114/790223D**	1-P	311.000	12.2441	515.000	20.2756	38.100	1.5000	6.400	0.2520	1.600	0.0630	0.40	1.71	2.54	1.67

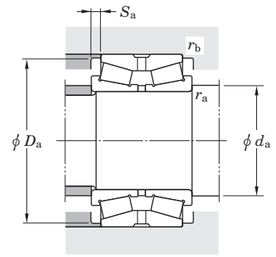
Note 1) SP indicates the specially chamfered from.

TDO · TDOS type

d 298.450 ~ 371.475 mm
11.7500 ~ 14.6250 inch



Design 1 | Design 1-P | Design 2 | Design 2-P

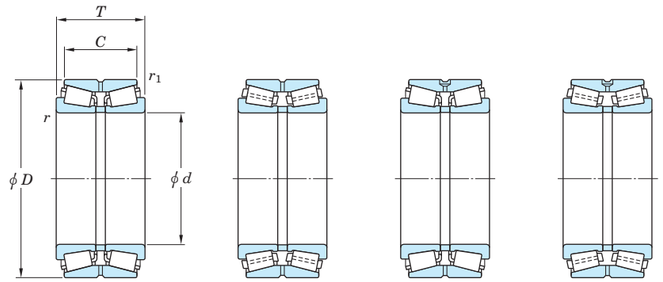


Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.	Design	Mounting dimensions										Constant	Axial load factors		
d		D		C		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u			d_a (min.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
298.450	11.7500	444.500	17.5000	98.425	3.8750	146.050	5.7500	7.900	0.3110	1.600	0.0630	1 550	2 760	288	**EE291175/291751D**	1	321.000	12.6378	414.000	16.2992	23.800	0.9370	7.900	0.3110	1.600	0.0630	0.38	1.79	2.66	1.75
300.038	11.8125	422.275	16.6250	136.525	5.3750	174.625	6.8750	6.400	0.2520	1.600	0.0630	2 130	4 030	409	**HM256849/HM256810D**	1	320.000	12.5984	403.000	15.8661	19.100	0.7520	6.400	0.2520	1.600	0.0630	0.34	2.00	2.98	1.96
304.800	12.0000	393.700	15.5000	82.550	3.2500	107.950	4.2500	6.400	0.2520	1.600	0.0630	1 130	2 360	266	**L357049/L357010D**	1	325.000	12.7953	379.000	14.9213	12.700	0.5000	6.400	0.2520	1.600	0.0630	0.36	1.88	2.80	1.84
	12.0000	412.750	16.2500	92.075	3.6250	123.825	4.8750	6.400	0.2520	1.600	0.0630	1 280	2 410	250	**EE109120/109163D**	1	325.000	12.7953	394.000	15.5118	15.900	0.6260	6.400	0.2520	1.600	0.0630	0.43	1.58	2.35	1.55
	12.0000	444.500	17.5000	98.425	3.8750	146.050	5.7500	7.900	0.3110	1.600	0.0630	1 550	2 760	288	**EE291201/291751D**	1	328.000	12.9134	414.000	16.2992	23.800	0.9370	7.900	0.3110	1.600	0.0630	0.38	1.79	2.66	1.75
	12.0000	495.300	19.5000	120.650	4.7500	162.245	6.3876	6.400	0.2520	1.600	0.0630	2 360	3 840	393	**EE941205/941951D**	1	315.000	12.4016	463.000	18.2283	20.800	0.8189	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
	12.0000	495.300	19.5000	127.000	5.0000	168.595	6.6376	6.400	0.2520	1.600	0.0630	2 360	3 840	393	**EE941205/941953D**	1	315.000	12.4016	463.000	18.2283	20.800	0.8189	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
	12.0000	495.300	19.5000	146.050	5.7500	196.850	7.7500	16.000	0.6299	1.600	0.0630	2 740	4 680	461	**EE724119/724196D**	1	344.000	13.5433	458.000	18.0315	25.400	1.0000	16.000	0.6299	1.600	0.0630	0.40	1.68	2.50	1.64
	12.0000	495.300	19.5000	146.050	5.7500	196.850	7.7500	16.000	0.6299	1.600	0.0630	2 740	4 680	461	**EE724120/724196D**	1	344.000	13.5433	458.000	18.0315	25.400	1.0000	16.000	0.6299	1.600	0.0630	0.40	1.68	2.50	1.64
	12.0000	558.800	22.0000	222.250	8.7500	298.450	11.7500	1.200	0.0472	1.600	0.0630	5 060	8 000	746	**EE790120/790223D**	1-P	315.000	12.4016	515.000	20.2756	38.100	1.5000	1.200	0.0472	1.600	0.0630	0.40	1.71	2.54	1.67
311.150	12.2500	558.800	22.0000	111.125	4.3750	190.500	7.5000	9.500	0.3740	3.200	0.1260	2 360	3 490	346	**EE148122/148221D**	1	338.000	13.3071	505.000	19.8819	39.700	1.5630	9.500	0.3740	3.200	0.1260	0.88	0.77	1.15	0.75
317.500	12.5000	444.500	17.5000	98.425	3.8750	146.050	5.7500	7.900	0.3110	1.600	0.0630	1 550	2 760	288	**EE291250/291751D**	1	341.000	13.4252	414.000	16.2992	23.800	0.9370	7.900	0.3110	1.600	0.0630	0.38	1.79	2.66	1.75
	12.5000	447.675	17.6250	146.050	5.7500	180.975	7.1250	3.600	0.1417	1.600	0.0630	2 400	4 770	465	**HM259049./HM259010D.**	1	328.000	12.9134	428.000	16.8504	17.500	0.6890	3.600	0.1417	1.600	0.0630	0.33	2.02	3.00	1.97
	12.5000	622.300	24.5000	174.625	6.8750	304.800	12.0000	14.300	0.5630	3.200	0.1260	4 780	6 990	632	**H961649/H961610D**	1-P	354.000	13.9370	585.000	23.0315	65.100	2.5630	14.300	0.5630	3.200	0.1260	0.94	0.72	1.07	0.70
329.870	12.9870	533.400	21.0000	114.300	4.5000	165.100	6.5000	4.800	0.1890	1.600	0.0630	2 350	3 580	362	**EE971298/972102D**	1	346.500	13.6417	494.000	19.4488	25.400	1.0000	4.800	0.1890	1.600	0.0630	0.33	2.03	3.02	1.98
	12.9870	546.100	21.5000	152.400	6.0000	177.800	7.0000	4.800	0.1890	3.200	0.1260	2 350	3 580	362	**EE971298/972151D**	1	347.000	13.6614	500.000	19.6850	12.700	0.5000	4.800	0.1890	3.200	0.1260	0.33	2.03	3.02	1.98
330.200	13.0000	482.600	19.0000	88.900	3.5000	133.350	5.2500	7.100	0.2795	1.600	0.0630	1 320	2 500	247	**EE161300/161901D**	1	352.000	13.8583	454.000	17.8740	22.200	0.8740	7.100	0.2795	1.600	0.0630	0.50	1.35	2.01	1.32
	13.0000	482.600	19.0000	127.000	5.0000	177.800	7.0000	6.400	0.2520	1.600	0.0630	2 320	4 100	404	**EE526130/526191D**	1	350.000	13.7795	454.000	17.8740	25.400	1.0000	6.400	0.2520	1.600	0.0630	0.39	1.73	2.57	1.69
	13.0000	482.600	19.0000	127.000	5.0000	177.800	7.0000	3.200	0.1260	1.600	0.0630	2 320	4 100	404	**EE526132/526191D**	1	344.000	13.5433	454.000	17.8740	25.400	1.0000	3.200	0.1260	1.600	0.0630	0.39	1.73	2.57	1.69
333.375	13.1250	469.900	18.5000	152.400	6.0000	190.500	7.5000	6.400	0.2520	1.600	0.0630	2 900	5 680	548	**HM261049/HM261010D**	1-P	354.000	13.9370	449.000	17.6772	19.100	0.7520	6.400	0.2520	1.600	0.0630	0.33	2.02	3.00	1.97
342.900	13.5000	533.400	21.0000	114.300	4.5000	165.100	6.5000	4.800	0.1890	1.600	0.0630	2 350	3 580	362	**EE971354/972102D**	1	360.000	14.1732	494.000	19.4488	25.400	1.0000	4.800	0.1890	1.600	0.0630	0.33	2.03	3.02	1.98
	13.5000	546.100	21.5000	152.400	6.0000	177.800	7.0000	4.800	0.1890	3.200	0.1260	2 350	3 580	362	**EE971354/972151D**	1	360.000	14.1732	500.000	19.6850	12.700	0.5000	4.800	0.1890	3.200	0.1260	0.33	2.03	3.02	1.98
346.075	13.6250	482.600	19.0000	88.900	3.5000	133.350	5.2500	7.100	0.2795	1.600	0.0630	1 320	2 500	247	**EE161363/161901D**	1	368.000	14.4882	454.000	17.8740	22.200	0.8740	7.100	0.2795	1.600	0.0630	0.50	1.35	2.01	1.32
	13.6250	488.950	19.2500	158.750	6.2500	200.025	7.8750	6.400	0.2520	1.600	0.0630	2 890	5 800	553	**HM262749/HM262710D**	1	366.000	14.4094	467.000	18.3858	20.600	0.8110	6.400	0.2520	1.600	0.0630	0.33	2.02	3.00	1.97
349.250	13.7500	514.350	20.2500	152.400	6.0000	193.675	7.6250	6.400	0.2520	1.600	0.0630	2 740	5 070	499	**EE333137/333203D**	1	370.000	14.5669	483.000	19.0157	20.600	0.8110	6.400	0.2520	1.600	0.0630	0.37	1.80	2.69	1.76
355.600	14.0000	444.500	17.5000	111.125	4.3750	136.525	5.3750	3.600	0.1417	1.600	0.0630	1 390	3 450	332	**L163149/L163110D**	1	370.000	14.5669	428.000	16.8504	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.31	2.20	3.27	2.15
	14.0000	482.600	19.0000	88.900	3.5000	133.350	5.2500	7.100	0.2795	1.600	0.0630	1 320	2 500	247	**EE161400/161901D**	1	377.000	14.8425	454.000	17.8740	22.200	0.8740	7.100	0.2795	1.600	0.0630	0.50	1.35	2.01	1.32
	14.0000	501.650	19.7500	107.950	4.2500	155.575	6.1250	6.400	0.2520	1.600	0.0630	1 700	3 280	322	**EE231400/231976D**	1	376.000	14.8031	481.000	18.9370	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.44	1.53	2.28	1.50
	14.0000	514.350	20.2500	107.950	4.2500	155.575	6.1250	6.400	0.2520	1.600	0.0630	1 700	3 280	322	**EE231400/232026D**	1	376.000	14.8031	481.000	18.9370	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.44	1.53	2.28	1.50
	14.0000	514.350	20.2500	152.400	6.0000	193.675	7.6250	6.400	0.2520	1.600	0.0630	2 740	5 070	499	**EE333140/333203D**	1	376.000	14.8031	483.000	19.0157	20.600	0.8110	6.400	0.2520	1.600	0.0630	0.37	1.80	2.69	1.76
368.249	14.4980	523.875	20.6250	169.863	6.6875	214.313	8.4375	6.400	0.2520	1.600	0.0630	3 590	7 060	663	**46T745221**	1	388.000	15.2756	505.000	19.8819	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
	14.4980	523.875	20.6250	169.863	6.6875	214.313	8.4375	6.400	0.2520	1.600	0.0630	3 420	6 780	644	**HM265049/HM265010D**	1-P	388.000	15.2756	505.000	19.8819	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
368.300	14.5000	596.900	23.5000	133.350	5.2500	203.200	8.0000	9.500	0.3740	2.400	0.0945	3 410	5 410	526	**EE181453/182351D**	1-P	395.000	15.5512	555.000	21.8504	34.900	1.3740	9.500	0.3740	2.400	0.0945	0.41	1.63	2.42	1.59
371.475	14.6250	501.650	19.7500	107.950	4.2500	155.575	6.1250	6.400	0.2520	1.600	0.0630	1 700	3 280	322	**EE231462/231976D**	1	392.000	15.4331	481.000	18.9370	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.44	1.53	2.28	1.50
	14.6250	514.350	20.2500	107.950	4.2500	155.575	6.1250	6.400	0.2520	1.600	0.0630	1 700	3 280	322	**EE231462/232026D**	1	392.000	15.4331	481.000	18.9370	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.44	1.53	2.28	1.50

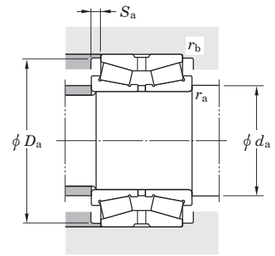
Note 1) SP indicates the specially chamfered from.

TDO · TDOS type

d 381.000 ~ 479.425 mm
15.0000 ~ 18.8750 inch



Design 1 | Design 1-P | Design 2 | Design 2-P

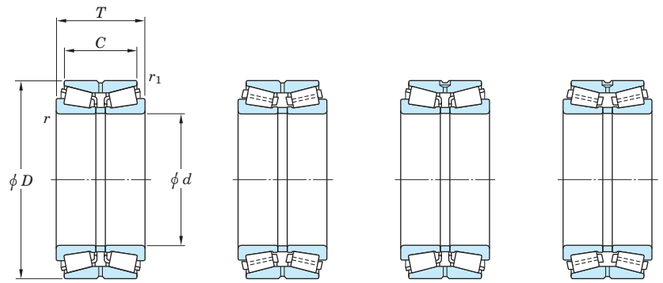


Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.	Design	Mounting dimensions										Constant	Axial load factors		
d		D		C		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u			d_a (min.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
381.000	15.0000	508.000	20.0000	88.900	3.5000	139.700	5.5000	6.400	0.2520	1.600	0.0630	1 480	2 980	288	**EE192150/192201D**	1	401.000	15.7874	480.000	18.8976	25.400	1.0000	6.400	0.2520	1.600	0.0630	0.53	1.27	1.89	1.24
	15.0000	546.100	21.5000	177.800	7.0000	222.250	8.7500	6.400	0.2520	1.600	0.0630	4 090	8 430	773	**HM266447/HM266410D**	1-P	401.000	15.7874	520.000	20.4724	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
	15.0000	546.100	21.5000	177.800	7.0000	222.250	8.7500	1.600	0.0630	6.400	0.2520	3 550	6 980	646	**46T765522A**	1	409.000	16.1024	520.000	20.4724	22.300	0.8780	1.600	0.0630	6.400	0.2520	0.33	2.03	3.02	1.98
	15.0000	590.550	23.2500	193.675	7.6250	244.475	9.6250	6.400	0.2520	1.600	0.0630	4 240	8 930	803	**M268730/M268710D**	1-P	401.000	15.7874	565.000	22.2441	25.400	1.0000	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
384.175	15.1250	546.100	21.5000	177.800	7.0000	222.250	8.7500	6.400	0.2520	1.600	0.0630	4 090	8 430	773	**HM266449/HM266410D**	1-P	404.000	15.9055	520.000	20.4724	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
385.763	15.1875	514.350	20.2500	139.700	5.5000	177.800	7.0000	1.600	0.0630	6.400	0.2520	2 590	5 410	516	**LM665949/LM665910D**	1	414.000	16.2992	494.000	19.4488	19.100	0.7520	1.600	0.0630	6.400	0.2520	0.42	1.61	2.40	1.58
393.700	15.5000	539.750	21.2500	101.600	4.0000	142.875	5.6250	6.400	0.2520	1.600	0.0630	1 860	3 810	357	**EE234154/234213D**	1	414.000	16.2992	515.000	20.2756	20.600	0.8110	6.400	0.2520	1.600	0.0630	0.48	1.42	2.11	1.39
	15.5000	546.100	21.5000	117.475	4.6250	158.750	6.2500	6.400	0.2520	1.600	0.0630	1 860	3 810	357	**EE234154/234216D**	1	414.000	16.2992	515.000	20.2756	20.600	0.8110	6.400	0.2520	1.600	0.0630	0.48	1.42	2.11	1.39
396.875	15.6250	539.750	21.2500	101.600	4.0000	142.875	5.6250	6.400	0.2520	1.600	0.0630	1 860	3 810	357	**EE234156/234213D**	1	417.000	16.4173	515.000	20.2756	20.600	0.8110	6.400	0.2520	1.600	0.0630	0.48	1.42	2.11	1.39
	15.6250	546.100	21.5000	117.475	4.6250	158.750	6.2500	6.400	0.2520	1.600	0.0630	1 860	3 810	357	**EE234156/234216D**	1	417.000	16.4173	515.000	20.2756	20.600	0.8110	6.400	0.2520	1.600	0.0630	0.48	1.42	2.11	1.39
406.400	16.0000	539.750	21.2500	101.600	4.0000	142.875	5.6250	6.400	0.2520	1.600	0.0630	1 860	3 810	357	**EE234160/234213D**	1	428.000	16.8504	515.000	20.2756	20.600	0.8110	6.400	0.2520	1.600	0.0630	0.48	1.42	2.11	1.39
	16.0000	546.100	21.5000	117.475	4.6250	158.750	6.2500	6.400	0.2520	1.600	0.0630	1 860	3 810	357	**EE234160/234216D**	1	428.000	16.8504	515.000	20.2756	20.600	0.8110	6.400	0.2520	1.600	0.0630	0.48	1.42	2.11	1.39
	16.0000	574.675	22.6250	106.363	4.1875	157.163	6.1875	6.700	0.2638	1.600	0.0630	2 040	3 880	367	**EE285160/285228D**	1	428.000	16.8504	535.000	21.0630	25.400	1.0000	6.700	0.2638	1.600	0.0630	0.50	1.35	2.01	1.32
	16.0000	574.675	22.6250	118.000	4.6457	175.000	6.8898	SP	SP	SP	SP	2 530	4 620	439	**46T815718**	1-P	426.400	16.7874	550.000	21.6535	28.500	1.1220	4.000	0.1575	2.000	0.0787	0.70	0.97	1.44	0.94
	16.0000	590.550	23.2500	174.625	6.8750	228.600	9.0000	9.500	0.3740	1.600	0.0630	3 830	7 070	658	**EE833160X/833233D**	1	434.000	17.0866	560.000	22.0472	27.000	1.0630	9.500	0.3740	1.600	0.0630	0.32	2.08	3.10	2.04
	16.0000	609.524	23.9970	133.350	5.2500	177.800	7.0000	7.900	0.3110	1.600	0.0630	3 260	6 060	567	**EE736160/736239D**	1	431.000	16.9685	575.000	22.6378	22.200	0.8740	4.000	0.1575	7.900	0.3110	0.35	1.95	2.90	1.91
	16.0000	609.600	24.0000	123.825	4.8750	187.325	7.3750	6.700	0.2638	1.600	0.0630	3 060	5 280	503	**EE911600/912401D**	1	428.000	16.8504	570.000	22.4409	31.800	1.2520	6.700	0.2638	1.600	0.0630	0.38	1.76	2.62	1.72
	16.0000	673.100	26.5000	127.000	5.0000	192.639	7.5842	6.400	0.2520	1.600	0.0630	3 170	5 240	494	**EE571602/572651D**	1	428.000	16.8504	620.000	24.4094	32.800	1.2913	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
	16.0000	673.100	26.5000	152.400	6.0000	192.639	7.5842	6.400	0.2520	1.600	0.0630	3 170	5 240	494	**EE571602/572653D**	1	428.000	16.8504	630.000	24.8031	20.100	0.7913	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
409.575	16.1250	546.100	21.5000	147.638	5.8125	185.738	7.3125	6.400	0.2520	1.600	0.0630	2 850	5 740	541	**M667948/M667911D**	1	431.000	16.9685	530.000	20.8661	19.100	0.7520	6.400	0.2520	1.600	0.0630	0.42	1.62	2.42	1.59
415.925	16.3750	590.550	23.2500	193.675	7.6250	244.475	9.6250	6.400	0.2520	1.600	0.0630	4 240	8 930	803	**M268749/M268710D**	1-P	437.000	17.2047	565.000	22.2441	25.400	1.0000	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
430.213	16.9375	603.250	23.7500	104.775	4.1250	159.639	6.2850	6.400	0.2520	1.600	0.0630	2 090	3 770	361	**EE241693/242377D**	1	451.000	17.7559	565.000	22.2441	27.400	1.0787	6.400	0.2520	1.600	0.0630	0.53	1.28	1.91	1.26
431.800	17.0000	571.500	22.5000	111.125	4.3750	155.575	6.1250	3.200	0.1260	1.600	0.0630	2 110	4 270	405	**LM869448/LM869410D**	1	447.000	17.5984	555.000	21.8504	22.200	0.8740	3.200	0.1260	1.600	0.0630	0.55	1.24	1.84	1.21
	17.0000	603.250	23.7500	104.775	4.1250	159.639	6.2850	6.400	0.2520	1.600	0.0630	2 090	3 770	361	**EE241701/242377D**	1	453.000	17.8346	565.000	22.2441	27.400	1.0787	6.400	0.2520	1.600	0.0630	0.53	1.28	1.91	1.26
	17.0000	673.100	26.5000	127.000	5.0000	192.639	7.5842	6.400	0.2520	1.600	0.0630	3 170	5 240	494	**EE571703/572651D**	1	453.000	17.8346	620.000	24.4094	32.800	1.2913	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
	17.0000	673.100	26.5000	152.400	6.0000	192.639	7.5842	6.400	0.2520	1.600	0.0630	3 170	5 240	494	**EE571703/572653D**	1	453.000	17.8346	630.000	24.8031	20.100	0.7913	6.400	0.2520	1.600	0.0630	0.40	1.68	2.50	1.64
441.325	17.3750	660.400	26.0000	138.113	5.4375	195.263	7.6875	10.400	0.4094	1.600	0.0630	2 900	5 260	482	**EE737173/737261D**	1	471.000	18.5433	615.000	24.2126	28.600	1.1260	10.400	0.4094	1.600	0.0630	0.37	1.80	2.69	1.76
447.675	17.6250	635.000	25.0000	206.375	8.1250	257.175	10.1250	6.400	0.2520	1.600	0.0630	4 920	10 500	917	**M270749/M270710D**	1-P	469.000	18.4646	605.000	23.8189	25.400	1.0000	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
457.200	18.0000	596.900	23.5000	120.650	4.7500	165.100	6.5000	9.500	0.3740	1.600	0.0630	2 410	5 230	486	**EE244180/244236D**	1	485.000	19.0945	570.000	22.4409	22.200	0.8740	9.500	0.3740	1.600	0.0630	0.40	1.67	2.48	1.63
	18.0000	605.000	23.8189	120.650	4.7500	165.100	6.5000	SP	SP	SP	SP	2 410	5 230	486	**46T916117**	2-P	489.000	19.2520	575.000	22.6378	22.000	0.8661	6.000	0.2362	0.800	0.0315	0.40	1.67	2.48	1.63
479.425	18.8750	679.450	26.7500	222.250	8.7500	276.225	10.8750	6.400	0.2520	1.600	0.0630	5 940	12 700	1 070	**46T966828**	2-P	490.000	19.2913	649.000	25.5512	27.000	1.0630	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
	18.8750	679.450	26.7500	222.250	8.7500	276.225	10.8750	6.400	0.2520	1.600	0.0630	5 310	11 100	952	**M272749/M272710D**	1-P	500.000	19.6850	650.000	25.5906	27.000	1.0630	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
	18.8750	679.450	26.7500	222.250	8.7500	276.225	10.8750	1.600	0.0630	6.400	0.2520	5 940	12 700	1 070	**46T966828**	1	508.000	20.0000	650.000	25.5906	27.000	1.0630	1.600	0.0630	6.400	0.2520	0.33	2.03	3.02	1.98
	18.8750	740.000	29.1339	230.000	9.0551	300.000	11.8110	1.600	0.0630	6.400	0.2520	7 020	13 100	1 110	**46T967430**	1-P	508.000	20.0000	696.000	27.4016	35.000	1.3780	1.600	0.0630	6.400	0.2520	0.33	2.03	3.02	1.98

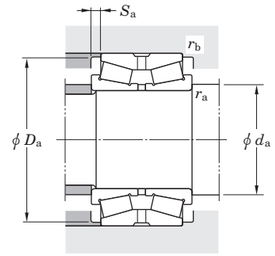
Note 1) SP indicates the specially chamfered from.

TDO · TDOS type

d 482.600 ~ (749.300) mm
19.0000 ~ (29.5000) inch



Design 1 | Design 1-P | Design 2 | Design 2-P

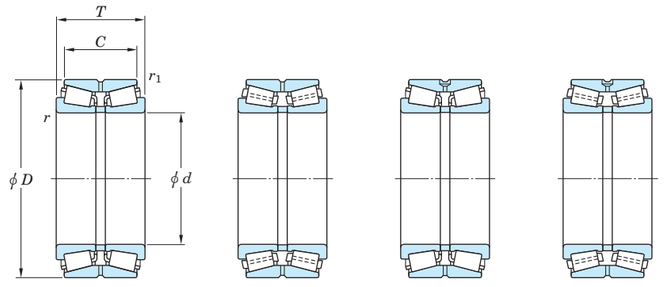


Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)	Bearing No.	Design	Mounting dimensions										Constant	Axial load factors		
d		D		C		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u			d_a (min.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
482.600	19.0000	615.950	24.2500	146.050	5.7500	184.150	7.2500	6.400	0.2520	1.600	0.0630	3 040	7 110	639	**LM272249/LM272210D**	1	505.000	19.8819	595.000	23.4252	19.100	0.7520	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
	19.0000	634.873	24.9950	142.875	5.6250	177.800	7.0000	6.400	0.2520	1.600	0.0630	2 840	6 590	585	**EE243190/243251D**	1	505.000	19.8819	610.000	24.0157	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.34	1.97	2.93	1.93
488.671	19.2390	660.400	26.0000	158.750	6.2500	206.375	8.1250	6.400	0.2520	1.600	0.0630	3 870	7 910	713	**EE640191/640261D**	1-P	510.000	20.0787	630.000	24.8031	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.31	2.20	3.27	2.15
488.950	19.2500	634.873	24.9950	136.525	5.3750	180.975	7.1250	6.400	0.2520	1.600	0.0630	3 090	6 840	613	**LM772748/LM772710D**	1	510.000	20.0787	615.000	24.2126	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.47	1.43	2.12	1.40
	19.2500	660.400	26.0000	158.750	6.2500	206.375	8.1250	6.400	0.2520	1.600	0.0630	3 870	7 910	713	**EE640192/640261D**	1-P	510.000	20.0787	630.000	24.8031	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.31	2.20	3.27	2.15
	19.2500	660.400	26.0000	158.750	6.2500	206.375	8.1250	1.600	0.0630	6.400	0.2520	3 940	8 090	722	**46T986621**	1	517.000	20.3543	631.000	24.8425	23.900	0.9409	1.600	0.0630	6.400	0.2520	0.31	2.20	3.27	2.15
489.026	19.2530	634.873	24.9950	142.875	5.6250	177.800	7.0000	6.400	0.2520	1.600	0.0630	2 840	6 590	585	**EE243192/243251D**	1	510.000	20.0787	610.000	24.0157	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.34	1.97	2.93	1.93
498.475	19.6250	634.873	24.9950	142.875	5.6250	177.800	7.0000	6.400	0.2520	1.600	0.0630	2 840	6 590	585	**EE243196/243251D**	1	520.000	20.4724	610.000	24.0157	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.34	1.97	2.93	1.93
508.000	20.0000	736.600	29.0000	114.300	4.5000	186.502	7.3426	6.400	0.2520	1.600	0.0630	3 160	5 150	475	**EE982003/982901D**	1-P	530.000	20.8661	690.000	27.1654	36.100	1.4213	6.400	0.2520	1.600	0.0630	0.48	1.42	2.11	1.39
520.700	20.5000	736.600	29.0000	114.300	4.5000	186.502	7.3426	6.400	0.2520	1.600	0.0630	3 160	5 150	475	**EE982051/982901D**	1-P	545.000	21.4567	690.000	27.1654	36.100	1.4213	6.400	0.2520	1.600	0.0630	0.48	1.42	2.11	1.39
533.400	21.0000	812.800	32.0000	187.325	7.3750	269.875	10.6250	9.500	0.3740	3.200	0.1260	5 680	11 000	947	**EE626210/626321D**	1-P	565.000	22.2441	760.000	29.9213	41.300	1.6260	9.500	0.3740	3.200	0.1260	0.44	1.54	2.29	1.50
536.575	21.1250	761.873	29.9950	247.650	9.7500	311.150	12.2500	6.400	0.2520	1.600	0.0630	7 060	14 400	1 190	**M276449/10CD**	2-P	555.000	21.8504	726.000	28.5827	32.000	1.2598	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
546.100	21.5000	736.600	29.0000	114.300	4.5000	165.100	6.5000	6.400	0.2520	3.200	0.1260	3 030	6 100	550	**EE542215/542291D**	1-P	570.000	22.4409	705.000	27.7559	25.400	1.0000	6.400	0.2520	3.200	0.1260	0.51	1.33	1.97	1.30
558.800	22.0000	736.600	29.0000	114.300	4.5000	165.100	6.5000	6.400	0.2520	3.200	0.1260	3 030	6 100	550	**EE542220/542291D**	1-P	580.000	22.8346	705.000	27.7559	25.400	1.0000	6.400	0.2520	3.200	0.1260	0.51	1.33	1.97	1.30
	22.0000	736.600	29.0000	138.113	5.4375	187.328	7.3751	6.400	0.2520	1.600	0.0630	3 710	8 050	714	**EE843220/843291D**	1-P	580.000	22.8346	710.000	27.9528	24.600	0.9685	6.400	0.2520	1.600	0.0630	0.34	1.97	2.93	1.93
	22.0000	736.600	29.0000	160.000	6.2992	225.425	8.8750	6.400	0.2520	1.600	0.0630	4 050	9 180	776	**2TR559**	1-P	580.000	22.8346	720.000	28.3465	32.700	1.2874	6.400	0.2520	1.600	0.0630	0.70	0.97	1.44	0.94
	22.0000	736.600	29.0000	177.800	7.0000	225.425	8.8750	6.400	0.2520	1.600	0.0630	4 500	9 870	854	**LM377449/LM377410D**	1-P	580.000	22.8346	710.000	27.9528	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.35	1.95	2.90	1.91
	22.0000	736.600	29.0000	177.800	7.0000	225.425	8.8750	1.600	0.0630	6.400	0.2520	4 800	10 800	923	**2TR559D**	1-P	587.000	23.1102	707.000	27.8346	23.900	0.9409	1.600	0.0630	6.400	0.2520	0.35	1.95	2.90	1.91
	22.0000	742.950	29.2500	138.113	5.4375	187.328	7.3751	6.400	0.2520	1.600	0.0630	3 710	8 050	714	**EE843220/843292D**	1-P	580.000	22.8346	710.000	27.9528	24.600	0.9685	6.400	0.2520	1.600	0.0630	0.34	1.97	2.93	1.93
560.000	22.0472	740.000	29.1339	140.000	5.5118	190.000	7.4803	SP	SP	SP	SP	3 710	8 050	714	**2TR560B**	1-P	585.000	23.0315	715.000	28.1496	25.000	0.9843	4.000	0.1575	0.800	0.0315	0.34	1.97	2.93	1.93
571.500	22.5000	812.800	32.0000	263.525	10.3750	333.375	13.1250	6.400	0.2520	1.600	0.0630	8 150	17 500	1 400	**M278749/10D**	1-P	600.000	23.6220	778.000	30.6299	35.000	1.3780	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
602.945	23.7380	787.400	31.0000	158.750	6.2500	206.375	8.1250	6.400	0.2520	1.600	0.0630	4 260	9 940	840	**EE649237/649311D**	1-P	625.000	24.6063	755.000	29.7244	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.37	1.82	2.70	1.78
	23.7380	793.750	31.2500	158.750	6.2500	206.375	8.1250	6.400	0.2520	1.600	0.0630	4 260	9 940	840	**EE649237/649313D**	1-P	625.000	24.6063	755.000	29.7244	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.37	1.82	2.70	1.78
609.600	24.0000	787.400	31.0000	158.750	6.2500	206.375	8.1250	6.400	0.2520	1.600	0.0630	4 260	9 940	840	**EE649240/649311D**	1-P	635.000	25.0000	755.000	29.7244	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.37	1.82	2.70	1.78
	24.0000	793.750	31.2500	158.750	6.2500	206.375	8.1250	6.400	0.2520	1.600	0.0630	4 260	9 940	840	**EE649240/649313D**	1-P	635.000	25.0000	755.000	29.7244	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.37	1.82	2.70	1.78
	24.0000	812.800	32.0000	146.050	5.7500	190.500	7.5000	6.400	0.2520	3.200	0.1260	4 100	8 590	743	**EE743240/743321D**	1-P	635.000	25.0000	770.000	30.3150	22.200	0.8740	6.400	0.2520	3.200	0.1260	0.33	2.06	3.06	2.01
682.625	26.8750	965.200	38.0000	311.150	12.2500	396.875	15.6250	9.500	0.3740	1.600	0.0630	11 500	25 400	1 910	**2TR683-1**	2-P	710.000	27.9528	926.000	36.4567	42.800	1.6850	9.500	0.3740	1.600	0.0630	0.33	2.03	3.02	1.98
685.800	27.0000	876.300	34.5000	152.400	6.0000	200.025	7.8750	6.400	0.2520	1.600	0.0630	4 400	10 800	880	**EE655270/655346D**	1-P	710.000	27.9528	850.000	33.4646	23.800	0.9370	6.400	0.2520	1.600	0.0630	0.42	1.62	2.42	1.59
711.200	28.0000	914.400	36.0000	139.700	5.5000	190.500	7.5000	6.400	0.2520	1.600	0.0630	3 780	8 930	747	**EE755280/755361D**	1-P	735.000	28.9370	880.000	34.6457	25.400	1.0000	6.400	0.2520	1.600	0.0630	0.38	1.78	2.65	1.74
723.900	28.5000	914.400	36.0000	139.700	5.5000	187.325	7.3750	3.200	0.1260	1.600	0.0630	3 780	8 930	747	**EE755285/755361D**	1-P	745.000	29.3307	880.000	34.6457	23.800	0.9370	3.200	0.1260	1.600	0.0630	0.38	1.78	2.65	1.74
749.300	29.5000	990.600	39.0000	265.000	10.4331	338.000	13.3071	6.400	0.2520	3.200	0.1260	9 820	23 900	1 780	**LM283649/LM283610D**	1-P	775.000	30.5118	960.000	37.7953	36.500	1.4370	6.400	0.2520	3.200	0.1260	0.32	2.12	3.15	2.07

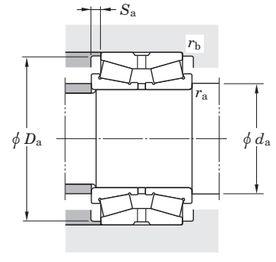
Note 1) SP indicates the specially chamfered from.

TDO · TDOS type

d (749.300) ~ 1 270.000 mm
(29.5000) ~ 50.0000 inch



Design 1 | Design 1-P | Design 2 | Design 2-P

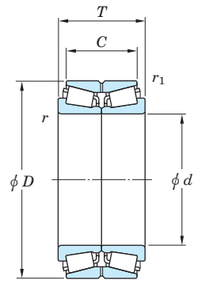


Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)		Bearing No.	Design	Mounting dimensions										Constant	Axial load factors		
d		D		C		T		$r^{1)}$ (min.)		$r_1{}^{1)}$ (min.)		C_r	C_{0r}	C_u				d_a (min.)		D_a (min.)		S_a (min.)		r_a (max.)		$r_b{}^{1)}$ (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch							mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
749.300	29.5000	990.600	39.0000	265.000	10.4331	338.000	13.3071	3.200	0.1260	6.400	0.2520	9 820	23 900	1 780		**2TR749A**	1-P	778.000	30.6299	955.000	37.5984	36.500	1.4370	3.200	0.1260	6.400	0.2520	0.32	2.12	3.15	2.07
812.800	32.0000	1 016.000	40.0000	146.050	5.7500	190.500	7.5000	6.400	0.2520	1.600	0.0630	4 680	10 500	846		**EE762320/762401D**	1-P	840.000	33.0709	980.000	38.5827	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.43	1.59	2.36	1.55
1 270.000	50.0000	1 435.100	56.5000	101.600	4.0000	146.050	5.7500	6.400	0.2520	3.200	0.1260	3 650	11 800	841		**LL889049/LL889010D**	1	1 300.000	51.1811	1 410.000	55.5118	22.200	0.8740	6.400	0.2520	3.200	0.1260	0.57	1.18	1.76	1.16

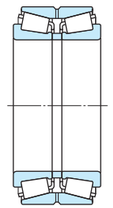
Note 1) SP indicates the specially chamfered from.

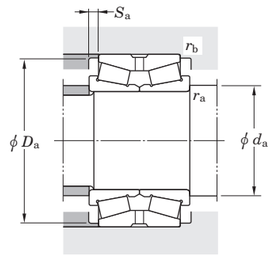
TNA type

d 60.325 ~ 203.200 mm
2.3750 ~ 8.0000 inch



Design 1

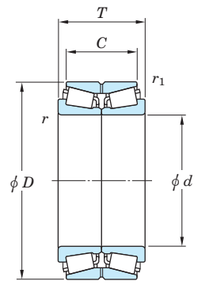

Design 2



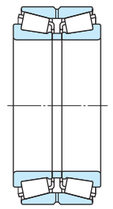
Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)		Bearing No.	Design	Mounting dimensions										Constant	Axial load factors		
d		D		C		T		r (min.)		r_1 (min.)		C_r	C_{0r}	C_u				d_a (min.)		D_a (min.)		S_a (min.)		r_a (max.)		r_b (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch							mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
60.325	2.3750	123.825	4.8750	63.500	2.5000	79.375	3.1250	1.600	0.0630	3.600	0.1417	426	446	69.6		**NA558/552D**	—	79.000	3.1102	112.000	4.4094	8.000	0.3150	1.600	0.0630	3.600	0.1417	0.35	1.95	2.90	1.91
76.200	3.0000	136.525	5.3750	53.975	2.1250	69.850	2.7500	0.800	0.0315	3.600	0.1417	287	396	59.9		**NA495A/493D**	—	95.000	3.7402	127.000	5.0000	8.000	0.3150	0.800	0.0315	3.600	0.1417	0.44	1.52	2.26	1.49
88.900	3.5000	161.925	6.3750	85.725	3.3750	104.775	4.1250	1.600	0.0630	3.600	0.1417	587	782	105		**NA759/752D**	—	107.000	4.2126	147.000	5.7874	9.600	0.3780	1.600	0.0630	3.600	0.1417	0.34	1.98	2.95	1.94
95.250	3.7500	161.925	6.3750	61.913	2.4375	82.547	3.2499	0.800	0.0315	3.600	0.1417	388	576	83.4		**NA52375/52637D**	—	114.000	4.4882	150.000	5.9055	10.400	0.4094	0.800	0.0315	3.600	0.1417	0.47	1.42	2.12	1.39
101.600	4.0000	168.275	6.6250	69.850	2.7500	92.075	3.6250	3.600	0.1417	0.800	0.0315	484	698	101		**NA691/672D**	2	120.000	4.7244	156.000	6.1417	11.200	0.4409	3.600	0.1417	0.800	0.0315	0.47	1.43	2.14	1.40
104.775	4.1250	180.975	7.1250	85.725	3.3750	104.775	4.1250	3.600	0.1417	1.600	0.0630	620	876	113		**NA782/774D**	2	123.000	4.8425	165.000	6.4961	9.600	0.3780	3.600	0.1417	1.600	0.0630	0.39	1.75	2.61	1.71
114.300	4.5000	190.500	7.5000	80.963	3.1875	106.363	4.1875	3.600	0.1417	1.600	0.0630	654	965	122		**NA71450/751D**	2	133.000	5.2362	177.000	6.9685	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.42	1.62	2.42	1.59
	4.5000	212.725	8.3750	117.475	4.6250	142.875	5.6250	3.600	0.1417	1.600	0.0630	965	1 350	168		**NA938//932D**	1	133.000	5.2362	192.000	7.5591	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.33	2.07	3.09	2.03
127.000	5.0000	182.563	7.1875	73.025	2.8750	85.725	3.3750	3.600	0.1417	0.800	0.0315	487	858	120		**NA48291/48220D**	2	145.000	5.7087	173.000	6.8110	6.400	0.2520	3.600	0.1417	0.800	0.0315	0.31	2.21	3.29	2.16
	5.0000	206.375	8.1250	82.550	3.2500	107.950	4.2500	3.600	0.1417	0.800	0.0315	702	1 100	134		**NA798/792D**	2	145.000	5.7087	194.000	7.6378	12.700	0.5000	3.600	0.1417	0.800	0.0315	0.46	1.47	2.19	1.44
	5.0000	234.950	9.2500	114.300	4.5000	142.875	5.6250	3.600	0.1417	1.600	0.0630	1 120	1 650	200		**NA95500//95927D**	1	145.000	5.7087	216.000	8.5039	14.300	0.5630	3.600	0.1417	1.600	0.0630	0.37	1.83	2.72	1.79
133.350	5.2500	215.900	8.5000	80.963	3.1875	106.363	4.1875	3.600	0.1417	1.600	0.0630	691	1 100	132		**NA74525//74851D**	1	152.000	5.9843	204.000	8.0315	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.49	1.38	2.06	1.35
136.525	5.3750	190.500	7.5000	73.025	2.8750	85.725	3.3750	3.600	0.1417	0.800	0.0315	505	944	129		**NA48390//48320D**	1	155.000	6.1024	181.000	7.1260	6.400	0.2520	3.600	0.1417	0.800	0.0315	0.32	2.10	3.13	2.06
139.700	5.5000	244.475	9.6250	79.375	3.1250	107.950	4.2500	3.600	0.1417	1.600	0.0630	694	989	131		**NA81550/81963D**	2	158.000	6.2205	226.000	8.8976	14.300	0.5630	3.600	0.1417	1.600	0.0630	0.35	1.93	2.88	1.89
142.875	5.6250	200.025	7.8750	73.025	2.8750	93.665	3.6876	3.600	0.1417	0.800	0.0315	527	982	133		**NA48686/48620D**	2	161.000	6.3386	190.000	7.4803	10.300	0.4055	3.600	0.1417	0.800	0.0315	0.34	2.01	2.99	1.96
146.050	5.7500	236.538	9.3125	106.363	4.1875	131.763	5.1875	3.600	0.1417	1.600	0.0630	904	1 460	171		**NA82576/82932D**	2	164.000	6.4567	224.000	8.8189	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.44	1.53	2.27	1.49
	5.7500	241.300	9.5000	106.363	4.1875	131.763	5.1875	3.600	0.1417	1.600	0.0630	904	1 460	171		**NA82576/82951D**	2	164.000	6.4567	224.000	8.8189	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.44	1.53	2.27	1.49
149.225	5.8750	236.538	9.3125	106.363	4.1875	131.763	5.1875	3.600	0.1417	1.600	0.0630	1 080	1 660	198		**HM231149NA/HM231111D**	2	168.000	6.6142	222.000	8.7402	12.700	0.5000	3.600	0.1417	1.600	0.0630	0.32	2.12	3.15	2.07
152.400	6.0000	244.475	9.6250	79.375	3.1250	107.950	4.2500	3.600	0.1417	1.600	0.0630	694	989	131		**NA81600/81963D**	2	171.000	6.7323	226.000	8.8976	14.300	0.5630	3.600	0.1417	1.600	0.0630	0.35	1.93	2.88	1.89
	6.0000	254.000	10.0000	111.125	4.3750	149.225	5.8750	3.600	0.1417	1.600	0.0630	1 180	1 830	215		**NA99600/99102D**	2	171.000	6.7323	236.000	9.2913	19.100	0.7520	3.600	0.1417	1.600	0.0630	0.41	1.66	2.47	1.62
165.100	6.5000	288.925	11.3750	111.125	4.3750	142.875	5.6250	3.600	0.1417	1.600	0.0630	1 350	1 950	223		**HM237536NA/HM237510D**	2	184.000	7.2441	270.000	10.6299	15.900	0.6260	3.600	0.1417	1.600	0.0630	0.32	2.12	3.15	2.07
165.496	6.5156	225.425	8.8750	69.850	2.7500	95.250	3.7500	3.600	0.1417	0.800	0.0315	554	1 140	148		**NA46791R/46720D**	2	184.000	7.2441	215.000	8.4646	12.700	0.5000	3.600	0.1417	0.800	0.0315	0.38	1.76	2.62	1.72
174.625	6.8750	247.650	9.7500	84.138	3.3125	103.188	4.0625	3.600	0.1417	0.800	0.0315	741	1 400	160		**NA67787//67720D**	1	193.000	7.5984	237.000	9.3307	9.500	0.3740	3.600	0.1417	0.800	0.0315	0.44	1.54	2.29	1.50
177.800	7.0000	247.650	9.7500	84.138	3.3125	103.188	4.0625	3.600	0.1417	0.800	0.0315	741	1 400	160		**NA67790/67720D**	2	196.000	7.7165	237.000	9.3307	9.500	0.3740	3.600	0.1417	0.800	0.0315	0.44	1.54	2.29	1.50
	7.0000	282.575	11.1250	79.375	3.1250	107.950	4.2500	3.600	0.1417	1.600	0.0630	880	1 450	182		**NA87700//87112D**	1	196.000	7.7165	266.000	10.4724	14.300	0.5630	3.600	0.1417	1.600	0.0630	0.42	1.62	2.42	1.59
	7.0000	288.925	11.3750	111.125	4.3750	142.875	5.6250	5.600	0.2205	1.600	0.0630	1 180	1 920	216		**NA94700//94114D**	1	206.000	8.1102	269.000	10.5906	15.900	0.6260	5.600	0.2205	1.600	0.0630	0.47	1.44	2.15	1.41
187.325	7.3750	320.675	12.6250	138.113	5.4375	185.738	7.3125	5.600	0.2205	1.600	0.0630	1 830	2 530	285		**H239649NA/H239612D**	2	216.000	8.5039	300.000	11.8110	23.800	0.9370	5.600	0.2205	1.600	0.0630	0.32	2.12	3.15	2.07
190.500	7.5000	266.700	10.5000	84.138	3.3125	109.538	4.3125	3.600	0.1417	0.800	0.0315	728	1 410	156		**NA67885SW//20D**	1	209.000	8.2283	257.000	10.1181	12.700	0.5000	3.600	0.1417	0.800	0.0315	0.48	1.42	2.11	1.38
203.200	8.0000	317.500	12.5000	88.900	3.5000	120.650	4.7500	6.400	0.2520	1.600	0.0630	944	1 450	166		**NA132083//132126D**	1	232.000	9.1339	292.000	11.4961	15.900	0.6260	6.400	0.2520	1.600	0.0630	0.31	2.15	3.21	2.11
	8.0000	317.500	12.5000	111.125	4.3750	146.050	5.7500	5.600	0.2205	1.600	0.0630	1 300	2 270	244		**NA93800/93127D**	2	232.000	9.1339	294.000	11.5748	17.500	0.6890	5.600	0.2205	1.600	0.0630	0.52	1.29	1.92	1.26

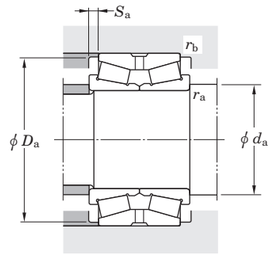
TNA type

d 228.600 ~ 406.400 mm
9.0000 ~ 16.0000 inch



Design 1


Design 2



Boundary dimensions												Basic load ratings (kN)		Fatigue load limit (kN)		Bearing No.	Design	Mounting dimensions										Constant	Axial load factors		
d		D		C		T		r (min.)		r_1 (min.)		C_r	C_{0r}	C_u				d_a (min.)		D_a (min.)		S_a (min.)		r_a (max.)		r_b (max.)		e	Y_2	Y_3	Y_0
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch							mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
228.600	9.0000	355.600	14.0000	111.125	4.3750	146.050	5.7500	6.400	0.2520	1.600	0.0630	1 560	2 610	280		**NA130902/131401D**	2	257.000	10.1181	330.000	12.9921	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.33	2.04	3.04	2.00
241.300	9.5000	368.300	14.5000	85.725	3.3750	120.650	4.7500	6.400	0.2520	1.600	0.0630	1 090	1 850	203		**NA170950//171451D**	1	270.000	10.6299	335.000	13.1890	17.500	0.6890	6.400	0.2520	1.600	0.0630	0.36	1.86	2.77	1.82
244.475	9.6250	349.148	13.7460	101.600	4.0000	133.350	5.2500	6.400	0.2520	1.600	0.0630	1 190	2 050	224		**NA127096/127136D**	2	273.000	10.7480	329.000	12.9528	15.900	0.6260	6.400	0.2520	1.600	0.0630	0.35	1.91	2.84	1.86
254.000	10.0000	422.275	16.6250	128.588	5.0625	173.038	6.8125	6.400	0.2520	1.600	0.0630	2 180	3 360	355		**HM252343NA/HM252311D**	2	282.000	11.1024	397.000	15.6299	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
	10.0000	431.724	16.9970	128.588	5.0625	173.038	6.8125	6.400	0.2520	1.600	0.0630	2 180	3 360	355		**HM252344NA/HM252315D**	2	282.000	11.1024	397.000	15.6299	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
	10.0000	431.724	16.9970	128.588	5.0625	173.038	6.8125	6.400	0.2520	1.600	0.0630	2 110	3 420	352		**NA551002/551701D**	2	282.000	11.1024	388.000	15.2756	22.200	0.8740	6.400	0.2520	1.600	0.0630	0.33	2.03	3.02	1.98
260.350	10.2500	400.050	15.7500	107.950	4.2500	146.050	5.7500	6.400	0.2520	1.600	0.0630	1 630	2 570	274		**NA221026/221576D**	2	289.000	11.3780	371.000	14.6063	19.100	0.7520	6.400	0.2520	1.600	0.0630	0.39	1.71	2.54	1.67
	10.2500	422.275	16.6250	128.588	5.0625	173.038	6.8125	6.400	0.2520	1.600	0.0630	2 180	3 360	355		**HM252349NA/HM252311D**	2	289.000	11.3780	397.000	15.6299	22.200	0.8740	1.600	0.0630	1.600	0.0630	0.33	2.03	3.02	1.98
	10.2500	431.724	16.9970	128.588	5.0625	173.038	6.8125	6.400	0.2520	1.600	0.0630	2 180	3 360	355		**HM252349NA/HM252315D**	2	289.000	11.3780	397.000	15.6299	22.200	0.8740	1.600	0.0630	1.600	0.0630	0.33	2.03	3.02	1.98
304.800	12.0000	438.048	17.2460	123.825	4.8750	161.925	6.3750	1.600	0.0630	6.400	0.2520	1 890	3 450	350		**NA329120/329173D**	—	333.000	13.1102	411.000	16.1811	19.100	0.7520	1.600	0.0630	6.400	0.2520	0.33	2.04	3.04	2.00
	12.0000	444.500	17.5000	98.425	3.8750	139.700	5.5000	6.400	0.2520	1.600	0.0630	1 550	2 760	288		**NA291201//291751D**	1	333.000	13.1102	413.000	16.2598	20.600	0.8110	6.400	0.2520	1.600	0.0630	0.38	1.79	2.66	1.75
355.600	14.0000	501.650	19.7500	107.950	4.2500	146.050	5.7500	6.400	0.2520	1.600	0.0630	1 700	3 280	322		**NA231400//231976D**	1	384.000	15.1181	480.000	18.8976	19.100	0.7520	6.400	0.2520	1.600	0.0630	0.44	1.53	2.28	1.50
406.400	16.0000	574.675	22.6250	106.363	4.1875	157.163	6.1875	6.400	0.2520	1.600	0.0630	2 040	3 880	367		**NA285160//285228D**	1	435.000	17.1260	535.000	21.0630	25.400	1.0000	6.400	0.2520	1.600	0.0630	0.50	1.35	2.01	1.32

Supplementary tables

Supplementary table 1 Shaft tolerances (deviation from nominal dimensions)

Nominal shaft dia. (mm)		Deviation classes of shaft dia.															
over	up to	d 6	e 6	f 6	g 5	g 6	h 5	h 6	h 7	h 8	h 9	h 10	js 5	js 6	js 7	j 5	j 6
3	6	− 30 − 38	− 20 − 28	− 10 − 18	− 4 − 9	− 4 −12	− 0 − 5	− 0 − 8	0 −12	0 − 18	0 − 30	0 − 48	± 2.5	± 4	± 6	+ 3 − 2	+ 6 − 2
6	10	− 40 − 49	− 25 − 34	− 13 − 22	− 5 −11	− 5 −14	− 0 − 6	− 0 − 9	0 −15	0 − 22	0 − 36	0 − 58	± 3	± 4.5	± 7.5	+ 4 − 2	+ 7 − 2
10	18	− 50 − 61	− 32 − 43	− 16 − 27	− 6 −14	− 6 −17	− 0 − 8	0 −11	0 −18	0 − 27	0 − 43	0 − 70	± 4	± 5.5	± 9	+ 5 − 3	+ 8 − 3
18	30	− 65 − 78	− 40 − 53	− 20 − 33	− 7 −16	− 7 −20	− 0 − 9	0 −13	0 −21	0 − 33	0 − 52	0 − 84	± 4.5	± 6.5	±10.5	+ 5 − 4	+ 9 − 4
30	50	− 80 − 96	− 50 − 66	− 25 − 41	− 9 −20	− 9 −25	0 −11	0 −16	0 −25	0 − 39	0 − 62	0 −100	± 5.5	± 8	±12.5	+ 6 − 5	+11 − 5
50	80	−100 −119	− 60 − 79	− 30 − 49	−10 −23	−10 −29	0 −13	0 −19	0 −30	0 − 46	0 − 74	0 −120	± 6.5	± 9.5	±15	+ 6 − 7	+12 − 7
80	120	−120 −142	− 72 − 94	− 36 − 58	−12 −27	−12 −34	0 −15	0 −22	0 −35	0 − 54	0 − 87	0 −140	± 7.5	±11	±17.5	+ 6 − 9	+13 − 9
120	180	−145 −170	− 85 −110	− 43 − 68	−14 −32	−14 −39	0 −18	0 −25	0 −40	0 − 63	0 −100	0 −160	± 9	±12.5	±20	+ 7 −11	+14 −11
180	250	−170 −199	−100 −129	− 50 − 79	−15 −35	−15 −44	0 −20	0 −29	0 −46	0 − 72	0 −115	0 −185	±10	±14.5	±23	+ 7 −13	+16 −13
250	315	−190 −222	−110 −142	− 56 − 88	−17 −40	−17 −49	0 −23	0 −32	0 −52	0 − 81	0 −130	0 −210	±11.5	±16	±26	+ 7 −16	±16
315	400	−210 −246	−125 −161	− 62 − 98	−18 −43	−18 −54	0 −25	0 −36	0 −57	0 − 89	0 −140	0 −230	±12.5	±18	±28.5	+ 7 −18	±18
400	500	−230 −270	−135 −175	− 68 −108	−20 −47	−20 −60	0 −27	0 −40	0 −63	0 − 97	0 −155	0 −250	±13.5	±20	±31.5	+ 7 −20	±20
500	630	−260 −304	−145 −189	− 76 −120	−22 −54	−22 −66	0 −32	0 −44	0 −70	0 −110	0 −175	0 −280	±16	±22	±35	–	–
630	800	−290 −340	−160 −210	− 80 −130	−24 −60	−24 −74	0 −36	0 −50	0 −80	0 −125	0 −200	0 −320	±18	±25	±40	–	–
800	1 000	−320 −376	−170 −226	− 86 −142	−26 −66	−26 −82	0 −40	0 −56	0 −90	0 −140	0 −230	0 −360	±20	±28	±45	–	–

[Note] 1) Δ_{dmp} : single plane mean bore diameter deviation

Unit : μm

k 5	k 6	k 7	m 5	m 6	m 7	n 5	n 6	p 6	r 6	r 7	Nominal shaft dia. (mm) over	up to	(Refer.) Δ_{dmp}[1] of bearing (class 0)
+ 6 + 1	+ 9 + 1	+13 + 1	+ 9 + 4	+12 + 4	+ 16 + 4	+13 + 8	+ 16 + 8	+ 20 + 12	+ 23 + 15	+ 27 + 15	3	6	0 − 8
+ 7 + 1	+10 + 1	+16 + 1	+12 + 6	+15 + 6	+ 21 + 6	+16 +10	+ 19 + 10	+ 24 + 15	+ 28 + 19	+ 34 + 19	6	10	0 − 8
+ 9 + 1	+12 + 1	+19 + 1	+15 + 7	+18 + 7	+ 25 + 7	+20 +12	+ 23 + 12	+ 29 + 18	+ 34 + 23	+ 41 + 23	10	18	0 − 8
+11 + 2	+15 + 2	+23 + 2	+17 + 8	+21 + 8	+ 29 + 8	+24 +15	+ 28 + 15	+ 35 + 22	+ 41 + 28	+ 49 + 28	18	30	0 − 10
+13 + 2	+18 + 2	+27 + 2	+20 + 9	+25 + 9	+ 34 + 9	+28 +17	+ 33 + 17	+ 42 + 26	+ 50 + 34	+ 59 + 34	30	50	0 − 12
+15 + 2	+21 + 2	+32 + 2	+24 +11	+30 +11	+ 41 + 11	+33 +20	+ 39 + 20	+ 51 + 32	+ 60 + 41	+ 71 + 41	50	65	0 − 15
									+ 62 + 43	+ 73 + 43	65	80	
+18 + 3	+25 + 3	+38 + 3	+28 +13	+35 +13	+ 48 + 13	+38 +23	+ 45 + 23	+ 59 + 37	+ 73 + 51	+ 86 + 51	80	100	0 − 20
									+ 76 + 54	+ 89 + 54	100	120	
+21 + 3	+28 + 3	+43 + 3	+33 +15	+40 +15	+ 55 + 15	+45 +27	+ 52 + 27	+ 68 + 43	+ 88 + 63	+103 + 63	120	140	0 − 25
									+ 90 + 65	+105 + 65	140	160	
									+ 93 + 68	+108 + 68	160	180	
+24 + 4	+33 + 4	+50 + 4	+37 +17	+46 +17	+ 63 + 17	+51 +31	+ 60 + 31	+ 79 + 50	+106 + 77	+123 + 77	180	200	0 − 30
									+109 + 80	+126 + 80	200	225	
									+113 + 84	+130 + 84	225	250	
+27 + 4	+36 + 4	+56 + 4	+43 +20	+52 +20	+ 72 + 20	+57 +34	+ 66 + 34	+ 88 + 56	+126 + 94	+146 + 94	250	280	0 − 35
									+130 + 98	+150 + 98	280	315	
+29 + 4	+40 + 4	+61 + 4	+46 +21	+57 +21	+ 78 + 21	+62 +37	+ 73 + 37	+ 98 + 62	+144 +108	+165 +108	315	355	0 − 40
									+150 +114	+171 +114	355	400	
+32 + 5	+45 + 5	+68 + 5	+50 +23	+63 +23	+ 86 + 23	+67 +40	+ 80 + 40	+108 + 68	+166 +126	+189 +126	400	450	0 − 45
									+172 +132	+195 +132	450	500	
+32 0	+44 0	+70 0	+58 +26	+70 +26	+ 96 + 26	+76 +44	+ 88 + 44	+122 + 78	+194 +150	+220 +150	500	560	0 − 50
									+199 +155	+225 +155	560	630	
+36 0	+50 0	+80 0	+66 +30	+80 +30	+110 + 30	+86 +50	+100 + 50	+138 + 88	+225 +175	+255 +175	630	710	0 − 75
									+235 +185	+265 +185	710	800	
+40 0	+56 0	+90 0	+74 +34	+90 +34	+124 + 34	+96 +56	+112 + 56	+156 +100	+266 +210	+300 +210	800	900	0 −100
									+276 +220	+310 +220	900	1 000	

Supplementary table 2 Housing bore tolerances (deviation from nominal dimensions)

Nominal bore dia. (mm)		Deviation classes of housing bore														
over	up to	E 6	F 6	F 7	G 6	G 7	H 6	H 7	H 8	H 9	H 10	JS 5	JS 6	JS 7	J 6	J 7
10	18	+ 43 + 32	+ 27 + 16	+ 34 + 16	+17 + 6	+ 24 + 6	+11 0	+ 18 0	+ 27 0	± 43 0	± 70 0	± 4	± 5.5	± 9	+ 6 – 5	+10 – 8
18	30	+ 53 + 40	+ 33 + 20	+ 41 + 20	+20 + 7	+ 28 + 7	+13 0	+ 21 0	+ 33 0	± 52 0	± 84 0	± 4.5	± 6.5	±10.5	+ 8 – 5	+12 – 9
30	50	+ 66 + 50	+ 41 + 25	+ 50 + 25	+25 + 9	+ 34 + 9	+16 0	+ 25 0	+ 39 0	± 62 0	+100 0	± 5.5	± 8	±12.5	+10 – 6	+14 –11
50	80	+ 79 + 60	+ 49 + 30	+ 60 + 30	+29 +10	+ 40 + 10	+19 0	+ 30 0	+ 46 0	± 74 0	+120 0	± 6.5	± 9.5	±15	+13 – 6	+18 –12
80	120	+ 94 + 72	+ 58 + 36	+ 71 + 36	+34 +12	+ 47 + 12	+22 0	+ 35 0	+ 54 0	± 87 0	+140 0	± 7.5	±11	±17.5	+16 – 6	+22 –13
120	180	+110 + 85	+ 68 + 43	+ 83 + 43	+39 +14	+ 54 + 14	+25 0	+ 40 0	+ 63 0	+100 0	+160 0	± 9	±12.5	±20	+18 – 7	+26 –14
180	250	+129 +100	+ 79 + 50	+ 96 + 50	+44 +15	+ 61 + 15	+29 0	+ 46 0	+ 72 0	+115 0	+185 0	±10	±14.5	±23	+22 – 7	+30 –16
250	315	+142 +110	+ 88 + 56	+ 108 + 56	+49 +17	+ 69 + 17	+32 0	+ 52 0	+ 81 0	+130 0	+210 0	±11.5	±16	±26	+25 – 7	+36 –16
315	400	+161 +125	+ 98 + 62	+119 + 62	+54 +18	+ 75 + 18	+36 0	+ 57 0	+ 89 0	+140 0	+230 0	±12.5	±18	±28.5	+29 – 7	+39 –18
400	500	+175 +135	+108 + 68	+131 + 68	+60 +20	+ 83 + 20	+40 0	+ 63 0	+ 97 0	+155 0	+250 0	±13.5	±20	±31.5	+33 – 7	+43 –20
500	630	+189 +145	+120 + 76	+146 + 76	+66 +22	+ 92 + 22	+44 0	+ 70 0	+110 0	+175 0	+280 0	±16	±22	±35	–	–
630	800	+210 +160	+130 + 80	+160 + 80	+74 +24	+104 + 24	+50 0	+ 80 0	+125 0	+200 0	+320 0	±18	±25	±40	–	–
800	1 000	+226 +170	+142 + 86	+176 + 86	+82 +26	+116 + 26	+56 0	+ 90 0	+140 0	+230 0	+360 0	±20	±28	±45	–	–
1 000	1 250	+261 +195	+164 + 98	+203 + 98	+94 +28	+133 + 28	+66 0	+105 0	+165 0	+260 0	+420 0	±23.5	±33	±52.5	–	–

[Note] 1) Δ_{Dmp} : single plane mean outside diameter deviation

Unit : μm

K 5	K 6	K 7	M 5	M 6	M 7	N 5	N 6	N 7	P 6	P 7	R 7	Nominal bore dia. (mm) over	up to	(Refer.) Δ_{Dmp}[1] of bearing (class 0)
+ 2 – 6	+ 2 – 9	+ 6 – 12	– 4 –12	– 4 – 15	0 – 18	– 9 – 17	– 9 – 20	– 5 – 23	– 15 – 26	– 11 – 29	– 16 – 34	**10**	**18**	0 – 8
+ 1 – 8	+ 2 –11	+ 6 – 15	– 5 –14	– 4 – 17	0 – 21	– 12 – 21	– 11 – 24	– 7 – 28	– 18 – 31	– 14 – 35	– 20 – 41	**18**	**30**	0 – 9
+ 2 – 9	+ 3 –13	+ 7 – 18	– 5 –16	– 4 – 20	0 – 25	– 13 – 24	– 12 – 28	– 8 – 33	– 21 – 37	– 17 – 42	– 25 – 50	**30**	**50**	0 – 11
+ 3 –10	+ 4 –15	+ 9 – 21	– 6 –19	– 5 – 24	0 – 30	– 15 – 28	– 14 – 33	– 9 – 39	– 26 – 45	– 21 – 51	– 30 – 60	**50**	**65**	0 – 13
											– 32 – 62	**65**	**80**	
+ 2 –13	+ 4 –18	+ 10 – 25	– 8 –23	– 6 – 28	0 – 35	– 18 – 33	– 16 – 38	– 10 – 45	– 30 – 52	– 24 – 59	– 38 – 73	**80**	**100**	0 – 15
											– 41 – 76	**100**	**120**	
+ 3 –15	+ 4 –21	+ 12 – 28	– 9 –27	– 8 – 33	0 – 40	– 21 – 39	– 20 – 45	– 12 – 52	– 36 – 61	– 28 – 68	– 48 – 88	**120**	**140**	(up to 150) 0 – 18 (over to 150) 0 – 25
											– 50 – 90	**140**	**160**	
											– 53 – 93	**160**	**180**	
+ 2 –18	+ 5 –24	+ 13 – 33	–11 –31	– 8 – 37	0 – 46	– 25 – 45	– 22 – 51	– 14 – 60	– 41 – 70	– 33 – 79	– 60 –106	**180**	**200**	0 – 30
											– 63 –109	**200**	**225**	
											– 67 –113	**225**	**250**	
+ 3 –20	+ 5 –27	+ 16 – 36	–13 –36	– 9 – 41	0 – 52	– 27 – 50	– 25 – 57	– 14 – 66	– 47 – 79	– 36 – 88	– 74 –126	**250**	**280**	0 – 35
											– 78 –130	**280**	**315**	
+ 3 –22	+ 7 –29	+ 17 – 40	–14 –39	– 10 – 46	0 – 57	– 30 – 55	– 26 – 62	– 16 – 73	– 51 – 87	– 41 – 98	– 87 –144	**315**	**355**	0 – 40
											– 93 –150	**355**	**400**	
+ 2 –25	+ 8 –32	+ 18 – 45	–16 –43	– 10 – 50	0 – 63	– 33 – 60	– 27 – 67	– 17 – 80	– 55 – 95	– 45 –108	–103 –166	**400**	**450**	0 – 45
											–109 –172	**450**	**500**	
0 –32	0 –44	0 – 70	–26 –58	– 26 – 70	– 26 – 96	– 44 – 76	– 44 – 88	– 44 –114	– 78 –122	– 78 –148	–150 –220	**500**	**560**	0 – 50
											–155 –225	**560**	**630**	
0 –36	0 –50	0 – 80	–30 –66	– 30 – 80	– 30 –110	– 50 – 86	– 50 –100	– 50 –130	– 88 –138	– 88 –168	–175 –255	**630**	**710**	0 – 75
											–185 –265	**710**	**800**	
0 –40	0 –56	0 – 90	–34 –74	– 34 – 90	– 34 –124	– 56 – 96	– 56 –112	– 56 –146	–100 –156	–100 –190	–210 –300	**800**	**900**	0 –100
											–220 –310	**900**	**1 000**	
0 –47	0 –66	0 –105	–40 –87	– 40 –106	– 40 –145	– 66 –113	– 66 –132	– 66 –171	–120 –186	–120 –225	–250 –355	**1 000**	**1 120**	0 –125
											–260 –365	**1 120**	**1 250**	

Supplementary table 3 (1) SI units and conversion factors

Mass	SI units	Other units[1)]	Conversion into SI units	Conversion from SI units
Angle	rad [radian(s)]	° [degree(s)] ∗ ' [minute(s)] ∗ " [second(s)] ∗	1° = π / 180 rad 1' = π / 10 800 rad 1" = π / 648 000 rad	1 rad = 57.295 78°
Length	m [meter(s)]	Å [Angstrom unit] μ [micron(s)] in [inch(es)] ft [foot (feet)] yd [yard(s)] mile [mile(s)]	1 Å = 10^{-10} m = 0.1 nm = 100 pm 1 μ = 1 μm 1 in = 25.4 mm 1 ft = 12 in = 0.304 8 m 1 yd = 3 ft = 0.914 4 m 1 mile = 5 280 ft = 1 609.344 m	1 m = 10^{10} Å 1 m = 39.37 in 1 m = 3.280 8 ft 1 m = 1.093 6 yd 1 km = 0.621 4 mile
Area	m^2	a [are(s)] ha [hectare(s)] acre [acre(s)]	1 a = 100 m^2 1 ha = 10^4 m^2 1 acre = 4 840 yd^2 = 4 046.86 m^2	 1 km^2 = 247.1 acre
Volume	m^3	ℓ, L [liter(s)] ∗ cc [cubic centimeters] gal (US) [gallon(s)] floz (US) [fluid ounce(s)] barrel (US) [barrels (US)]	1 ℓ = 1 dm^3 = 10^{-3} m^3 1 cc = 1 cm^3 = 10^{-6} m^3 1 gal (US) = 231 in^3 = 3.785 41 dm^3 1 floz (US) = 29.573 5 cm^3 1 barrel (US) = 158.987 dm^3	1 m^3 = 10^3 ℓ 1 m^3 = 10^6 cc 1 m^3 = 264.17 gal 1 m^3 = 33 814 floz 1 m^3 = 6.289 8 barrel
Time	s [second(s)]	min [minute(s)] ∗ h [hour(s)] ∗ d [day(s)] ∗		
Angular velocity	rad / s			
Velocity	m / s	kn [knot(s)] m / h ∗	1 kn = 1 852 m / h	1 km / h = 0.539 96 kn
Acceleration	m / s^2	G	1 G = 9.806 65 m / s^2	1 m / s^2 = 0.101 97 G
Frequency	Hz [hertz]	c / s [cycle(s) / second]	1 c / s = 1 s^{-1} = 1 Hz	
Rotational frequency	s^{-1}	rpm [revolutions per minute] min^{-1} ∗ r / min	1 rpm = 1 / 60 s^{-1}	1 s^{-1} = 60 rpm
Mass	kg [kilogram(s)]	t [ton(s)] ∗ lb [pound(s)] gr [grain(s)] oz [ounce(s)] ton (UK) [ton(s) (UK)] ton (US) [ton(s) (US)] car [carat(s)]	1 t = 10^3 kg 1 lb = 0.453 592 37 kg 1 gr = 64.798 91 mg 1 oz = 1 / 16 lb = 28.349 5 g 1 ton (UK) = 1 016.05 kg 1 ton (US) = 907.185 kg 1 car = 200 mg	 1 kg = 2.204 6 lb 1 g = 15.432 4 gr 1 kg = 35.274 0 oz 1 t = 0.984 2 ton (UK) 1 t = 1.102 3 ton (US) 1 g = 5 car

[Note] 1) ∗ : Unit can be used as an SI unit.
No asterisk : Unit cannot be used.

Supplementary table 3 (2) SI units and conversion factors

Mass	SI units	Other units[1)]	Conversion into SI units	Conversion from SI units
Density	kg/m^3			
Linear density	kg/m			
Momentum	$kg{\cdot}m/s$			
Moment of momentum, Angular momentum	$kg{\cdot}m^2/s$			
Moment of inertia	$kg{\cdot}m^2$			
Force	N [newton(s)]	dyn [dyne(s)] kgf [kilogram-force] gf [gram-force] tf [ton-force] lbf [pound-force]	1 dyn = 10^{-5} N 1 kgf = 9.806 65 N 1 gf = 9.806 65 × 10^{-3} N 1 tf = 9.806 65 × 10^3 N 1 lbf = 4.448 22 N	1 N = 10^5 dyn 1 N = 0.101 97 kgf 1 N = 0.224 809 lbf
Moment of force	N·m [newton meter(s)]	gf·cm kgf·cm kgf·m tf·m lbf·ft	1 gf·cm = 9.806 65 × 10^{-5} N·m 1 kgf·cm = 9.806 65 × 10^{-2} N·m 1 kgf·m = 9.806 65 N·m 1 tf·m = 9.806 65 × 10^3 N·m 1 lbf·ft = 1.355 82 N·m	 1 N·m = 0.101 97 kgf·m 1 N·m = 0.737 56 lbf·ft
Pressure, **Normal stress**	Pa [pascal(s)] or N/m^2 {1 Pa = 1 N/m^2}	gf/cm^2 kgf/mm^2 kgf/m^2 lbf/in^2 bar [bar(s)] at [engineering air pressure] mH_2O, mAq [meter water column] atm [atmosphere] mHg [meter mercury column] Torr [torr]	1 gf/cm^2 = 9.806 65 × 10 Pa 1 kgf/mm^2 = 9.806 65 × 10^6 Pa 1 kgf/m^2 = 9.806 65 Pa 1 lbf/in^2 = 6 894.76 Pa 1 bar = 10^5 Pa 1 at = 1 kgf/cm^2 = 9.806 65 × 10^4 Pa 1 mH_2O = 9.806 65 × 10^3 Pa 1 atm = 101 325 Pa 1 mHg = $\frac{101\ 325}{0.76}$ Pa 1 Torr = 1 mmHg = 133.322 Pa	 1 MPa = 0.101 97 kgf/mm^2 1 Pa = 0.101 97 kgf/m^2 1 Pa = 0.145 × 10^{-3} lbf/in^2 1 Pa = 10^{-2} mbar 1 Pa = 7.500 6 × 10^{-3} Torr
Viscosity	Pa·s [pascal second]	P [poise] $kgf{\cdot}s/m^2$	10^{-2} P = 1 cP = 1 mPa·s 1 $kgf{\cdot}s/m^2$ = 9.806 65 Pa·s	 1 Pa·s = 0.101 97 $kgf{\cdot}s/m^2$
Kinematic viscosity	m^2/s	St [stokes]	10^{-2} St = 1 cSt = 1 mm^2/s	
Surface tension	N/m			

Supplementary table 3 (3) SI units and conversion factors

Mass	SI units	Other units[1)]	Conversion into SI units	Conversion from SI units
Work, energy	J [joule(s)] {1 J = 1 N·m}	eV [electron volt(s)] ∗ erg [erg(s)] kgf·m lbf·ft	1 eV = (1.602 189 2 ± 0.000 004 6) × 10^{-19} J 1 erg = 10^{-7} J 1 kgf·m = 9.806 65 J 1 lbf·ft = 1.355 82 J	 1 J = 10^{7} erg 1 J = 0.101 97 kgf·m 1 J = 0.737 56 lbf·ft
Power	W [watt(s)]	erg / s [ergs per second] kgf·m / s PS [French horse-power] HP [horse-power (British)] lbf·ft / s	1 erg / s = 10^{-7} W 1 kgf·m / s = 9.806 65 W 1 PS = 75 kgf·m / s = 735.5 W 1 HP = 550 lbf·ft / s = 745.7 W 1 lbf·ft / s = 1.355 82 W	 1 W = 0.101 97 kgf·m / s 1 W = 0.001 36 PS 1 W = 0.001 34 HP
Thermo-dynamic temperature	K [kelvin(s)]			
Celsius temperature	ºC [celsius(s)] {t ºC = (t + 273.15) K}	ºF [degree(s) Fahrenheit]	t ºF = $\frac{5}{9}$ (t − 32) ºC	t ºC = ($\frac{9}{5}$ t + 32) ºF
Linear expansion coefficient	K^{-1}	$ºC^{-1}$ [per degree]		
Heat	J [joule(s)] {1 J = 1 N·m}	erg [erg(s)] kgf·m cal_{IT} [I. T. calories]	1 erg = 10^{-7} J 1 cal_{IT} = 4.186 8 J 1 $Mcal_{IT}$ = 1.163 kW·h	1 J = 10^{7} erg 1 J = 0.238 85 cal_{IT} 1 kW·h = 0.86 × 10^{6} cal_{IT}
Thermal conductivity	W / (m·K)	W / (m·ºC) cal / (s·m·ºC)	1 W / (m·ºC) = 1 W / (m·K) 1 cal / (s·m·ºC) = 4.186 05 W / (m·K)	
Coefficient of heat transfer	W / (m^2·K)	W / (m^2·ºC) cal / (s·m^2·ºC)	1 W / (m^2·ºC) = 1 W/ (m^2·K) 1 cal / (s·m^2·ºC) = 4.186 05 W / (m^2·K)	
Heat capacity	J / K	J / ºC	1 J / ºC = 1 J / K	
Massic heat capacity	J / (kg·K)	J / (kg·ºC)		

[Note] 1) ∗ : Unit can be used as an SI unit.
No asterisk : Unit cannot be used.

Supplementary table 3 (4) SI units and conversion factors

Mass	SI units	Other units[1)]	Conversion into SI units	Conversion from SI units
Electric current	A [ampere(s)]			
Electric charge, quantity of electricity	C [coulomb(s)] {1 C = 1 A·s}	A·h *	1 A·h = 3.6 kC	
Tension, electric potential	V [volt(s)] {1 V = 1 W / A}			
Capacitance	F [farad(s)] {1 F = 1 C / V}			
Magnetic field strength	A / m	Oe [oersted(s)]	$1\ \mathrm{Oe} = \frac{10^3}{4\pi}\ \mathrm{A/m}$	$1\ \mathrm{A/m} = 4\pi \times 10^{-3}\ \mathrm{Oe}$
Magnetic flux density	T [tesla(s)] {1 T = 1 N / (A·m) = 1 Wb / m^2 = 1 V·s / m^2}	Gs [gauss(es)] γ [gamma(s)]	1 Gs = 10^{-4} T 1 γ = 10^{-9} T	1 T = 10^4 Gs 1 T = 10^9 γ
Magnetic flux	Wb [weber(s)] {1 Wb = 1 V·s}	Mx [maxwell(s)]	1 Mx = 10^{-8} Wb	1 Wb = 10^8 Mx
Self inductance	H [henry (-ries)] {1 H = 1 Wb / A}			
Resistance (to direct current)	Ω [ohm(s)] {1 Ω = 1 V / A}			
Conductance (to direct current)	S [siemens] {1 S = 1 A / V}			
Active power	W {1 W = 1 J / s = 1 A·V}			

Supplementary table 4 Greek alphabet list

Name	Roman type	Italic type		Name	Roman type	Italic type	
	Capital	Capital	Lowercase		Capital	Capital	Lowercase
alpha	Α	A	α	nu	Ν	N	ν
beta	Β	B	β	xi	Ξ	Ξ	ξ
gamma	Γ	Γ	γ	omicron	Ο	O	o
delta	Δ	Δ	δ	pi	Π	Π	π
epsilon	Ε	E	ε	rho	Ρ	P	ρ
zeta	Ζ	Z	ζ	sigma	Σ	Σ	σ
eta	Η	H	η	tau	Τ	T	τ
theta	Θ	Θ	θ	upsilon	Υ	Y	υ
iota	Ι	I	ι	phi	Φ	Φ	ϕ
kappa	Κ	K	κ	chi	Χ	X	χ
lambda	Λ	Λ	λ	psi	Ψ	Ψ	ψ
mu	Μ	M	μ	omega	Ω	Ω	ω

Supplementary table 5 Prefixes used with SI units

Factor	Prefix		Factor	Prefix	
	Name	Symbol		Name	Symbol
10^{18}	exa	E	10^{-1}	deci	d
10^{15}	peta	P	10^{-2}	centi	c
10^{12}	tera	T	10^{-3}	milli	m
10^{9}	giga	G	10^{-6}	micro	μ
10^{6}	mega	M	10^{-9}	nano	n
10^{3}	kilo	k	10^{-12}	pico	p
10^{2}	hecto	h	10^{-15}	femto	f
10	deka	da	10^{-18}	atto	a

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