

# ZWZ

## Precision Series Bearings



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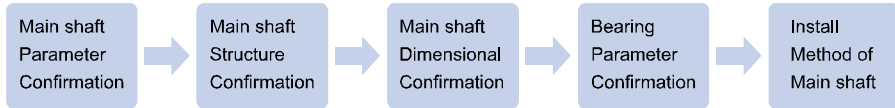
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Rolling Bearings	1
Double-row Cylindrical Roller Bearings	29
High-precision Angular Contact Ball Bearings	39
High-speed Angular Contact Ball Bearings	47
Tapered Roller Bearings	65
Thrust Angular Contact Ball Bearings For Machine Tools	75
Thrust Ball Bearings	79
Double-direction Thrust Angular Contact Ball Bearings	91
High Precision Radial And Axial Cylindrical Roller Bearings	95

## Precision Bearing's Type Selection for Application

The selection methods for normal bearing type can not always choose reasonable bearings for its main shaft, especially for precision bearings. This industry have extremely strict requirements. After years of research and study by ZWZ, ZWZ developed selection method for high precision & high speed main shaft, ZWZ took advantage of this concept developed suitable precision bearing. The suggested precision bearing type selection flow as follows:



Notes: The precision bearing's type selection based on the design parameter & structure, such as the requirements of precision level, available space, fit, system required rigidity, adapt axle direction displacement, speed, amount of heat generated. After the precision calculation then confirm the critical parameters such as, the pattern of bearing, precision level, clearance, to meet the requirement of customer.

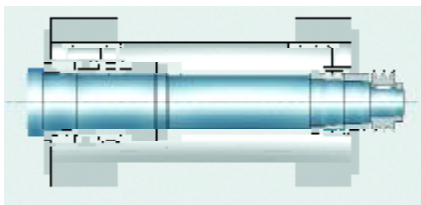
## The main shaft supporting rigidity & rotating speed comparison Chart

Table 1

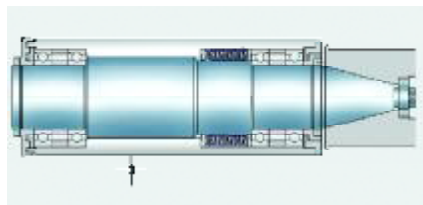
Supporting		Rotating speed parameter(mm.r/min)		Rigidity(%)	
Working End	Driving End	Grease Lubrication	Oil Lubrication	Radial direction	Axial direction
NN30xxK+2344 <sup>x</sup>	NN30xxK	0.6 x106	0.8x106	100	100
NN30xxK+SV <sup>x</sup>	NN30xxK	0.7x106	0.9x106	100	60
70xxAC/TBT	NN30xxK	0.9x106	1.2x106	80	50
719 xxC/QBC	N10xxK	1.0x106	1.3x106	60	30
70xxAC/DB	70xxC/DB	1.1x106	1.4x106	50	30
70xxC/DT	70xxC/DT	1.3x106	1.6x106	50	20
70xxAC	70xxAC	1.4x106	1.8x106	30	15
70xxC	70xxC		3x106	20	10

## Case of main shaft configuration application

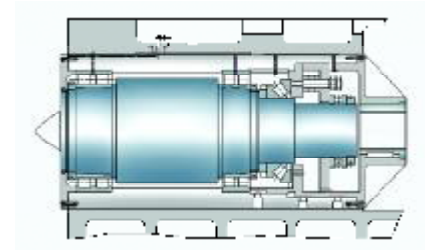
Schematic plot for turning machine main shaft assemble



Working End: NN30xxK+SVx, Driving End: NN30xxK



The configuration of High Speed Grinding Machine:  
Working End, 70xxC/DT; Driving End, 70xxC/DT



The tail shaft of the heavy turning machine: Front-End, NN30xx; Rare-End, NNU40xx+29xx

## Precision Bearing Load & Life Span Calculation

In the scope of precision bearing application, such as turning machine, the loading capacity have less effectiveness on determine the size of bearing, than the normal applications for general engineering circumstances. But while in the applications for heavy-load machining tool, pump and other heavy load or specified bearing configuration bearing type, the magnitude of load and the direction of load will have more effectiveness to the bearing dimension.

## Basic Nominal Dynamic Load

Basic nominal dynamic load indicate that the capacity of bearing resisting rolling fatigue ( Loading Capacity), refers to the pure radial load with fixed magnitude and direction (for radial bearing), under the specific circumstance of inner ring rotating and outer ring fixed (or inner ring fixed and outer ring rotating), the rated life of the bearing under this load could reach 1 million turns. The basic nominal dynamic load for radial bearings and thrust bearings are separately called radial basic nominal dynamic load and axile basic nominal dynamic load, expressed by Cr & Ca, the numerical value input to the table of bearing size . The basic nominal dynamic load which shown in the product list of angular contact ball bearing, is suitable for single set of bearing. Double , triple and quad pairs combined bearing sets' basic nominal dynamic load can get by multiple the Cr value of each single set of bearing with the coefficient listed below.

- 1.62 (double pairs combined bearing set)
- 2.16 (triple pairs combined bearing set)
- 2.64 (Quad pairs combined bearing set)

## Basic Rated Life

Formula (1) indicates the relationship of basic nominal dynamic load, Equivalent dynamic load, and basic rated life.

While the rotating speed is fixed, use time to show the life of bearing is more convenient, shown as formula (2)

$$\text{(Total turns)} \quad L_{10} = \left( \frac{C}{P} \right)^p \quad \dots \dots \dots (1)$$

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

- $L_{10}$  : Basic rated life,  $10^6$  turns
- $L_{10h}$  : Basic rated life, h
- $L_{10k}$  : Basic rated life, km
- P : Equivalent Dynamic Load, N{kgf}
- C : Basic Nominal Dynamic Load, N{kgf}
- n : Rotating Speed, rpm
- p : Life Index
- Ball Bearing  $\dots \dots \dots P=3$
- Roller Bearing  $\dots \dots \dots P=\frac{10}{3}$

## Adjusted Bearing life Formula

Because of there are many factors will affect the bearing life in the real work conditions, subsequently, must adjust the bearing life based on the real working condition, the formula is shown below:

$$L_{na} = a_1 a_2 a_3 L_{10} \quad \dots \dots \dots (x)$$

$$L_{na} : \text{adjusted rating life, } 10^6 \text{ turns}$$

The life considered the bearing Feature and working conditions factor, the reliability is 100-n% ( he failure rate is n%)

- $a_1$  : Reliability coefficient  $\dots \dots \dots$  refer to item (1)
- $a_2$  : Bearing coefficient  $\dots \dots \dots$  refer to item (2)
- $a_3$  : Bearing coefficient  $\dots \dots \dots$  refer to item (3)

[Notes] when selecting bearing size according to  $L_{na}$  reliability more than 90%, shall pay special attention to the strength of shaft and housing.

(1) reliability coefficient  $a_1$

When calculating the adjusted rated life, the reliability not less than 90%, the failure rate is no more than 10%, select coefficient  $a_1$  from the table below.

Table 3 Reliability Coefficient

Reliability(%)	$L_{na}$	$a_1$
90	$L_{10a}$	1
95	$L_{5a}$	0.62
96	$L_{4a}$	0.53
97	$L_{3a}$	0.44
98	$L_{2a}$	0.33
99	$L_{1a}$	0.21

## Equivalent Dynamic Load

Bearing mostly bear the combined load which shaped by radial and axile load, and the load condition is in a variety of kinds, such as the vary of load.

In consequence, can not compare the real loading of bearing compare with the basic nominal dynamic load.

In this circumstance, make the real load convert to the fixed amount of imaginary load with fixed directions, which via the center of bearing, analysis and compare the same bearing life under the conditions with the imaginary load.

The convert imaginary load called equivalent dynamic load, shown as P

The equivalent dynamic load can be calculated by the formula below

$$P = XF_r + YF_a \quad (9)$$

P : Equivalent Dynamic Load, N {kgf}

$F_r$  : Radial Load, N {kgf}

$F_a$  : Axile Load, N {kgf}

X : Radial Load Coefficient

Y : Axile Load coefficient

## Choice and application of the bearing material

The performance and reliability of rolling bearings mostly depend on bearing material property. The rolling bearings are required to undergo large stress frequently on the inter face

between rings and rolling elements, meanwhile, to keep the high precision rotation. So it is required that the materials of the rings and the rolling elements possess the characteristics of hardness coinciding with loading capability, anti-fatigue and anti-wear, and dimensional steady under different conditions of rolling contact and lubrication. Too much non-metallic impurity can cause fatigue and chapping easily. The less the impurity is, the cleaner the materials are and the longer life of rolling bearings.

High carbon chrome bearing steel is generally used for the rolling bearing rings and the rolling elements. The carburizing steel is used for the bearings with high impact load and alternating bending stress.

High carbon chrome bearing steel is widely used for the rolling bearings, which are required to be through hardened, the surface and bore of the bearing both are hardened. Recently, the quality of the bearing steel is being improved, the material property is improved greatly by vacuumed degassed treatment, the oxygen content and non-metal content are reduced. Electroslag refining bearing steel with higher clean degree is used for bearings with long service life and high liability.

ZWZ heat treatment technology for rolling bearing rings and rolling elements ensures the dimensional steady when under 120\*.

The cage is applied to embrace the rolling elements partially to ensure a distance between the two neighbor rollers to reduce operating friction and generated heat, keep the same distance among rolling elements and distribute load equably, to prevent rolling elements from falling off from separable bearings, and to guide rolling elements. The cages can take functions in lubrication grease storage to improve bearings' lubrication.

Cages of ZWZ precision bearing can generally divided to pressed cage, metal solid cage, nylon cage, and phenolic resin cage and so on.

ZWZ high precision bearing rolling elements are made

of high-carbon chromium steel or ceramics. Machine tools rotation speed is high, especially the machining center main shaft. In order to meet the requirement of temperature rising and rigidity under high rotation speed, the rolling elements can use ceramic material.

## Bearing limit rotational speed

The rotational speed of the bearing is mainly restricted by the increase in temperature due to the frictional heat generated inside the bearing. When the rotational speed exceeds certain limit, the bearing shall fail to continue to rotate due to the burns.

Limit rotational speed of the bearing indicates the limit value of the rotational speed when there is no frictional heat that leads to the burns and the bearing can continuously rotate.

Therefore, the limit rotational speed of the bearing is subject to the bearing type, dimensions, precision, lubrication method, quality and amount of lubricant, material and design of retaining cage, loading conditions and other factors.

The limit rotational speed for different types of bearings using grease lubrication and oil lubrication are respectively given in the dimension tables of these bearings. These values indicate the limit values of rotation speed the bearings of normal design under normal loading conditions ( $C/P \geq 13$ ,  $F_a/F_r \leq 0.25$  or so).

Following table is limitation rolling speed of bearing to different size of the bearing under Grease lubrication or oil lubrication the designed rolling speed must lower than the limited rolling speed under common load ( $C/P > 13$ ,  $F_a/F_r \leq 0.25$ ).

Otherwise: different size or grade lubrication may has better property than others, but it still cannot be used in high rolling speed bearing.

## Correction of limit rotation

Correction must be with formula (1) on limit rotational speed, when the loading condition  $C/P < 13$  (ie. the equivalent dynamic load P exceeds basic dynamic load rating C by 8% or so), or the axial load exceeds the radial load by over 25% in the combined load.

$$n_a = f_1 \cdot f_2 \cdot n \quad (1)$$

$n_a$ : revised limit\*rpm

$f_1$ : correction factors relative to loading condition (chart 1)

$f_2$ : correction factors relative to combined load (chart 2)

n: the limit rotational speed under normal load conditions, rpm (see bearing dimension tables)

C: basic static load rating, {N\*kgf}

P: Equivalent Dynamic Load, N {kgf}

$F_r$ : radial load, N {kgf}

$F_a$ : axial load, N {kgf}

## Notes for high speed rotating

When bearing is rotating with high speed, especially the rotation speed is close to or more than the limit rotation speed in the measurement chart, the following items should be pay attention to:

Consider improving the bearing precision;

- (1) Consider to increase the precision level of bearing.
- (2) Optimize clearance inside bearing\*Considering the decrement of clearance from temperature increase\*.
- (3) For high speed rotation, suited copper alloy or phenolic resin cutting cage should be selected, in addition, there's synthetic resin forming cage fit for high speed rotation.
- (4) Apply lubrication oil, grease fit for high speed, or air-oil lubrication fit for high speed.

## Lubrication and Grease

It's up to rotation condition (such as temperature or rotation speed) to select lubricant and lubrication method for a certain application, in addition, the lubrication of neighboring parts should be taken into consideration.

Proper amount of lubrication applied, lubricants could form enough lubrication membrane between rolling element and raceway. If the amount of lubrication usage is proper, hydrodynamic force friction loss will be little, the operating temperature can be kept very low. The quantity of lubrication can be accurately controlled in grease lubrication, and it's no need to design individual lubrication system, so this kind of lubrication is more and more common in main shaft configuration. However, air-oil lubrication method is recommended in extremely high speed application, since the life of lubrication grease in high speed working condition is too short.



# Rolling Bearings

## 1. Selection of lubrication grease:

a) For most precision main shaft bearing, we recommend to use mineral oil and lubrication grease with lithium base thickener. Temperature range of lubrication grease: -30~+100°C.

b) For ball screw support with thrust angular contact ball bearing, we recommend to use calcium base mixed thickener grease.

c) If bear heavy load or impact stress, it may need to change lubrication grease.

d) When waterproofness should be taken into consideration, we recommend to use calcium base mixed thickener grease.

## 2. Grease injection volume

ZWZ recommend to use little grease for bearings in high

speed rotation. The grease usage should be less than 30% for high speed main shaft bearings for machine tools. According to practical experience, ZWZ recommend to use 10%~15% grease of the internal bearing space which rotation speed more than 3000rpm.

If customer's working condition is special, ZWZ can recommend suitable lubrication grease type and injection volume according to the working condition.

## Bearing fit selection instruction

In order to take full use of the capability of precision bearing, axle and bearing gear and relative parts should be in high precision class. Attached list is recommendation for fit and precision from ZWZ.

Fit with axle

chart 2

Bearing form	Axle OD		Axle OD tolerance		Fit tolerance	
	over	to	min	max	min	max
main shaft bearing	10	18	-0.003	0	-0.002	0
	18	50	-0.004	0	-0.0025	0
	50	80	-0.005	0	-0.003	0
	80	120	-0.003	0.003	-0.004	0
	120	180	-0.004	0.004	-0.004	0
	180	250	-0.005	0.005	-0.005	0
Ball screw support with thrust angular contact ball bearing	10	18	-0.008	0	-	-
	18	50	-0.009	0	-	-
	50	80	-0.011	0	-	-
	80	120	-0.013	0	-	-

Precision and roughness for axle

chart 3

Diameter of axle		Precision and roughness of axle									
		roundness		Cylindricity		Run out		Axiality		Roughness	
		Precision class		Precision class		Precision class		Precision class		Precision class	
over	to	P5,P4	P2	P5,P4	P2	P5,P4	P2	P5,P4	P2	P5,P4	P2
-	10	0.7	0.5	0.7	0.5	2	1.2	4	2.5	0.2	0.1
10	18	1	0.6	1	0.6	2.5	1.5	5	3	0.2	0.1
18	30	1.2	0.7	1.2	0.7	3	2	6	4	0.2	0.1
30	50	1.2	0.7	1.2	0.7	3.5	2	7	4	0.2	0.1
50	80	1.5	1	1.5	1	4	2.5	8	5	0.2	0.1
80	120	2	1.2	2	1.2	5	3	10	6	0.4	0.2
120	180	2.5	1.7	2.5	1.7	6	4	12	8	0.4	0.2
180	250	3.5	2.2	3.5	2.2	7	5	14	10	0.4	0.2
250	315	4	3	4	3	8	6	16	12	0.4	0.2

Fit with bearing housing

chart 4

Bearing form	ID of bearing housing		ID tolerance of bearing housing		Fit tolerance	
	over	to	Lower deviation	Upper deviation	Lower deviation	Upper deviation
Angular contact ball bearing (work side)	18	50	-0.002	0.002	0.002	0.006
	50	80	-0.0025	0.0025	0.002	0.006
	80	120	-0.003	0.003	0.003	0.008
	120	180	-0.004	0.004	0.003	0.008
	180	250	-0.005	0.005	0.005	0.010
Angular contact ball bearing (free side)	18	50	0	0.004	0.006	0.011
	50	80	0	0.005	0.006	0.011
	80	120	0	0.006	0.009	0.015
	120	180	0	0.008	0.009	0.015
	180	250	0	0.010	0.015	0.022
Cylindrical roller bearing	18	50	-0.006	0	-0.002	0.002
	50	80	-0.007	0	-0.002	0.002
	80	120	-0.008	0	-0.002	0.002
	120	180	-0.009	0	-0.002	0.002
	180	250	-0.011	0	-0.002	0.002
Ball screw support with thrust angular contact ball bearing	10	18	-	-	-	-
	18	30	-	-	-	-
	30	50	0	0.016	-	-
	50	80	0	0.019	-	-
	80	120	0	0.022	-	-

Bearing housing precision and roughness

Chart 5

Diameter of axle		Precision and roughness of axle									
		roundness		Cylindricity		Run out		Axiality		Roughness	
		Precision class		Precision class		Precision class		Precision class		Precision class	
over	to	P5,P4	P2	P5,P4	P2	P5,P4	P2	P5,P4	P2	P5,P4	P2
10	18	1	0.6	1	0.6	2.5	1.5	5	3	0.4	0.2
18	30	1.2	0.7	1.2	0.7	3	2	6	4	0.4	0.2
30	50	1.2	0.7	1.2	0.7	3.5	2	7	4	0.4	0.2
50	80	1.5	1	1.5	1	4	2.5	8	5	0.4	0.2
80	120	2	1.2	2	1.2	5	3	10	6	0.8	0.4
120	180	2.5	1.7	2.5	1.7	6	4	12	8	0.8	0.4
180	250	3.5	2.2	3.5	2.2	7	5	14	10	0.8	0.4
250	315	4	3	4	3	8	6	16	12	1.6	0.8
315	400	4.5	3.5	4.5	3.5	9	6.5	18	13	1.6	0.8

Note: diagram for supplement for upper axle and bearing housing precision roughness.

## Bearing mounting

### 1. Preparation of the bearing mounting

#### 1.1 The ambient of bearing mounting.

The mounting of the bearing shall be done in dry and dust free room, mounting work also shall be away from the equipments with metalworking or generating metal debris and dust.

Bearing mounting must be done without any protection happens to (large size bearings always experience), proper protective measures must be taken to protect the bearings from dust and humid air until the mounting is finished.

#### 1.2 Preparation of the bearing

Do not open the packing of the bearing until mounting operation since the bearing has received rust-prevention handling and been properly packaged. In addition, the rust-preventive oil on the bearing have good lubricant performance, for the bearings of general applications or filled with lubricating grease, there is no need of washing before using the bearing. But for the bearings applied to the instrument or rotating at high speed, washing with cleaning oil should be used to rid the bearings of the rust-preventive oil. In this case, the bearings may easily get rusty, therefore they should not be kept for a long time.

#### 1.3 The preparation of mounting tools

The mounting tools should be made from wood or light metal. The materials which can generate the chips should

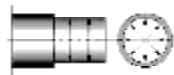
be avoided. The mounting tools should be kept clean.

#### 1.4 The inspection on the shaft and housing

Wash the shaft and housing to ensure there is no burrs or scratches from machining. There should be no grinding agents (SiC, AL<sub>2</sub>O<sub>3</sub> and so on), foundry sand or smear metal in the housing.

The check if the dimension, shape and the processing quality of the shaft and the housing are in conformity with the drawings.

As shown in Figure 1 and 2, measuring should be done at several places. Also it is necessary to inspect the dimension of the fillet and the verticality of the abutment. Before mounting, lubricate the qualified shaft and housing on all the fit surfaces.



Picture 1



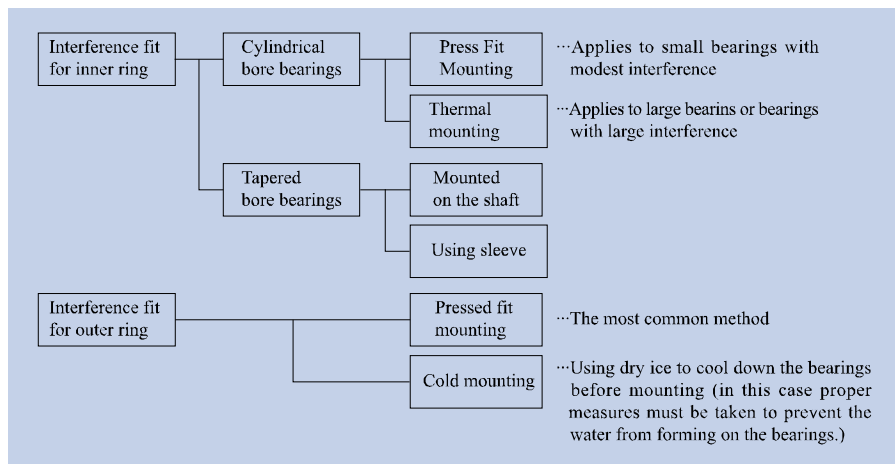
Picture 2

Picture 1: The measuring position of the shaft diameter

Picture 2: The measuring position of the housing bore diameter

## 2. The classification of the bearings mounting method

The bearing mounting methods vary with the bearing types and the fit conditions. Since in the most cases it is the shaft that rotates.



## 3. The mounting of the cylindrical core bearings

### 3.1 Press fit mounting

Hydraulic press is normally used, sometimes nuts and screws are also employed. Hammers can be used only when there have no alternative options. When the inner ring of the bearing is interference fit and mounted on shaft, the pressure should be applied on the inner ring. When the outer ring of the bearing is interference fit and mounted on the housing, the pressure should be applied on the outer ring.

When the inner and the outer ring is interference fit, a shim plate must be used to make sure pressure applied on both inner ring and outer ring simultaneously.

### 3.2 Thermal mounting

This method heats the bearings to make it expand and then mounts the bearing on the shaft. It can prevent the bearings from being affected by unnecessary external forces and finish the mounting within very short time. The heating methods mainly are oil bath and induction.

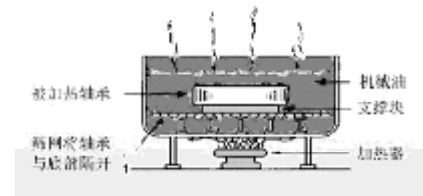


Chart 3 Oil bath heat method



Chart 4 Induction heating method

The advantage of the electric induction heating

- 1) Clear, no pollution
- 2) Timing, constant temperature
- 3) Easy operation

When the bearing is heated to the expected temperature (below 120\*), take it out and mount it on the shaft. The bearing will be shrink along with the cooling. Sometimes there will be gap between the shaft shoulder and the bearing end face, therefore the bearing should be pushed by the tools toward the bearing shoulder.

Due to the pre-lubricated grease or sealing material has limitation with the temperature, the heating temperature should not over 80\* and the oil bath method could not be used. Make sure the temperature is distributed uniformly when hearing the bearing and no partly overheated conditions.

## 4. The mounting of tapered bore bearing

Most of the tapered bore bearings are mounted with interference fit of inner ring.

The tapered bore bearing can be directly mounted to tapered shaft or to cylindrical shaft through adapter sleeve and withdrawal sleeve.

Interference degree is defined by checking the clearance decreased volume or the axial displacement of the inner ring on the tapered shaft. On certain circumstances, it can be defined by testing the lock angle of the locknut or the expansion volume of the inner ring.

As for the tapered core bearing, when the inner ring is pressed on the tapered shaft, adapter sleeve or withdrawal sleeve, interference degree will be increased and the radial clearance will be decreased. The interference degree can be defined by checking the decreased volume of the radial clearance.

### 4.1 Measure of the clearance decreased volume

The method of using feeler gauge to check the radial clearance before and after the mounting is only suitable for medium size or extra large size bearings. The measure of the clearance must be at the position between the unloaded rollers and the outer ring raceway. Before measuring, running the outer ring for several revolutions, and make sure the central lines of the outer ring and roller group are overlapped. In the first measure, feeler gauge should has a measuring value lower than the minimum value of the clearance, and then choose a thicker feeler gauge to measure the clearance for several times until the feeler gauge meet the resistance in the following situation when being moved. Before mounting -measuring place is between outer ring

and the highest roller.

After mounting -measuring place is between the inner ring and the lowest roller according to different cages.

## 5. Mounting of the outer ring

When mounting the outer ring to bearing housing with

interference fit,for the small size bearing,the outer ring can be pressed in normal temperature.When interference is big,the outer ring can be pressed through heating bearinghousing or cooling outer ring.When applying the dry ice or other refrigerant,the moisture in the air will agglomerate on the bearing,anti-rust measures must be taken.

## Postposition Code

Table 6

Code	Measuring
-1, -2, ...	Indicates series of non-standard X1,X2,YA2...
A	1.angular contact ball bearing with normal contact angle of $\alpha=30^\circ$ 2.Tapered roller bearings with contact angle and outer ring raceway diameter D1 not conforming to national standards,and usd A,A1,A2...to indicate when more than two non-national-standard a or D1 occurred in a code. 3.Outer ring guided
AC	Angular contact ball bearing with normal contact angle of $\alpha=25^\circ$
B	1. Angular contact ball bearing with normal contact angle of $\alpha=40^\circ$ 2.Tapered roller bearing with bigger contact angle. 3.Inner ring guided
C	1. Angular contact ball bearing with normal contact angle of $\alpha=15^\circ$ 2.Aligning roller bearings with central rib,paralleled rollers and pressed cage,inner ring without rib 3.Matched tapered roller bearings, mean value of axial clearance added directly after C if not conforming to ZWZ standards
CA	Aligning roller bearings with central rib ,paralleled rollers and brass solid cage,inner ring without rib Clearance of deep groove ball bearings for motors
/CM	0 group clearmace. /CN combined with
/CN	H, M or L indicates half of the clearance,combined with P*indicates the clearance shifting. For example: /CNM indicates half of 0 group clearance at the middle part /CNL indicates half of 0 group clearance at the lower part /CNP indicates the upper part of 0 group clearance and the lower part of C3 group
/C1	Clearance conforms to the standard group 1
/C2	Clearance conforms to the standard group 2 Bearing clearance does not conforms to the present standard
/C9	When two or more clearances in one code are different from present standard,it will be indicated with added digitals,such as C91,C92..

Code	Measuring
/CR	When matched tapered roller bearings have radial clearance,the mean value of clearance will be added after CR. 1.Double-row angular contact ball bearing,double inner ring ,contact angle $\alpha=45^\circ$ 2.Double row tapered roller bearing,no inner spacer or outer spacer un-grinded end face. 3.Inch tapered roller bearing,inner ring with double raceways or outer ring with double raceways. 4.Split bearing
D	Two angular contact ball bearings or tapered roller bearings used for face to face paired mounting.
/DB	Two single deep groove ball bearings angular contact ball bearings or tapered roller ball bearings used for face to face paired mounting.
/DF	Two angular contact ball bearings or tapered roller bearings used to same direction tandem paired mounting.
/DT	Inside design is changed ,belonging to reinforced type.
E	Ring, rolling elements and cage or only the ring and rolling elements are made from vacuum smelted bearing steel.
HA	Ring and rolling elements or only ring or rolling elements are made from case hardened steel (/HC-20Cr2Ni4A; /HC1-20Cr2Mn2MoA; /HC2-15Mn).
/HC	Ring,rolling elements and cage or only the ring and rolling elements are made from electroslag remelting bering steel (military first grade steel)ZGCr15.
/HE	Ring and rolling elements or only rolling elements are made from other bearing steel (/HG-5GrMnMo; /HG1-55SiMoVA; /HG2-GCr18Mo; /HG3-42CrMo).
/HG	Ring and the rolling elements are made from unusual materials (/HQ-plastic; /HQ1-ceraqmic alloy)
HQ	Pressed steel cage.When the material changes,it is indicated with the added digitals.
J	Pressed steel cage,outer ring guided.
JA	Tapered core bearing, conisity is 1:12
K	Tapered core bearing, conisity is 1:30
K30	Light alloy solid cage. When the material of the cage changes,it is indicated by the added digitals.
L	Zinky aluminum alloy ZznAl27Cu2
L3	Light alloy solid cage, outer ring guided
LA	Light alloy solid cage, inner ring guided
LB	Brass solid cage
M	Brass solid cage, outer ring guided
MA	Brass solid cage,inner ring guided

Code	Measuring
MB	Bearing with snap groove on the outer ring
N	Tolerance grade conforms to standard PO,code is omitted.
/P0	Tolerance grade conforms to standard P6
/P6	Tolerance grade conforms to standard P6X
/P6X	Tolerance grade conforms to standard P5
/P5	Tolerance grade conforms to standard P4 Tolerance grade conforms to standard P2 Bronze solid cage,indicated with appended digitals ,means different material
/P4	Q1-aluminum iron manganese bronze Q2-silicon iron zinc bronze
/P2	Q3-silicon nickel bronze Q4-aluminum bronze
Q	Q5-stannum bronze*ZQSn10-1*
/QB	Four sets of bearings in pair tandem matched and back to back mounting
/QF	Four sets of bearings in pair tandem matched and face to face mounting
/QT	Four sets of bearings in tandem mounting
/QBT	Four sets of bearings,three in tandem and one in back to back mounting
/QFT	Four sets of bearings,three in tandem and one in face to face mounting Super precision grade*dimension tolerance equals to P5,rotating tolerance equals to P4. Solid cage with phenolic coat,outer ring guided.
/SP	Solid cage with phenolic coat,inner ring guided.
TA	Three sets of bearings in tandem and back to back mounting
TB	Three sets of bearings in tandem and face to face mounting Class fiber reinforced phenolic cage
/TBT	Engineering plastic cage
/TFT	TN1-nylon TN2-polyamide(PA)
TH	TN3-polyimide TN4-polycarbonate TN5-paraformaldehyde
TN	Three sets of bearings in tandem mounting
/TT	Thrust ball bearing with spherical seat washer Super precision grade*dimension tolerance equals to P4 *rotating tolerance is higher than P4.
U	Bearing vibrating speed group*The appended digitals indicate different groups. V1-vibrating speed group conforms to V1 group
/UP	V2-vibrating speed group conforms to V2 group V3-vibrating speed group conforms to V3 group

Code	Measuring
/V	Bearing with oil slot and three lubricating oil holes on the outer ring Bearing with oil slot and four lubricating oil holes on the outer ring
/W33	Non-standard outside diameter Non-standard outside width(height).
/W33A	Non-standard outside diameter,width (height)(standard bore diameter)
X1	Y combines with another letter (such as YA,YB) or more digitals to identify the change of the non-series which can not be indicated with the present suffix code.
X2	YA-structure change
X3	YA1-outside surface of the outer ring is different from standard design. YA2-bore of inner ring is different from standard design. YA3-end face of the bearing ring is different from standard design. YA4-raceway of the bearing ring is different from standard design.
/Y	YA5-rolling element of the bearing is different from standard design. YAB-structure and the technical specification changes simultaneously. YAD-one type of the bearing has two or more changes on structure.
	YB-technical specification changes YB1-surface of the bearing ring has the coating YB2-bearing dimension and tolerance changes YB3-surface roughness degree of the bearing ring changes YB4-heat treatment (e.g.harness)changes YB5-position tolerance has special requirements. YBD-one type of the bearing has two or more changes on technical specification.
Z	Bearing vibrating acceleration rating group.The appended digital indicates different groups. Z1-vibrating acceleration rating group conforms to Z1 group Z2-vibrating acceleration rating group conforms to Z2 group Z3-vibrating acceleration rating group conforms to Z3 group

## Double row cylindrical roller bearing

### 1. Structure characteristic

Double row cylindrical roller bearing adopt to main bearing of machine for high stiffness requirement. on the work side of main bearing apply double cylindrical roller bearing ,for easy to adjust and make the radial clearance after install, it is normally used by tapered bore bearing.

There are two series ZWZ precision double cylindrical roller bearing mainly: 30 (NN, NNU) series and 49(NN, NNU) series. NNU49 series have the compact dimension, it is the better chosen when the space is limited; NN30series achieved the balance between speed and high stiffness, it is one of the bearing series in common use,special for the back side supporting to the main shaft.

### 2. Tapered Bore

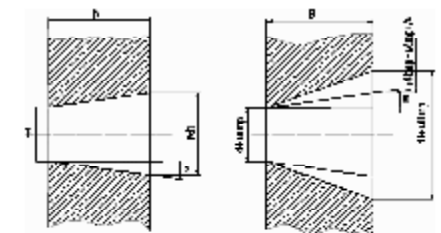


Chart 3 theoretical tapered bore

chart 4 Tapered bore with actual mean diameter and its deviation

tapered 1:12:

Nominal half tapered angle  $\alpha=2^{\circ} 23' 9.4''=2.38594^{\circ}$   
 $=0.041643$  Radian

Basic diameter of theoretical large end of tapered bore

$$d1 = d + \frac{1}{12} B$$

tapered 1:30:

Nominal half tapered angle  $\alpha=0^{\circ} 57' 17.4''=$   
 $0.95484^{\circ} = 0.01667$  Radian

Basic diameter of theoretical large end of tapered bore

$$d1 = d + \frac{1}{30} B$$

The tolerance of tapered bore includes:

- mean diameter tolerance indicated by limit value of actual mean diameter deviation  $\Delta d_{mp}$  of theoretical small end of tapered bore.

-Tapered tolerance indicated by limit value of the difference of actual mean diameter deviation of two ends of tapered bore.

-Diameter variation tolerance indicated by maximum value of inner diameter variation  $V_{dp}$  on any radial plain of tapered bore.

## SP level Tolerance

Table 7 Tapered bore (1:12)

$\mu\text{m}$

d mm		$\Delta d_{mp}$		$\Delta d_{1mp} - \Delta d_{mp}$		$V_{dp}$
From	to	Upper deviation	Lower deviation	Upper deviation	Lower deviation	max
18	30	+10	0	+4	+1	3
30	50	+12	0	+4	+1	4
50	80	+15	0	+4	+1	5
80	120	+20	0	+7	+2	5
120	180	+25	0	+7	+2	7
180	250	+30	0	+8	+2	8
250	315	+35	0	+10	+2	9

## UP level tolerance

Table 8 Tapered bore (1:12)

$\mu\text{m}$

d mm		$\Delta d_{mp}$		$\Delta d_{1mp} - \Delta d_{mp}$		$V_{dp}$
From	to	Upper deviation	Lower deviation	Upper deviation	Lower deviation	max
18	30	+6	0	+3	+1	2
30	50	+8	0	+3	+1	3
50	80	+9	0	+3	+1	3
80	120	+10	0	+4	+2	4
120	180	+13	0	+4	+2	5
180	250	+15	0	+5	+2	7
250	315	+18	0	+5	+2	9

## 3. Radial clearance

Table 9 Radial clearance of cylindrical clearance of double-row cylindrical roller bearing.

$\mu\text{m}$

Nominal ID d mm		Clearance					
		Group 1		Group 2		Group 3	
From	to	Min	Max	Min	Max	Min	max
24	24	5	15	10	20	20	30
24	30	5	15	10	25	25	35
30	40	5	15	12	25	25	40
40	50	5	18	15	30	30	45
50	65	5	20	15	35	35	50
65	80	10	25	20	40	40	60
80	100	10	30	25	45	45	70
100	120	10	30	25	50	50	80
120	140	10	35	30	60	60	90
140	160	10	35	35	65	65	100
160	180	10	40	35	75	75	110
180	200	15	45	40	80	80	120
200	225	15	50	45	90	90	135
225	250	15	50	50	100	100	150
250	280	20	55	55	110	110	165
280	315	20	60	60	120	120	180
315	355	20	65	65	135	135	200
355	400	25	75	75	150	150	225
400	450	25	85	85	170	170	255
450	500	25	95	95	190	190	285

Table 10 Radial clearance of taper hole double row cylindrical roller bearing.

$\mu\text{m}$

Nominal ID d mm		Clearance			
		Group 1		Group 2	
From	to	Min	Max	Min	Max
24	24	10	20	20	30
24	30	15	25	25	35
30	40	15	25	25	40
40	50	17	30	30	45
50	65	20	35	35	50
65	80	25	40	40	60
80	100	35	55	45	70
100	120	40	60	50	80
120	140	45	70	60	90
140	160	50	75	65	100
160	180	55	85	75	110

Nominal ID d mm		Clearance			
		Group 1		Group 2	
From	to	Min	Max	Min	Max
180	200	60	90	80	120
200	225	60	95	90	135
225	250	65	100	100	150
250	280	75	110	110	165
280	315	80	120	120	180
315	355	90	135	135	200
355	400	100	150	150	225
400	450	110	170	170	255
450	500	120	190	190	285

## Tolerance

Except the tolerance according to GB/T307.1 ,ZWZ provide precision double row cylindrical roller bearing with with the tolerance level SP and UP. SP and UP tolerance value are shown in the table (X) 11.

Table 11 Inner Ring

SP level

Nominal ID d mm		$\Delta ds$		Vdp	$\Delta Bs$		VBs	Kia	Sd
From	to	High	Low	Max	High	Low	Max	Max	Max
-	18	0	-5	3	0	-100	5	3	8
18	30	0	-6	3	0	-100	5	3	8
30	50	0	-8	4	0	-120	5	4	8
50	80	0	-9	5	0	-150	4	4	8
80	120	0	-10	5	0	-200	7	5	3
120	180	0	-13	7	0	-250	8	6	10
180	250	0	-15	8	0	-300	10	8	11
250	315	0	-18	9	0	-350	13	8	13

Table 12 Outer ring

SP level

Nominal ID D mm		$\Delta Ds$		VDP	$\Delta Cs$		Vcs	Kea	S <sub>b</sub>
From	to	High	Low	Max	High	Low	Max	Max	Max
30	50	0	-7	4	The value is the same as inner ring of bearing		5	5	8
50	80	0	-9	5		6	5	8	
80	120	0	-10	5		7	6	9	
120	150	0	-11	6		7	7	10	
150	180	0	-13	7		8	8	10	
180	250	0	-15	8		10	10	11	
250	315	0	-18	9		13	11	13	
315	400	0	-20	10		15	13	13	
400	500	0	-23	12	25	15	15		

Table 13 Inner ring

SP level

Nominal ID d mm		$\Delta ds$		Vdp	$\Delta Bs$		VBs	Kia	S <sub>d</sub>
From	to	High	Low	Max	High	Low	Max	Max	Max
-	18	0	-4	2	0	-25	1.5	1.5	2
18	30	0	-5	3	0	-25	1.5	1.5	3
30	50	0	-6	3	0	-30	2	2	3
50	80	0	-7	4	0	-40	3	2	4
80	120	0	-8	4	0	-50	3	3	4
120	180	0	-10	5	0	-60	4	3	5
180	250	0	-12	6	0	-75	5	4	6
250	315	0	-18	9	0	-90	6	5	6

Table 14 Outer ring

SP level

Nominal ID D mm		$\Delta Ds$		VDP	$\Delta Cs$		Vcs	Kea	S <sub>b</sub>
From	to	High	Low	Max	High	Low	Max	Max	Max
30	50	0	-5	3	The value is the same as inner ring of bearing		2	3	2
50	80	0	-6	3		3	3	2	
80	120	0	-7	4		3	3	3	
120	150	0	-8	4		4	4	3	
150	180	0	-9	5		4	4	3	
180	250	0	-10	5		5	5	4	
250	315	0	-12	6		6	6	4	
315	400	0	-14	7		8	7	5	
400	500	0	-23	12		10	8	-	

## Angular contact ball bearing

### 1. Structural characteristics

ZWZ produces standard angular contact ball bearing with three kinds of angles: 15° (name suffix is C), 25° (name suffix is AC), 40° (name suffix is B). The bearing with bigger contact angle recommended for application scenarios like high axial rigidity and high axial load carrying capacity. According to different working conditions, ZWZ also can design and produce angular contact ball bearing with special angles.

According to different requirements of installation control, ZWZ' s precision angular contact ball bearing has different bearing series like 70, 72, 719 and etc. In high speed or minimum radial clearance conditions, it's better to choose 719 or 70 series bearing. For the heavy load and medium speed conditions, 72 series bearing is suitable. 719 series bearing fits to the conditions where stiffness requirements are extremely important, because it has many rolling elements and fits to large diameter main shaft, all of these factors help to make main shaft system have high rigidity. In view of the high speed trend of main shaft, ZWZ has specially researched and developed HA series high speed angular contact ball bearing to adapt high speed main shaft conditions.

### 2. Pre-tighten of bearing

During working and under the running condition, the bearings usually have proper internal clearance. In order to improve the rigidity or ruing accuracy of bearing

under different working conditions, the bearing is preloaded to make it with certain negative internal clearance,taking some measures to generate certain predeformation among rolling elements, inner ring and outer ring to keep the condition of being pressed between inner ring and outer ring. This process measure is called pre-tighten.

#### The purpose of pre-tighten

To improve the axial and radial positioning accuracy of shaft and reduce the run-out of shaft.

To improve the rigidity of bearing

To avoid the bearing noise generated by vibration and resonance vibration

To keep correct relative position among rolling elements and rings.

#### Forms of pre-tighten

Radial or axial pretension can be adopted according to different bearing type. The pretension is realized by applying preload on bearing and make inner ring and outer ring have relative displacement.

#### Positioning pre-tighten

In order to fix the relative axial position of bearing and improve the rigidity of bearing

#### Constant pressure pre-tighten

The pre-tighten is realized by a spring. Therefore, pre-pressure can be kept steadily even though the position



between bearings may change due to temperature rise or load during operation.

Single-row angular contact ball bearing: Generally, they're applied axial pre-tighten and used with the other bearing of the same type in face-to-face arrangement or back-to-back arrangement.

Normally, pre-tighten is adjusted under certain ambient temperature during mounting. (or preset according to this temperature). During operating, if the temperature rise of shaft is greater than bearing block, the preload will be increased. And the preload amount of face-to-face arrangement increases greater than the preload amount of back-to-back arrangement.

### 3. The preload of bearing

The form of preload

In order to meet customers' different demand in speed, heat dissipation and rigidity, ZWZ produces three kinds of national standard preload matched stock precision angular contact ball bearing, the grades are:

Grade A: light preload

Grade B: medium preload

Grade C: heavy preload

In addition, ZWZ can design special group preloaded angular contact ball bearings based on the different working conditions.

### The factors effect to preload

In static and dynamic conditions, the preload in bearing system is affected by some factors. The actual preload installed on bearing in system is different from the scheduled preload in production process. It is depending upon :

Table 15

Bearing configuration	Preload		
	A	B	C
Double tandem pairing (DT)	0.9	0.8	0.65
Back-to-back, face-to-face dual pairs matched	0.8	0.7	0.55
Three pairs matched	0.7	0.55	0.35
Quad pairs matched	0.65	0.45	0.25

1. The actual cooperation between bearing's inner ring with axle and the actual cooperation between bearing's outer ring with bearing housing;
2. system speed of fixed position;
3. the operation temperature of inside ring, outside ring and rolling elements of bearing;
4. the material of axle and bearing housing (different material had different thermal expansion coefficient, so the deformation of cooperating part is different when the system operating.
5. Geometric error(such as forced not alignment and front and back bearing pedestal in the same axle error)

### 4. Rated speed

The limit speeds given in bearing table are effective when the bearing is running under prescribed national standard lubrication and well heat transmission conditions. When bearing combined with double, triple or four pairs, and one of them working in different preload conditions, we should multiply a required reduce coefficient on the base of the given limit speed. Coefficients are as following:

### 5. Tolerance

Tolerance Class 5 (table 16、 table 17)

Table 16 Inner Ring Tolerance Class 5

μm

d mm	$\Delta d_{mp}$		$V_{dp}$			$V_{dmp}$	$K_{ia}$	$S_d$	$S_{ia}^{(3)}$	$\Delta B_s$			$V_{Bs}$
			Diameter series							Total	Normal	Correction	
			9	0、1、2、3、4	max								
Over	To	High	Low		max	max	max	Max	High	Low		max	
0.61 <sup>1)</sup>	2.5	0	-5	5	4	3	4	7	0	-40	-40	-250	5
2.5	10	0	-5	5	4	3	4	7	0	-40	-40	-250	5
10	18	0	-5	5	4	3	4	7	0	-80	-80	-250	5
18	30	0	-6	6	5	3	4	8	0	-120	-120	-250	5
30	50	0	-8	8	6	4	5	8	0	-120	-120	-250	5
50	80	0	-9	9	7	5	5	8	0	-150	-150	-250	6
80	120	0	-10	10	8	5	6	9	0	-200	-200	-380	7
120	180	0	-13	13	10	7	8	10	0	-250	-250	-380	8
180	250	0	-15	15	12	8	10	11	0	-300	-300	-500	10
250	315	0	-18	18	14	9	13	13	0	-350	-350	-500	13
315	400	0	-23	23	18	12	15	15	0	-400	-400	-630	15

Notes: 1) Including 0 and 6.

2) Diameter series 7 and 8 have no specified value.

3) Only applicable to groove ball bearing.

4) Refers to installing in pair or in group, the inside ring width deviation of single bearing.

Table 17 Outer Ring Tolerance Class 5

μm

D mm	$\Delta D_{mp}$		$V_{dp}^{(2)(3)}$			$V_{Dmp}$	$K_{ea}$	$S_D$	$S_{ea}^{(4)}$	$S_{ea1}^{(6)}$	$\Delta C_s$		$V_{Cs}$ $V_{C1s}^{(5)}$
			Diameter series								High	Low	
			9	0、1、2、3、4	max								
Over	To	High	Low		max	max	max	max	max	High	Low	max	
2.5 <sup>1)</sup>	6	0	-5	5	4	3	5	8	8	11	Equal to the $\Delta B_s$ of the same bearing inside ring	5	
16	18	0	-5	5	4	3	5	8	8	11		5	
18	30	0	-6	6	5	3	6	8	8	11		5	
30	50	0	-7	7	5	4	7	8	8	11		5	
50	80	0	-9	9	7	5	8	8	10	14		6	
80	120	0	-10	10	8	5	10	9	11	16		8	
120	150	0	-11	11	8	6	11	10	13	18		8	
150	180	0	-13	13	10	7	13	10	14	20		8	
180	250	0	-15	15	11	8	15	11	15	21		10	
250	315	0	-18	18	14	9	18	13	18	25		11	
315	400	0	-20	20	15	10	20	13	20	28		13	
400	500	0	-23	23	17	12	23	15	23	33		15	
500	630	0	-28	28	21	14	25	18	25	35		18	
630	800	0	-35	35	26	18	30	20	30	42	20		

Notes: 1) Including 2 and 5

2) Diameter series 7 and 8 have no specified value.

3) Closed type bearing has no specified value.

4) Unapplicable to flanged outer ring bearing.

5) Only applicable to groove ball bearing.

## Tolerance Class 4 (table 18、table 19)

Table 18 Inner Ring Tolerance Class 4

μm

d mm		Δd <sub>mp</sub>		Δd <sub>s</sub> <sup>2)</sup>		V <sub>dp</sub>		V <sub>dmp</sub>	K <sub>ia</sub>	S <sub>c</sub>	S <sub>ia</sub> <sup>4)</sup>	ΔB <sub>s</sub>			V <sub>as</sub>
						Diameter series						Total	Normal	Correction <sup>5)</sup>	
						9	0、1、2、3、4								
Over	To	High	Low	High	Low	max		max	max	max	max	High	Low	max	
0.61 <sup>1)</sup>	2.5	0	-4	0	-4	4	3	2	2.5	3	3	0	-40	-250	2.5
2.5	10	0	-4	0	-4	4	3	2	2.5	3	3	0	-40	-250	2.5
10	18	0	-4	0	-4	4	3	2	2.5	3	3	0	-80	-250	2.5
18	30	0	-5	0	-5	5	4	2.5	3	4	4	0	-120	-250	2.5
30	50	0	-6	0	-6	6	5	3	4	4	4	0	-120	-250	3
50	80	0	-7	0	-7	7	5	3.5	4	5	5	0	-150	-250	4
80	120	0	-8	0	-8	8	6	4	5	5	5	0	-200	-380	4
120	180	0	-10	0	-10	10	8	5	6	6	7	0	-250	-380	5
180	250	0	-12	0	-12	12	9	6	8	7	8	0	-300	-500	6

Notes: 1) Including 0 and 6

2) Only applicable to diameter series 0, 1, 2, 3 and 4.

3) Diameter series 7 and 8 have no specified value.

4) Only applicable to groove ball bearing.

5) Refers to installing in pair or in group, the inside ring width deviation of single bearing.

Table 19 Outer Ring Tolerance Class 4

μm

D mm		ΔD <sub>mp</sub>		ΔD <sub>s</sub> <sup>2)</sup>		V <sub>Dp</sub> <sup>3)4)</sup>		V <sub>Dmp</sub>	K <sub>ea</sub>	S <sub>D</sub> <sup>5)</sup> S <sub>D1</sub> <sup>6)</sup>	S <sub>ea</sub> <sup>5)</sup>	S <sub>ea1</sub> <sup>6)</sup>	ΔC <sub>s</sub>		V <sub>Cs</sub> V <sub>C1s</sub> <sup>5)</sup>
						Diameter series							Upper deviation	Lower deviation	
						9	0、1、2、3、4								
Exceed	Reach	Upper deviation	Lower deviation	Upper deviation	Lower deviation	max		max	max	max	max	max	Upper deviation	Lower deviation	max
2.51 <sup>1)</sup>	6	0	-4	-4	-4	4	3	2	3	4	5	7	Equal to the ΔBs of the same bearing inside ring	2.5	
6	18	0	-4	-4	-4	4	3	2	3	4	5	7		2.5	
18	30	0	-5	-5	-5	5	4	2.5	4	4	5	7		2.5	
30	50	0	-6	-6	-6	6	5	3	5	4	5	7		2.5	
50	80	0	-7	-7	-7	7	5	3.5	5	4	5	7		3	
80	120	0	-8	-8	-8	8	6	4	6	5	6	8		4	
120	150	0	-9	-9	-9	9	7	5	7	5	7	10		5	
150	180	0	-10	-10	-10	10	8	5	8	5	8	11		5	
180	250	0	-11	-11	-11	11	8	6	10	7	10	14		7	
250	315	0	-13	-13	-13	13	10	7	11	8	10	14		7	
315	400	0	-15	-15	-15	15	11	8	13	10	13	18	8		

Notes: Outside ring flange outside diameter D1 tolerance prescribed in article 19 of 5.3.

4) Including 2.5

5) Only applicable to diameter series 0, 1, 2, 3 and 4.

6) Diameter series 7 and 8 have no specified value.

7) Closed type bearing has no specified value.

8) Unapplicable to flanged outer ring bearing

9) Only applicable to groove ball bearing.

## Class 2 tolerance (table 20、table 21)

Table 20 Inner Ring Tolerance Class 2

μm

d mm		Δd <sub>mp</sub>		Δd <sub>s</sub>		V <sub>dp</sub> <sup>2)</sup>	V <sub>dmp</sub>	K <sub>ia</sub>	S <sub>d</sub>	S <sub>ia</sub> <sup>2)</sup>	ΔB <sub>s</sub>			V <sub>Bs</sub>
											Total	Normal	Correction <sup>5)</sup>	
Over	To	High	Low	High	Low	max	max	max	max	max	High	Low	max	
0.6 <sup>1)</sup>	2.5	0	-2.5	0	-2.5	2.5	1.5	1.5	1.5	1.5	0	-40	-250	1.5
2.5	10	0	-2.5	0	-2.5	2.5	1.5	1.5	1.5	1.5	0	-40	-250	1.5
10	18	0	-2.5	0	-2.5	2.5	1.5	1.5	1.5	1.5	0	-80	-250	1.5
18	30	0	-2.5	0	-2.5	2.5	1.5	2.5	1.5	2.5	0	-120	-250	1.5
30	50	0	-2.5	0	-2.5	2.5	1.5	2.5	1.5	2.5	0	-120	-250	1.5
50	80	0	-4	0	-4	4	2	2.5	1.5	2.5	0	-150	-250	1.5
80	120	0	-5	0	-5	5	2.5	2.5	2.5	2.5	0	-200	-380	2.5
120	150	0	-7	0	-7	7	3.5	2.5	2.5	2.5	0	-250	-380	2.5
150	180	0	-7	0	-7	7	3.5	5	4	5	0	-250	-380	4
180	250	0	-8	0	-8	8	4	5	5	5	0	-300	-500	5

Notes : 1) Including 0 and 6.

2) not apply diameter series 7, 8 and 9.

3) Only applicable to groove ball bearing.

4) Refers to installing in pair or in group, the inside ring width deviation of single bearing.

Table 21 Outer Ring Tolerance Class 2

μm

D mm		ΔD <sub>mp</sub>		ΔD <sub>s</sub> <sup>2)</sup>		V <sub>Dp</sub> <sup>2)</sup>	V <sub>Dmp</sub>	K <sub>ea</sub>	S <sub>D</sub> <sup>3)</sup> S <sub>D1</sub> <sup>4)</sup>	S <sub>ea</sub> <sup>3)4)</sup>	S <sub>ea1</sub> <sup>4)</sup>	ΔC <sub>s</sub>		V <sub>Cs</sub> V <sub>C1s</sub> <sup>4)</sup>
												High	Low	
Over	To	High	Low	High	Low	max	max	max	max	max	max	High	Low	max
2.51*	6	0	-2.5	0	-2.5	2.5	1.5	1.5	1.5	1.5	3	Equal to the ΔBs of the same bearing inside ring	1.5	
6	18	0	-2.5	0	-2.5	2.5	1.5	1.5	1.5	3	1.5			
18	30	0	-4	0	-4	4	2	2.5	1.5	2.5	4		1.5	
30	50	0	-4	0	-4	4	2	2.5	1.5	2.5	4		1.5	
50	80	0	-4	0	-4	4	2	4	1.5	4	6		1.5	
80	120	0	-5	0	-5	5	2.5	5	2.5	5	7		2.5	
120	150	0	-5	0	-5	5	2.5	5	2.5	5	7		2.5	
150	180	0	-7	0	-7	7	3.5	5	2.5	5	7		2.5	
180	250	0	-8	0	-8	8	4	7	4	7	10		4	
250	315	0	-8	0	-8	8	4	7	5	7	10		5	
315	400	0	-10	0	-10	10	5	8	7	8	11	7		

Notes : outside ring flange diameter D1 tolerance prescribed in article 19 of 5.3.

1) Including 2.5.

2) Applicable to diameter series 0,1,2,3 and 4 of the open type and closed type bearing.

3) unapplicable to flanged outer ring bearing.

4) Only applicable to groove ball bearing.

## Taper roller bearings

### 1. structural characteristics

while the tapered roller bearing designing, the sliding surfaces of cup, inner ring and the rolling elements will converge towards the same single point on the bearing axes. Therefore, the roller will archive pure rolling motion on the raceway.

Tapered roller bearing can bear combined load of radial and axial. The axial load capacity of bearing varies with contact angle. The greater contact angle is, the bigger axial load capacity is. Even under the circumstance bearing only

bears radial load, the axial separate will also appears, generally, double sets of tapered roller bearings arrangement is recommended.

### 2. Internal clearance

Single row tapered roller bearings have clearance only after they are mounted, and the clearance can be determined only when another bearing is located next to it in the opposite direction after adjusting. The radial clearance of double row tapered roller bearing are listed in the table below:

$\mu\text{m}$

Nominal bore Dia d mm	C1		C2		Normal(CN)		C3		C4		C5	
	Over	To	min	max	min	max	min	max	min	max	min	max
30	30	0	10	20	20	30	40	50	50	60	70	80
40	40	0	12	12	25	40	45	60	60	75	80	95
50	50	0	15	15	30	30	45	50	65	80	90	110
65	65	0	15	15	30	30	50	50	70	70	90	120
80	80	0	20	20	40	40	60	60	80	80	110	150
100	100	0	20	20	45	45	70	70	100	100	130	170
120	120	0	25	25	50	50	80	80	110	110	150	200
140	140	0	30	30	60	60	90	90	120	120	170	230
160	160	0	30	30	6	65	100	100	140	140	190	260
180	180	0	35	35	70	70	110	110	150	150	210	280
200	200	0	40	40	80	80	120	120	170	170	230	310
225	225	0	40	40	90	90	140	140	190	190	260	340
250	250	0	50	50	100	100	150	150	210	210	290	380
280	280	0	50	50	110	110	170	170	230	230	320	420
315	315	0	60	60	120	120	180	180	250	250	350	460
355	355	0	70	70	140	140	210	210	280	280	390	510
400	400	0	70	70	150	150	230	230	310	310	440	580
450	450	0	80	80	170	170	260	260	350	350	490	650
500	500	0	90	90	190	190	290	290	390	390	540	720
560	560	0	100	100	210	210	320	320	430	430	590	790
630	630	0	110	110	230	230	350	350	480	480	660	880
710	710	0	130	130	260	260	400	400	540	540	740	910
800	800	0	140	140	290	290	450	450	610	610	830	1100
900	900	0	160	160	330	330	500	500	670	670	920	1240
1000	1000	0	180	180	360	360	540	540	720	720	980	1300
1120	1120	0	200	200	400	400	600	600	820	820	1100	1440
1250	1250	0	220	220	450	450	670	670	900	900	1200	1560
1400	1400	0	250	250	500	500	750	750	980	980	1300	1700

### 3. Tolerance

P0 tolerance (Table 23, Table 24, Table 25)

Table 23 Inner ring Diameter Tolerance and Runout Tolerance  $\mu\text{m}$

d mm	$\Delta d_{mp}$		$V_{dp}$	$V_{dmp}$	$K_{ia}$	
	Over	To	High	Low	max	
10	18	0	-12	12	9	15
18	30	0	-12	12	9	18
30	50	0	-12	12	9	20
50	80	0	-15	15	11	25
80	120	0	-20	20	15	30
120	180	0	-25	25	19	35
180	250	0	-30	30	23	50
250	315	0	-35	35	26	60
315	400	0	-40	40	30	70

Table 24 Outer ring Diameter Tolerance and Runout Tolerance  $\mu\text{m}$

D mm	$\Delta D_{mp}$		$V_{Dp}$	$V_{Dmp}$	$K_{ea}$	
	Over	To	High	Low	max	
18	30	0	-12	12	9	18
30	50	0	-14	14	11	20
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	50	38	100

Table 25 Width - inner and outer ring ,single row bearings and its components  $\mu\text{m}$

d mm	$\Delta B_s$		$\Delta C_s$		$\Delta T_s$		$\Delta T_{1s}$		$\Delta T_{2s}$		
	Over	To	High	Low	High	Low	High	Low	High	Low	
10	18	0	-120	0	-120	+200	0	+100	0	+100	0
18	30	0	-120	0	-120	+200	0	+100	0	+100	0
30	50	0	-120	0	-120	+200	0	+100	0	+100	0
50	80	0	-150	0	-150	+200	0	+100	0	+100	0
80	120	0	-200	0	-200	+200	-200	+100	-100	+100	-100
120	180	0	-250	0	-250	+350	-250	+150	-150	+200	-100
180	250	0	-300	0	-300	+350	-250	+150	-150	+200	-100
250	315	0	-350	0	-350	+350	-250	+150	-150	+200	-100
315	400	0	-400	0	-400	+400	-400	+200	-200	+200	-200

### P6X tolerance

The inner and outer diameter and runout tolerance of the tolerance level is the same as the specified values of P0 tolerance in Table 13 and Table 14. The width tolerance specifications is in Table 16

Table 26 Width-the inner and outer ring ,single row bearings and its components  $\mu\text{m}$

d mm	$\Delta B_s$		$\Delta C_s$		$\Delta T_s$		$\Delta T_{1s}$		$\Delta T_{2s}$		
	Over	To	High	Low	High	Low	High	Low	High	Low	
10	18	0	-50	0	-100	+100	0	+50	0	+50	0
18	30	0	-50	0	-100	+100	0	+50	0	+50	0
30	50	0	-50	0	-100	+100	0	+50	0	+50	0
50	80	0	-50	0	-100	+100	0	+50	0	+50	0
80	120	0	-50	0	-100	+100	0	+50	0	+50	0
120	180	0	-50	0	-100	+150	0	+50	0	+100	0
180	250	0	-50	0	-100	+150	0	+50	0	+100	0
250	315	0	-50	0	-100	+200	0	+100	0	+100	0
315	400	0	-50	0	-100	+200	0	+100	0	+100	0

P5 Tolerance (Table 27、Table 28)

Table 27 The width of the inner ring and single row bearings

μm

d mm		Δ <sub>Dmp</sub>		V <sub>dp</sub>	V <sub>dmp</sub>	K <sub>ia</sub>	S <sub>d</sub>	Δ <sub>Bs</sub>		Δ <sub>Ts</sub>	
Over	To	High	Low	max	max	max	max	High	Low	High	Low
10	18	0	-7	5	5	5	7	0	-200	+200	-200
18	30	0	-8	6	5	5	8	0	-200	+200	-200
30	50	0	-10	8	5	6	8	0	-240	+200	-200
50	80	0	-12	9	6	7	8	0	-300	+200	-200
80	120	0	-15	11	8	8	9	0	-400	+200	-200
120	180	0	-18	14	9	11	10	0	-500	+350	-250
180	250	0	-22	17	11	13	11	0	-600	+350	-250

Table 28 The outer ring

μm

D mm		Δ <sub>Dmp</sub>		V <sub>Dp</sub>	V <sub>Dmp</sub>	K <sub>ea</sub>	S <sub>D1</sub> S <sub>D1</sub>	Δ <sub>Cs</sub>	
Over	To	High	Low	max	max	max	max	High	Low
18	30	0	-8	6	5	6	8	The same as the same bearing inner ring's Δ <sub>Bs</sub>	
30	50	0	-9	7	5	7	8		
50	80	0	-11	8	6	8	8		
80	120	0	-13	10	7	10	9		
120	150	0	-15	11	8	11	10		
150	180	0	-18	14	9	13	10		
180	250	0	-20	15	10	15	11		
250	315	0	-25	19	13	18	13		
315	400	0	-28	22	14	20	13		

1) Not suitable for flanged outer bearings

P4 Tolerance (Table 29、Table 30)

Table 29 The width of the inner ring and single row bearings

μm

d mm		Δ <sub>dmp</sub>		Δ <sub>ds</sub>		V <sub>dp</sub>	V <sub>dmp</sub>	K <sub>ia</sub>	S <sub>d</sub>	S <sub>ia</sub>	Δ <sub>Bs</sub>		Δ <sub>Ts</sub>	
Over	To	High	Low	High	Low	max	max	max	max	max	High	Low	High	Low
10	18	0	-5	0	-5	4	4	3	3	3	0	-200	+200	-200
18	30	0	-6	0	-6	5	4	3	4	4	0	-200	+200	-200
30	50	0	-8	0	-8	6	5	4	4	4	0	-240	+200	-200
50	80	0	-9	0	-9	7	5	4	5	4	0	-300	+200	-200
80	120	0	-10	0	-10	8	5	5	5	5	0	-400	+200	-200
120	180	0	-13	0	-13	10	7	6	6	7	0	-500	+350	-250
180	250	0	-15	0	-15	11	8	8	7	8	0	-600	+350	-250

Table 30 Outer ring

μm

D mm		Δ <sub>Dmp</sub>		Δ <sub>Ds</sub>		V <sub>Dp</sub>	V <sub>Dmp</sub>	K <sub>ea</sub>	S <sub>D1</sub> S <sub>D1</sub>	S <sub>ea1</sub>	S <sub>ea1</sub> <sup>1</sup>	Δ <sub>Cs</sub>	
Over	To	High	Low	High	Low	max	max	max	max	max	max	High	Low
18	30	0	-6	0	-6	5	4	4	4	5	7	The same as the same bearing inner ring's Δ <sub>Bs</sub>	
30	50	0	-7	0	-7	5	5	5	4	5	7		
50	80	0	-9	0	-9	7	5	5	4	5	7		
80	120	0	-10	0	-10	8	5	6	5	6	8		
120	150	0	-11	0	-11	8	6	7	5	7	10		
150	180	0	-13	0	-13	10	7	8	5	8	11		
180	250	0	-15	0	-15	11	8	10	7	10	14		
250	315	0	-18	0	-18	14	9	11	8	10	14		
315	400	0	-20	0	-20	15	10	13	10	13	18		

Not suitable for flanged outer bearings

## Machine tool screw with thrust angular contact ball bearing

### Structural features

In order to adapt to the conditions required of the machine tool screw, ZWZ has developed thrust angular contact ball bearings specifically for machine tool screw. This type of bearing has 60° contact angle, and featured by more steel balls in order to fulfill the requirement of axial rigidity and low starting torque to the screw bearing.

### Size and Tolerance

ZWZ not only could design and manufacture the 7602XX and 7603XX, two series screw bearings complied with national standards, but ZWZ can also design special dimension bearings base on the customer demand.

ZWZ can provide P4 and P2 tolerance level products for machining screw ball bearings, the tolerance complied the rules for radial ball bearings.

## Thrust Ball Bearings

### 1. Structural features

Single direction thrust ball bearing is the separation type bearing. Composed by a shaft washer, a housing washer and a group of ball and cage. Have the characteristics of convenient installation and remove. The single direction thrust ball bearings can only bear axial force, can not afford any radial loads, can positioning to the single axial direction.

## 2. Tolerance

Table 31 Tolerance Grade 5 Shaft washer and bearing height

d and,d2/mm		$\Delta_{dmp}, \Delta_{dmp}$		$V_{dp}, V_{d2p}$	$S_i$	$\Delta T_s$		$\Delta T_{1s}$	
Over	To	High	Low	max	max	High	Low	High	Low
—	18	0	-8	6	3	+20	-250	+150	-400
18	30	0	-10	8	3	+20	-250	+150	-400
30	50	0	-12	9	3	+20	-250	+150	-400
50	80	0	-15	11	4	+20	-300	+150	-500
80	120	0	-20	15	4	+25	-300	+200	-500
120	180	0	-25	19	5	+25	-400	+200	-600
180	250	0	-30	23	5	+30	-400	+250	-600
250	315	0	-35	26	7	+40	-400		
315	400	0	-40	30	7	+40	-500		
400	500	0	-45	34	9	+50	-500		
500	630	0	-50	38	11	+60	-600		
630	800	0	-75	55	13	+70	-750		
800	1000	0	-100	75	15	+80	-1000		
1000	1250	0	-125	95	18	+100	-1400		
1250	1600	0	-160	120	25	+120	-1600		
1600	2000	0	-200	150	30	+140	-1900		
2000	2500	0	-250	190	40	+160	-2300		

Table 32 Tolerance Grade 5 housing washer

D /mm		$\Delta D_{mp}$		$V_{DP}$	$S_e$
Over	To	High	Low	max	max
10	18	0	-11	8	
18	30	0	-13	10	
30	50	0	-16	12	
50	80	0	-19	14	Si value is equal to same model of shaft washer
80	120	0	-22	17	
120	180	0	-25	19	
180	250	0	-30	23	
250	315	0	-35	26	
315	400	0	-40	30	
400	500	0	-45	34	
500	630	0	-50	38	
630	800	0	-75	55	

D /mm		$\Delta D_{mp}$		$V_{DP}$	$S_e$
Over	To	High	Low	max	max
800	1000	0	-100	75	Si value is equal to same model of shaft washer
1000	1250	0	-125	95	
1250	1600	0	-160	120	
1600	2000	0	-200	150	
2000	2500	0	-250	190	
2500	2850	0	-300	225	
Note: Double direction bearing tolerance only suitable for bearing D ≤ 360mm.					

Table 33 Tolerance Grade 4 Shaft washer and bearing height

d and,d2/mm		$\Delta_{dmp}, \Delta_{dmp}$		$V_{dp}, V_{d2p}$	$S_i$	$\Delta T_s$		$\Delta T_{1s}$	
Over	To	High	Low	max	max	High	Low	High	Low
—	18	0	-7	5	2	+20	-250	+150	-400
18	30	0	-8	6	2	+20	-250	+150	-400
30	50	0	-10	8	2	+20	-250	+150	-400
50	80	0	-12	9	3	+20	-300	+150	-500
80	120	0	-15	11	3	+25	-300	+200	-500
120	180	0	-18	14	4	+25	-400	+200	-600
180	250	0	-22	17	4	+30	-400	+250	-600
250	315	0	-25	19	5	+40	-400		
315	400	0	-30	23	5	+40	-500		
400	500	0	-35	26	6	+50	-500		
500	630	0	-40	30	7	+60	-600		
630	800	0	-50	40	8	+70	-750		
Note: Double direction bearing tolerance only suitable for bearing D ≤ 190mm.									

Table 34 Tolerance Grade 4 housing washer

D /mm		$\Delta D_{mp}$		$V_{DP}$	$S_e$
Over	To	High	Low	max	max
10	18	0	-7	5	Si value is equal to same model of shaft washer
18	30	0	-8	6	
30	50	0	-9	7	
50	80	0	-11	8	
80	120	0	-13	10	
120	180	0	-15	11	
180	250	0	-20	15	
250	315	0	-25	19	
315	400	0	-28	21	
400	500	0	-33	25	
500	630	0	-38	29	
630	800	0	-45	34	
800	1000	0	-60	45	
Note: Double direction bearing tolerance only suitable for bearing D ≤ 360mm.					

## Double direction thrust angular contact ball bearing

### Structural features

ZWZ mainly provide two series, 2344 and 2349, double direction thrust angular contact ball bearing. With 60\* contact angle.

This bearing can positioning at the axial location on the main shaft in both directions. This series bearings usually installed together with same bore and the outer diameter NN30 series cylindrical roller bearings. However, the tolerance of the housing washer is less than the diameter tolerance of cylindrical roller bearings, keeps sufficient radial clearance of the bearing bore. This ensures that the thrust bearing only carry axial load.

### tolerance

Standard ZWZ two-way thrust angular contact ball bearings in accordance with SP, UP grade production

Table 35 Shaft Washer

SP tolerance

Shaft washer Inner diameter		$\Delta d_s$		$S_i$	$\Delta T_s$	
mm		$\mu m$		$\mu m$	$\mu m$	
Over	To	High	Low	max	High	Low
18	30	+1	-9	3	+50	-80
30	50	+1	-11	3	+60	-100
50	80	+2	-14	4	+70	-120
80	120	+3	-18	4	+85	-140
120	180	+3	-21	5	+95	-160
180	250	+4	-26	5	+120	-200

Table 36 housing washer

SP tolerance

housing washer outer diameter		$\Delta d_s$		$S_e$	$\Delta C_s$	
mm		$\mu m$		$\mu m$	$\mu m$	
Over	To	High	Low	max	High	Low
30	50	-20	-27	Si value is equal to same model of shaft washer	0	-60
50	80	-24	-33		0	-60
80	120	-28	-38		0	-60
120	150	-33	-44		0	-60
150	180	-33	-46		0	-60
180	250	-37	-52		0	-60
250	315	-41	-59		0	-60

Table 37 Shaft washer

SP tolerance

Shaft washer Inner diameter		$\Delta d_s$		$S_i$	$\Delta T_s$	
mm		$\mu m$		$\mu m$	$\mu m$	
Over	To	High	Low	max	High	Low
18	30	0	-6	1.5	+50	-80
30	50	0	-8	1.5	+60	-100
50	80	0	-9	2	+70	-120
80	120	0	-10	2	+85	-140
120	180	0	-13	3	+95	-160
180	250	0	-15	3	+120	-200

Table38 housing washer

UP tolerance

housing washer outer diameter		$\Delta d_s$		$S_e$	$\Delta C_s$	
mm		$\mu m$		$\mu m$	$\mu m$	
Over	To	High	Low	max	High	Low
30	50	-20	-27	Si value is equal to same model of shaft washer	0	-60
50	80	-24	-33		0	-60
80	120	-28	-38		0	-60
120	150	-33	-44		0	-60
150	180	-33	-46		0	-60
180	250	-37	-52		0	-60
250	315	-41	-59		0	-60

## High precision axial and radial cylindrical roller bearings

### Structural features

High precision axial and radial cylindrical roller bearings have up and down two row thrust cylindrical roller, and a set of full complement cylindrical roller composition. Therefore can capable of two-way axial load and the additional radial load as well as installation moment.

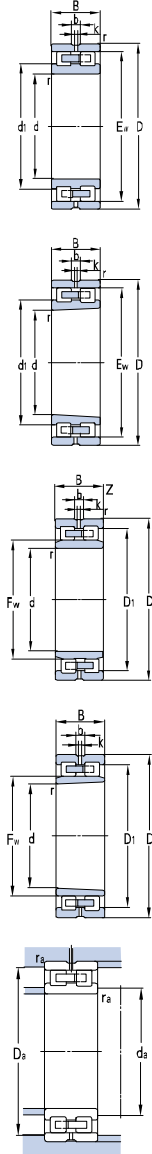
### Tolerance

Table 39

Size tolerance				Installation size					Axial/radial runout
Inner diameter		outer diameter		$H_1$ mm	$\Delta H_{1s}$ mm	$\Delta H_{1s}$ mm	$H_2$ mm	$\Delta H_{2s}$ mm	Standard $\mu m$
d mm	$\Delta d_s$ mm	D mm	$\Delta D_s$ mm						
50	-0.008	126	-0.011	20	$\pm 0.125$	$\pm 0.025$	10	$\pm 0.02$	2
80	-0.009	146	-0.011	23.35	$\pm 0.15$	$\pm 0.025$	11.7	$\pm 0.02$	3
100	-0.01	185	-0.015	25	$\pm 0.175$	$\pm 0.025$	13	$\pm 0.02$	3
120	-0.01	210	-0.015	26	$\pm 0.175$	$\pm 0.025$	14	$\pm 0.02$	3
150	-0.013	240	-0.015	26	$\pm 0.175$	$\pm 0.03$	14	$\pm 0.02$	3
180	-0.013	280	-0.018	29	$\pm 0.175$	$\pm 0.03$	14	$\pm 0.025$	4
200	-0.015	300	-0.018	30	$\pm 0.175$	$\pm 0.03$	15	$\pm 0.025$	4
260	-0.018	385	-0.02	36.5	0.2	0.04	18.5	0.025	6
325	-0.023	450	-0.029	40	$\pm 0.2$	$\pm 0.05$	20	$\pm 0.025$	6
395	-0.023	525	-0.028	42.5	$\pm 0.2$	$\pm 0.05$	22.5	$\pm 0.025$	6
460	-0.023	600	-0.028	46	0.225	0.06	24	0.03	6
580	-0.025	750	-0.035	60	$\pm 0.25$	$\pm 0.075$	30	$\pm 0.03$	10
650	-0.038	870	-0.05	78	$\pm 0.25$	$\pm 0.1$	44	$\pm 0.03$	10
850	-0.05	1095	-0.063	80.5	$\pm 0.3$	$\pm 0.12$	43.5	$\pm 0.03$	12
950	-0.05	1200	-0.063	86	$\pm 0.3$	$\pm 0.12$	46	$\pm 0.03$	12
1030	-0.063	1300	-0.08	92.5	0.3	0.15	52.5	0.03	12

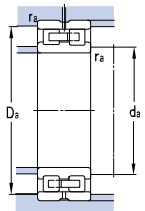
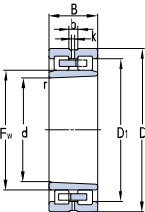
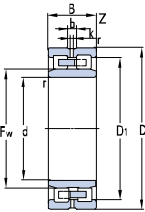
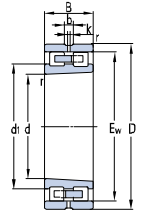
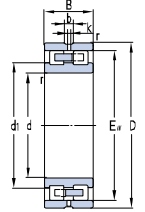


# Double-row Cylindrical Roller Bearings



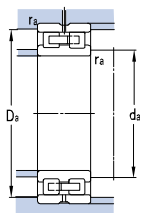
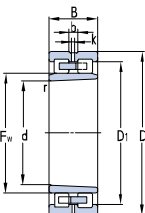
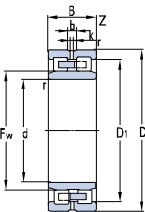
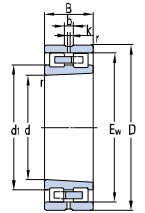
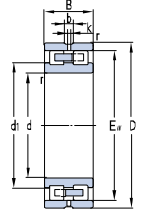
Principal dimensions					Basic rating load		Limit rating speed		Designations	Other dimensions				Contact surface and chamfer dimensions			Weight kg									
d	D	B	r	Ew, Fw	Cr	Cor	Grease	Oil		d1	D1	b	k	da(min)	Da(max)	ra(max)										
mm	mm	mm	mm	mm	KN	KN	r/min	r/min		mm	mm	mm	mm	mm	mm	mm										
50	80	23	1	72.5	60.0	85	10000	13000	NN3010K	61.3				55	75	1	0.428									
	80	23	1	72.5	60.0	84.5	10000	13000										NN3010	61.3				55	75	1	0.431
60	95	26	1.1	86.1	77.0	114	9000	10000	NN3012K	73.3				66	89	1	0.691									
65	100	26	1.1	91	80	120	9000	10000	NN3013K					75	93	1.1	0.72									
70	100	30	1	80	65	105	8000	9500	NNU4914					79	92	1	0.74									
	110	30	1.1	100	100	150	7500	9000										NN3014					82	102	1.1	1.05
75	105	30	1.0	85	65	115	7000	8500	NNU4915					84	97	1	0.77									
	115	30	1.1	105	106	165	6700	8000										NNU3015	90.6				87	107	1.1	1.07
80	110	30	1	90	71.5	135	6700	8000	NNU4916					89	102	1	0.80									
	125	34	1.1	113	130	207	6300	7500										NN3016K	97				86.5	118.5	1	1.50
	125	34	1.1	113	130	207	6300	7500										NN3016K	97				86.5	118.5	1	1.50
85	120	35	1.1	96.5	98	175	6300	7500	NNU4917					96	111	1.1	1.21									
	130	34	1.1	118	135	224	6000	7000										NN3017K	102				91.5	123.5	1	1.63
90	140	37	1.5	127	147	260	5600	6700	NN3018	109.4				98	132	1.5	1.98									
	140	37	1.5	127	147	260	5600	6700										NN3018K	109.4	6.5	4		98	132	1.5	1.92
95	130	35	1.1	106.5	96	186	5600	6700	NNU4919					106	121	1.1	1.33									
	145	37	1.5	132	135	224	5600	6700										NN3019K	114.4				103	137	1.5	2.26
100	140	40	1.1	113	135	300	5300	6300	NNU4920					112	129	1.1	1.87									
	150	37	1.5	137	168	292	5300	6300										NN3020K	119.4				108	142	1.5	2.20
	150	37	1.5	137	168	292	5300	6300										NN3020	119.4				108	142	1.5	2.25
	150	50	1.5	115	168	292	5300	6300										NNU4020		133			108	142	1.5	3.11
105	145	40	1.1	118	130	280	5300	6300	NNU4921					117	134	1.1	1.95									
	160	41	2.0	146	192	350	4800	5600										NN3021	125.2				116.5	154	1	2.94
	160	41	2.0	146	192	350	4800	5600										NN3021K	125.2				116.5	154	1	2.93
110	150	40	1.1	123	132	300	4800	5600	NNU4922					122	139	1.1	2.05									

# Double-row Cylindrical Roller Bearings



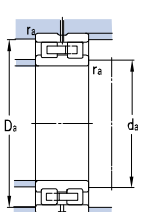
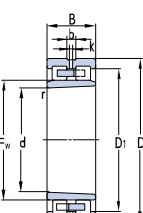
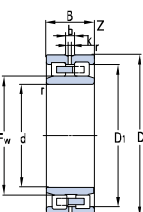
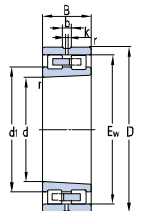
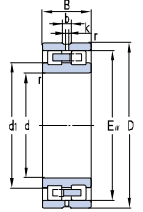
Principal dimensions					Basic rating load		Limit rating speed		Designations	Other dimensions				Contact surface and chamfer dimensions			Weight kg				
d	D	B	r	Ew, Fw	Cr	Cor	Grease	Oil		d1	D1	b	k	da(min)	Da(max)	ra(max)					
mm	mm	mm	mm	mm	KN	KN	r/min	r/min		mm	mm	mm	mm	mm	mm	mm					
110	170	45	2.0	155	220	405	5000	6000	NN3022K NN3022KL NN3022	132.6		12	4	116.5	163	1	3.73				
	170	45	2.0	155	220	405	5000	6000						116.5	163	1	3.54				
	170	45	2.0	155	220	405	5000	6000						116.5	163	1	3.74				
120	165	45	1.1	134.5	185	365	4500	5300	NNU4924 NN3024K NN3024	142.6				133	155	1.1	2.72				
	180	46	2.0	165	243	445	4300	5000						130	171	2	3.85				
	180	46	2.0	160	243	445	4300	5000						130	171	2	3.86				
130	180	50	1.5	146	205	420	4000	4800	NNU4926 NN3026 NN3026K	156.4				145	166	1.5	3.75				
	200	52	2.0	182	305	530	3800	4500						139	191	2	5.54				
	200	52	2.0	182	305	530	3800	4500						139	191	2	5.34				
140	190	50	1.5	156	199	405	3800	4500	NNU4928 NNU3028/C9W33 NN3028K NN3028	172				149	182	2	4.19				
	210	53	2.0	160	320	575	3800	4500						185.6	9.6	5	6.18				
	210	53	2.0	192	320	575	3800	4500						166.4				149	201	2	6.05
	210	53	2.0	192	320	575	3800	4500						166.4				149	201	2	6.05
150	210	60	2.0	168.5	350	675	3600	4300	NNU4930 NN3030K NN3030	178.8				167	197	2.0	6.15				
	225	56	2.1	206	363	650	3400	4000						161	214	2	7.70				
	225	56	2.1	206	363	650	3400	4000						161	214	2	7.75				
160	220	60	2.0	178.5	340	680	3400	4000	NNU4932 NN3032K NN3032KTn1 NN3032	190.2				177	207	2.0	6.42				
	240	60	2.1	219	380	675	3200	3800						171	229	2	8.39				
	240	60	2.1	219	380	335	3200	3800						171	229	2	7.86				
	240	60	2.1	219	380	675	3200	3800						171	229	2	8.38				
170	230	60	2.0	188.5	350	720	3200	3800	NNU4934 NN3034K NN3034	204				187	217	2.0	6.74				
	260	67	2.1	236	470	860	3000	3600						181	249	2	12.9				
	260	67	2.1	236	470	860	3000	3600						181	249	2	13.3				
180	250	69	2.3	201	382	703	3000	3600	NNU4936K NN3036K NN3036	228				191	239	2	9.80				
	280	74	2.1	255	605	1090	2800	3400						218.2				191	269	2	16.9
	280	74	2.1	255	605	1090	2800	3400						218.2				191	269	2	16.9
190	260	69	3.0	212	616	1250	2800	3400	NNU4938B	257	9.5	5	201	249	2	11					

# Double-row Cylindrical Roller Bearings



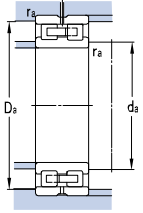
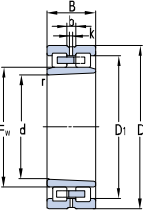
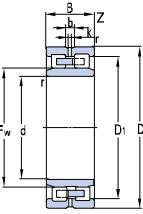
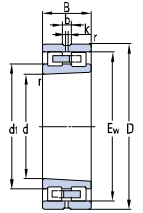
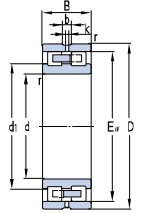
Principal dimensions					Basic rating load		Limit rating speed		Designations	Other dimensions				Contact surface and chamfer dimensions			Weight
d	D	B	r	Ew, Fw	Cr	Cor	Grease	Oil		d1	D1	b	k	da(min)	Da(max)	ra(max)	
mm	mm	mm	mm	mm	KN	KN	r/min	r/min		mm	mm	mm	mm	mm	mm	kg	
190	290	75	2.1	265	622	1140	2600	3200	NN3038K NN3038 NNU6038	228.2				201	279	2	17.9
	290	75	2.1	265	622	1140	2600	3200		228.2				201	279	2	18.0
	290	180	2.1	219	1390	3200	2600	3200			236				201	279	2
200	280	80	2.1	225	520	1120	2600	3200	NNU4940 NN3040K NN3040					223	259	2.1	14.9
	310	82	2.1	282	675	1340	2400	3000		242				211	299	2	22.0
	310	82	2.1	282	675	1340	2400	3000		242				211	299	2	22.1
220	300	80	2.1	245	530	1200	2400	3000	NNU4944K NN3044K NN3044		273	12.2	6	231	289	2	16.6
	340	90	3.0	310	875	1610	2200	2800		265.2				233	327	2.5	30.1
	340	90	3.0	310	875	1610	2200	2800		265.2				233	327	2.5	31.0
240	320	80	2.1	265	625	1470	2200	2800	NNU4948K NN3048K NN3048		295	12.2	6	251	309	2	17.7
	360	92	3.0	330	885	1690	2000	2600		285.2				253	347	2.5	32.7
	360	92	3.0	330	885	1690	2000	2600		285.2				253	347	2.5	31.6
260	360	100	2.1	292	760	2030	2000	2600	NNU4952 NN3052K NNU4152 NNU4052 NNU4952K		325	15	6	273	347	2.6	31.7
	400	104	4.0	364	1110	2120	1900	2600		312.8				276	384	3	49.3
	440	180	4.0	306	2240	4500	1900	2600			367			276	424	3	111
	400	140	4	295	1570	3000	1900	2600			358	13.9	7.5	276	384	3	63.4
	360	100	2.1	292	760	2030	1900	2600		326		15	6	273	347	2.7	30.4
280	380	100	2.1	309	870	2200	1900	2400	NNU4956K NNU4956 NN3056K NN3056		347	15	6	291	369	2	27.5
	380	100	2.1	309	870	2200	1900	2400			347			291	369	2	29
	420	106	4.0	384	1170	2290	1800	2200		332.8				296	404	3	49.7
	420	106	4.0	384	1170	2290	1800	2200		332.8				296	404	3	52.3
280	460	180	5	326	2500	4700	1700	2000	NNU4156		407			300	440	4	118
300	420	118	3.0	339	1050	2800	1600	1900	NNU4960 NN3060K NN3060 NNU4960K		379	17.7	9	314	406	2.5	51.6
	460	118	4.0	418	1290	2790	1600	1900		360.4				316	444	3	76.2
	460	118	4.0	418	1290	2790	1600	1900		360.4				316	444	3	77.9
	420	118	3.0	339	1150	2800	1700	2000			379	17.7	9	314	406	2.5	49.3
320	440	118	3.0	359	1090	3040	1600	1900	NNU4964 NN3064 NN3064K		399	17.7	9	334	426	2.5	54.9
	480	121	4.0	438	1360	2910	1600	1900		377		17.7	8	336	464	3	76.3
	480	121	4.0	438	1360	2910	1600	1900		377		17.7	8	336	464	3	72.8

# Double-row Cylindrical Roller Bearings



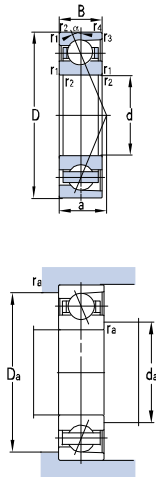
Principal dimensions					Basic rating load		Limit rating speed		Designations	Other dimensions				Contact surface and chamfer dimensions			Weight kg
d	D	B	r	Ew, Fw	Cr	Cor	Grease	Oil		d1	D1	b	k	da(min)	Da(max)	ra(max)	
mm	mm	mm	mm	mm	KN	KN	r/min	r/min		mm	mm	mm	mm	mm	mm	mm	
340	580	243	5	402	4000	7550	1400	1700	NNU4168 NNU4068 NN3068K	510	460	12	6	360	500	4	267
	520	180	5	385	2490	4800	1500	1800									
	520	133	5	473	1730	3780	1500	1800									
360	480	118	3.0	399	1420	3150	1500	1800	NNU4972 NN3072K	426	17.7	12	396	449	3	57.5	
	540	134	5.0	493	1940	3900	1400	1700									
380	520	140	4.0	426	1500	3600	1400	1700	NNU4976 NN3076K NNU4176	448	17.7	12	423	482	4	85.8	
	560	135	5.0	515	1800	4100	1300	1600									
	620	243	5.0	442	4130	8350	700	850									
400	600	148	5	549	2360	4750	1200	1500	NN3080K NNU4180 NNU4980K	472	568	16.7	8	426	580	4	141
	650	250	6	463	4700	9550	1000	1250									
	540	140	4	446	1700	4500	1200	1600									
420	560	140	4.0	466	1650	4750	1300	1600	NNU4984K NNU4084 NN3084K	515	17.7	9	436	539	2	93.3	
	620	200	5	469	3450	7500	1100	1400									
	620	150	5	569	2100	4500	1200	1500									
440	640	230	6.0	482	4790	10400	1100	1400	NNP4088X3 NNU4888K NNU4888 NNU4088 NNU4088K NNU4188K30M NNU4188	602	16.7	7.5	466	614	5	256	
	540	100	2.1	471	1000	3000	1300	1600									
	540	100	2.1	471	1000	3000	1300	1600									
	650	212	6	487	3850	8250	1100	1400									
	650	212	6	487	3850	8250	1100	1400									
	720	280	6	511	5650	11500	1000	1300									
	720	280	6	511	5650	11500	1000	1300									
460	680	163	6.0	624	2600	6200	1100	1400	NN3092K NNU4892K NNU4892 NNU4992 NNU4992K NNU4092 NNU4092K NNU4192K30 NNU4192	544	20.5	12	486	627	5	198	
	580	118	3	497	1150	3250	1300	1700									
	580	118	3	497	1150	3250	1200	1600									
	620	160	4	510	2000	5400	1200	1600									
	620	160	4	510	2000	5400	1200	1600									
	680	218	6	513	4250	9300	1000	1300									
	680	218	6	513	4250	9300	1000	1300									
	760	300	7.5	537	6350	13000	800	900									
	760	300	7.5	537	6350	13000	800	900									

# Double-row Cylindrical Roller Bearings



Principal dimensions					Basic rating load		Limit rating speed		Designations	Other dimensions				Contact surface and chamfer dimensions			Weight
d	D	B	r	Ew, Fw	Cr	Cor	Grease	Oil		d1	D1	b	k	da(min)	Da(max)	ra(max)	
					KN		r/min		mm				mm				
480	650	170	5	534	2300	6150	1100	1400	NNU4996	592	22.3	12	500	630	4	150	
	650	170	5	534	2300	6150	1100	1400		NNU4996K	592	22.3	12	500	630	4	148
	700	165	6	644	2500	5800	1000	1300	NN3096	564	22.3	12	648	674	5	198	
	700	165	6	644	2500	5800	1000	1300		NN3096K	564	22.3	12	648	674	5	192
	700	218	6	533	4200	9600	950	1200	NNU4096	634	22.3	12	506	674	5	272	
	790	308	7.5	557	7000	14400	800	1000	NNU4196	701	22.3	12	513	757	6	591	
790	308	7.5	557	7000	14400	800	1000	NNU4196K	701	22.3	12	513	757	6	585		
500	670	170	5	554	2330	6100	1000	1300	NNU49/500F1	612	22.3	12	520	650	4	178	
	670	170	5	554	2330	6100	1000	1300		NNU49/500K	612	22.3	12	520	650	4	178
	720	167	6	664	2650	5800	1000	1300	NN30/500	584	22.3	12	668	694	5	210	
	720	218	6	553	4450	10500	950	1200		NNU40/500	654	22.3	12	526	694	5	285
	720	218	6	553	4450	10500	950	1200	NNU40/500K	654	22.3	12	526	694	5	282	
	830	325	7.5	582	7400	14500	800	1000	NNU41/500	734	22.3	12	533	797	6	705	

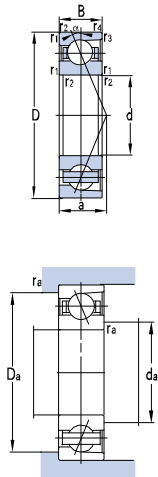
# High-precision Angular Contact Ball Bearings



Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Installation Dimensions			Weight kg
d	D	B	r12min	r34min	Cr	Cor	Grease	Oil			da(max)	Da(max)	ra(max)	
mm					KN		r/min		mm	mm	mm			
25	47	12	0.6	0.3	11.5	7.5	25000	35000	7005C	11	30	42	0.6	0.078
	47	12	0.6	0.3	11	7.1	20000	30000	7005AC	11	30	42	0.6	0.078
	52	15	1	0.6	16.5	10.5	22000	32000	7205C	13	31	46	1	0.127
	52	15	1	0.6	16	10.0	19500	28500	7205AC	13	31	46	1	0.127
30	55	13	1	0.3	15.5	10.5	18500	28500	7006C	12	36	49	1	0.113
	55	13	1	0.3	14.5	10.0	18000	28000	7006AC	12	36	49	1	0.113
	62	16	1	0.6	23	14.5	18500	28000	7206C	14	36	56	1	0.196
	62	16	1	0.6	23	14.5	18500	28000	7206AC	14	36	56	1	0.196
35	72	17	1.1	0.6	32.5	22.0	9000	12000	7207C	15.7	42	65	1	0.304
40	80	18	1.1	0.6	36.4	25.0	8000	11000	7208C	17	47	73	1	0.364
	80	18	1.1	0.6	47.2	21.5	10000	15000	7208CTN1	17	47	73	1	0.312
45	85	19	1.1	0.6	40.3	29.0	12000	17000	7209C	18.2	52	78	1	0.403
50	80	16	1	0.3	26.5	17.3	8000	10000	7010CM	16.7	57	73	1	0.309
	80	16	1	0.3	25.0	20.5	7000	9000	7010ACM	23.2	57	73	1	0.314
	90	20	1.1	0.6	42.9	32.0	7600	10000	7210C	19.4	57	83	1	0.458
	90	20	1.1	0.6	40.3	30.0	5800	7800	7210AC	26.3	57	83	1	0.460
55	90	18	1.1	0.6	31.2	26.0	10000	12000	7011AC	25.9	62	83	1	0.385
	100	21	1.5	0.6	53.3	40.0	8000	10000	7211C	20.9	64	91	1.5	0.599
	100	21	1.5	0.6	50.7	38.0	7100	10000	7211AC	28.6	64	91	1.5	0.599
	100	21	1.5	0.6	53.3	40.0	10000	14000	7211CM	20.9	65	91	1.5	0.698
	100	21	1.5	0.6	50.7	32.0	10000	14000	7211C	20.9	65	91	1.5	0.578
60	95	18	1.1	0.6	35.1	30.0	7100	10000	7012AC	27.1	67	88	1	0.392
	110	22	1.5	0.6	55.9	43.0	6700	9000	7212AC	30.8	69	101	1.5	0.786
	110	22	1.5	0.6	55.9	43.0	6700	9000	7212ACM	30.8	69	101	1.5	0.951
	110	22	1.5	0.6	58.5	45.0	9500	13000	7212C	22.4	69	101	1.5	0.786
65	100	18	1.1	0.6	33.8	31.0	6700	9500	7013AC	28.2	72	93	1	0.414
	100	18	1.1	0.6	33.8	31.0	6700	9500	7013ACM	28.2	72	93	1	0.504
	120	23	1.5	0.6	72.8	59.0	9000	12000	7213C	23.9	74	111	1.5	1.02

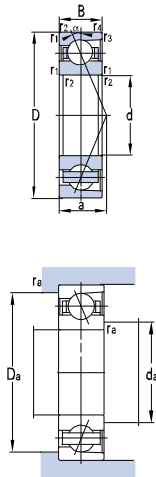


# High-precision Angular Contact Ball Bearings



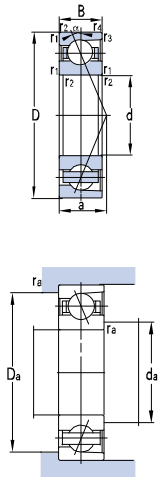
Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Installation Dimensions			Weight
d	D	B	r12min	r34min	Cr	Cor	Grease	Oil			mm	da(max)	Da(max)	
mm					KN		r/min			mm	mm	mm		
65	120	23	1.5	0.6	70.2	56.0	6000	8500	7213ACM	33.1	74	111	1.5	1.16
	120	23	1.5	0.6	70.2	56.0	6000	8500	7213AC/YB5	33.1	74	111	1.5	1.02
	120	23	1.5	0.6	72.8	59.0	9000	12000	7213CM	23.9	74	111	1.5	1.16
70	110	20	1.1	0.6	44.2	41.0	6300	8500	7014AC	31	77	103	1	0.626
	110	20	1.1	0.6	44.2	41.0	6300	8500	7014ACM	31	77	103	1	0.725
	125	24	1.5	0.6	79.3	65.0	8500	11000	7214CM	25.1	79	116	1.5	1.26
	125	24	1.5	0.6	79.3	65.0	8500	11000	7214C	25.1	79	116	1.5	1.10
	125	24	1.5	0.6	75.4	62.0	5600	8000	7214ACM	34.7	79	116	1.5	1.26
	125	24	1.5	0.6	75.4	62.0	5600	8000	7214AC	34.7	79	116	1.5	1.10
75	130	25	1.5	0.6	78.7	66.5	6800	8500	7215C	26.2	84	121	1.5	1.24
	130	25	1.5	0.6	79.3	67.0	5600	7500	7215ACM	36.4	84	121	1.5	1.29
	130	25	1.5	0.6	79.3	67.0	5600	7500	7215AC	36.4	84	121	1.5	1.18
	130	25	1.5	0.6	79.3	67.0	4480	6000	7215ACTN1	36.4	84	121	1.5	1.21
80	125	22	1.1	0.6	55.9	53.0	6500	8000	7016CA	24.7	87	118	1	0.845
	125	22	1.1	0.6	55.9	53.0	5600	7500	7016ACM	34.9	87	118	1	0.983
	140	26	2	1	97.5	83.0	7500	10000	7216CM	27.7	90	130	2	1.74
	140	26	2	1	92.3	79.0	5000	7100	7216ACM	38.7	90	130	2	1.73
	140	26	2	1	92.3	79.0	5000	7100	7216AC	38.7	90	130	2	1.48
85	130	22	1.1	0.6	57.2	56.0	5300	7100	7017ACM	36.1	92	123	1	1.12
	130	22	1.1	0.6	57.2	56.0	5300	7100	7017AC	36.1	92	123	1	0.95
	150	28	2	1	104	90.0	6700	9500	7217CM	29.7	95	140	2	1.72
	150	28	2	1	98.8	86.0	4800	6700	7217AC	41.4	95	140	2	1.91
	150	28	2	1	98.8	86.0	4800	6700	7217ACTN1	41.4	95	140	2	1.96
	150	28	2	1	98.8	86.0	4800	6700	7217ACM	41.4	95	140	2	1.72
90	140	24	1.5	0.6	67.6	66.0	4800	6700	7018ACM	38.8	99	131	1.5	1.39
	140	24	1.5	0.6	69.0	66.0	4800	6700	7018ACMA	38.8	99	131	1.5	1.37
	160	30	2	1	122	105	6300	9000	7218CM	31.7	100	150	2	2.47
	160	30	2	1	122	105	6300	9000	7218C	31.7	100	150	2	2.09
	160	30	2	1	117	100	4500	6000	7218ACM	44.1	100	150	2	2.35
	160	30	2	1	117	100	4500	6000	7218AC	44.1	100	150	2	2.11

# High-precision Angular Contact Ball Bearings



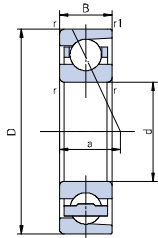
Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Installation Dimensions			Weight
d	D	B	r12min	r34min	Cr	Cor	Grease	Oil			mm	da(max)	Da(max)	
mm					KN		r/min			mm	mm	mm		
95	145	24	1.5	0.6	53.5	69.0	5200	6300	7019ACM	40	93	135	1.5	1.44
	170	32	2.1	1.1	139	120	6000	8500	7219CM	33.8	107	158	2	3.20
	170	32	2.1	1.1	133	114	4300	5600	7219ACM	46.9	107	158	2	2.97
100	150	24	1.5	0.6	76.7	77.0	4500	6000	7020AC	41.2	109	141	1.5	1.25
	180	34	2.1	1.1	156	136	5600	8000	7220CM	35.8	112	168	2	3.71
	180	34	2.1	1.1	148	130	4000	5300	7220ACM	49.6	112	168	2	3.74
	180	34	2.1	1.1	148	130	4000	5300	7220AC	49.6	112	168	2	3.25
110	170	21	1.5	1.5	76.7	82.0	4800	6800	7022AX2M	50.9	115	165	1.5	1.86
	170	28	2	1	98.8	101	4000	5300	7022ACM	46.7	120	160	2	2.41
	170	28	2	1	98.8	101	4000	5300	7022AC	46.7	120	160	2	2.16
	200	38	2.1	1.1	185	171	5000	7100	7222CM	39.8	122	188	2	5.03
	200	38	2.1	1.1	185	171	5000	7100	7222C	39.8	122	188	2	4.07
	200	38	2.1	1.1	176	164	3600	4800	7222ACM	55.1	122	188	2	4.81
	200	38	2.1	1.1	176	164	3600	4800	7222AC	55.1	122	188	2	4.07
120	180	28	2	1	100	107	3600	5000	7024ACM	49	130	170	2	2.62
	180	28	2	1	100	107	3600	5000	7024AC	49	130	170	2	2.31
	215	40	2.1	1.1	190	184	3200	4500	7224ACM	59.1	132	203	2	6.04
130	200	33	2	1	129	137	5400	6500	7026C	38.6	140	190	2	3.33
	230	40	3	1.1	207	209	4400	5200	7226CM	44.1	144	216	2.5	7.28
	230	40	3	1.1	196	200	2400	3200	7226ACM	62	144	216	2.5	7.26
140	210	33	2	1	125	137	3200	4300	7028AC	57.3	150	200	2	3.46
	210	33	2	1	125	137	3200	4300	7028ACM	57.3	150	200	2	4.14
	250	42	3	1.1	231	243	4200	5000	7228CM	47.1	154	236	2.5	8.83
	250	42	3	1.1	220	237	2200	3000	7228ACM	66.5	154	236	2.5	8.71
150	225	35	2.1	1.1	153	170	2400	3000	7030ACM	61.2	162	213	2	4.80
	270	45	3	1.1	242	268	2000	2800	7230AC	71.5	164	256	2.5	12.1
160	240	38	2.1	1.1	161	183	1800	2200	7032ACM	65.6	172	228	2	5.95
	290	48	3	1.1	263	304	2900	3600	7232C	54.1	174	276	2.5	14.5
	290	48	3	1.1	250	289	1900	2600	7232AC	76.5	174	276	2.5	14.5

# High-precision Angular Contact Ball Bearings



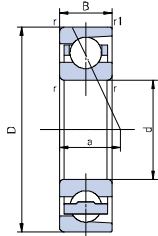
Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Installation Dimensions			Weight
d	D	B	r12min	r34min	Cr	Cor	Grease	Oil			da(max)	Da(max)	ra(max)	
mm					KN		r/min		mm	mm	mm	kg		
<b>170</b>	260	42	2.1	1.1	199	227	2000	2600	<b>7034ACQ1</b>	71.1	182	248	2	8.27
	260	42	2.1	1.1	199	227	2000	2600	<b>7034AC</b>	71.1	182	248	2	7.98
	310	52	4	1.5	321	389	2800	3400	<b>7234C</b>	58.2	188	292	3	17.2
	310	52	4	1.5	306	371	1800	2400	<b>7234AC</b>	82	188	292	3	17.2
<b>180</b>	250	33	2	1	160	196	3200	4300	<b>71936CM</b>	45.3	192	235	2	4.88
	320	52	4	1.5	333	418	2700	3200	<b>7236C</b>	59.5	198	302	3	17.9
	320	52	4	1.5	317	399	1700	2200	<b>7236AC</b>	84.3	198	302	3	17.9
<b>190</b>	290	46	2.1	1.1	215	263	1800	2400	<b>7038AC</b>	79	202	278	2	10.7
	340	55	4	1.5	257	430	1500	2000	<b>7238AC</b>	89.3	222	324	3	22.4
<b>200</b>	310	51	2.1	1.1	264	331	1700	2200	<b>7040AC</b>	85	212	298	2	14.9
	310	51	2.1	1.1	264	331	1700	2200	<b>7040ACN1</b>	85	212	298	2	14.8
	360	58	4	1.5	363	487	2500	3000	<b>7240C</b>	66.5	218	342	3	25.2
	360	58	4	1.5	345	462	1500	2000	<b>7240AC</b>	94.3	218	342	3	25.2
<b>220</b>	400	65	4	1.5	423	605	1100	1600	<b>7244AC</b>	104.7	238	382	3	36.1
	400	65	4	1.5	423	605	1100	1600	<b>7244AC</b>	104.7	238	382	3	36.1
<b>240</b>	320	48	2.1	1.1	185	250	1000	1500	<b>72948AC</b>	89.3	252	308	2	10.0
<b>260</b>	360	46	2.1	1.1	260	380	900	1400	<b>71952AC</b>	95.3	272	348	2	13.8
<b>280</b>	380	46	2.1	1.1	268	405	800	1300	<b>71956AC</b>	99.9	292	368	2	15.7
<b>300</b>	460	74	4	1.5	410	690	950	1300	<b>7060A</b>	147	318	442	3	43
<b>320</b>	440	56	3	1.1	340	580	940	1400	<b>71964AC</b>	116	334	426	2.5	26.5
	480	74	4	1.5	416	700	800	1100	<b>7064AC</b>	130	385	445	3	47.5
<b>340</b>	460	56	3	1.1	330	575	900	1350	<b>71968AC</b>	126	354	446	2.5	24.5
	520	82	5	2	510	1050	800	1100	<b>7068AC</b>	141.3	360	500	4	61.0
<b>360</b>	440	38	2.1	1.1	228	430	1800	2650	<b>71872AC</b>	112	371	430	2	12.5
	480	56	3	1.1	340	630	900	1300	<b>71972AC</b>	126	374	468	2.5	29.5
	480	56	3	1.1	330	620	850	1000	<b>71972A</b>	149	374	468	2.5	29.5

# High-speed Angular Contact Ball Bearings



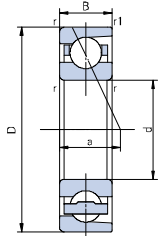
Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Weight
d	D	B	r <sub>min</sub>	r <sub>1min</sub>	Cr	Cor	Grease	Oil			
mm					KN		r/min				kg
25	42	9	0,3	0,15	7,85	5,4	34400	52300	71905CHA	9	0,043
25	42	9	0,3	0,15	7,84	5,4	29900	44800	71905ACHA	12,3	0,043
30	47	9	0,3	0,15	8,5	6,25	29900	45500	71906CHA	9,7	0,049
30	47	9	0,3	0,15	7,85	5,95	26000	39000	71906ACHA	13,5	0,05
35	55	10	0,6	0,3	12	9,15	25600	38900	71907CHA	11	0,075
35	55	10	0,6	0,3	11,5	9	22300	33400	71907ACHA	15,5	0,075
40	62	12	0,6	0,3	15	11,5	22600	34400	71908CHA	12,8	0,109
40	62	12	0,6	0,3	14,5	11,5	19700	29500	71908ACHA	17,9	0,11
45	68	12	0,6	0,3	16	13,5	20400	31000	71909CHA	13,6	0,129
45	68	12	0,6	0,3	15	12,5	17700	26600	71909ACHA	19,2	0,13
50	72	12	0,6	0,3	17	15	18900	28700	71910CHA	14,2	0,13
50	72	12	0,6	0,3	16	14,5	16400	24600	71910ACHA	20,2	0,132
55	80	13	1	0,6	19	17,5	17100	26000	71911CHA	15,5	0,182
55	80	13	1	0,6	18	16,5	14900	22300	71911ACHA	22,2	0,184
60	85	13	1	0,6	19,5	19	15900	24200	71912CHA	16,2	0,195
60	85	13	1	0,6	18,5	18	13800	20700	71912ACHA	23,4	0,198
65	90	13	1	0,6	20	20,5	14900	22600	71913CHA	16,9	0,208
65	90	13	1	0,6	19	19,5	13000	19400	71913ACHA	24,6	0,211
70	100	16	1	0,6	28	27,5	13600	20600	71914CHA	19,4	0,338
70	100	16	1	0,6	26,5	20,5	11800	17700	71914ACHA	27,8	0,341
75	105	16	1	0,6	28,5	29,5	12800	19500	71915CHA	20,1	0,358
75	105	16	1	0,6	27	28	11200	16700	71915ACHA	29	0,355
80	110	16	1	0,6	29	30,5	12200	18500	71916CHA	20,7	0,377
80	110	16	1	0,6	27,5	29	10600	15800	71916ACHA	30,2	0,381

# High-speed Angular Contact Ball Bearings



Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Weight
d	D	B	r <sub>min</sub>	r <sub>1min</sub>	Cr	Cor	Grease	Oil			
mm					KN		r/min				kg
85	120	18	1.1	0.6	39	40.5	11300	17100	71917CHA	22.7	0.534
85	120	18	1.1	0.6	36.5	38.5	9800	14700	71917ACHA	32.9	0.541
90	125	18	1.1	0.6	41.5	46	10700	16300	71918CHA	23.4	0.568
90	125	18	1.1	0.6	39.5	43.5	9400	14000	71918ACHA	34.1	0.56
95	130	18	1.1	0.6	42.5	48	10300	15600	71919CHA	24.1	0.597
95	130	18	1.1	0.6	40	45.5	8900	13400	71919ACHA	35.2	0.603
100	140	20	1.1	0.6	50	54	9600	14600	71920CHA	26.1	0.8
100	140	20	1.1	0.6	47.5	51.5	8400	12500	71920ACHA	38	0.808
105	145	20	1.1	0.6	51	57	9200	14000	71921CHA	26.7	0.831
105	145	20	1.1	0.6	48	54	8000	12000	71921ACHA	39.2	0.82
110	150	20	1.1	0.6	52	59.5	8900	13500	71922CHA	27.4	0.867
110	150	20	1.1	0.6	49	56	7700	11600	71922ACHA	40.3	0.877
120	165	22	1.1	0.6	72	81	8100	12300	71924CHA	30.1	1.16
120	165	22	1.1	0.6	67.5	77	7100	10600	71924ACHA	44.2	1.15
130	180	24	1.5	1	78.5	91	7500	11300	71926CHA	32.8	1.5
130	180	24	1.5	1	74	86	6500	9700	71926ACHA	48.1	1.54
140	190	24	1.5	1	79.5	95.5	7000	10700	71928CHA	34.1	1.63
140	190	24	1.5	1	75	90	6100	9100	71928ACHA	50.5	1.63
150	210	28	2	1	102	122	6400	9800	71930CHA	38.1	2.96
150	210	28	2	1	96.5	115	5600	8400	71930ACHA	56	2.97
160	220	28	2	1	106	133	6100	9300	71932CHA	39.4	3.1
160	220	28	2	1	100	125	5300	7900	71932ACHA	58.3	3.12
170	230	28	2	1	113	148	5800	8800	71934CHA	40.8	3.36
170	230	28	2	1	106	140	5000	7500	71934ACHA	60.6	3.36

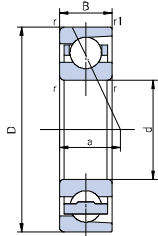
# High-speed Angular Contact Ball Bearings



Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Weight
d	D	B	rmin	r1min	Cr	Cor	Grease	Oil			
mm					KN		r/min			kg	
180	250	33	2	1	145	184	5400	8200	71938CHA	45.3	4.9
180	250	33	2	1	137	174	4700	7000	71936ACHA	66.6	4.94
190	260	33	2	1	147	192	5200	7800	71938CHA	46.6	4.98
190	260	33	2	1	139	182	4500	6700	71938ACHA	69	5.12
200	280	38	2.1	1.1	189	244	4800	7300	71940CHA	51.2	6.85
200	280	38	2.1	1.1	178	231	4200	6300	71940ACHA	75	6.92
220	300	38	2.1	1.1	190	256	4500	6800	71944CHA	53.8	6.65
220	300	38	2.1	1.1	179	242	3900	5800	71944ACHA	79.6	6.65
240	320	38	2.1	1.1	200	286	4200	6300	71948CHA	56.5	7.22
240	320	38	2.1	1.1	189	270	3600	5400	71948ACHA	84.3	7.22
260	360	46	2.1	1.1	256	365	3800	5700	71952CHA	64.5	11.9
260	360	46	2.1	1.1	241	345	3300	4900	71952ACHA	95.3	11.9
280	380	46	2.1	1.1	272	410	3500	5400	71956CHA	67.2	12.9
280	380	46	2.1	1.1	256	390	3100	4600	71956ACHA	99.9	12.9

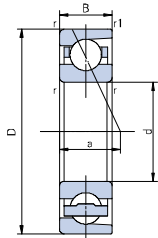


# High-speed Angular Contact Ball Bearings



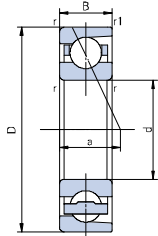
Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Weight
d	D	B	rmin	r1min	Cr	Cor	Grease	Oil			
mm					KN		r/min				kg
25	47	12	0.6	0.3	11.5	7.5	32000	48700	7005CHA	10.8	0.078
25	47	12	0.6	0.3	11	7	27800	41700	7005ACHA	14.4	0.077
25	47	12	0.6	0.3	10.5	6.85	20900	27800	7005AHA	16.4	0.079
30	55	13	1	0.6	15	10.5	27100	41200	7006CHA	12.2	0.114
30	55	13	1	0.6	14.5	10	23600	35300	7006ACHA	16.5	0.114
30	55	13	1	0.6	9.45	6.2	17700	23600	7006AHA	18.8	0.116
35	62	14	1	0.6	19	13.5	23800	36100	7007CHA	13.5	0.151
35	62	14	1	0.6	13	11.5	20700	31000	7007ACHA	18.3	0.151
35	62	14	1	0.6	17.5	12.5	15500	20700	7007AHA	21	0.153
40	68	15	1	0.6	20.5	16	21300	32500	7008CHA	14.7	0.189
40	68	15	1	0.6	19.5	15	18600	27800	7008ACHA	20.1	0.188
40	68	15	1	0.6	18.5	14.5	13900	18600	7008AHA	23.1	0.191
45	75	16	1	0.6	24.5	19.5	19200	29200	7009CHA	16	0.238
45	75	16	1	0.6	23	18.5	16700	25000	7009ACHA	22	0.25
45	75	16	1	0.6	22.5	18	12500	16700	7009AHA	25.3	0.241
50	80	16	1	0.6	26	22	17700	27000	7010CHA	16.7	0.259
50	80	16	1	0.6	24.5	21	15400	23100	7010ACHA	23.2	0.27
50	80	16	1	0.6	23.5	20	11600	15400	7010AHA	26.8	0.262
55	90	18	1.1	0.6	34	28.6	15900	24200	7011CHA	18.7	0.38
55	90	18	1.1	0.6	32.5	27.5	13800	20700	7011ACHA	25.9	0.383
55	90	18	1.1	0.6	31	26.5	10400	13800	7011AHA	29.9	0.385
60	95	18	1.1	0.6	35	30.5	14900	22600	7012CHA	19.4	0.405
60	95	18	1.1	0.6	33	29	13000	19400	7012ACHA	27.1	0.408
60	95	18	1.1	0.6	32	28	9700	13000	7012AHA	31.4	0.41
65	100	19	1.1	0.6	37	34.5	14000	21300	7013CHA	20	0.435
65	100	19	1.1	0.6	35	32.5	12200	18200	7013ACHA	28.2	0.455
65	100	19	1.1	0.6	33.5	31.5	9100	12200	7013AHA	32.8	0.441

# High-speed Angular Contact Ball Bearings



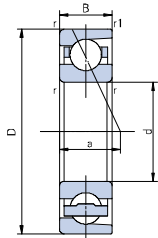
Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Weight
d	D	B	rmin	r1min	Cr	Cor	Grease	Oil			
mm					KN		r/min				kg
70	110	20	1.1	0.6	47	43	12800	19500	7014CHA	22.1	0.606
70	110	20	1.1	0.6	44.5	41	11200	16700	7014ACHA	31	0.625
70	110	20	1.1	0.6	42.5	39.5	8400	11200	7014AHA	36	0.613
75	115	20	1.1	0.6	48	45.5	12200	18500	7015CHA	22.7	0.643
75	115	20	1.1	0.6	45.5	43.5	10600	15800	7015ACHA	32.1	0.652
75	115	20	1.1	0.6	43.5	41.5	7900	10600	7015AHA	37.4	0.65
80	125	22	1.1	0.6	58.5	55.5	11300	17100	7016CHA	24.7	0.855
80	125	22	1.1	0.6	55.5	52.5	9800	14700	7016ACHA	34.9	0.88
80	125	22	1.1	0.6	53.5	50.5	7400	9800	7016AHA	40.6	0.864
85	130	22	1.1	0.6	60	58.5	10700	16300	7017CHA	25.4	0.898
85	130	22	1.1	0.6	57	55.5	9400	14000	7017ACHA	36.1	0.904
85	130	22	1.1	0.6	54.5	53.5	7000	9400	7017AHA	42	0.907
90	140	24	1.5	1	71.5	69	10000	15300	7018CHA	27.4	1.16
90	140	24	1.5	1	68	65.5	8700	13100	7018ACHA	38.8	1.17
90	140	24	1.5	1	65	63.5	6600	8700	7018AHA	45.2	1.18
95	145	24	1.5	1	73.5	73	9600	14600	7019CHA	28.1	1.21
95	145	24	1.5	1	69.5	69.5	8400	12500	7019ACHA	40	1.41
95	145	24	1.5	1	67	67	6300	8400	7019AHA	46.6	1.23
100	150	24	1.5	1	75.5	77	9200	14000	7020CHA	28.7	1.27
100	150	24	1.5	1	71	73.5	8000	12000	7020ACHA	41.1	1.45
100	150	24	1.5	1	68.5	70.5	6000	8000	7020AHA	48.1	1.28
110	170	28	2	1	106	104	8300	12500	7022CHA	32.7	1.94
110	170	28	2	1	100	99	7200	10800	7022ACHA	46.6	2.26
110	170	28	2	1	96.5	95.5	5400	7200	7022AHA	54.4	1.96
120	180	28	2	1	112	117	7700	11700	7024CHA	34.1	2.09
120	180	28	2	1	106	111	6700	10000	7024ACHA	49	2.43
120	180	28	2	1	102	107	5000	6700	7024AHA	57.3	2.12

# High-speed Angular Contact Ball Bearings



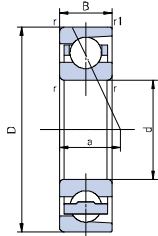
Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Weight
d	D	B	rmin	r1min	Cr	Cor	Grease	Oil			
mm					KN		r/min			kg	
130	200	33	2	1	129	137	7000	10700	7026CHA	38.6	3.22
130	200	33	2	1	122	130	6100	9100	7026ACHA	55	3.66
130	200	33	2	1	117	125	4600	6100	7026AHA	64.1	3.26
140	210	33	2	1	132	145	6600	10000	7028CHA	39.9	3.41
140	210	33	2	1	125	138	5800	8600	7028ACHA	57.3	3.87
140	210	33	2	1	120	133	4300	5800	7028AHA	67	3.44
150	225	35	2.1	1.1	151	168	6200	9400	7030CHA	42.6	4.15
150	225	35	2.1	1.1	143	160	5400	8000	7030ACHA	61.2	4.69
150	225	35	2.1	1.1	137	154	4000	5400	7030AHA	71.6	4.19
160	240	38	2.1	1.1	171	193	5800	8800	7032CHA	45.8	5.11
160	240	38	2.1	1.1	162	183	5000	7500	7032ACHA	65.6	5.71
160	240	38	2.1	1.1	155	176	3800	5000	7032CAHA	76.7	5.16
170	260	42	2.1	1.1	205	234	5400	8200	7034CHA	49.8	6.88
170	260	42	2.1	1.1	193	223	4700	7000	7034ACHA	71.1	7.83
170	260	42	2.1	1.1	186	214	3500	4700	7034AHA	83.1	6.94
180	280	46	2.1	1.1	228	276	5000	7700	7036CHA	53.8	10.4
180	280	46	2.1	1.1	216	262	4400	6600	7036ACHA	76.6	10.4
180	280	46	2.1	1.1	207	252	3300	4400	7036AHA	89.4	9.17
190	290	46	2.1	1.1	247	305	4800	7300	7038CHA	55.2	11.2
190	290	46	2.1	1.1	233	291	4200	6300	7038ACHA	79	11.2
190	290	46	2.1	1.1	224	280	3200	4200	7038AHA	92.3	11.3
200	310	51	2.1	1.1	265	340	4600	6900	7040CHA	59.7	13.6
200	310	51	2.1	1.1	250	325	4000	5900	7040ACHA	85	13.7
200	310	51	2.1	1.1	240	310	3000	4000	7040AHA	99.1	13.7

# High-speed Angular Contact Ball Bearings



Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Weight
d	D	B	rmin	r1min	Cr	Cor	Grease	Oil			
mm					KN		r/min				kg
25	52	15	1	0.6	16.5	10	29900	45500	7205CHA	12.7	0.127
25	52	15	1	0.6	16	10	26000	39000	7205ACHA	16.5	0.13
25	52	15	1	0.6	15.5	9.45	19500	26000	7205AHA	18.6	0.129
30	62	16	1	0.6	23	14.7	25000	38100	7206CHA	14.2	0.194
30	62	16	1	0.6	22	14	21800	32700	7206ACHA	18.7	0.194
30	62	16	1	0.6	21.5	13.5	16400	21800	7206AHA	21.3	0.197
35	72	17	1.1	0.6	30.5	20	21500	32800	7207CHA	15.7	0.28
35	72	17	1.1	0.6	29	19	18700	28100	7207ACHA	21	0.277
35	72	17	1.1	0.6	28	18.5	14100	18700	7207AHA	23.9	0.284
40	80	18	1.1	0.6	36.5	25	19200	29200	7208CHA	17	0.366
40	80	18	1.1	0.6	34.5	24	16700	25000	7208ACHA	23	0.362
40	80	18	1.1	0.6	33.5	23.5	12500	16700	7208AHA	26.3	0.37
45	85	19	1.1	0.6	41	28.5	17700	27000	7209CHA	18.2	0.406
45	85	19	1.1	0.6	39	27.5	15400	23100	7209ACHA	24.7	0.402
45	85	19	1.1	0.6	37.5	26.5	11600	15400	7209AHA	28.3	0.41
50	90	20	1.1	0.6	43	31.5	16500	25000	7210CHA	19.4	0.457
50	90	20	1.1	0.6	41	30.5	14300	21500	7210ACHA	26.3	0.453
50	90	20	1.1	0.6	39.5	29.5	10800	14300	7210AHA	30.2	0.462
55	100	21	1.5	1	53	40	14900	22600	7211CHA	20.9	0.601
55	100	21	1.5	1	50.5	38	13000	19400	7211ACHA	28.6	0.596
55	100	21	1.5	1	49	37	9700	13000	7211AHA	32.9	0.609
60	110	22	1.5	1	64	49	13600	20600	7212CHA	22.4	0.78
60	110	22	1.5	1	61	47	11800	17700	7212ACHA	30.8	0.773
60	110	22	1.5	1	59	45.5	8900	11800	7212AHA	35.5	0.789
65	120	23	1.5	1	73	58.5	12500	19000	7213CHA	23.9	1.01
65	120	23	1.5	1	69.5	56	10900	16300	7213ACHA	33.1	1
65	120	23	1.5	1	67.5	54	8200	10900	7213AHA	38.2	1.02

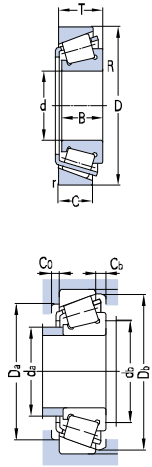
# High-speed Angular Contact Ball Bearings



Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Weight
d	D	B	rmin	r1min	Cr	Cor	Grease	Oil			
mm					KN		r/min			kg	
70	125	24	1.5	1	79.5	43	11800	18000	7214CHA	25.1	1.09
70	125	24	1.5	1	76	49.5	10300	15400	7214ACHA	34.7	1.08
70	125	24	1.5	1	73	38	7700	10300	7214AHA	40.1	1.1
75	130	25	1.5	1	83	70	11300	17100	7215CHA	26.2	1.19
75	130	25	1.5	1	79	66.5	9800	14700	7215ACHA	36.4	1.18
75	130	25	1.5	1	76	64.5	7400	9800	7215AHA	42.1	1.2
80	140	26	2	1	93	77.5	10500	16000	7216CHA	27.7	1.43
80	140	26	2	1	88.5	74	9100	13700	7216ACHA	38.6	1.42
80	140	26	2	1	85.5	71.5	6900	9100	7216AHA	44.8	1.45
85	150	28	2	1	107	90.5	9800	14900	7217CHA	29.7	1.79
85	150	28	2	1	102	86.5	8600	12800	7217ACHA	41.4	1.79
85	150	28	2	1	98.5	83.5	6400	8600	7217AHA	47.9	1.8
90	160	30	2	1	123	105	9200	14000	7218CHA	31.7	2.2
90	160	30	2	1	117	100	8000	12000	7218ACHA	44.1	2.31
90	160	30	2	1	113	96.5	6000	8000	7218AHA	51.1	2.23
95	170	32	2.1	1.1	133	112	8700	13300	7219CHA	33.7	2.64
95	170	32	2.1	1.1	127	107	7600	11400	7219ACHA	46.9	2.63
95	170	32	2.1	1.1	122	103	5700	7600	7219AHA	54.2	2.67
100	180	34	2.1	1.1	149	127	8300	12500	7220CHA	35.7	3.18
100	180	34	2.1	1.1	142	121	7200	10800	7220ACHA	49.6	3.16
100	180	34	2.1	1.1	137	117	5400	7200	7220AHA	57.4	3.21
105	190	36	2.1	1.1	162	143	7800	11900	7221CHA	37.7	3.78
105	190	36	2.1	1.1	155	137	6800	10200	7221ACHA	52.4	3.77
105	190	36	2.1	1.1	150	132	5100	6800	7221AHA	60.6	3.82
110	200	38	2.1	1.1	176	160	7500	11300	7222CHA	39.8	4.45
110	200	38	2.1	1.1	168	153	6500	9700	7222ACHA	65.1	4.45
110	200	38	2.1	1.1	162	148	4900	6500	7222AHA	63.7	4.49

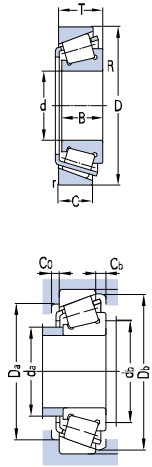


# Tapered Roller Bearings



Principal dimensions									Basic rating load		Limit rating speed		Designations	Installation Dimensions							Calculation Factor				Weight
d	D	T	B	C	R <sub>radial</sub>	R <sub>axial</sub>	r <sub>radial</sub>	r <sub>axial</sub>	C <sub>r</sub>	C <sub>or</sub>	Grease	Oil		d <sub>a(max)</sub>	d <sub>b(min)</sub>	D <sub>a(min)</sub>	D <sub>a(max)</sub>	D <sub>b(min)</sub>	C <sub>a(min)</sub>	C <sub>b(min)</sub>	e	Y	Y <sub>0</sub>	a	
mm									KN		r/min		mm							KN					
20	42	15	15	12	0.6	0.6	0.6	0.6	23	33	8500	12000	32004	25	25	37	36	39	2	3	0.37	1.6	0.9	10	0.105
	47	15	14	12	1	1	1	1	30.5	29.7	8000	11000	30204X2	28	24	40	43	44	2.5	3	0.35	1.7	0.96	11	0.123
	47	15.25	14	12	1	1	1	1	26.8	26.9	8000	11000	30204	27	26	40	41	43	2.5	3.3	0.35	1.7	0.96	11	0.121
	47	19.25	18	15	1	1	1	1	27.5	31	7500	10000	32204	26	24	38	43	44	2	4.3	0.33	1.8	1	12	0.158
25	47	15	15	11.5	0.6	0.6	0.6	0.6	26	39.5	8000	11000	32005	30	30	42	40	44	3	3.5	0.43	1.4	0.8	12	0.43
	52	16.25	15	13	1	1	1	1	32	34	7500	9500	30205	31	31	44	46	49	2	3.3	0.37	1.6	0.88	12	0.160
	52	19.25	18	16	1	1	1	1	40.5	46	7000	9500	32205	31	31	44	48	50	2	3.3	0.36	1.7	0.92	13	0.199
30	52	23.75	22.5	13	5.5	5.5	1	1	32	35	7500	9500	30205X2	32	26	43	48	49	2	11	0.37	1.6	0.88	12	0.200
	55	17	17	13	1	1	1	1	36	47	6700	9000	32006	35	36	48	49	52	3	4	0.43	1.4	0.8	13	0.171
	62	17.25	16	14	1	1	1	1	41	44	6300	8500	30206	37	36	53	56	58	3	4.5	0.37	1.6	0.88	14	0.230
35	62	21.25	20	17	1	1	1	1	55	65	6300	8500	32206	36	36	52	56	58	2	4.3	0.37	1.6	0.88	15	0.356
	62	18	18	14	1	1	1	1	42	52	6000	8000	32007	40	41	54	56	59	4	4	0.45	1.3	0.73	15	0.384
	72	18.25	17	15	1.5	1.5	1.5	1.5	50.5	55	5300	7000	30207	44	42	62	65	67	3	3.3	0.37	1.6	0.88	15	0.318
	72	24.25	23	19	1.5	1.5	1.5	1.5	66	80	5300	7000	32207E	42	42	61	65	68	3	5.3	0.37	1.6	0.88	17	0.465
45	72	24.25	23	19	1.5	1.5	1.5	1.5	66	80	5300	7000	32207	42	42	61	65	68	2	5.3	0.37	1.6	0.88	17	0.452
	68	19	19	14.5	1	1	1	1	58.5	79.5	5300	7000	32008	47	44	59	64	66	3	4.5	0.38	1.6	0.87	15	0.297
	80	19.75	18	16	1.5	1.5	1.5	1.5	66	73	4800	6300	30208	49	47	69	73	75	3	3.8	0.37	1.6	0.88	17	0.430
50	80	24.75	23	19	1.5	1.5	1.5	1.5	79	93	4800	6300	32208	48	47	68	73	76	3	5.8	0.37	1.6	0.88	18	0.561
	75	20	20	15.5	1	1	1	1	57.5	80	4800	6300	32009	52	49	65	71	73	3	6	0.39	1.5	0.84	17	0.343
	85	20.75	19	16	1.5	1.5	1.5	1.5	70.5	83	4500	6000	30209	53	52	74	78	80	3	5	0.4	1.5	0.81	18	0.464
	85	24.75	23	19	1.5	1.5	1.5	1.5	84.5	105	4500	6000	32209	53	52	73	78	81	3	5.8	0.4	1.5	0.81	20	0.576
55	85	24.75	23.5	20	1.5	1.5	1.5	1.5	59.5	72	4500	6000	32209X2A	53	53	69	78	78	3	4.8	0.4	1.5	0.83	19	0.621
	80	20	20	15.5	1	1	1	1	60	86.5	4500	6000	32010	57	54	70	76	78	4	4.5	0.42	1.4	0.78	18	0.381
	80	22	20	17.5	4	4	1.5	1.5	60	86	4500	6000	32010X2A	57	64	70	73	78	4	4.5	0.42	1.4	0.78	19	0.388
	83	20.5	20.5	15.5	4	4	1	1	66	91	4500	6000	32010X3A	57	64	73	79	80	4	5	0.36	1.7	0.92	17	0.430
	90	21.75	20	17	1.5	1.5	1.5	1.5	72.5	74	4300	5600	30210	58	57	79	83	86	3	5	0.42	1.4	0.79	20	0.550
	90	24.75	23	19	1.5	1.5	1.5	1.5	88	110	4000	5600	32210	57	57	78	83	86	3	5.8	0.42	1.4	0.79	21	0.654
90	25	23	19	1.3	1.3	1.3	1.3	62	77	4300	5600	32210A	60	59	76	90	86	3	6	0.42	1.4	0.78	21	0.612	
	90	23	23	17.5	1.5	1.5	1.5	1.5	77	111	4000	5300	32011	64	63	79	83	88	4.5	5.5	0.41	1.5	0.81	20	0.564

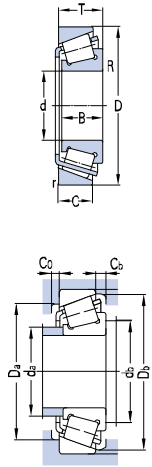
# Tapered Roller Bearings



Principal dimensions										Basic rating load		Limit rating speed		Designations	Installation Dimensions							Calculation Factor				Weight
d	D	T	B	C	R <sub>radial</sub>	R <sub>axial</sub>	r <sub>radial</sub>	r <sub>axial</sub>	Cr	Co	Grease	Oil	da(max)		db(min)	Da(min)	Da(max)	Db(min)	Ca(min)	Cb(min)	e	Y	Yo	a	kg	
mm	mm	mm	mm	mm	mm	mm	mm	mm	KN	KN	r/min	r/min	mm	mm	mm	mm	mm	mm	mm	KN						
55	100	22.75	21	18	2	2	1.5	1.5	93	110	3800	5000	30211	64	64	88	91	95	4	5	0.4	1.5	0.81	21	0.713	
	100	26.75	25	21	2	2	1.5	1.5	108	133	3800	5000	32211	62	64	87	91	95	4	5.7	0.4	1.5	0.81	22	0.878	
60	85	17	16	14	1	1	1	1	42.5	67.5	3900	5100	32912X2A	65	68	76	81	79	4	3	0.38	1.6	0.87	17	0.277	
	95	23	23	17.5	1.5	1.5	1.5	1.5	78.5	112	3800	5000	32012	66	68	83	88	92	5	5.5	0.4	1.4	0.77	21	0.597	
	110	23.75	22	19	2	2	1.5	1.5	104	124	3400	4500	30212	69	69	96	101	103	4	5	0.4	1.5	0.81	23	0.923	
65	110	29.75	28	24	2	2	1.5	1.5	133	170	3400	4500	32212	69	68	95	101	104	4	5.8	0.4	1.5	0.81	25	1.26	
	100	23	23	17.5	1.5	1.5	1.5	1.5	82.5	128	3400	4500	32013	72	72	90	93	97	4	5.5	0.46	1.3	0.7	22	0.612	
70	100	23.3	22	19	1.5	1.5	1.5	1.5	81	116	3400	4500	32013X2	72	72	90	93	97	4	5.5	0.35	1.7	0.94	20	0.629	
	120	24.75	23	20	2	2	1.5	1.5	122	147	3000	4000	30213	77	74	106	111	114	4	5	0.4	1.5	0.81	24	1.14	
	120	32.75	31	27	2	2	1.5	1.5	151	192	3000	4000	32213	75	74	104	111	115	4	5.8	0.4	1.5	0.81	26	1.58	
	120	33	31	27	1.8	1.8	1.8	1.8	130	163	3000	4000	32213A	75	74	104	111	115	3.5	6	0.37	1.6	0.89	26	1.50	
	130	57	56	35	10.5	11	1.5	1.5	250	345	3000	4000	30214X3	82	71	109	123	124	5	22	0.33	1.8	0.99	30	2.92	
75	115	25	25	19	1.5	1.5	1.5	1.5	104	160	3000	4000	32015	84	83	100	108	112	6	6	0.46	1.3	0.72	25	0.922	
	130	27.25	25	22	2	2	1.5	1.5	139	175	2800	3800	30215	85	84	115	121	125	4.5	5.3	0.44	1.4	0.76	28	1.40	
	130	33.25	31	27	2	2	1.5	1.5	173	231	2600	3600	32215	84	84	115	126	126	4.5	6.3	0.44	1.4	0.76	30	1.76	
	130	33.5	31	27	1.8	1.8	1.8	1.8	139	184	2600	3600	32215A	87	83	110	125	123	4.5	6.5	0.41	1.5	0.81	29	1.74	
80	110	20	19	16	1	1	1	1	63	105	2700	3700	32916X2A	86	88	100	106	106	5	6	0.32	1.83	1	20	0.500	
	125	29	29	22	1.5	1.5	1.5	1.5	139	219	2600	3600	32016	90	88	109	118	121	6	7	0.42	1.4	0.78	27	1.26	
	140	28.25	26	22	2.5	2.5	2	2	146	178	2400	3400	30216	90	90	124	130	133	4.5	6.3	0.42	1.4	0.79	29	1.56	
	140	35.25	33	28	2.5	2.5	2	2	198	263	2400	3400	32216	89	90	122	130	135	5	7.3	0.42	1.4	0.79	32	2.19	
	140	35.25	33	28	5.5	5.5	2	2	198	263	2400	3400	32216/YA6-1	91	81	120	132	134	6	7.3	0.42	1.4	0.79	32	2.19	
	140	35.5	33	28	2.3	2.3	2.3	2.3	162	216	2400	3400	32216A	94	90	119	140	132	4.5	7.5	0.4	1.5	0.82	31	2.13	
85	130	29	29	22	1.5	1.5	1.5	1.5	138	220	2400	3400	32017	94	93	114	123	126	7	7	0.44	1.4	0.75	28	1.33	
	150	30.5	28	24	2.5	2.5	2	2	167	204	2400	3400	30217	96	95	132	140	142	5	6.5	0.42	1.4	0.79	31	2.05	
	150	38.5	36	30	2.5	2.5	2	2	230	315	2200	3200	32217	95	95	130	140	143	5	8.5	0.42	1.4	0.79	34	2.70	

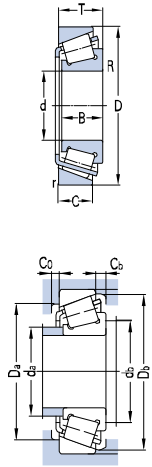


# Tapered Roller Bearings



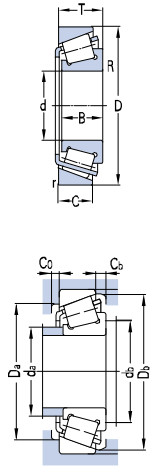
Principal dimensions									Basic rating load		Limit rating speed		Designations	Installation Dimensions							Calculation Factor				Weight
d	D	T	B	C	R <sub>radial</sub>	R <sub>axial</sub>	r <sub>radial</sub>	r <sub>axial</sub>	Cr	Cor	Grease	Oil		d <sub>a(max)</sub>	d <sub>b(min)</sub>	D <sub>a(min)</sub>	D <sub>a(max)</sub>	D <sub>b(min)</sub>	C <sub>a(min)</sub>	C <sub>b(min)</sub>	e	Y	Y <sub>0</sub>	a	
mm									KN			r/min	mm							KN					
<b>90</b>	140	32	32	24	2	2	1.5	1.5	165	255	2200	3200	<b>32018</b>	100	99	122	133	135	7	8	0.42	1.4	0.78	30	1.77
	140	32.4	30	26	2	2	1.5	1.5	150	196	2200	3200	<b>32018X2A</b>	100	99	125	131	134	6	8	0.34	1.8	0.97	23	1.71
	160	32.5	30	26	2.5	2.5	2	2	222	291	2000	3000	<b>30218</b>	102	100	140	150	151	5	6.5	0.42	1.4	0.79	33	2.73
	160	42.5	40	34	2.5	2.5	2	2	274	280	2000	3000	<b>32218</b>	101	100	138	150	152	5	8.5	0.42	1.4	0.79	37	3.61
<b>95</b>	130	23	22	18	1.5	1.5	1.5	1.5	79.5	135	2300	3300	<b>32919X2A</b>	102	103	117	124	126	5	7	0.38	1.59	0.87	25	0.786
	145	32	32	24	2	2	1.5	1.5	182	292	2200	3200	<b>32019</b>	105	104	130	138	139	6	8	0.44	1.35	0.8	31	1.87
	145	32.4	30	26	2	2	1.5	1.5	161	248	2200	3200	<b>32019X2A</b>	105	104	130	136	140	6	8	0.36	1.7	0.93	33	1.80
	170	34.5	32	27	3	3	2.5	2.5	233	300	1900	2800	<b>30219</b>	108	107	149	158	160	5	7.5	0.42	1.4	0.79	35	3.27
	150	32	32	24	2	2	1.5	1.5	190	281	1600	2200	<b>32020</b>	110	109	131	143	145	4.5	8	0.46	1.3	0.72	33	1.87
	180	37	34	29	3	3	2.5	2.5	262	340	1900	2800	<b>30220</b>	114	112	157	168	169	5	8	0.42	1.4	0.79	37	3.56
	180	49	46	39	3	3	2.5	2.5	345	490	1800	2600	<b>32220</b>	113	112	154	168	172	5	10	0.42	1.4	0.79	42	5.31
	190	32	32	24	2	2	1.5	1.5	190	281	1600	2200	<b>32020</b>	110	109	131	143	145	4.5	8	0.46	1.3	0.72	33	1.87
<b>105</b>	160	35	35	26	2.5	2.5	2	2	199	320	1900	2800	<b>32021</b>	116	116	143	150	154	6	9	0.44	1.35	0.8	34	2.38
	190	39	36	30	3	3	2.5	2.5	292	365	1800	2600	<b>30221</b>	125	117	162	181	177	6	9	0.42	1.4	0.79	39	4.47
	190	53	50	43	3	3	2.5	2.5	385	555	1800	2600	<b>32221</b>	118	117	161	178	182	5	10	0.42	1.4	0.79	45	6.34
<b>110</b>	150	25.4	24	20	1.5	1.5	1.5	1.5	88	138	2000	3000	<b>32922X2A</b>	120	118	138	143	145	7	5.4	0.28	2.1	1.117	23	1.18
	170	38	29	2.5	2.5	2	2	231	365	1800	2600	<b>32022</b>	123	120	148	162	164	4.5	9	0.43	1.4	0.77	37	3.08	
	170	38.4	36	31	2.5	2.5	2	2	198	297	1800	2600	<b>32022X2A</b>	122	120	152	160	163	7	9	0.35	1.7	0.95	33	3.10
	200	41	38	32	3	3	2.5	2.5	320	430	1700	2400	<b>30222</b>	132	122	171	191	187	6	9	0.42	1.4	0.79	41	5.27
<b>120</b>	165	29	29	23	1.5	1.5	1.5	2.5	189	320	1600	2200	<b>32924</b>	131	118	150	158	161	4.5	6	0.35	1.7	0.95	29	1.79
	180	38	38	29	2.5	2.5	2	2	237	395	1700	2400	<b>32024</b>	132	120	157	172	175	4.5	9	0.46	1.3	0.72	40	3.31
	180	38.4	36	31	2.5	2.5	2	2	230	325	1700	2400	<b>32024X2A</b>	131	130	161	170	173	7	9	0.37	1.6	0.89	29	3.66
	215	43.5	40	34	3	3	2.5	2.5	330	445	1600	2200	<b>30224</b>	139	132	187	203	203	6	9.5	0.44	1.4	0.76	45	6.32
<b>130</b>	180	32.5	30	26	2	2	1.5	1.5	150	249	1700	2400	<b>32926X2A</b>	142	139	164	173	174	9	6.5	0.27	2.2	1.22	28	2.31
	200	45	45	34	2.5	2.5	2	2	340	580	1600	2200	<b>32026</b>	144	142	178	190	192	7	11	0.43	1.4	0.8	42	5.06
	200	45.5	42	36	2.5	2.5	2	2	271	420	1500	2000	<b>32026X2A</b>	144	140	178	190	192	8	11	0.35	1.7	0.95	39	4.66
	230	43.75	40	34	4	4	3	3	360	480	1500	2000	<b>30226</b>	150	144	203	216	219	7	10	0.44	1.4	0.76	47	7.02
	230	67.75	64	54	4	4	3	4	555	845	1500	2000	<b>32226</b>	143	144	193	216	221	7	14	0.44	1.4	0.76	56	11.8
<b>140</b>	190	32.5	30	26	2	2	1.5	1.5	154	257	1600	2200	<b>32928X2A</b>	142	149	164	183	174	9	6.5	0.27	2.2	0.22	28	2.43
	190	32	32	25	2	2	1.5	1.5	206	390	1600	2200	<b>32928</b>	150	150	177	182	184	6	7	0.35	1.7	0.9	33	2.55

# Tapered Roller Bearings

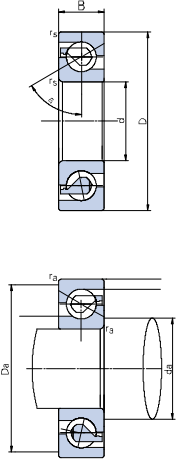


Principal dimensions								Basic rating load		Limit rating speed		Designations	Installation Dimensions						Calculation Factor				Weight				
d	D	T	B	C	R <sub>radial</sub>	R <sub>axial</sub>	r <sub>radial</sub>	r <sub>axial</sub>	Cr	Cor	Grease		Oil	d <sub>a(max)</sub>	d <sub>b(min)</sub>	D <sub>a(min)</sub>	D <sub>a(max)</sub>	D <sub>b(min)</sub>	C <sub>a(min)</sub>	C <sub>b(min)</sub>	e	Y		Y <sub>0</sub>	a	kg	
mm									KN			r/min									KN						
140	210	45	45	34	2.5	2.5	2		330	560	1600	2200			<b>3202B</b>	154	150	183	202	4.5	11	11	0.46	1.3	0.72	46	5.84
	210	45.5	42	36	2.5	2.5	2	2	276	440	1600	2200			<b>3202B X2A</b>	153	150	187	201	8	11	11	0.37	1.6	0.89	42	4.94
	250	45.75	42	36	4	4	3	3	405	540	1400	1900			<b>3022B</b>	162	154	219	236	9	11	11	0.44	1.4	0.76	50	8.80
	250	71.75	68	58	4	4	3	3	650	1000	1400	1900			<b>3222B</b>	156	154	210	236	8	14	14	0.44	1.4	0.76	61	14.7
150	210	38	38	30	2.5	2.5	2	2	270	465	1500	2000			<b>32930</b>	161	160	190	202	9	7.5	7.5	0.33	1.83	1	36	3.83
	210	38.5	36	31	2.5	2.5	2	2	220	385	1500	2000			<b>32930 X2A</b>	165	160	191	202	9	7.5	7.5	0.27	2.2	1.21	33	4.56
	225	48	48	36	3	3	2.5	2.5	365	635	950	1400			<b>32030</b>	161	160	197	216	9	13	13	0.46	1.3	0.72	49	6.40
	225	48.5	45	38	3	3	2.5	2.5	280	454	950	1400			<b>32030 X2</b>	164	162	200	213	8	13	13	0.39	1.5	0.85	46	6.84
	270	49	45	38	4	4	3	3	450	605	1300	1800			<b>30230</b>	174	164	234	256	9	11	11	0.44	1.4	0.76	53	11.2
	270	77	73	60	4	4	3	3	735	1140	1200	1700			<b>32230</b>	168	164	223	256	4.5	17	17	0.44	1.4	0.76	64	18.4
160	220	38.5	36	31	2.5	2.5	2	2	232	400	1500	2000			<b>32932 X2A</b>	175	170	203	212	9	7.5	7.5	0.27	2.2	1.23	34	3.79
	240	51	51	38	3	3	2.5	2.5	415	730	1100	1600			<b>32032</b>	174	173	211	231	8	13	13	0.46	1.3	0.72	53	7.69
	240	51.5	48	41	3	3	2.5	2.5	375	630	1100	1600			<b>32032 X2A-1</b>	175	172	213	228	8	13	13	0.37	1.6	0.89	47	7.67
	290	52	48	40	4	4	3	3	510	695	1100	1600			<b>30232</b>	189	174	252	276	9	12	12	0.44	1.4	0.76	57	13.4
	290	84	80	67	4	4	3	3	925	1490	1100	1600			<b>32232</b>	180	174	242	276	10	17	17	0.44	1.4	0.76	70	23.3
170	230	38	38	30	2.5	2.5	2	2	280	560	1400	1900			<b>32934</b>	183	182	213	220	7	8	8	0.37	1.6	0.9	42	4.51
	230	38.5	36	31	2.5	2.5	2	2	235	415	1400	1900			<b>32934 X2A</b>	185	180	213	222	9	7.5	7.5	0.28	2.1	1.17	36	3.864
	260	57	57	43	3	3	2.5	2.5	520	870	1200	1700			<b>32034</b>	188	184	230	246	10	14	14	0.44	1.35	0.8	56	10.6
	260	57.5	54	46	3	3	2.5	2.5	430	750	1400	1900			<b>32034 X2A</b>	187	182	230	248	10	14	14	0.31	1.9	1.07	47	10.1
	310	91	86	71	5	5	4	4	1010	1630	1000	1500			<b>32234</b>	196	190	259	293	10	20	20	0.43	1.4	0.8	75	30.0
180	250	45	45	34	2.5	2.5	2	2	345	725	1600	2500			<b>32936</b>	194	192	225	240	8	11	11	0.48	1.25	0.7	53	6.7
	280	64.5	60	52	3	3	2.5	2.5	520	860	950	1400			<b>32036 X2A</b>	199	192	247	268	9	16	16	0.28	2.2	1.19	53	13.0
	290	65	63.5	48	2.3	2.3	2.3	2.3	580	1010	950	1400			<b>32036 X3A</b>	207	196	247	290	4.5	17	17	0.44	1.4	0.75	62	15.6
	320	57	52	43	5	5	4	4	590	820	1000	1500			<b>30236</b>	209	198	278	302	4.5	14	14	0.45	1.3	0.73	64	17.8
	320	91	86	71	5	5	4	4	1020	1670	950	1400			<b>32236</b>	208	196	264	307	10	20	20	0.45	1.3	0.73	78	32.3
	190	260	45.5	42	36	2.5	2.5	2	2	350	670	1100	1600			<b>32938 X2A</b>	205	202	235	252	10	9.5	9.5	0.38	1.6	0.86	49
290		51	46	40	3	3	2.5	2.5	380	610	950	1400			<b>32038 X2A-1</b>	215	202	256	281	4.5	11	11	0.38	1.6	0.87	53	10.5
290		64.5	60	52	3	3	2.5	2.5	520	882	1000	1500			<b>32038 X2A</b>	209	202	257	278	10	13	13	0.37	1.6	0.89	58	15.28
340		60	55	46	5	5	4	4	740	1040	950	1400			<b>30238</b>	229	206	294	327	4.5	14	14	0.44	1.4	0.76	67	20.6
340		97	92	75	5	5	4	4	1100	1080	950	1300			<b>32238</b>	214	208	286	322	10	22	22	0.44	1.4	0.76	81	36.1

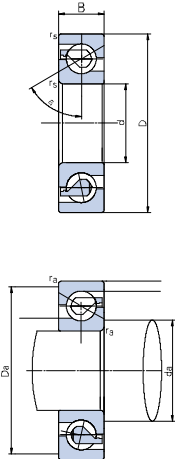
# Tapered Roller Bearings



Principal dimensions									Basic rating load		Limit rating speed		Designations	Installation Dimensions							Calculation Factor				Weight
d	D	T	B	C	R <sub>radial</sub>	R <sub>axial</sub>	r <sub>radial</sub>	r <sub>axial</sub>	Cr	Cor	Grease	Oil		da(max)	db(min)	Da(min)	Da(max)	Db(min)	Ca(min)	Cb(min)	e	Y	Yo	a	
mm									KN		r/min		mm							KN					
<b>190</b>	280	51	51	39	3	3	2.5	2.5	455	935	1000	1500	<b>32940</b>	218	215	252	271	270	4.5	11	0.39	1.5	0.84	54	9.56
	280	51.5	48	41	3	3	2.5	2.5	380	742	1000	1500	<b>32940X2A</b>	220	212	251	271	270	4.5	11	0.39	1.5	0.84	54	8.86
	310	70.5	66	56	3	3	2.5	2.5	575	1040	950	1400	<b>32040X2A</b>	221	212	273	298	297	11	17	0.39	1.5	0.84	65	18.2
	360	64	58	48	5	5	4	4	780	1100	900	1300	<b>30240</b>	236	218	315	342	338	9	16	0.44	1.4	0.76	70	25.4
	360	104	98	82	5	5	4	4	1350	2144	900	1300	<b>32240</b>	222	218	302	342	342	11	22	0.41	1.5	0.81	84	42.6
<b>260</b>	300	51.5	48	41	3	3	2.5	2.5	390	835	900	1400	<b>32944X2A</b>	310	232	342	291	361	10	11	0.39	1.5	0.84	66	10.1
	340	76.5	72	62	4	4	3	3	780	1330	950	1400	<b>32044X2A</b>	243	234	300	326	326	12	19	0.35	1.7	0.95	67	23.3
	400	72	65	54	5	5	4	4	975	1370	900	1300	<b>30244</b>	256	220	334	382	382	10	18	0.42	1.4	0.79	77	36.8
	400	114	108	90	5	5	4	4	1650	2770	900	1300	<b>32244</b>	256	220	334	382	382	10	24	0.44	1.4	0.76	96	62.7
	320	51	51	39	3	3	2.5	2.5	500	1050	850	1200	<b>32948</b>	255	254	294	308	311	9	12	0.46	1.3	0.7	64	11.5
<b>280</b>	320	51	48	41	3	3	2.5	2.5	390	790	900	1300	<b>32948X2A</b>	259	252	331	387	309	10	11	0.32	1.9	1.04	52	10.8
	360	76.5	72	62	4	4	3	3	770	1400	850	1200	<b>32048X2A</b>	261	254	318	346	346	12	19	0.31	1.9	1.05	65	23.8
	440	127	120	100	5	5	4	4	1900	3300	700	950	<b>32248</b>	276	262	365	420	415	14	27	0.43	1.4	0.8	105	82.5
	360	64.5	60	52	3	3	2.5	2.5	595	1250	800	1100	<b>32952X2A</b>	286	272	325	351	344	13	13	0.3	2	1.09	60	19.2
	400	87.7	82	71	5	5	4	4	1050	1960	800	1100	<b>32052X2A</b>	287	278	352	382	383	14	22	0.3	2	1.11	71	37.8
<b>280</b>	480	137	130	105	6	6	5	5	2160	3650	670	900	<b>32252</b>	305	279	394	465	451	13	32	0.43	1.4	0.77	113	105
	380	64.5	60	52	3	3	2.5	2.5	600	1250	800	1100	<b>32956X2A</b>	305	292	344	371	364	13	13	0.32	1.9	1.03	64	21.3
<b>300</b>	420	87.7	82	71	5	5	4	4	1000	1840	750	1000	<b>32056X2A</b>	305	298	370	402	402	14	22	0.37	1.6	0.89	83	39.6
	440	74.5	72	62	4	4	3	3	710	1810	700	950	<b>32960</b>	330	314	379	409	400	13	15	0.28	2.1	1.17	67	30.2
<b>320</b>	440	73	70	55	4	4	3	3	860	1460	700	950	<b>32960X3B</b>	335	314	398	429	423	13	18	0.44	1.4	0.75	87	34.2
	460	100	100	74	5	5	4	4	1460	2740	670	900	<b>32060</b>	330	322	404	440	439	15	26	0.43	1.4	0.8	97	56.6
	460	100.7	95	77	5	5	4	4	1310	2400	700	950	<b>32060X2A</b>	329	318	404	442	439	15	26	0.36	1.7	0.9	89	57.0
<b>320</b>	440	76	76	57	4	4	3	3	1000	2300	650	900	<b>32964</b>	343	337	402	424	426	13	19	0.43	1.4	0.8	84	34.5
	480	100	100	74	5	5	4	4	1540	2940	630	850	<b>32064</b>	354	336	419	467	463	13	26	0.46	1.3	0.72	104	62.7

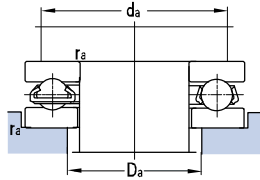
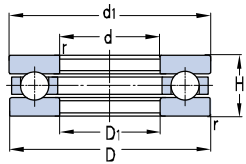


Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Installation Dimensions			Weight kg
d	D	B	r12	r34	Cr	Cor	Grease	Oil			da(max)	Da(max)	ra(max)	
mm	mm	mm	mm	mm	KN	KN	r/min	r/min	mm	mm	mm	kg		
20	47	14	1.0	0.6	16.0	25.0	4800	5500	760204	36.1	26	42	0.6	0.12
	47	15	1.0	0.6	16.0	25.0	4800	5500	760204X2	36.6	26	42	0.6	0.13
	52	15	1.0	0.6	20.0	31.0	4300	5100	760304	38.7	26	47	0.6	0.18
25	52	15	1.1	1.0	18.5	32.0	4000	5000	760205	41	32	46	1	0.15
	62	15	1.1	1.0	23.5	41.5	3600	4800	760305X2	45.4	32	56	1	0.25
	62	17	1.1	1.0	23.5	41.5	3600	4800	760305	46.4	32	56	1	0.28
30	62	15	1.1	1.0	22.5	41.5	3350	4500	760206X2	47.5	37	56	1	0.22
	62	16	1.1	1.0	22.5	41.5	3350	4500	760206	48	37	56	1	0.23
	72	19	1.1	1.0	30.0	54.5	3100	4300	760306	53.9	39	65	1	0.42
35	72	15	1.5	1.1	27.5	55.0	2800	4200	760207X2	54	44	65	1	0.31
	72	17	1.5	1.1	27.5	55.0	2800	4200	760207	55	44	65	1	0.33
	80	21	1.5	1.1	36.5	100	2700	4000	760307	67	44	73	1	0.54
40	72	15	1.1	1.0	22.5	52.0	2900	4200	760208X3		49	62.5	1.1	0.25
	80	18	1.5	1.1	32.0	66.5	2600	4000	760208	61.2	49	73	1	0.42
	90	20	1.5	1.1	50.0	93.5	2400	3400	760308X2	66.6	49	83	1	0.65
	90	23	1.5	1.1	48.5	93.5	2400	3350	760308	68.1	49	83	1	0.72
45	75	15	1.5	1.1	24.5	49.5	3000	4250	760209X3		52	68	1	0.27
	85	19	1.5	1.1	36.5	79.5	2400	3600	760209	66	54	78	1	0.45
	100	20	1.5	1.1	60.0	170	2200	3200	760309X2	75	54	93	1	0.82
	100	25	1.5	1.1	60.0	170	2100	3200	760309	77.5	54	93	1	1.01
50	90	20	1.5	1.1	37.5	84.0	2200	3100	760210	70.9	60	83	1	0.54
	100	20	1.5	1.1	40.0	87.5	2000	3000	760210X1		60	103	1	0.72
	110	27	1.5	1.1	65.5	120	1800	2800	760310	85.5	60	103	1	1.25
55	90	15	1.1	1.0	28.5	62.5	2400	3550	760211X3		65	80	1	0.375
	100	21	1.5	1.1	40.0	81.5	2000	3200	760211	77.5	65	92	1	0.76
	120	20	1.5	1.1	58.5	120	1900	3000	760311X2		77	97.5	1	1.21
	120	29	1.5	1.1	70.5	145	1800	2800	760311	90.7	65	112	1	1.64
60	110	22	1.5	1.1	56.5	116	1900	3000	760212	86	70	102	1	0.99



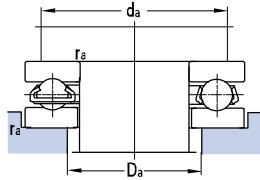
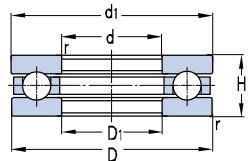
Principal dimensions					Basic rating load		Limit rating speed		Designations	Contact points a	Installation Dimensions			Weight kg
d	D	B	r12	r34	Cr	Cor	Grease	Oil			da(max)	Da(max)	ra(max)	
mm					KN		r/min		mm	mm	mm			
60	120	20	1.5	1.1	61.0	123	1800	2900	760212X3	98	79.5	100.5	1	1.12
	130	31	1.5	1.1	89.0	175	1700	2800	760312		70	122	1	2.11
65	120	23	1.5	1.1	59.5	125	1800	2850	760213	92.5	75	112	1	1.18
	140	33	1.5	1.1	99.0	185	1500	2650	760313	107.5	75	132	1	2.65
70	125	24	1.5	1.1	65.5	140	1800	2800	760214	96.5	80	117	1	96.3
	150	35	1.5	1.1	108	235	1500	2600	760314	113	80	142	1	3.15
75	110	15	1.5	1.1	35.5	85.0	1900	3000	760215X3		85	99.5	1	0.45
	130	25	1.5	1.1	67.0	155	1400	2500	760215	102.5	85	122	1	1.45
	160	37	1.5	1.1	125	275	1200	2400	760315	123	85	152	1	3.78
80	140	26	1.5	1.1	75.5	180	1300	2500	760216	109	90	132	1	1.75
	170	39	1.5	1.1	135	290	1200	2400	760319	129.5	90	162	1	4.52
85	150	28	1.5	1.1	86.5	215	1300	2400	760217	117	95	148	1	2.18
	180	41	1.5	1.1	158	330	1200	2350	760317	136	95	172	1	5.27
90	160	30	1.5	1.1	98.0	240	1200	2400	760218	124	100	152	1	2.65
	190	43	1.5	1.1	165	360	1100	2200	760318	142.5	100	182	1	6.15
95	170	32	1.5	1.1	110	280	1200	2300	760219	131	105	162	1	3.25
	200	45	1.5	1.1	163	385	1000	2100	760319	150	105	192	1	7.11
100	150	22.5	1.5	1.1	69.4	185	1150	2000	760220X3		114.5	135	1	1.42
	180	34	1.5	1.1	123	300	1000	2000	760220	138	110	170	1	3.95
	215	47	1.5	1.1	190	445	900	1950	760320	161	110	205	1	8.78
110	200	38	2.1	1.5	140	385	950	1900	760222		139	171	1.5	5.45
	240	50	2.1	1.5	245	595	850	1800	760322		154.5	200	1.5	11.9
120	215	40	2.1	1.5	175	440	900	1900	760224		150	185	1.5	6.4
130	230	40	2.1	1.5	175	480	850	1800	760226		162.5	197	1.5	7.2
	280	58	2.1	1.5	290	700	800	1750	760326		181	229	1.5	18.5

# Thrust Ball Bearings



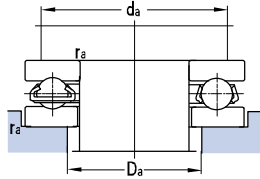
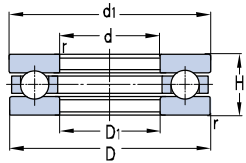
Principal dimensions				Basic rating load		Limit rating speed		Designations	Other dimensions		Installation Dimensions			Weight kg
d	D	H	rmin	Cr	Cor	Grease	Oil		d1	D1	da(min)	Da(max)	ra(max)	
mm	mm	mm	mm	KN	KN	r/min	r/min	mm	mm	mm	mm	mm	mm	
25	42	11	0.6	18.2	28.0	4800	6300	51105	42	26	35	32	0.6	0.0589
	52	18	1	35.0	42.0	3400	4500	51305	52	27	41	36	1	0.165
30	52	16	0.6	27.3	40.0	3600	4800	51206	52	32	43	39	0.6	0.138
	60	21	1	42.5	56.0	2800	3800	51306	60	32	48	42	1	0.266
	70	28	1	69.0	74.0	2000	3000	51406	70	32	54	46	1	3.94
35	52	12	0.6	20.8	36.0	4300	5600	51107	52	37	45	42	0.6	0.0779
	62	18	1	37.3	55.5	3000	4000	51207	62	37	51	46	1	0.193
	68	24	1	55.5	73.8	2400	3400	51307	68	37	55	48	1	0.361
40	60	13	0.6	27.3	51.0	3800	5000	51108	60	42	52	48	0.6	0.118
	60	13	0.6	27.3	51.0	3800	5000	51108M	60	42	52	48	0.6	0.118
	68	19	1	46.8	78.0	2800	3800	51208	68	42	57	51	1	0.273
	68	19	1	46.8	78.0	2800	3800	51208M	68	42	57	51	1	0.324
	78	26	1	68.5	95.0	2000	2400	51308	78	42	63	55	1	0.521
45	65	14	0.6	26.7	50.0	3400	4500	51109	65	47	57	53	0.6	0.139
	65	14	0.6	26.7	50.0	3400	4500	51109M	65	47	57	53	0.6	0.139
	73	20	1	37.0	81.0	2600	3600	51209	73	47	62	56	1	0.332
	85	28	1	72.3	96.0	1900	2800	51309	85	47	69	61	1	0.656
50	70	14	0.6	27.3	58.0	3200	4300	51110	70	52	62	58	0.6	0.155
	70	14	0.6	27.3	58.0	3200	4300	51110M	70	52	62	58	0.6	0.155
	78	22	1	54.6	94.0	2400	3400	51210	78	52	67	61	1	0.374
	95	31	1.1	96.2	145	1800	2600	51310	95	52	77	68	1	0.942
	110	43	1.5	159	197	1500	2000	51410M	110	52	86	74	1.5	1.86
55	78	16	0.6	33.5	72.0	2800	3800	51111	78	57	69	64	0.6	0.226
	78	16	0.6	33.5	72.0	2800	3800	51111M	78	57	69	64	0.6	0.226
	90	25	1	68.9	123	1900	2800	51211	90	57	76	69	1	0.571
	105	35	1.1	119	174	1600	2200	51311	105	57	85	75	1	1.35
	120	48	1.5	191	226	1300	1800	51411	120	57	94	81	1.5	2.61
60	85	17	1	39.5	87.0	2600	3600	51112	85	62	75	70	1	0.263
	85	17	1	39.5	87.0	2600	3600	51112M	85	62	75	70	1	0.263

# Thrust Ball Bearings



Principal dimensions				Basic rating load		Limit rating speed		Designations	Other dimensions		Installation Dimensions			Weight kg
d	D	H	rmin	Cr	Cor	Grease	Oil		d1	D1	da(min)	Da(max)	ra(max)	
mm				KN		r/min			mm		mm			
<b>60</b>	95	26	1	74.0	141	1900	2800	51212	95	62	81	74	1	0.695
	95	26	1	74.0	141	1900	2800	51212M	95	62	81	74	1	0.752
	110	35	1.1	100	208	1600	2200	51313	110	62	90	80	1	1.39
	130	51	1.5	200	262	1100	1600	51412M	130	62	102	88	1.5	3.48
<b>65</b>	90	18	1	45.5	103	2400	3400	51113	90	67	80	75	1	0.315
	90	18	1	45.5	103	2400	3400	51113M	90	67	80	75	1	0.363
	100	27	1	75.4	151	1800	2600	51213	100	67	86	79	1	0.733
	115	36	1.1	107	228	1500	2000	51313	115	67	95	85	1	1.54
	140	56	2	239	330	1000	1500	51413M	140	68	110	95	2	4.17
<b>70</b>	95	18	1	49.4	119	2400	3400	51114	95	72	85	80	1	0.351
	95	18	1	49.4	119	2400	3400	51114M	95	72	85	80	1	0.377
	105	27	1	76.7	161	1800	2600	51214	105	72	91	84	1	0.764
	125	40	1.1	148	270	1400	1900	51314	125	72	103	92	1	2.00
	125	40	1.1	148	270	1400	1900	51314M	125	72	103	92	1	2.85
	150	60	2	257	350	950	1400	51414M	150	73	118	102	2	5.06
<b>75</b>	100	19	1	48.1	120	2200	3200	51115	100	77	90	85	1	0.382
	100	19	1	48.1	120	2200	3200	51115M	100	77	90	85	1	0.382
	110	27	1	64.2	173	1200	2400	51215	110	77	96	89	1	0.83
	135	44	1.5	175	288	1900	1700	51315	135	77	111	99	1.5	2.61
	160	65	2	251	438	1300	2000	51415	160	78	126	109	2	6.61
<b>80</b>	105	19	1	49.4	130	2000	3000	51116	105	82	95	90	1	0.399
	115	28	1	87.1	193	1700	2400	51216	115	82	101	94	1	0.92
	140	44	1.5	182	315	1200	1700	51316	140	82	116	104	1.5	2.63
	140	44	1.5	173	395	1200	1700	51316M	140	82	116	104	1.5	2.92
	170	68	1.1	317	485	850	1200	51416	170	83	133	117	2	7.89
<b>85</b>	110	19	1	49.4	132	1600	3000	51117	110	87	100	95	1	0.419
	125	31	1	111	237	1100	2200	51217	125	88	109	101	1	1.21
	150	49	1.5	223	475	850	1600	51317	150	88	124	111	1.5	3.49
	150	49	1.5	223	475	850	1600	51317M	150	88	124	111	1.5	3.97
	180	72	1.1	336	534	850	1200	51417M	177	88	141	124	2	8.60
	180	72	1.1	336	534	1200	1800	51417	177	88	141	124	2	8.35

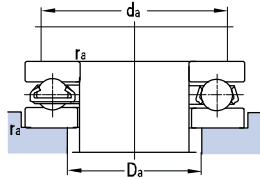
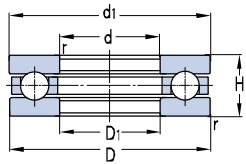
# Thrust Ball Bearings



Principal dimensions				Basic rating load		Limit rating speed		Designations	Other dimensions		Installation Dimensions			Weight kg
d	D	H	rmin	Cr	Cor	Grease	Oil		d1	D1	da(min)	Da(max)	ra(max)	
mm				KN		r/min		mm		mm				
<b>90</b>	120	22	1	65.0	170	1500	2600	51118	120	92	108	102	1	0.632
	120	22	1	65.0	170	1500	2600	51118M/P4	120	92	108	102	1	0.721
	135	35	1.1	132	285	1000	2000	51218	135	93	117	108	1	1.67
	155	50	1.5	232	517	800	1500	51318	155	93	129	116	1.5	4.02
	155	50	1.5	232	517	800	1500	51318M	155	93	129	116	1.5	4.44
	190	77	2.1	381	621	1100	1700	51418M	187	93	149	131	2	9.91
<b>100</b>	135	25	1	81.0	213	1700	2400	51120	135	102	121	114	1	0.937
	135	25	1	81.0	213	1300	2400	51120M	135	102	121	114	1	0.937
	150	38	1.1	125	347	950	1800	51220	150	103	130	120	1	2.12
	150	38	1.1	125	347	950	1800	51220M	150	103	130	120	1	2.33
	170	55	1.5	229	513	950	1400	51320	170	103	142	128	1.5	4.85
	170	55	1.5	229	513	700	1400	51320M	170	103	142	128	1.5	4.92
	210	85	3	448	775	700	950	51420	205	103	165	145	2.5	13.6
	172	57	1.8	275	513	1300	1400	51820	172	100.2	143	129	1.8	5.36
<b>110</b>	145	25	1	83.0	233	1200	2200	51122	145	112	131	124	1	1.12
	145	25	1	83.0	233	1200	2200	51122M	145	112	131	124	1	1.21
	160	38	1.1	131	393	850	1700	51222	160	113	140	130	1	2.43
	160	38	1.1	131	393	850	1700	51222M	160	113	140	130	1	2.67
	190	63	2	304	588	850	1200	51322M	187	113	158	142	2	7.36
	190	63	2	304	588	630	1200	51322	187	113	158	142	2	7.08
<b>120</b>	230	95	3	490	900	850	1600	51422M	225	113	181	159	2.5	18.6
	155	25	1	84.0	236	1600	2200	51124	155	122	141	134	1	1.13
	155	25	1	84.0	236	1600	2200	51124M	155	122	141	134	1	1.25
	170	39	1.1	167	399	1100	2200	51224	170	123	150	140	1	2.71
	210	70	2.1	348	711	800	1100	51324M	205	123	173	157	2	9.85
	210	70	2.1	348	711	1100	1400	51324	205	123	173	157	2	9.43
<b>130</b>	250	102	4	536	1030	600	800	51424M	245	123	197	173	3	23.9
	170	30	1	111	316	1400	1900	51126M	170	170	154	146	1	1.86
	170	30	1	111	316	950	1900	51126	170	170	154	146	1	1.67
	190	45	1.5	230	535	750	1400	51226	187	133	166	154	1.5	4.17
	225	75	2.1	394	843	750	1000	51326M	220	134	186	169	2	12.5
	225	75	2.1	394	843	560	1000	51326	220	134	186	169	2	11.6

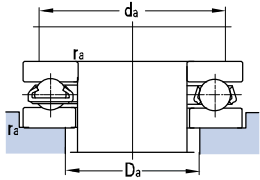
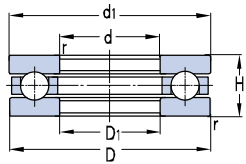


# Thrust Ball Bearings



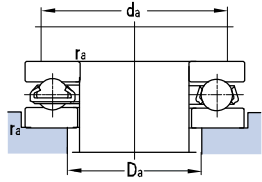
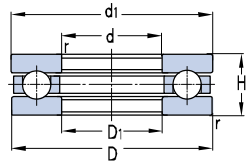
Principal dimensions				Basic rating load		Limit rating speed		Designations	Other dimensions		Installation Dimensions			Weight kg
d	D	H	rmin	Cr	Cor	Grease	Oil		d1	D1	da(min)	Da(max)	ra(max)	
mm				KN		r/min			mm		mm			
130	270	110	4	637	1284	560	750	51426M	265	134	213	187	3	29.0
	270	110	4	637	1284	750	1400	51426	265	134	213	187	3	28.8
140	180	31	1	114	344	1300	1800	51128	178	142	164	156	1	1.80
	180	31	1	114	344	950	1800	51128M	178	142	164	156	1	2.00
	200	46	1.5	226	543	950	1400	51228	197	143	176	164	1.5	4.49
	240	80	2.1	415	923	530	950	51328	235	144	199	181	2	14.6
	280	112	4	628	1317	700	1200	51428M	275	144	223	197	3	31.6
150	190	31	1	117	371	1200	1700	51130M	188	152	174	166	1	2.19
	190	31	1	117	371	900	1700	51130	188	152	174	166	1	1.96
	215	50	1.5	262	651	900	1300	51230M	212	153	189	176	1.5	5.80
	215	50	1.5	262	651	900	1300	51230	212	153	189	176	1.5	5.61
	250	80	2.1	429	1021	670	900	51330M	245	154	209	191	2	17.0
	250	80	2.1	429	1021	670	900	51330	245	154	209	191	2	17.0
	300	120	4	673	1479	500	670	51430M	295	154	239	211	3	38.7
160	200	31	1	121	399	1200	1700	51132M	198	162	184	176	1	2.38
	225	51	1.5	266	392	850	1200	51232M	222	163	199	186	1.5	6.19
	225	51	1.5	266	392	850	1200	51232	222	163	199	186	1.5	6.08
	270	87	3	455	1097	630	850	51332M	265	164	225	205	2.5	18.8
170	215	34	1.1	131	443	1100	1600	51134M	213	172	197	188	1	2.99
	215	34	1.1	131	443	1100	1600	51134	213	172	197	188	1	2.64
	240	55	1.5	281	744	800	1100	51234M	237	173	212	198	1.5	7.65
	240	55	1.5	281	744	800	1100	51234	237	173	212	198	1.5	7.33
	280	87	3	472	1268	600	800	51334M	275	174	235	215	2.5	19.9
180	225	34	1.1	151	500	1000	1500	51136M	222	183	207	198	1	3.08
	225	34	1.1	151	500	1000	1500	51136	222	183	207	198	1	2.86
	250	56	1.5	295	825	800	1100	51236M	247	183	222	208	1.5	8.15
	250	56	1.5	295	825	800	1100	51236	247	183	222	208	1.5	8.02
	300	95	3	515	1436	560	750	51336	295	184	251	229	2.5	26.7
190	240	37	1.1	178	592	950	1400	51138M	237	193	220	210	1	4.02
	240	37	1.1	178	592	950	1400	51138	237	193	220	210	1	3.62

# Thrust Ball Bearings



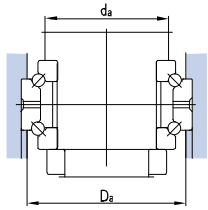
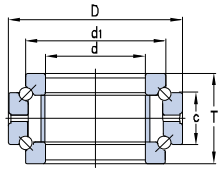
Principal dimensions				Basic rating load		Limit rating speed		Designations	Other dimensions		Installation Dimensions			Weight kg
d	D	H	rmin	Cr	Cor	Grease	Oil		d1	D1	da(min)	Da(max)	ra(max)	
mm				KN		r/min		mm	mm	mm				
190	270	62	2	357	1019	750	1000	51238M	267	194	238	222	2	11.7
	270	62	2	357	1019	750	1000	51238	267	194	238	222	2	11.0
	320	105	4	607	1662	700	800	51338M	315	195	266	244	3	33.5
200	250	37	1.1	183	636	950	1400	51140M	247	203	230	220	1	3.60
	280	62	2	352	1029	750	1000	51240M	277	204	248	232	2	11.5
	280	62	2	352	1029	750	1000	51240	277	204	248	232	2	10.9
	340	110	4	660	1865	480	630	51340M	335	205	282	258	3	30.8
220	270	37	1.1	186	682	900	1300	51144	267	223	250	240	1	4.45
	300	63	2	366	1148	700	950	51244	297	224	268	252	2	12.9
240	300	45	1.5	259	927	800	1100	51148	297	243	276	264	1.5	7.28
	340	78	2.1	454	1483	630	860	51248	335	244	299	281	2	21.1
	380	112	4	693	2224	500	700	51348	375	245	320	300	3	49.6
	340	70	2.5	417	1392	600	800	51948	340	238	299	281	2.5	19.4
260	320	45	1.5	264	994	800	1100	51152	317	263	296	248	1.5	7.56
	360	79	2.1	474	1651	560	750	51252	355	264	319	301	2	23.3
280	350	53	1.5	337	1274	640	900	51156	347	283	322	308	1.5	11.4
	380	80	2.1	493	1821	560	750	51256	375	284	339	321	2	25.3
300	380	62	2	416	1634	630	850	51160	376	304	348	332	2	17.4
	420	95	3	589	2245	480	630	51260	415	304	371	349	2.5	40.0
320	400	63	2	426	1756	600	800	51164	396	324	368	352	2	18.0
340	420	64	2	420	1768	600	800	51168	416	344	388	372	2	19.9
	460	96	3	604	2495	450	600	51268	455	345	411	389	2.5	44.6
	540	160	5	1122	4439	400	530	51368	535	345	452	356	4	137
360	440	65	2	430	1890	560	750	51172	436	364	408	392	2	23.9
	500	110	4	793	3591	400	530	51272	495	365	442	418	3	64.7
400	480	65	2	435	2020	530	700	51180	476	404	448	432	2	23.0

# Thrust Ball Bearings



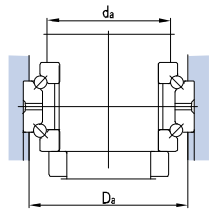
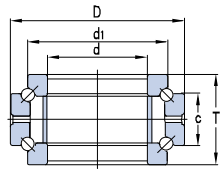
Principal dimensions				Basic rating load			Limit rating speed		Designations	Other dimensions		Installation Dimensions			Weight kg
d	D	H	r <sub>min</sub>	C <sub>r</sub>	C <sub>or</sub>		Grease	Oil		d1	D1	d <sub>a</sub> (min)	D <sub>a</sub> (max)	r <sub>a</sub> (max)	
mm				KN			r/min			mm		mm			
420	500	65	2	442	2560		530	700	51184	496	424	488	452	2	24.5
440	540	80	2.1	565	2770		450	600	51188	535	444	499	481	2	40.6
460	560	80	2.1	585	2960		450	600	51192	555	464	519	501	2	42.2
	620	130	5	894	4504		430	560	51292	615	465	552	528	4	113

# Double-direction Thrust Angular Contact Ball Bearings



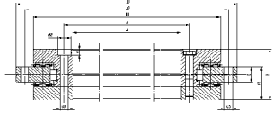
Principal dimensions						Basic rating load		Limit rating speed		Designations	Dimensions d1	Installation Dimensions				Weight kg
d	D	T	C	r <sub>min</sub>	r1 <sub>min</sub>	Cr	Cor	Grease	Oil			da(min)	Da(max)	ra(max)	ra(max)	
mm	mm	mm	mm	mm	mm	KN	KN	r/min	r/min	mm	mm	mm	mm	mm		
50	80	38	19	1	0.15	27	64.5	5000	6700	234410	70	61	76	1	0.15	0.624
55	90	44	22	1.1	0.3	37.5	85.5	4500	6000	234411	78	68	85	1	0.3	0.949
60	95	44	22	1.1	0.3	37.5	90	4300	5600	234412	83	73	90	1	0.3	0.989
65	100	44	22	1.1	0.3	38.5	97.5	4300	5600	234413	88	78	95	1	0.3	1.08
70	110	48	24	1.1	0.3	47	123	3800	5000	234414	97	85	105	1	0.3	1.51
75	115	48	24	1.1	0.3	49	131	3800	5000	234415	102	90	110	1	0.3	1.59
80	125	54	27	1.1	0.3	57.5	157	3400	4500	234416	110	97	119	1	0.3	2.23
85	130	54	27	1.1	0.3	58	163	3200	4300	234417	115	102	124	1	0.3	2.35
90	140	60	30	1.5	0.3	67.5	190	3000	4000	234418	123	109	132	1.5	0.3	3.01
95	145	60	30	1.5	0.3	68	197	2800	3800	234419	128	114	137	1.5	0.3	3.13
100	150	60	30	1.5	1	60.3	180	2900	3800	234420	133	119	142	1.5	0.3	3.13
	140	48	24	1	0.6	52.2	168	2800	3700	234920	126	114	134	1	0.6	
105	160	66	33	2	0.6	109	200	2600	3500	234421	142	125	151	2	0.6	4.15
	145	48	24	1	0.6	53.5	235	2400	3400	234921	121	125	151	2	0.6	
110	170	72	36	2	0.6	95.5	280	2200	3200	234422	150	132	161	2	0.6	5.32
	150	48	24	1	0.6	54	174	2700	3600	234922	136	124	144.5	1	0.6	
120	180	72	36	2	0.6	139	265	2400	3200	234424	160	142	171	2	0.6	5.54
	165	54	27	1	0.6	65	215	2400	3200	234924	150	138	159.5	1	0.6	
130	200	84	42	2	0.6	139	405	1900	2800	234426	177	156	190	2	0.6	10.1
	180	60	30	1.5	1	74.5	255	2200	2900	234926	163	150	173.5	1.5	0.8	
140	210	84	42	2.1	0.6	144	435	1800	2600	234428	187	166	200	2	0.6	9.15

# Double-direction Thrust Angular Contact Ball Bearings



Principal dimensions						Basic rating load		Limit rating speed		Designations	Dimensions d1	Installation Dimensions				Weight kg
d	D	T	C	r <sub>min</sub>	r <sub>1min</sub>	C <sub>r</sub>	C <sub>or</sub>	Grease	Oil			mm	d <sub>a</sub> (min)	D <sub>a</sub> (max)	r <sub>a</sub> (max)	
mm						KN		r/min			mm	mm				
140	190	60	30	1.5	1	75.5	269	2100	2800	234928	173	160	183.5	1.5	0.8	4.57
150	225	90	45	2.1	0.6	250	390	1900	2500	234430	200	178	213	2	0.6	12.5
		210	72	36	2	1	151	320	1800							
160	240	96	48	2.1	1.1	241	680	1700	2300	234432	212	190	227	2	0.6	14
		220	72	36	2	1	109	385	1800							
170	260	108	54	2.5	1.3	287	590	1600	2100	234434	230	206	245	2	1	18.5
		230	72	36	2	1	111	405	1700							
180	280	120	60	2.1	0.6					234436	248					
		250	84	42	2	1	155	545	1500							
190	290	120	60	2.1	0.6	235	790	1400	1900	234438	258	229	280	2	1	25.7
		260	84	42	2	1	157	560	1500							
200	310	132	66	2.1	0.6	270	915	1300	1700	234440	274	243	300	2	1	33.6
		280	96	48	2	1	185	655	1300							
220	300	96	48	2	1	190	715	1300	1700	234944	272	251	290	2	1	
		340	144	72	3	1	335	1120	1200							
240	320	96	48	2	1	196	770	1200	1600	234948	292	271	310	2	1	
		360	144	72	3	1	300	1090	1100							
280	380	120	60	2	1	265	1080	980	1300	234956	348	319	370	2	1	
300	420	144	72	3	1	336	1360	840	1100	234960	384	349	410	2.5	1	

# High Precision Radial And Axial Cylindrical Roller Bearings



Designations	Dimensions								Fixing holes				Outer ring	Number of retaining screws	Thread dial fetch hole g	Quantity	Basic rating speed(KN)				Fatigue load		Limit rating speed	Friction Torque	Axial direction rigidity	Radial direction rigidity	Inclined rigidity	Weight		
	d	D	H	H1	C	D1	J	J1	Inner ring								Axial				Radial direction									
	mm								d1(mm)	d2(mm)	a(mm)	Quantity(PCS)					d3(mm)	Quantity(PCS)	(PCS)	(PCS)	Dynamic load	Static load							Dynamic load	Static load
MRTC50	50	126	30	20	10	105	63	116	5.6			10		5.6	12	2		56	280	28.5	49.5	33	7.1	440	2.5	0.25	1.1	1.25	1.6	
MRTC80	80	146	35	23.35	12	130	92	138	5.6	10	4	10		4.6	12	2		38	158	44	98	15.3	13	350	3	0.5	1.8	2.5	2.4	
MRTC100	100	185	38	25	12	160	112	170	5.6	10	5.4	16		5.6	15	2	M5	3	73	370	52	108	40.5	14.4	280	3	0.8	2	5	4.1
MRTC120	120	210	40	26	12	184	135	195	7	11	6.2	22		7	21	2	M8	3	80	445	70	148	46.5	18.3	230	7	1	2.2	7	5.3
MRTC150	150	240	40	26	12	214	165	225	7	11	6.2	34		7	33	2	M8	3	85	510	77	179	50	21	210	10	1.5	2.6	11	6.2
MRTC180	180	280	43	29	15	244	194	260	7	11	6.2	46		7	45	2	M8	3	92	580	83	209	56	23.3	190	12	2.2	3	17	7.7
MRTC200	200	300	45	30	15	274	215	285	7	11	6.2	46		7	45	2	M8	3	98	650	89	236	61	25.5	170	14	3	3.5	23	9.7
MRTC280	260	385	55	36.5	18	345	280	365	9.3	15	8.2	34		9.3	33	2	M12	3	109	810	102	310	71	31	130	20	5.5	4.5	45	18.3
MRTC325	325	450	60	40	20	415	342	430	9.3	15	8.2	34		9.3	33	2	M12	3	186	1710	134	415	131	38.5	110	40	8.5	5	80	25
MRTC395	395	525	65	42.5	20	486	415	505	9.3	15	8.2	46		9.3	45	2	M12	3	202	2010	133	435	146	43.5	90	55	12.5	6	130	33
MRTC460	460	600	70	46	22	560	482	580	9.3	15	8.2	46		9.3	45	2	M12	3	217	2300	187	650	161	59	80	70	18	7	200	45
MRTC580	580	750	90	60	30	700	610	720	11.4	18	11	46		11.4	42	2	M12	6	390	3600	211	820	206	69	60	140	30	9	380	89
MRTC650	650	870	122	78	34	800	680	830	14	20	13	46		14	42	2	M12	6	495	5200	415	1500	285	113	55	200	45	10	550	170
MRTC850	850	1095	124	80.5	37	1018	890	1055	18	26	17	58		18	54	2	M16	6	560	6600	475	1970	340	136	40	300	80	13	1100	253
MRTC950	950	1200	132	86	40	1130	990	1160	18	26	17	58		18	54	2	M16	6	1040	10300	600	2450	510	162	40	600	100	14	1500	312