



BEARINGS TABLE

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1. DEEP GROOVE BALL BEARINGS

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BEARINGS TABLE

Single-Row Deep Groove Ball Bearings
Open Type, Shielded Type, Sealed Type

Bore Diameter 10 – 240 mm C 020

Open Type

Bore Diameter 260 – 800 mm C 040

Creep-Free Bearings™

Bore Diameter 10 – 100 mm C 046

Maximum Type Ball Bearings

Bore Diameter 25 – 110 mm C 048

Magneto Bearings

Bore Diameter 4 – 20 mm C 050



DESIGN, TYPES, AND FEATURES

SINGLE-ROW DEEP GROOVE BALL BEARINGS

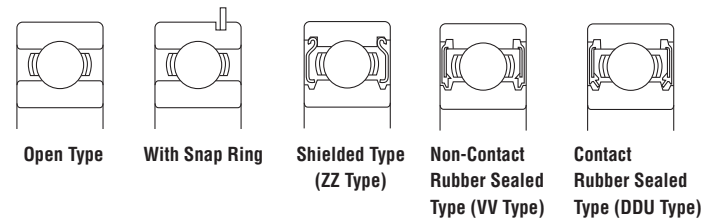
Single-Row Deep Groove Ball Bearings are classified into the types shown below.

The proper amount of good quality grease is packed in shielded and sealed ball bearings. A comparison of the features of each type is shown in Table 1.

Table 1 Features of Sealed Ball Bearings

Type	Shielded Type (ZZ Type)	Non-Contact Rubber Sealed Type (VV Type)	Contact Rubber Sealed Type (DDU Type)
Torque	Low	Low	Higher than ZZ, VV types due to contact seal
Speed capability	Good	Good	Limited by contact seals
Grease sealing effectiveness	Good	Better than ZZ type	A little better than VV type
Dust resistance	Good	Better than ZZ type (usable in moderately dusty environment)	Best (usable even in very dusty environment)
Water resistance	Not suitable	Not suitable	Good (usable even if fluid is splashed on bearing)
Operating temperature (1)	-10 to +110°C	-10 to +110°C	-10 to +100°C

Note (1) The above temperature range applies to standard bearings. By using cold or heat resistant grease and changing the type of rubber, the operating temperature range can be extended. For such applications, please contact NSK.



For deep groove ball bearings, pressed cages are usually used. For big bearings, machined brass cages are used. (Refer to Table 2)
Machined cages are also used for high speed applications.

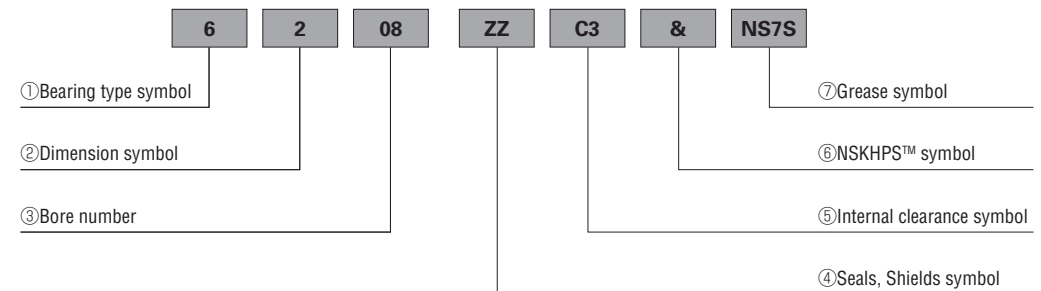
Table 2 Standard Cages for Deep Groove Ball Bearings

Series	Pressed Steel Cages	Machined Brass Cages
68	6800 - 6838	6840 - 68/800
69	6900 - 6936	6938 - 69/800
160	16001 - 16026	16028 - 16064
60	6000 - 6040	6044 - 60/670
62	6200 - 6240	6244 - 6272
63	6300 - 6332	6334 - 6356

Formulation of Bearing Numbers

Single-Row Deep Groove Ball Bearings

Bearing number example :



- ① Bearing type symbol 6 : Single-Row Deep Groove Ball Bearings
- ② Dimension symbol 2 : 02 Series, 3 : 03 Series, 9 : 19 Series, 0 : 10 Series
- ③ Bore number Less than 03, Bearing bore 00 : 10mm, 01 : 12mm, 02 : 15mm, 03 : 17mm
Over 04, Bearing bore Bore number X 5 (mm)
- ④ Seals, Shields symbol ZZ : Shield on Both Side, DDU : Contact Rubber Seal on Both Side, VV : Non-Contact Rubber Sealed on Both Side
- ⑤ Internal clearance symbol Omitted : CN clearance*1, C3 : Clearance greater than CN, C4 : Clearance greater than C3, CM : For Electric Motors*1
- ⑥ NSKHPS™ symbol & : NSKHPS™ Bearings
- ⑦ Grease symbol NS7 : NS HI-LUBE

* 1 The CM clearance can be used in substitute of the CN clearance. (The opposite is not available.)

DEEP GROOVE BALL BEARINGS

Creep-Free Bearings™

Creep-Free Bearings, which come with two O-rings mounted in the outer ring, help to prevent the occurrence of creep by restricting the amount of clearance between the outer ring and housing.

No special machining is required; bearings can be used with the same housing as standard bearings.

In creep limit load tests, the more housing clearance is reduced, the greater the improvement in creep prevention, due to the tension of the O-ring mounted in the outer ring.

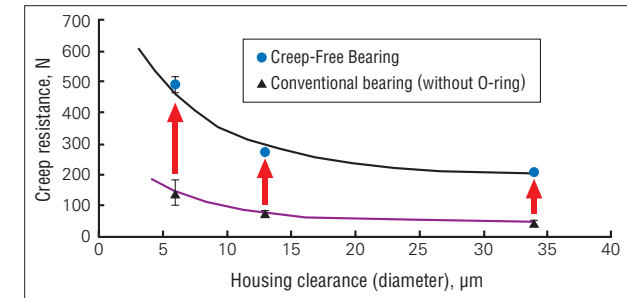
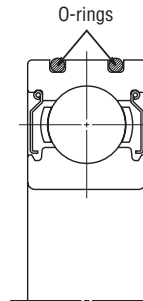
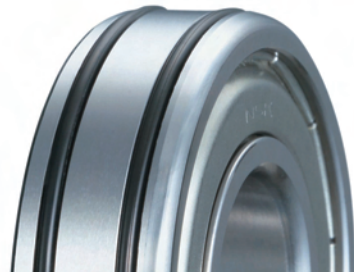


Fig. 1 Structure of Creep-Free Bearings

Fig. 2 Creep limit load test (example: 6204)

Features

Prevents creep

O-rings help prevent creep.

Easy to assemble

Assembly is easy since bearings can be fitted with a loose tolerance.

Reusable housing

Very little abrasion occurs on the bore surface of the housing, making reuse possible.

No special machining of the housing is required

Bearings can be replaced since boundary dimensions are identical to standard bearings. No reworking of the housing is required.

Application examples

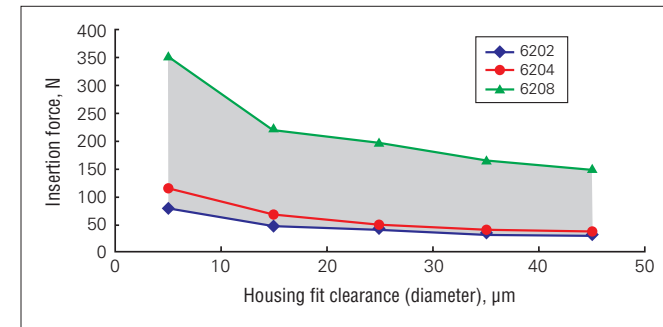
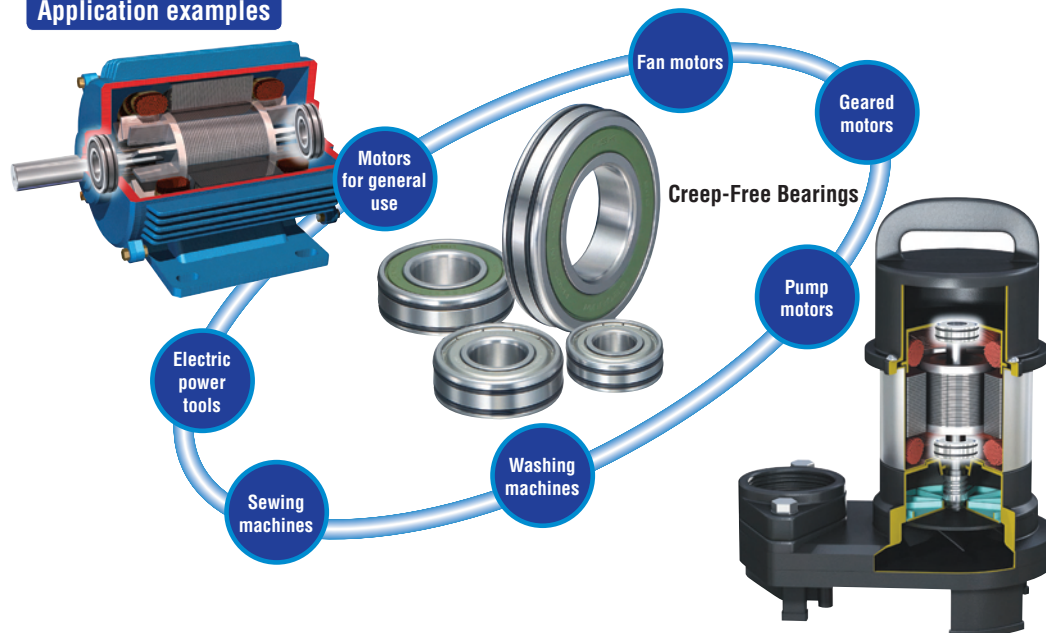


Fig. 3 Fit and insertion force

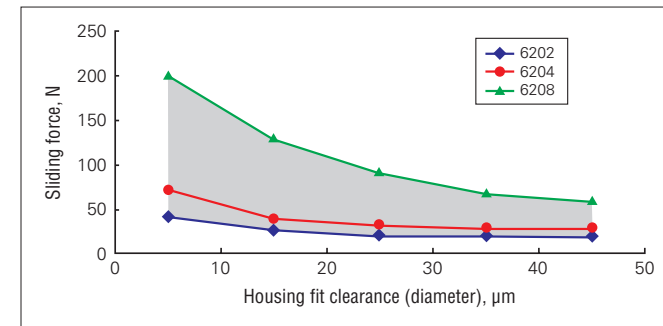


Fig. 4 Fit and sliding force



Note on mounting Creep-Free Bearings

- When oil or grease is applied to the outer diameter of the bearing, use a mineral oil or a synthetic hydrocarbon oil (NSK's EA2, etc.).
- O-ring material is nitrile rubber (operating temperature range: -30 to 120°C) as a standard specification. Please contact NSK for use under special environments such as high temperatures.

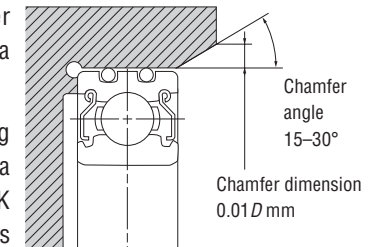
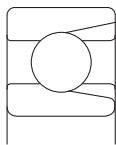


Fig. 5 Housing shape and dimension

Note on the product name "Creep-Free Bearings": The term "free" should not be construed to mean that creep is nonexistent.

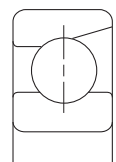
DEEP GROOVE BALL BEARINGS**MAXIMUM TYPE BALL BEARINGS**

Maximum Type Ball Bearings contain a larger number of balls than normal deep groove ball bearings because of filling slots in the inner and outer rings. Because of their filling slots, they are not suitable for applications with high axial loads.

BL2 and BL3 types of bearings have boundary dimensions equal to those of single-row deep groove ball bearings of Series 62 and 63 respectively. Besides the open type, ZZ type shielded bearings are also available.

When using these bearings, it is important for the filling slot in the outer ring to be outside of the loaded zone as much as possible.

Their cages are pressed steel.

**MAGNETO BEARINGS**

The groove in the inner ring is a little shallower than that of deep groove ball bearings and one side of the outer ring is relieved. Consequently, the outer ring is separable, which makes it convenient for mounting.

Pressed cages are standard, but for high speed applications, machined synthetic resin cages are used.

PRECAUTIONS FOR USE OF DEEP GROOVE BALL BEARINGS

For deep groove ball bearings, if the bearing load is too small during operation, slippage occurs between the balls and raceways, which may result in smearing. The higher the weight of balls and cage, the higher this tendency becomes, especially for large bearings. If very small bearing loads are expected, please contact NSK for selection of an appropriate bearing.

TOLERANCES AND RUNNING ACCURACY**SINGLE-ROW DEEP GROOVE BALL**

BEARINGSTable 7.2 (Pages A128 to A131)

MAXIMUM TYPE BALL BEARINGSTable 7.2 (Pages A128 to A131)

MAGNETO BEARINGSTable 7.5 (Pages A138 and A139)

RECOMMENDED FITS**SINGLE-ROW DEEP GROOVE BALL**

BEARINGSTable 8.3 (Page A164)

Table 8.5 (Page A165)

MAXIMUM TYPE BALL BEARINGSTable 8.3 (Page A164)

Table 8.5 (Page A165)

MAGNETO BEARINGSTable 8.3 (Page A164)

Table 8.5 (Page A165)

INTERNAL CLEARANCES**SINGLE-ROW DEEP GROOVE BALL**

BEARINGSTable 8.10 (Page A169)

MAXIMUM TYPE BALL BEARINGSTable 8.10 (Page A169)

MAGNETO BEARINGSTable 8.12 (Page A169)

LIMITING SPEEDS (GREASE/OIL)

The limiting speeds (grease) and limiting speeds (oil) listed in the bearing tables should be adjusted depending on the bearing load condition. Also, higher speeds are attainable by making changes in the lubrication method, cage design, etc. Refer to page A098 for detailed information.

TECHNICAL DATA

Radial and Axial Internal Clearances and Contact Angles for Single Row Deep Groove Ball Bearings

(1) Radial and Axial Internal Clearances

The internal clearance in single row bearings has been specified as the radial internal clearance. The bearing internal clearance is the amount of relative displacement possible between the bearing rings when one ring is fixed and the other ring does not bear a load. The amount of movement along the direction of the bearing radius is called the radial clearance, and the amount along the direction of the axis is called the axial clearance.

The geometric relation between the radial and axial clearance is shown in Fig. 1.

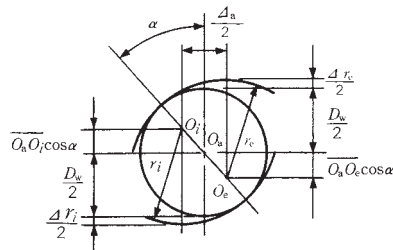


Fig. 1 Relationship Between Δ_r and Δ_a

Symbols used in Fig. 1

- O_a: Ball center
- O_e: Center of groove curvature, outer ring
- O_i: Center of groove curvature, inner ring
- D_w: Ball diameter (mm)
- r_e: Radius of outer ring groove (mm)
- r_i: Radius of inner ring groove (mm)
- α: Contact angle (°)
- Δ_r: Radial clearance (mm)
- Δ_a: Axial clearance (mm)

It is apparent from Fig. 1 that Δ_r=Δr_e+Δr_i.

From geometric relationships, various equations for clearance, contact angle, etc. can be derived.

$$\Delta_r = 2 (1 - \cos \alpha) (r_e + r_i - D_w) \dots\dots\dots (1)$$

$$\Delta_a = 2 \sin \alpha (r_e + r_i - D_w) \dots\dots\dots (2)$$

$$\frac{\Delta_a}{\Delta_r} = \cot \frac{\alpha}{2} \dots\dots\dots (3)$$

$$\Delta_a \doteq 2 (r_e + r_i - D_w)^{1/2} \Delta_r^{1/2} \dots\dots\dots (4)$$

$$\alpha = \cos^{-1} \left(\frac{r_e + r_i - D_w - \frac{\Delta_r}{2}}{r_e + r_i - D_w} \right) \dots\dots\dots (5)$$

$$= \sin^{-1} \left(\frac{\Delta_a / 2}{r_e + r_i - D_w} \right) \dots\dots\dots (6)$$

Because (r_e+r_i-D_w) is a constant, it is apparent why fixed relationships between Δ_r, Δ_a and α exist for all the various bearing types.

As was previously mentioned, the clearances for deep groove ball bearings are given as radial clearances, but there are specific applications where it is desirable to have an axial clearance as well. The relationship between deep groove ball bearing radial clearance Δ_r and axial clearance Δ_a is given in Equation (4). To simplify,

$$\Delta_a \doteq K \Delta_r^{1/2} \dots\dots\dots (7)$$

where K: Constant depending on bearing design
 $K = 2 (r_e + r_i - D_w)^{1/2}$

Fig. 2 shows one example. The various values for K are presented by bearing size in Table 1 below.

Example

Assume a 6312 bearing, for a sample calculation, which has a radial clearance of 0.017 mm. From Table 1, K=2.09. Therefore, the axial clearance Δ_a is: Δ_a=2.09×√0.017=2.09×0.13=0.27 (mm)

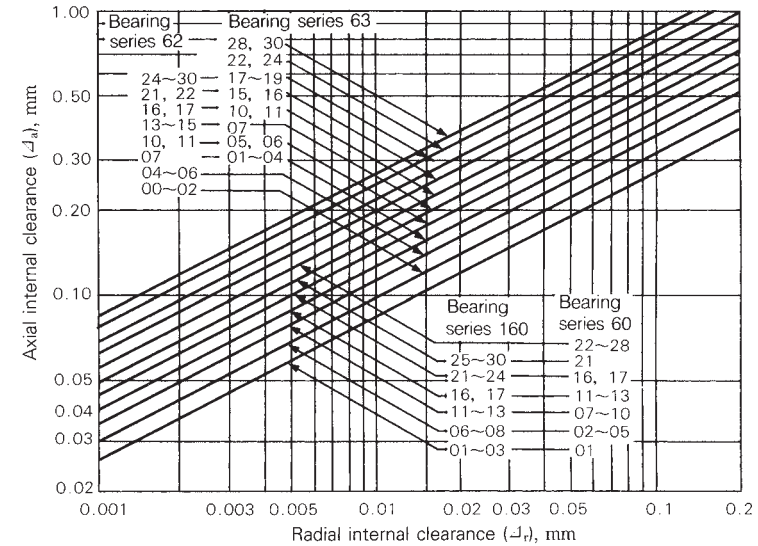


Fig. 2 Radial Clearance, Δ_r, and Axial Clearance, Δ_a of Deep Groove Ball Bearings

Table 1 Constant Values of K for Radial and Axial Clearance Conversion

Bearing bore No.	K			
	Series 160	Series 60	Series 62	Series 63
00	—	—	0.93	1.14
01	0.80	0.80	0.93	1.06
02	0.80	0.93	0.93	1.06
03	0.80	0.93	0.99	1.11
04	0.90	0.96	1.06	1.07
05	0.90	0.96	1.06	1.20
06	0.96	1.01	1.07	1.19
07	0.96	1.06	1.25	1.37
08	0.96	1.06	1.29	1.45
09	1.01	1.11	1.29	1.57
10	1.01	1.11	1.33	1.64
11	1.06	1.20	1.40	1.70
12	1.06	1.20	1.50	2.09
13	1.06	1.20	1.54	1.82
14	1.16	1.29	1.57	1.88
15	1.16	1.29	1.57	1.95
16	1.20	1.37	1.64	2.01
17	1.20	1.37	1.70	2.06
18	1.29	1.44	1.76	2.11
19	1.29	1.44	1.82	2.16
20	1.29	1.44	1.88	2.25
21	1.37	1.54	1.95	2.32
22	1.40	1.64	2.01	2.40
24	1.40	1.64	2.06	2.40
26	1.54	1.70	2.11	2.49
28	1.54	1.70	2.11	2.59
30	1.57	1.76	2.11	2.59

(2) Relation between Radial Clearance and Contact Angle

Single-row deep groove ball bearings are sometimes used as thrust bearings. In such applications, it is recommended to make the contact angle as large as possible.

The contact angle for ball bearings is determined by the geometric relationship between the radial clearance and the radii of the inner and outer grooves. Using Equations (1) to (6), Fig. 3 shows the particular relationship between the radial clearance and contact angle of 62 and 63 series bearings. The initial contact angle, α_0 , is the initial contact angle when the axial load is zero. Application of any load to the bearing will change this contact angle.

If the initial contact angle α_0 exceeds 20°, it is necessary to check whether or not the contact area of the ball and raceway touch the edge of raceway shoulder. (Refer to Section 8.1.2)

For applications when an axial load alone is applied, the radial clearance for deep groove ball bearings is normally greater than the normal clearance in order to ensure that the contact angle is relatively large. The initial contact angles for C3 and C4 clearances are given for selected bearing sizes in Table 2 below.

Table 2 Initial Contact Angle, α_0 , with C3 and C4 Clearances

Bearing No.	α_0 with C3	α_0 with C4
6205	12.5° to 18°	16.5° to 22°
6210	11.5° to 16.5°	13.5° to 19.5°
6215	11.5° to 16°	15.5° to 19.5°
6220	10.5° to 14.5°	14° to 17.5°
6305	11° to 16°	14.5° to 19.5°
6310	9.5° to 13.5°	12° to 16°
6315	9.5° to 13.5°	12.5° to 15.5°
6320	9° to 12.5°	12° to 15°

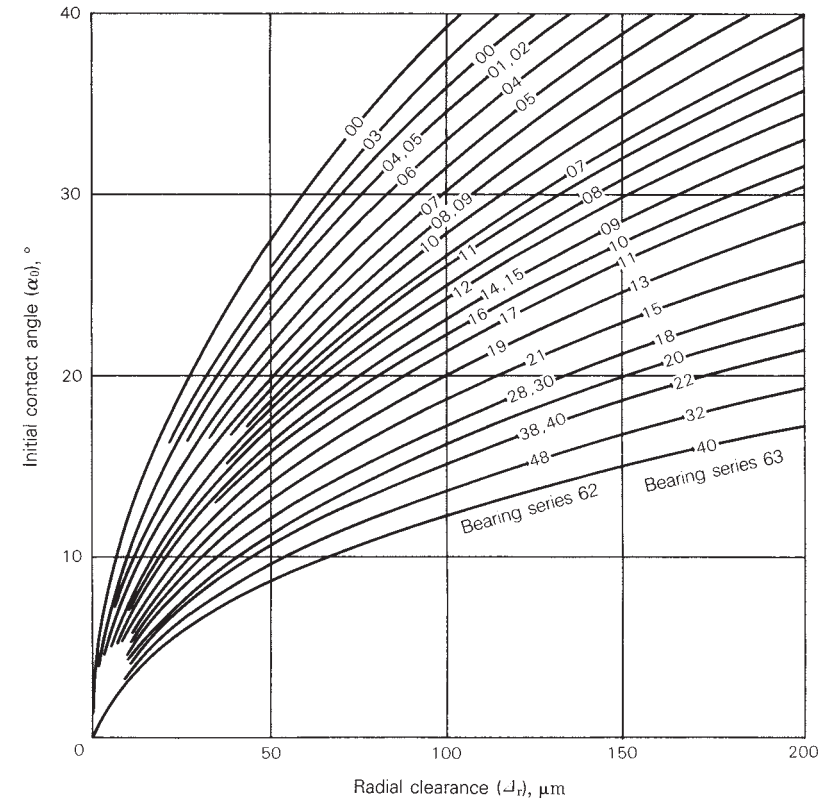


Fig. 3 Radial Clearance and Contact Angle

Features and Operating Temperature Range of Ball Bearing Seal Material

The sealed ball bearing is a ball bearing with seals as shown in Figs. 1 and 2. There are two seal types: non-contact seal type and contact seal type. For rubber seal material, nitrile rubber is used for general purpose and poly-acrylic rubber, silicon rubber, and fluorine rubber are used depending on temperature conditions.

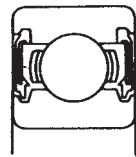
These rubbers have their own unique nature and appropriate rubber must be selected by considering the particular application environment and running conditions.

Table 1 shows principal features of each rubber material and the operating temperature range of the bearing seal. The operating temperature range of Table 1 is a guideline for continuous operation. Thermal aging of rubber is related to the temperature and time. Rubber may be used in a much wider range of operating temperatures depending on the operating time and frequency.

In the non-contact seal, heat generation due to friction on the lip can be ignored. And thermal factors, which cause aging of the rubber, are physical changes due to atmospheric and bearing temperatures. Accordingly, increased hardness or loss of elasticity due to thermal aging exerts only a negligible effect on the seal performance. A rubber non-contact seal can thus be used in an expanded range of operating temperatures greater than that for a contact seal.

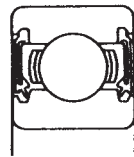
But there are some disadvantages. The contact seal has a problem with wear occurring at the seal lip due to friction, thermal plastic deformation, and hardening. When friction or plastic deformation occurs, the contact pressure between the lip and slide surface decreases, resulting in a clearance. This clearance is minimum and does not cause excessive degradation of sealing performance (for instance, it does not allow dust entry or grease leakage). In most cases, this minor plastic deformation or slightly increased hardness presents no practical problems.

However, in external environments with dust and water in large quantity, the bearing seal is used as an auxiliary seal and a principal seal should be provided separately. As so far described, the operating temperature range of rubber material is only a guideline for selection. Since heat resistant rubber is expensive, it is important to understand the temperature conditions so that an economical selection can be made. Due attention should also be paid not only to heat resistance, but also to the distinctive features of each rubber.



Non-contact rubber seal (VV)

Fig. 1



Contact rubber seal (DDU)

Fig. 2

Table 1 Features and Operating Temperature Range of Rubber Materials

Material		Nitrile rubber	Polyacrylic rubber	Silicon rubber	Fluorine rubber
Key features		<ul style="list-style-type: none"> Most popular seal material Superior in oil and wear resistances and mechanical properties Readily ages under direct sun-rays Less expensive than other rubbers 	<ul style="list-style-type: none"> Superior in heat and oil resistances Large compression causes permanent deformation Inferior in cold resistance One of the less expensive materials among the high temperature materials Attention is necessary because it swells the ester oil based grease 	<ul style="list-style-type: none"> High heat and cold resistances Inferior in mechanical properties other than permanent deformation by compression. Pay attention to tear strength Pay attention so as to avoid swell caused by low aniline point mineral oil, silicone grease, and silicone oil 	<ul style="list-style-type: none"> High heat resistance Superior in oil and chemical resistances Cold resistance similar to nitrile rubber Attention is necessary because it deteriorates the urea grease
	Operating temperature range (1) (°C)				
	Non-contact seal	-50 to +130	-30 to +170	-100 to +250	-50 to +220
	Contact seal	-30 to +110	-15 to +150	-70 to +200	-30 to +200

Note (1) This operating temperature is the temperature of seal rubber materials.

DEEP GROOVE BALL BEARINGS

Free Space and Grease Filling Amount for Deep Groove Ball Bearings

Grease lubrication can simplify the bearing's peripheral construction. In place of oil lubrication, grease lubrication is now employed along with enhancement of the grease quality for applications in many fields. It is important to select a grease appropriate to the operating conditions. Due care is also necessary as to the filling amount, since too much or too little grease greatly affects the temperature rise and torque. The amount of grease needed depends on such factors as housing construction, free space, grease brand, and environment. A general guideline is described next.

First, the bearing is filled with an appropriate amount of grease. In this case, it is essential to push grease onto the cage guide surface. Then, the free space, which excludes the spindle and bearing inside the housing, is filled with an amount of grease as shown next:

- 1/2 to 2/3 when the bearing speed is 50% or less of the allowable speed specified in the catalog.
- 1/3 to 1/2 when the bearing speed is 50% or more.

Roughly, low speeds require more grease while high speeds require less grease. Depending on the particular application, the filling amount may have to be reduced further to reduce the torque and to prevent heat generation. When the bearing speed is extremely low, on the other hand, grease may be packed almost full to prevent dust and water entry. Accordingly, it is necessary to know the extent of the housing's free space for the specific bearing to determine the correct filling amount. As a reference, the volume of free space is shown in Table 1 for an open type deep groove ball bearing.

Note that the free space of the open type deep groove ball bearing is the volume obtained by subtracting the volume of the balls and cage from the space formed between inner and outer rings.

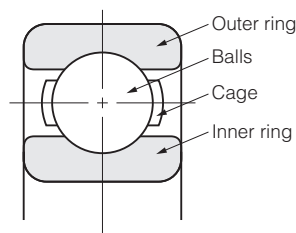


Table 1 Free Space of Open Type Deep Groove Ball Bearing

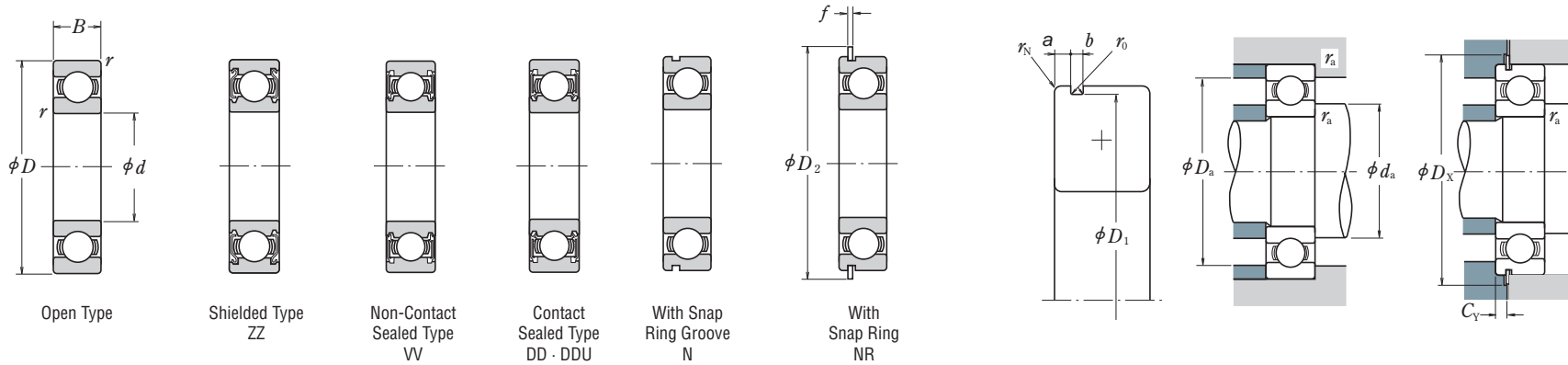
Units : cm³

Bearing bore No.	Bearing free space			Bearing bore No.	Bearing free space		
	Bearing series				Bearing series		
	60	62	63		60	62	63
00	1.2	1.5	2.9	14	34	61	148
01	1.2	2.1	3.5	15	35	67	180
02	1.6	2.7	4.8	16	47	84	213
03	2.0	3.7	6.4	17	48	104	253
04	4.0	6.0	7.9	18	63	127	297
05	4.6	7.7	12	19	66	155	345
06	6.5	11	19	20	68	184	425
07	9.2	15	25	21	88	216	475
08	11	20	35	22	114	224	555
09	14	23	49	24	122	310	675
10	15	28	64	26	172	355	830
11	22	34	79	28	180	415	1 030
12	23	45	98	30	220	485	1 140
13	24	54	122	32	285	545	1 410

Remark The table above shows the free space of a bearing using a pressed steel cage. The free space of a bearing using a high-tension brass machined cage is about 50 to 60% of the value in the table.

SINGLE-ROW DEEP GROOVE BALL BEARINGS

Bore Diameter 10 – 17 mm



Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0 F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

$\frac{F_a}{F_r} > 0.8, P_0 = 0.6F_r + 0.5F_a$

$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor f_0	Limiting Speeds (min^{-1})			Bearing Numbers			Snap Ring Groove Dimensions ⁽¹⁾ (mm)					Snap Ring ⁽¹⁾ Dimensions (mm)		Abutment and Fillet Dimensions (mm)					Mass (kg) approx.	
d	D	B	r min.	C_r	C_{0r}		Grease	Oil	Open	Shielded	Sealed	With Snap Ring Groove	With Snap Ring Groove	a max.	b min.	D_1 max.	r_0 max.	r_N min.	D_2 max.	f max.	$d_a^{(2)}$ min.	$D_a^{(2)}$ max.	r_a max.	D_x min.		C_y max.
10	19	5	0.3	1 720	840	14.8	34 000	24 000	40 000	6800	ZZ	VV	DD	—	—	—	—	—	—	—	12	12	17	0.3	—	—
	22	6	0.3	2 700	1 270	14.0	32 000	22 000	38 000	6900	ZZ	VV	DD	N ⁽³⁾	NR ⁽³⁾	1.05	0.8	20.8	0.2	0.2	12	12.5	20	0.3	25.5	1.5
	26	8	0.3	4 550	1 970	12.4	30 000	22 000	36 000	6000	ZZ	VV	DDU	N ⁽⁴⁾	NR ⁽⁴⁾	1.35	0.87	24.5	0.2	0.3	12	13	24	0.3	29.4	1.9
	30	9	0.6	5 350	2 390	13.2	28 000	18 000	34 000	* 6200	ZZ	VV	DDU	N	NR	2.06	1.35	28.17	0.4	0.5	14	16	26	0.6	35.5	2.9
	30	9	0.6	5 100	2 390	13.2	24 000	18 000	30 000	6200	ZZ	VV	DDU	N	NR	2.06	1.35	28.17	0.4	0.5	14	16	26	0.6	35.5	2.9

Notes ⁽¹⁾ For tolerances for the snap ring grooves and snap ring dimensions, refer to Pages A116 to A119.

⁽²⁾ When heavy axial loads are applied, increase d_a and decrease D_a from the above values.

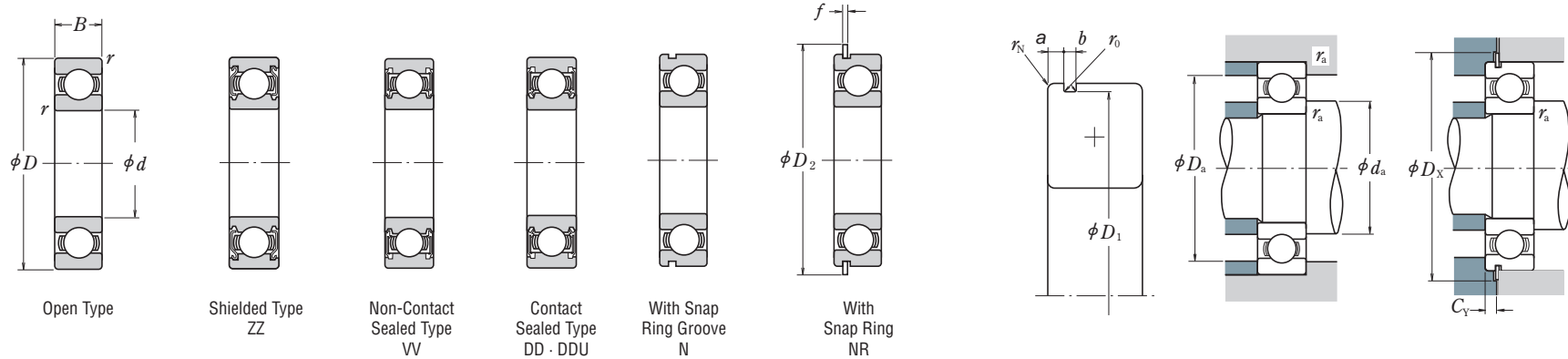
⁽³⁾ Ring types N and NR applicable only to open-type bearings. Please consult NSK about the snap ring groove dimensions of sealed or shielded bearings.

⁽⁴⁾ Snap ring groove dimensions and snap ring dimensions are not conformed to ISO15.

Remarks 1. Diameter Series 7 (extra thin section bearings) are also available, please contact NSK.
2. When using bearings with rotating outer rings, contact NSK if they are sealed, shielded, or have snap rings.
3. The bearings denoted by an asterisk(*) are NSKHPS™ Deep groove ball bearings.

■ SINGLE-ROW DEEP GROOVE BALL BEARINGS

Bore Diameter 32 – 45 mm



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$\frac{f_0 F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6 F_r + 0.5 F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

Boundary Dimensions (mm)	Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)			Bearing Numbers			Snap Ring Groove Dimensions (1)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)					Mass (kg)			
										a		D ₁	r ₀	r _N	D ₂	f	d _a (2)	D _a (2)	r _a	D _x	C _Y		approx.		
d	D	B	r _{min.}	C _r	C _{0r}	f ₀	Grease	Oil	Open	Shielded	Sealed											With Snap Ring Groove		With Snap Ring	max.
32	58	13	1	15 100	9 150	14.5	12 000	7 500	14 000	60/32 ZZ VV DDU	N NR	2.08	1.35	55.6	0.4	0.5	63.7	1.12	37	38.5	53	1	64.5	2.9	0.122
	65	17	1	20 700	11 600	13.6	10 000	7 100	12 000	62/32 ZZ VV DDU	N NR	3.28	1.9	62.6	0.6	0.5	70.7	1.7	37	40	60	1	71.5	4.6	0.225
	75	20	1.1	29 900	17 000	13.2	9 000	6 300	11 000	63/32 ZZ VV DDU	N NR	3.28	1.9	71.83	0.6	0.5	81.6	1.7	38.5	44.5	68.5	1	83	4.6	0.389
35	47	7	0.3	4 900	4 100	16.7	14 000	7 500	16 000	6807 ZZ VV DD	N NR	1.30	0.95	45.7	0.25	0.3	49.8	0.85	37	37	45	0.3	50.5	1.8	0.027
	55	10	0.6	10 600	7 250	15.5	12 000	7 500	15 000	6907 ZZ VV DDU	N NR	1.70	0.95	53.7	0.25	0.5	57.8	0.85	39	39	51	0.6	58.5	2.3	0.075
	62	9	0.3	11 700	8 200	15.6	11 000	—	13 000	16007	—	—	—	—	—	—	—	37	—	60	0.3	—	—	0.107	
	62	14	1	16 800	10 300	14.8	13 000	6 700	15 000	* 6007 ZZ VV DDU	N NR	2.08	1.9	59.61	0.6	0.5	67.7	1.7	40	41.5	57	1	68.5	3.4	0.151
	62	14	1	16 000	10 300	14.8	11 000	6 700	13 000	6007 ZZ VV DDU	N NR	2.08	1.9	59.61	0.6	0.5	67.7	1.7	40	41.5	57	1	68.5	3.4	0.151
	72	17	1.1	27 000	15 300	13.8	11 000	6 300	13 000	* 6207 ZZ VV DDU	N NR	3.28	1.9	68.81	0.6	0.5	78.6	1.7	41.5	44.5	65.5	1	80	4.6	0.284
	72	17	1.1	25 700	15 300	13.8	9 500	6 300	11 000	6207 ZZ VV DDU	N NR	3.28	1.9	68.81	0.6	0.5	78.6	1.7	41.5	44.5	65.5	1	80	4.6	0.284
40	52	7	0.3	6 350	5 550	17.0	12 000	6 700	14 000	6808 ZZ VV DD	N NR	1.30	0.95	50.7	0.25	0.3	54.8	0.85	42	42	50	0.3	55.5	1.8	0.031
	62	12	0.6	13 700	10 000	15.7	11 000	6 300	13 000	6908 ZZ VV DDU	N NR	1.70	0.95	60.7	0.25	0.5	64.8	0.85	44	46	58	0.6	65.5	2.3	0.112
	68	9	0.3	12 600	9 650	16.0	10 000	—	12 000	16008	—	—	—	—	—	—	—	42	—	66	0.3	—	—	0.13	
	68	15	1	17 600	11 500	15.3	12 000	6 000	14 000	* 6008 ZZ VV DDU	N NR	2.49	1.9	64.82	0.6	0.5	74.6	1.7	45	47.5	63	1	76	3.8	0.19
	68	15	1	16 800	11 500	15.3	10 000	6 000	12 000	6008 ZZ VV DDU	N NR	2.49	1.9	64.82	0.6	0.5	74.6	1.7	45	47.5	63	1	76	3.8	0.19
	80	18	1.1	30 500	17 900	14.0	9 500	5 600	12 000	* 6208 ZZ VV DDU	N NR	3.28	1.9	76.81	0.6	0.5	86.6	1.7	46.5	50.5	73.5	1	88	4.6	0.366
	80	18	1.1	29 100	17 900	14.0	8 500	5 600	10 000	6208 ZZ VV DDU	N NR	3.28	1.9	76.81	0.6	0.5	86.6	1.7	46.5	50.5	73.5	1	88	4.6	0.366
45	90	23	1.5	43 000	24 000	13.2	9 000	5 300	11 000	* 6308 ZZ VV DDU	N NR	3.28	2.7	86.79	0.6	0.5	96.5	2.46	48	53	82	1.5	98	5.4	0.636
	90	23	1.5	40 500	24 000	13.2	7 500	5 300	9 000	6308 ZZ VV DDU	N NR	3.28	2.7	86.79	0.6	0.5	96.5	2.46	48	53	82	1.5	98	5.4	0.636
	58	7	0.3	6 600	6 150	17.2	11 000	6 000	13 000	6809 ZZ VV DD	N NR	1.30	0.95	56.7	0.25	0.3	60.8	0.85	47	47.5	56	0.3	61.5	1.8	0.038
	68	12	0.6	14 100	10 900	15.9	9 500	5 600	12 000	6909 ZZ VV DDU	N NR	1.70	0.95	66.7	0.25	0.5	70.8	0.85	49	50	64	0.6	72	2.3	0.126
	75	10	0.6	14 900	11 400	15.9	9 000	—	11 000	16009	—	—	—	—	—	—	—	49	—	71	0.6	—	—	0.167	
	75	16	1	22 000	15 200	15.3	10 000	5 300	12 000	* 6009 ZZ VV DDU	N NR	2.49	1.9	71.83	0.6	0.5	81.6	1.7	50	53.5	70	1	83	3.8	0.241
	75	16	1	20 900	15 200	15.3	9 000	5 300	11 000	6009 ZZ VV DDU	N NR	2.49	1.9	71.83	0.6	0.5	81.6	1.7	50	53.5	70	1	83	3.8	0.241
	85	19	1.1	33 000	20 400	14.4	9 000	5 300	11 000	* 6209 ZZ VV DDU	N NR	3.28	1.9	81.81	0.6	0.5	91.6	1.7	51.5	55.5	78.5	1	93	4.6	0.42
	85	19	1.1	31 500	20 400	14.4	7 500	5 300	9 000	6209 ZZ VV DDU	N NR	3.28	1.9	81.81	0.6	0.5	91.6	1.7	51.5	55.5	78.5	1	93	4.6	0.42
	100	25	1.5	55 500	32 000	13.1	7 500	4 800	9 500	* 6309 ZZ VV DDU	N NR	3.28	2.7	96.8	0.6	0.5	106.5	2.46	53	61.5	92	1.5	108	5.4	0.829
	100	25	1.5	53 000	32 000	13.1	6 700	4 800	8 000	6309 ZZ VV DDU	N NR	3.28	2.7	96.8	0.6	0.5	106.5	2.46	53	61.5	92	1.5	108	5.4	0.829

Notes (1) For tolerances for the snap ring grooves and snap ring dimensions, refer to Pages A116 to A119.

(2) When heavy axial loads are applied, increase d_a and decrease D_a from the above values.

(3) Ring types N and NR applicable only to open-type bearings. Please consult NSK about the snap ring groove dimensions of sealed or shielded bearings.

(4) Snap ring groove dimensions and snap ring dimensions are not conformed to ISO15.

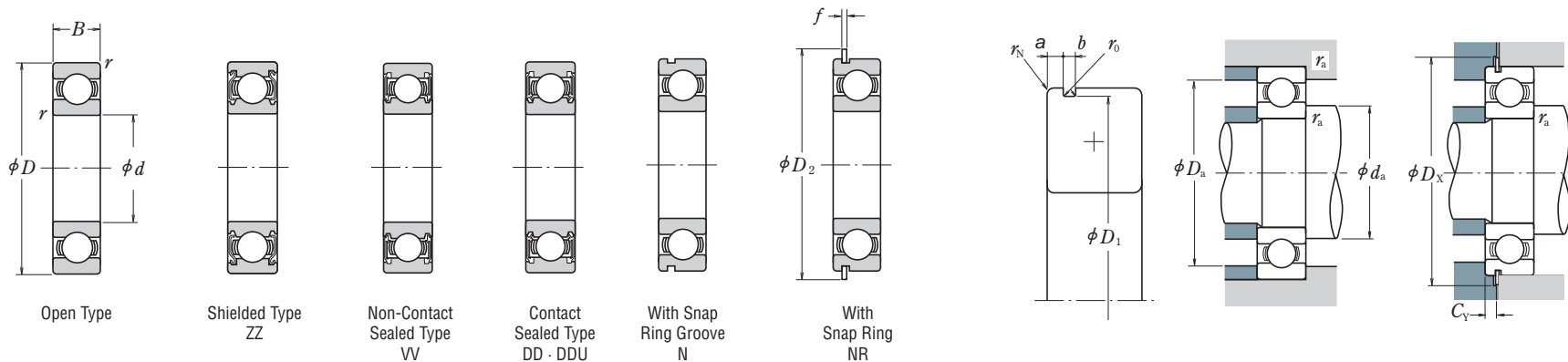
Remarks 1. Diameter Series 7 (extra thin section bearings) are also available, please contact NSK.

2. When using bearings with rotating outer rings, contact NSK if they are sealed, shielded, or have snap rings.

3. The bearings denoted by an asterisk(*) are NSKHPS™ Deep groove ball bearings.

■ SINGLE-ROW DEEP GROOVE BALL BEARINGS

Bore Diameter 65 – 75 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$\frac{f_0 F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
		0.172	0.19	1	0
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6F_r + 0.5F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

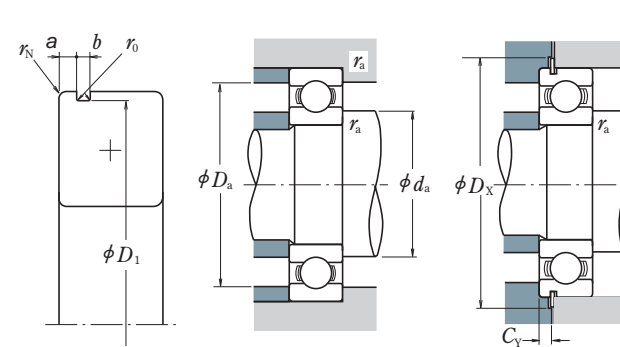
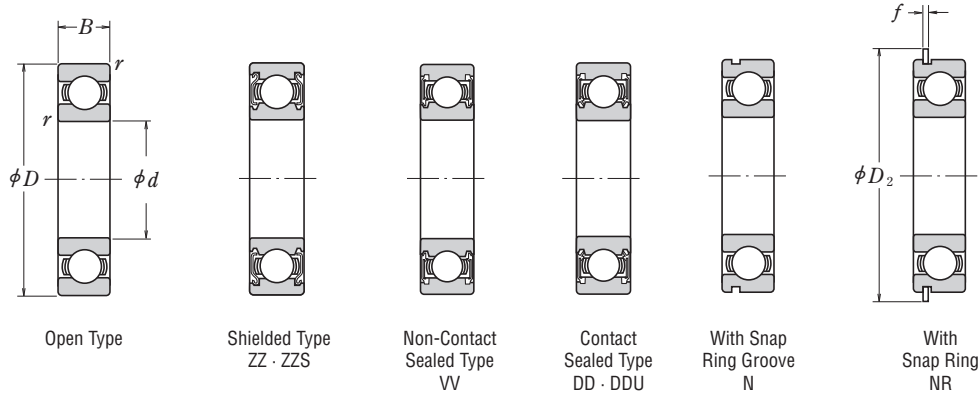
Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor f_0	Limiting Speeds (min ⁻¹)			Bearing Numbers			With Snap Ring Groove		Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)					Mass (kg) approx.		
d	D	B	$r_{min.}$	C_r	C_{0r}		Grease		Oil	Open	Shielded	Sealed	With Snap Ring Groove	With Snap Ring Groove	a	b	D_1	r_0	r_N	D_2	f	d_a (2)	D_a (2)	r_a	D_x	C_Y			
65	85	10	0.6	11 900	12 100	17.0	7 500	4 000	8 500	6813	ZZ	VV	DD	N	NR	1.70	1.3	82.9	0.4	0.5	89.4	1.12	69	69	81	0.6	91	2.5	0.128
	90	13	1	17 400	16 100	16.6	7 100	4 000	8 500	6913	ZZ	VV	DDU	N	NR	2.10	1.3	87.9	0.4	0.5	94.4	1.12	70	71.5	85	1	96	2.9	0.218
	100	11	0.6	20 500	18 700	16.5	6 700	—	8 000	16013	—	—	—	—	—	—	—	—	—	—	—	—	—	69	—	96	0.6	—	—
100	18	1.1	32 000	25 200	15.8	7 500	4 000	9 000	* 6013	ZZ	VV	DDU	N	NR	2.87	2.7	96.8	0.6	0.5	106.5	2.46	71.5	73	93.5	1	108	5	0.439	
	100	18	1.1	30 500	25 200	15.8	6 700	4 000	8 000	* 6013	ZZ	VV	DDU	N	NR	2.87	2.7	96.8	0.6	0.5	106.5	2.46	71.5	73	93.5	1	108	5	0.439
	120	23	1.5	60 000	40 000	14.4	6 300	3 600	7 500	* 6213	ZZ	VV	DDU	N	NR	4.06	3.1	115.21	0.6	0.5	129.7	2.82	73	80	112	1.5	131.5	6.5	1.0
120	23	1.5	57 500	40 000	14.4	5 300	3 600	6 300	* 6213	ZZ	VV	DDU	N	NR	4.06	3.1	115.21	0.6	0.5	129.7	2.82	73	80	112	1.5	131.5	6.5	1.0	
	140	33	2.1	97 500	60 000	13.2	5 600	3 400	6 700	* 6313	ZZ	VV	DDU	N	NR	4.90	3.1	135.23	0.6	0.5	149.7	2.82	76	85.5	129	2	152	7.3	2.11
	140	33	2.1	92 500	60 000	13.2	4 800	3 400	6 000	* 6313	ZZ	VV	DDU	N	NR	4.90	3.1	135.23	0.6	0.5	149.7	2.82	76	85.5	129	2	152	7.3	2.11
70	90	10	0.6	12 100	12 700	17.2	6 700	3 800	8 000	6814	ZZ	VV	DD	N	NR	1.70	1.3	87.9	0.4	0.5	94.4	1.12	74	74.5	86	0.6	96	2.5	0.134
	100	16	1	23 700	21 200	16.3	6 300	3 600	7 500	6914	ZZ	VV	DDU	N	NR	2.50	1.3	97.9	0.4	0.5	104.4	1.12	75	77.5	95	1	106	3.3	0.349
	110	13	0.6	26 800	23 600	16.3	6 000	—	7 100	16014	—	—	—	—	—	—	—	—	—	—	—	—	—	74	—	106	0.6	—	—
110	20	1.1	40 000	31 000	15.6	7 100	3 600	8 500	* 6014	ZZ	VV	DDU	N	NR	2.87	2.7	106.81	0.6	0.5	116.6	2.46	76.5	80.5	103.5	1	118	5	0.608	
	110	20	1.1	38 000	31 000	15.6	6 000	3 600	7 100	* 6014	ZZ	VV	DDU	N	NR	2.87	2.7	106.81	0.6	0.5	116.6	2.46	76.5	80.5	103.5	1	118	5	0.608
	125	24	1.5	65 500	44 000	14.5	6 000	3 400	7 100	* 6214	ZZ	VV	DDU	N	NR	4.06	3.1	120.22	0.6	0.5	134.7	2.82	78	84	117	1.5	136.5	6.5	1.09
125	24	1.5	62 000	44 000	14.5	5 000	3 400	6 300	* 6214	ZZ	VV	DDU	N	NR	4.06	3.1	120.22	0.6	0.5	134.7	2.82	78	84	117	1.5	136.5	6.5	1.09	
	150	35	2.1	109 000	68 000	13.2	5 300	3 200	6 300	* 6314	ZZ	VV	DDU	N	NR	4.90	3.1	145.24	0.6	0.5	159.7	2.82	81	92	139	2	162	7.3	2.57
	150	35	2.1	104 000	68 000	13.2	4 500	3 200	5 300	* 6314	ZZ	VV	DDU	N	NR	4.90	3.1	145.24	0.6	0.5	159.7	2.82	81	92	139	2	162	7.3	2.57
75	95	10	0.6	12 500	13 900	17.3	6 300	3 600	7 500	6815	ZZ	VV	DDU	N	NR	1.70	1.3	92.9	0.4	0.5	99.4	1.12	79	79.5	91	0.6	101	2.5	0.149
	105	16	1	24 400	22 600	16.5	6 000	3 400	7 100	6915	ZZ	VV	DDU	N	NR	2.50	1.3	102.6	0.4	0.5	110.7	1.12	80	82	100	1	112	3.3	0.364
	115	13	0.6	27 600	25 300	16.4	5 600	—	6 700	16015	—	—	—	—	—	—	—	—	—	—	—	—	—	79	—	111	0.6	—	—
115	20	1.1	41 500	33 500	15.8	6 700	3 400	8 000	* 6015	ZZ	VV	DDU	N	NR	2.87	2.7	111.81	0.6	0.5	121.6	2.46	81.5	85.5	108.5	1	123	5	0.649	
	115	20	1.1	39 500	33 500	15.8	5 600	3 400	6 700	* 6015	ZZ	VV	DDU	N	NR	2.87	2.7	111.81	0.6	0.5	121.6	2.46	81.5	85.5	108.5	1	123	5	0.649
	130	25	1.5	69 500	49 500	14.7	5 600	3 200	6 700	* 6215	ZZ	VV	DDU	N	NR	4.06	3.1	125.22	0.6	0.5	139.7	2.82	83	90	122	1.5	141.5	6.5	1.19
130	25	1.5	66 000	49 500	14.7	4 800	3 200	5 600	* 6215	ZZ	VV	DDU	N	NR	4.06	3.1	125.22	0.6	0.5	139.7	2.82	83	90	122	1.5	141.5	6.5	1.19	
	160	37	2.1	119 000	77 000	13.2	4 800	2 800	6 000	* 6315	ZZ	VV	DDU	N	NR	4.90	3.1	155.22	0.6	0.5	169.7	2.82	86	98.5	149	2	172	7.3	3.08
	160	37	2.1	113 000	77 000	13.2	4 300	2 800	5 000	* 6315	ZZ	VV	DDU	N	NR	4.90	3.1	155.22	0.6	0.5	169.7	2.82	86	98.5	149	2	172	7.3	3.08

- Notes** (1) For tolerances for the snap ring grooves and snap ring dimensions, refer to Pages A116 to A119.
 (2) When heavy axial loads are applied, increase d_a and decrease D_a from the above values.
 (3) Ring types N and NR applicable only to open-type bearings. Please consult NSK about the snap ring groove dimensions of sealed or shielded bearings.
 (4) Not conformed to ISO15.

- Remarks** 1. Diameter Series 7 (extra thin section bearings) are also available, please contact NSK.
 2. When using bearings with rotating outer rings, contact NSK if they are sealed, shielded, or have snap rings.
 3. The bearings denoted by an asterisk(*) are NSKHPS™ Deep groove ball bearings.

■ SINGLE-ROW DEEP GROOVE BALL BEARINGS

Bore Diameter 160 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$\frac{f_0 F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6F_r + 0.5F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

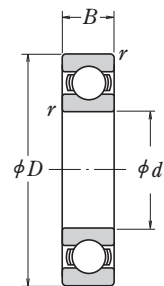
Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor f_0	Limiting Speeds (min ⁻¹)			Bearing Numbers			Snap Ring Groove Dimensions (1) (mm)		Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)					Mass (kg) approx.								
d	D	B	r min.	C_r	C_{0r}		Grease		Oil	Open	Shielded	Sealed	With Snap Ring Groove	With Snap Ring Groove	a max.	b min.	D_1 max.	r_0 max.	r_N min.	D_2 max.	f max.		min.	d_a (2) max.	D_a (2) max.	r_a max.	D_x min.	C_y max.		
160	200	20	1.1	48 500	61 000	17.2	2 600	1 700	3 200	6832	ZZS	VV	DDU	N	NR	3.30	1.9	196.8	0.6	0.5	206.5	1.7	166.5	170.5	193.5	1	208	4.7	1.23	
	220	28	2	87 000	96 000	16.6	2 600	1 600	3 000	6932	ZZS	—	DDU	—	—	—	—	—	—	—	—	—	169	176	211	2	—	—	2.71	
	240	25	1.5	99 000	108 000	16.5	2 400	—	2 800	16032	—	—	—	—	—	—	—	—	—	—	—	—	—	232	1.5	—	—	4.2		
	240	38	2.1	137 000	135 000	15.9	2 400	1 600	2 800	6032	ZZ	—	DDU	—	—	—	—	—	—	—	—	—	—	171	181.5	229	2	—	—	5.15
	290	48	3	185 000	186 000	15.4	1 900	—	2 400	6232	ZZS	—	—	—	—	—	—	—	—	—	—	—	—	173	202	277	2.5	—	—	12.8
	340	68	4	278 000	287 000	13.9	1 700	—	2 000	6332	ZZS	—	—	—	—	—	—	—	—	—	—	—	—	176	215.5	324	3	—	—	26.2

Notes (1) For tolerances for the snap ring grooves and snap ring dimensions, refer to Pages A116 to A119.
 (2) When heavy axial loads are applied, increase d_a and decrease D_a from the above values.

Remarks 1. When using bearings with rotating outer rings, contact NSK if they are sealed, shielded, or have snap rings.
 2. Please consult NSK about the snap ring groove dimensions of sealed and shielded bearings when the diameter of dimension series 18 and 19 is 50 mm or more.

SINGLE-ROW DEEP GROOVE BALL BEARINGS

Bore Diameter 170 – 240 mm



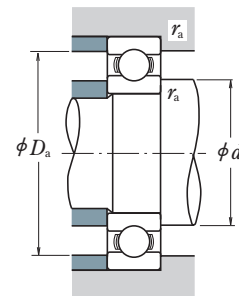
Open Type



Shielded Type
ZZS



Non-Contact
Sealed Type
VV



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$\frac{f_0 F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6F_r + 0.5F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

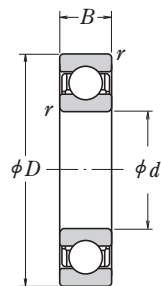
Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor f_0	Limiting Speeds (min ⁻¹)			Bearing Numbers			Abutment and Fillet Dimensions (mm)				Mass (kg)	
d	D	B	r _{min.}	C_r	C_{0r}		Grease		Oil	Open	Shielded	Sealed	$d_a^{(1)}$	$D_a^{(1)}$	r_a	approx.		
							Open Z Z · ZZ V · VV	DU DDU	Open Z				min.	max.	max.			
170	215	22	1.1	60 000	75 000	17.1	2 600	1 600	3 000	6834	ZZS	VV	DDU	176.5	182	208.5	1	1.86
	230	28	2	86 000	97 000	16.7	2 400	—	2 800	6934	ZZS	—	—	179	186	221	2	3.34
	260	28	1.5	114 000	126 000	16.5	2 200	—	2 600	16034	—	—	—	178	—	252	1.5	5.71
	260	42	2.1	161 000	161 000	15.8	2 200	—	2 600	6034	ZZS	VV	—	181	194.5	249	2	6.89
	310	52	4	212 000	224 000	15.3	1 800	—	2 200	6234	ZZS	—	—	186	215	294	3	15.8
180	360	72	4	325 000	355 000	13.6	1 600	—	2 000	6334	—	—	—	186	—	344	3	36.6
	225	22	1.1	60 500	78 500	17.2	2 400	—	2 800	6836	—	VV	—	186.5	192	218.5	1	1.98
	250	33	2	119 000	128 000	16.4	2 200	—	2 600	6936	ZZS	—	—	189	198.5	241	2	4.16
	280	31	2	145 000	157 000	16.3	2 000	—	2 400	16036	—	—	—	189	—	271	2	7.5
	280	46	2.1	180 000	185 000	15.6	2 000	—	2 400	6036	ZZS	VV	—	191	208	269	2	8.88
	320	52	4	227 000	241 000	15.1	1 700	—	2 000	6236	ZZS	—	—	196	223	304	3	15.9
	380	75	4	355 000	405 000	13.9	1 500	—	1 800	6336	—	—	—	196	—	364	3	43.1
190	240	24	1.5	73 000	93 500	17.1	2 200	—	2 600	6838	—	VV	—	198	202.5	232	1.5	2.53
	260	33	2	113 000	127 000	16.6	2 200	—	2 600	6938	—	—	—	199	—	251	2	5.18
	290	31	2	149 000	168 000	16.4	2 000	—	2 400	16038	—	—	—	199	—	281	2	7.78
	290	46	2.1	188 000	201 000	15.8	2 000	—	2 400	6038	ZZS	—	—	201	218	279	2	9.39
	340	55	4	255 000	282 000	15.0	1 600	—	2 000	6238	ZZS	—	—	206	236	324	3	22.3
	400	78	5	355 000	415 000	14.1	1 400	—	1 700	6338	—	—	—	210	—	380	4	49.7
200	250	24	1.5	74 000	98 000	17.2	2 200	—	2 600	6840	—	—	—	208	—	242	1.5	2.67
	280	38	2.1	143 000	158 000	16.4	2 000	—	2 400	6940	ZZS	—	—	211	222	269	2	7.28
	310	34	2	161 000	180 000	16.4	1 900	—	2 200	16040	—	—	—	209	—	301	2	10
	310	51	2.1	207 000	226 000	15.6	1 900	—	2 200	6040	ZZS	—	—	211	231.5	299	2	12
	360	58	4	269 000	310 000	15.2	1 500	—	1 800	6240	ZZS	—	—	216	252	344	3	26.7
	420	80	5	380 000	445 000	13.8	1 300	—	1 600	6340	—	—	—	220	—	400	4	55.3
220	270	24	1.5	76 500	107 000	17.4	1 900	—	2 400	6844	ZZS	—	—	228	233.5	262	1.5	2.9
	300	38	2.1	146 000	169 000	16.6	1 800	—	2 200	6944	ZZS	—	—	231	242	289	2	7.88
	340	37	2.1	180 000	217 000	16.5	1 600	—	2 000	16044	—	—	—	231	—	329	2	13.1
	340	56	3	235 000	271 000	15.6	1 700	—	2 000	6044	ZZS	—	—	233	254.5	327	2.5	18.6
	400	65	4	310 000	375 000	15.1	1 300	—	1 600	6244	—	—	—	236	—	384	3	37.4
240	460	88	5	410 000	520 000	14.3	1 200	—	1 500	6344	—	—	—	240	—	440	4	73.9
	300	28	2	98 500	137 000	17.3	1 700	—	2 000	6848	—	—	—	249	—	291	2	4.48
	320	38	2.1	154 000	190 000	16.8	1 700	—	2 000	6948	ZZS	—	—	251	262	309	2	8.49
	360	37	2.1	196 000	243 000	16.5	1 500	—	1 900	16048	—	—	—	251	—	349	2	13.9
	360	56	3	244 000	296 000	15.9	1 500	—	1 900	6048	—	—	—	253	—	347	2.5	19.9
	440	72	4	340 000	430 000	15.2	1 200	—	1 500	6248	—	—	—	256	—	424	3	50.5
	500	95	5	470 000	625 000	14.2	1 100	—	1 300	6348	—	—	—	260	—	480	4	94.4

Note (1) When heavy axial loads are applied, increase d_a and decrease D_a from the above values.

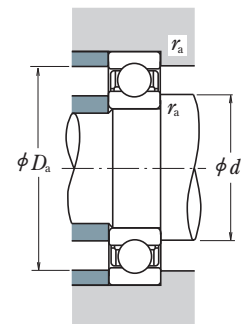
Remark When using bearings with rotating outer rings, contact NSK if they are sealed or shielded.

■ SINGLE-ROW DEEP GROOVE BALL BEARINGS

Bore Diameter 260 – 360 mm



Open Type



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$\frac{f_0 F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6F_r + 0.5F_a$$

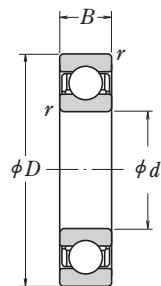
$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor f_0	Limiting Speeds (min ⁻¹)		Bearing Numbers Open	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.
d	D	B	r min.	C_r	C_{0r}		Grease	Oil		$d_{a(1)}$ min.	$D_{a(1)}$ max.	r_a max.	
260	320	28	2	101 000	148 000	17.4	1 600	1 900	6852	269	311	2	4.84
	360	46	2.1	204 000	255 000	16.5	1 500	1 800	6952	271	349	2	14
	400	44	3	237 000	310 000	16.4	1 400	1 700	16052	273	387	2.5	21.1
	400	65	4	291 000	375 000	15.8	1 400	1 700	6052	276	384	3	29.4
	480	80	5	400 000	540 000	15.1	1 100	1 300	6252	280	460	4	67
	540	102	6	505 000	710 000	14.6	1 000	1 200	6352	286	514	5	118
280	350	33	2	133 000	191 000	17.3	1 500	1 700	6856	289	341	2	7.2
	380	46	2.1	209 000	272 000	16.6	1 400	1 700	6956	291	369	2	15.1
	420	44	3	243 000	330 000	16.5	1 300	1 600	16056	293	407	2.5	22.7
	420	65	4	300 000	410 000	16.0	1 300	1 600	6056	296	404	3	31.2
	500	80	5	400 000	550 000	15.2	1 000	1 300	6256	300	480	4	70.4
	580	108	6	570 000	840 000	14.5	900	1 100	6356	306	554	5	144
300	380	38	2.1	166 000	233 000	17.1	1 300	1 600	6860	311	369	2	10.3
	420	56	3	269 000	370 000	16.4	1 300	1 500	6960	313	407	2.5	23.9
	460	50	4	285 000	405 000	16.4	1 200	1 400	16060	316	444	3	31.5
	460	74	4	355 000	500 000	15.8	1 200	1 400	6060	316	444	3	44.2
	540	85	5	465 000	670 000	15.1	950	1 200	6260	320	520	4	87.8
	320	400	38	2.1	168 000	244 000	17.2	1 300	1 500	6864	331	389	2
440		56	3	266 000	375 000	16.5	1 200	1 400	6964	333	427	2.5	25.3
480		50	4	293 000	430 000	16.5	1 100	1 300	16064	336	464	3	33.2
	480	74	4	390 000	570 000	15.7	1 100	1 300	6064	336	464	3	46.5
	580	92	5	530 000	805 000	15.0	850	1 100	6264	340	560	4	111
	340	420	38	2.1	175 000	265 000	17.3	1 200	1 400	6868	351	409	2
460		56	3	273 000	400 000	16.6	1 100	1 300	6968	353	447	2.5	26.6
520		82	5	440 000	660 000	15.6	1 000	1 200	6068	360	500	4	62.3
	620	92	6	530 000	820 000	15.3	800	1 000	6268	366	594	5	129
	360	440	38	2.1	192 000	290 000	17.3	1 100	1 300	6872	371	429	2
480		56	3	280 000	425 000	16.7	1 100	1 300	6972	373	467	2.5	27.9
540		82	5	460 000	720 000	15.7	950	1 200	6072	380	520	4	65.3
	650	95	6	555 000	905 000	15.4	750	950	6272	386	624	5	145

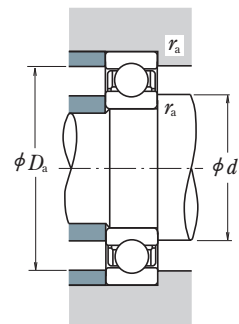
Note (1) When heavy axial loads are applied, increase d_a and decrease D_a from the above values.

■ SINGLE-ROW DEEP GROOVE BALL BEARINGS

Bore Diameter 380 – 600 mm



Open Type



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$\frac{f_0 F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6F_r + 0.5F_a$$

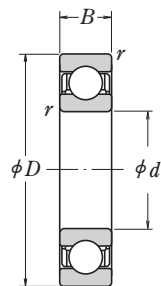
$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	f_0	Grease	Oil	Open	$d_{a(1)}$ min.	$D_{a(1)}$ max.	r_a max.	approx.
380	480	46	2.1	238 000	375 000	17.1	1 000	1 200	6876	391	469	2	19.5
	520	65	4	325 000	510 000	16.6	950	1 200	6976	396	504	3	40
	560	82	5	455 000	725 000	15.9	900	1 100	6076	400	540	4	68
400	500	46	2.1	241 000	390 000	17.2	950	1 200	6880	411	489	2	20.5
	540	65	4	335 000	540 000	16.7	900	1 100	6980	416	524	3	42
	600	90	5	510 000	825 000	15.7	850	1 000	6080	420	580	4	88.4
420	520	46	2.1	245 000	410 000	17.3	900	1 100	6884	431	509	2	21.4
	560	65	4	340 000	570 000	16.8	900	1 100	6984	436	544	3	43.6
	620	90	5	530 000	895 000	15.8	800	1 000	6084	440	600	4	92.2
440	540	46	2.1	248 000	425 000	17.4	900	1 100	6888	451	529	2	22.3
	600	74	4	395 000	680 000	16.6	800	1 000	6988	456	584	3	60.2
	650	94	6	550 000	965 000	16.0	750	900	6088	466	624	5	106
460	580	56	3	310 000	550 000	17.1	800	1 000	6892	473	567	2.5	34.3
	620	74	4	405 000	720 000	16.7	800	950	6992	476	604	3	62.6
	680	100	6	605 000	1 080 000	15.8	710	850	6092	486	654	5	123
480	600	56	3	315 000	575 000	17.2	800	950	6896	493	587	2.5	35.4
	650	78	5	450 000	815 000	16.6	750	900	6996	500	630	4	73.5
	700	100	6	605 000	1 090 000	15.9	710	850	6096	506	674	5	127
500	620	56	3	320 000	600 000	17.3	750	900	68/500	513	607	2.5	37.2
	670	78	5	460 000	865 000	16.7	710	850	69/500	520	650	4	82
	720	100	6	630 000	1 170 000	16.0	670	800	60/500	526	694	5	131
530	650	56	3	325 000	625 000	17.4	710	850	68/530	543	637	2.5	39.8
	710	82	5	455 000	870 000	16.8	670	800	69/530	550	690	4	89.8
	780	112	6	680 000	1 300 000	16.0	600	750	60/530	556	754	5	184
560	680	56	3	330 000	650 000	17.4	670	800	68/560	573	667	2.5	41.5
	750	85	5	525 000	1 040 000	16.7	600	750	69/560	580	730	4	105
	820	115	6	735 000	1 500 000	16.2	560	670	60/560	586	793.5	5	203
600	730	60	3	355 000	735 000	17.5	600	710	68/600	613	717	2.5	50.9
	800	90	5	550 000	1 160 000	16.9	560	670	69/600	620	780	4	120
	870	118	6	790 000	1 640 000	16.1	530	630	60/600	626	844	5	236

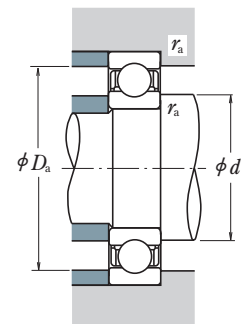
Note (1) When heavy axial loads are applied, increase d_a and decrease D_a from the above values.

■ SINGLE-ROW DEEP GROOVE BALL BEARINGS

Bore Diameter 630 – 800 mm



Open Type



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$\frac{f_0 F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6F_r + 0.5F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor f_0	Limiting Speeds (min ⁻¹)		Bearing Numbers Open	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.
d	D	B	r min.	C_r	C_{0r}		Grease	Oil		$d_a^{(1)}$ min.	$D_a^{(1)}$ max.	r_a max.	
630	780	69	4	420 000	890 000	17.3	560	670	68/630 69/630 60/630	646	764	3	71.3
	850	100	6	625 000	1 350 000	16.7	530	630		656	824	5	163
	920	128	7.5	750 000	1 620 000	16.4	480	600		662	888	6	285
670	820	69	4	435 000	965 000	17.4	500	630	68/670 69/670 60/670	686	804	3	75.4
	900	103	6	675 000	1 460 000	16.7	480	560		696	874	5	181
	980	136	7.5	765 000	1 730 000	16.6	450	530		702	948	6	351
710	870	74	4	480 000	1 100 000	17.4	480	560	68/710 69/710	726	854	3	92.6
	950	106	6	715 000	1 640 000	16.8	450	530		736	924	5	208
750	920	78	5	525 000	1 260 000	17.4	430	530	68/750 69/750	770	900	4	110
	1 000	112	6	785 000	1 840 000	16.7	400	500		776	974	5	245
800	980	82	5	530 000	1 310 000	17.5	400	480	68/800 69/800	820	960	4	132
	1 060	115	6	825 000	2 050 000	16.8	380	450		826	1 034	5	275

Note (1) When heavy axial loads are applied, increase d_a and decrease D_a from the above values.

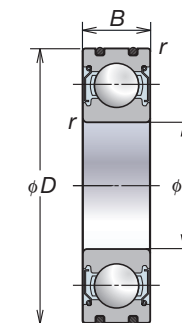
■ CREEP-FREE BEARINGS™
Bore Diameter 10 – 100 mm

Bearing bore diameter <i>d</i> (mm)	Bearing outer diameter <i>D</i> (mm)	Bearing width <i>B</i> (mm)	Basic load ratings		Recommended fits ⁽¹⁾
			<i>C_r</i> (N)	<i>C_{0r}</i> (N)	
10	26	8	4 550	1 970	H7 or G6
	30	9	5 100	2 390	
	35	11	8 100	3 450	
12	28	8	5 100	2 370	
	32	10	6 800	3 050	
	37	12	9 700	4 200	
15	32	9	5 600	2 830	
	35	11	7 650	3 750	
	42	13	11 400	5 450	
17	35	10	6 000	3 250	
	40	12	9 550	4 800	
	47	14	13 600	6 650	
20	42	12	9 400	5 000	
	47	14	12 800	6 600	
	52	15	15 900	7 900	
25	47	12	10 100	5 850	
	52	15	14 000	7 850	
	62	17	20 600	11 200	
30	55	13	13 200	8 300	
	62	16	19 500	11 300	
	72	19	26 700	15 000	
35	62	14	16 000	10 300	
	72	17	25 700	15 300	
	80	21	33 500	19 200	
40	68	15	16 800	11 500	
	80	18	29 100	17 900	
	90	23	40 500	24 000	
45	75	16	20 900	15 200	
	85	19	31 500	20 400	
	100	25	53 000	32 000	
50	80	16	21 800	16 600	
	90	20	35 000	23 200	
	110	27	62 000	38 500	
55	90	18	28 300	21 200	
	100	21	43 500	29 300	
	120	29	71 500	44 500	
60	95	18	29 500	23 200	
	110	22	52 500	36 000	
	130	31	82 000	52 000	
65	100	18	30 500	25 200	
	120	23	57 500	40 000	
	140	33	92 500	60 000	
70	110	20	38 000	31 000	
	125	24	62 000	44 000	
	150	35	104 000	68 000	
75	115	20	39 500	33 500	
	130	25	66 000	49 500	
80	125	22	47 500	40 000	
	140	26	72 500	53 000	
85	130	22	49 500	43 000	
	150	28	84 000	62 000	
90	140	24	58 000	50 000	
95	145	24	60 500	54 000	
100	150	24	60 000	54 000	

Notes ⁽¹⁾ Although recommended fits are H7 or G6, G6 is recommended when used under conditions that prioritize insertion under light pre-load.

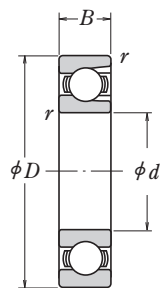
⁽²⁾ Low-contact seal available for seal type bearings, Contact NSK for details.

Bearing number			
Basic number(Open type)	Shield type	Contact seal type ⁽²⁾	Non-contact seal type
6000 6200 6300	ZZ	DDU	VV
6001 6201 6301	ZZ	DDU	VV
6002 6202 6302	ZZ	DDU	VV
6003 6203 6303	ZZ	DDU	VV
6004 6204 6304	ZZ	DDU	VV
6005 6205 6305	ZZ	DDU	VV
6006 6206 6306	ZZ	DDU	VV
6007 6207 6307	ZZ	DDU	VV
6008 6208 6308	ZZ	DDU	VV
6009 6209 6309	ZZ	DDU	VV
6010 6210 6310	ZZ	DDU	VV
6011 6211 6311	ZZ	DDU	VV
6012 6212 6312	ZZ	DDU	VV
6013 6213 6313	ZZ	DDU	VV
6014 6214 6314	ZZ	DDU	VV
6015 6215	ZZ	DDU	VV
6016 6216	ZZ	DDU	VV
6017 6217	ZZ	DDU	VV
6018	ZZ	DDU	VV
6019	ZZ	DDU	VV
6020	ZZ	DDU	VV



MAXIMUM TYPE BALL BEARINGS

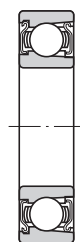
Bore Diameter 25 – 110 mm



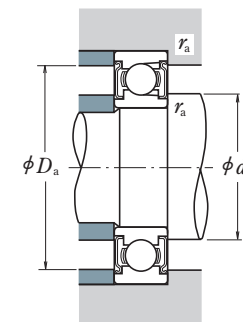
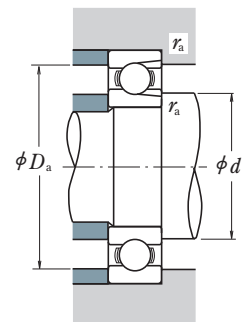
Open Type



Shielded Type
(One Shield) Z



Shielded Type
(Two Shields) ZZ

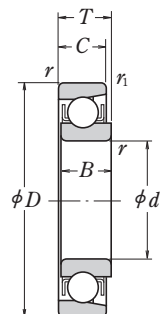


Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers			Abutment and Fillet Dimensions (mm)				Mass (kg)
d	D	B	r min.	C _r	C _{0r}	Grease Open Z · ZZ	Oil Open Z	Open	With One Shielded	With Two Shields	d _a min.	d _b max.	D _a max.	r _a max.	approx.
25	52	15	1	14 400	10 500	12 000	15 000	BL 205	BL 205 Z	BL 205 ZZ	30	32	47	1	0.133
	62	17	1.1	21 500	15 500	11 000	13 000				31.5	36	55.5	1	0.246
30	62	16	1	21 000	16 300	10 000	12 000	BL 206	BL 206 Z	BL 206 ZZ	35	38.5	57	1	0.215
	72	19	1.1	27 900	20 700	9 000	11 000				36.5	42	65.5	1	0.364
35	72	17	1.1	27 800	22 100	9 000	11 000	BL 207	BL 207 Z	BL 207 ZZ	41.5	44.5	65.5	1	0.307
	80	21	1.5	37 000	29 100	8 000	9 500				43	44.5	72	1.5	0.486
40	80	18	1.1	35 500	28 800	8 000	9 500	BL 208	BL 208 Z	BL 208 ZZ	46.5	50	73.5	1	0.394
	90	23	1.5	46 500	36 000	7 500	9 000				48	52.5	82	1.5	0.685
45	85	19	1.1	37 000	32 000	7 500	9 000	BL 209	BL 209 Z	BL 209 ZZ	51.5	55.5	78.5	1	0.449
	100	25	1.5	55 500	44 000	6 300	8 000				53	61.5	92	1.5	0.883
50	90	20	1.1	39 000	35 000	6 700	8 500	BL 210	BL 210 Z	BL 210 ZZ	56.5	60	83.5	1	0.504
	110	27	2	65 000	52 500	6 000	7 100				59	68	101	2	1.16
55	100	21	1.5	48 000	44 000	6 300	7 500	BL 211	BL 211 Z	BL 211 ZZ	63	66.5	92	1.5	0.667
	120	29	2	75 000	61 500	5 600	6 700				64	72.5	111	2	1.49
60	110	22	1.5	58 000	54 000	5 600	6 700	BL 212	BL 212 Z	BL 212 ZZ	68	74.5	102	1.5	0.856
	130	31	2.1	85 500	71 500	5 000	6 000				71	79	119	2	1.88
65	120	23	1.5	63 500	60 000	5 300	6 300	BL 213	BL 213 Z	BL 213 ZZ	73	80	112	1.5	1.09
	140	33	2.1	103 000	89 500	4 800	5 600				76	85.5	129	2	2.36
70	125	24	1.5	69 000	66 000	5 000	6 000	BL 214	BL 214 Z	BL 214 ZZ	78	84	117	1.5	1.19
	150	35	2.1	115 000	102 000	4 300	5 300				81	92	139	2	2.87
75	130	25	1.5	72 000	72 000	4 500	5 600	BL 215	BL 215 Z	BL 215 ZZ	83	90	122	1.5	1.29
	160	37	2.1	126 000	116 000	4 000	5 000				86	98.5	149	2	3.43
80	140	26	2	84 000	85 000	4 300	5 300	BL 216	BL 216 Z	BL 216 ZZ	89	95.5	131	2	1.61
	170	39	2.1	136 000	130 000	3 800	4 500				91	104.5	159	2	4.08
85	150	28	2	93 000	93 000	4 000	5 000	BL 217	BL 217 Z	BL 217 ZZ	94	102	141	2	1.97
	180	41	3	147 000	145 000	3 600	4 300				98	110.5	167	2.5	4.77
90	160	30	2	107 000	107 000	3 800	4 500	BL 218	BL 218 Z	BL 218 ZZ	99	107.5	151	2	2.43
	190	43	3	158 000	161 000	3 400	4 000				103	117	177	2.5	5.45
95	170	32	2.1	121 000	123 000	3 600	4 300	BL 219	BL 219 Z	BL 219 ZZ	106	114	159	2	2.95
	200	45	3	169 000	178 000	2 800	3 600				108	124	187	2.5	6.4
100	180	34	2.1	136 000	140 000	3 400	4 000	BL 220	BL 220 Z	BL 220 ZZ	111	121.5	169	2	3.54
105	190	36	2.1	148 000	157 000	3 200	3 800	BL 221	BL 221 Z	BL 221 ZZ	116	127.5	179	2	4.23
110	200	38	2.1	160 000	176 000	2 800	3 400	BL 222	—	—	121	—	189	2	4.84

Remark When using Maximum Type Ball Bearings, please contact NSK.

MAGNETO BEARINGS

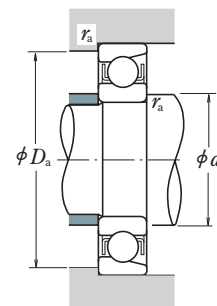
Bore Diameter 4 – 20 mm



Outside Diameter Tolerance (Class N)

Units : μm

Nominal Outside Diameter D (mm)	Single Plane Mean Outside Diameter ΔD _{mp}					
			E Series		EN Series	
	Over	Incl.	High	Low	High	Low
—	10	+ 8	0	0	— 8	
10	18	+ 8	0	0	— 8	
18	30	+ 9	0	0	— 9	
30	50	+11	0	0	—11	



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$		e
X	Y	X	Y	
1	0	0.5	2.5	0.2

Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers		Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B,C,T	r min.	r ₁ min.	C _r	C _{0r}	Grease	Oil	E Series	EN Series	d _a min.	D _a max.	r _a max.	approx.
4	16	5	0.15	0.1	1 650	288	34 000	40 000	E 4	EN 4	5.2	14.8	0.15	0.005
5	16	5	0.15	0.1	1 650	288	34 000	40 000	E 5	EN 5	6.2	14.8	0.15	0.004
6	21	7	0.3	0.15	2 490	445	30 000	36 000	E 6	EN 6	8	19	0.3	0.011
7	22	7	0.3	0.15	2 490	445	30 000	36 000	E 7	EN 7	9	20	0.3	0.013
8	24	7	0.3	0.15	3 450	650	28 000	34 000	E 8	EN 8	10	22	0.3	0.014
9	28	8	0.3	0.15	4 550	880	24 000	30 000	E 9	EN 9	11	26	0.3	0.022
10	28	8	0.3	0.15	4 550	880	24 000	30 000	E 10	EN 10	12	26	0.3	0.021
11	32	7	0.3	0.15	4 400	845	22 000	26 000	E 11	EN 11	13	30	0.3	0.029
12	32	7	0.3	0.15	4 400	845	22 000	26 000	E 12	EN 12	14	30	0.3	0.028
13	30	7	0.3	0.15	4 400	845	22 000	26 000	E 13	EN 13	15	28	0.3	0.021
14	35	8	0.3	0.15	5 800	1 150	19 000	22 000	—	EN 14	16	33	0.3	0.035
15	35	8	0.3	0.15	5 800	1 150	19 000	22 000	E 15	EN 15	17	33	0.3	0.034
	40	10	0.6	0.3	7 400	1 500	17 000	20 000	BO 15	—	19	36	0.6	0.055
16	38	10	0.6	0.2	6 900	1 380	17 000	22 000	—	EN 16	20	34	0.6	0.049
17	40	10	0.6	0.3	7 400	1 500	17 000	20 000	L 17	—	21	36	0.6	0.051
	44	11	0.6	0.3	7 350	1 500	16 000	19 000	—	EN 17	21	40	0.6	0.080
	44	11	0.6	0.3	7 350	1 500	16 000	19 000	BO 17	—	21	40	0.6	0.080
18	40	9	0.6	0.2	5 050	1 030	17 000	20 000	—	EN 18	22	36	0.6	0.051
19	40	9	0.6	0.2	5 050	1 030	17 000	20 000	E 19	EN 19	23	36	0.6	0.049
20	47	12	1	0.6	11 000	2 380	14 000	17 000	E 20	EN 20	25	42	1	0.089
	47	14	1	0.6	11 000	2 380	14 000	17 000	L 20	—	25	42	1	0.101

- Remarks**
1. The outside diameters of Magneto Bearings Series E always have plus tolerances.
 2. When using Magneto Bearings other than E, please contact NSK.

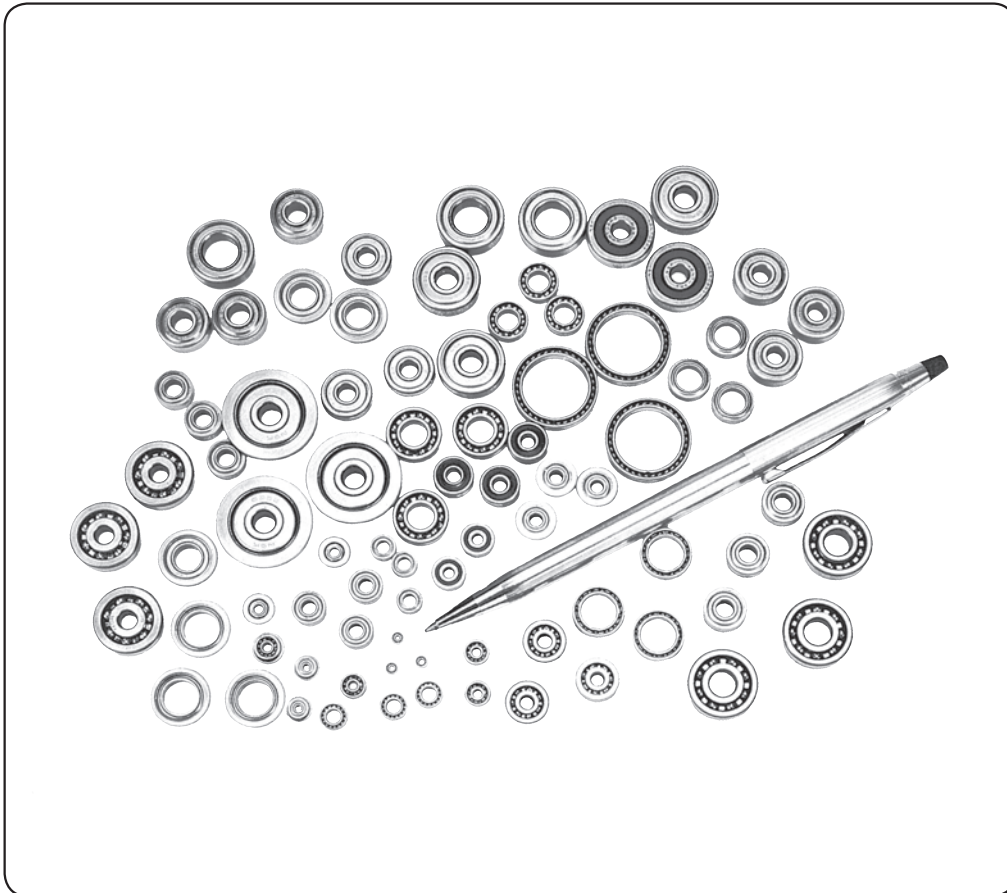
2. EXTRA SMALL BALL BEARINGS AND MINIATURE BALL BEARINGS

INTRODUCTION C 054

BEARINGS TABLE

EXTRA SMALL BALL BEARINGS · MINIATURE BALL BEARINGS

Metric Design	Bore Diameter 1 – 9mm	C 058
With Flange	Bore Diameter 1 – 9mm	C 062
Inch Design	Bore Diameter 1.016 – 9.525mm	C 066
With Flange	Bore Diameter 1.191 – 9.525mm	C 068



DESIGN AND TYPES

The size ranges of extra small and miniature ball bearings are shown in Table 1. The design, types, and type symbols are shown in Table 2. Those types among them that are listed in the bearing tables are indicated by the shading ■ in Table 2.

Table 1 Size Ranges of Bearings Units : mm

Design	Extra Small Ball Bearings	Miniature Ball Bearings
Metric	Outside diameter $D \geq 9$ Bore diameter $d < 10$	Outside diameter $D < 9$
Inch	Outside diameter $D \geq 9.525$ Bore diameter $d < 10$	Outside diameter $D < 9.525$

Please refer to NSK Miniature Ball Bearings (CAT. No. E126) for details.

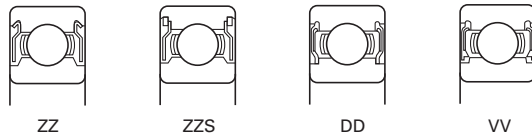


Table 2 Design, Types, and Type Symbols

Design · Types	Type Symbols				Remarks	
	Metric	Inch	Special			
			Metric	Inch		
Single-Row Deep Groove Ball Bearings		6○○	R	MR	—	Shielded · sealed bearings are available.
	Thin section 	—	—	SMT	—	
	With flange 	F6○○	FR	MF	—	Shielded · sealed bearings are available.
	Extended inner ring 	—	—	—	RW	Shielded bearings are available.
	With flange and extended inner ring 	—	—	—	FRW	Shielded bearings are available.
	For synchro motors 	—	—	—	SR00X00	Shielded bearings are available.
	Pivot Ball Bearings 	—	—	BCF	—	
	Thrust Ball Bearings 	—	—	F	—	

Remark Single-row angular contact ball bearings are available besides those shown above.

TOLERANCES AND RUNNING ACCURACY

METRIC DESIGN BEARINGS Table 7.2(Pages A128 to A131)

The flange tolerances for metric design bearings are listed in Table 3.

Table 3 Flange Tolerances for Metric Flanged Bearings

(1) Tolerances of Flange Outside Diameter Units : μm

Nominal Flange Outside Diameter D_f (mm)		Deviation of Flange Outside Diameter ΔD_{fs}			
		①		②	
over	incl.	high	low	high	low
	10	+220	-36	0	-36
	18	+270	-43	0	-43
	30	+330	-52	0	-52

Remarks ② is applied when the flange outside diameter is used for positioning.

(2) Flange Width Tolerances and Running Accuracies Related to Flange Units : μm

Nominal Bearing Outside Diameter D (mm)		Deviation of Flange Width ΔC_{1s}		Variation of Flange Width ΔC_{1s}			Variation of Bearing Outside Surface Generatrix Inclination with Flange Backface S_{D1}			Flange Backface Runout with Raceway S_{ea1}		
over	incl.	high	low	max.			max.			max.		
2.5 ⁽¹⁾	6	Use the ΔB_s tolerance for d of the same bearing of the same class	Use the ΔV_{BS} tolerance for d of the same bearing of the same class	5	2.5	1.5	8	4	1.5	11	7	3
6	18			5	2.5	1.5	8	4	1.5	11	7	3
18	30			5	2.5	1.5	8	4	1.5	11	7	3

Notes ⁽¹⁾ 2.5 mm is included

INCH DESIGN BEARINGS Table 7.2 (Pages A128 to A131)

The flange tolerances for inch design flanged bearings are listed in Table 7.9(2) (Pages A146 and A147).

INSTRUMENT BALL BEARINGS Table 7.9 (Pages A146 and A147)

RECOMMENDED FITS

Please refer to NSK Miniature Ball Bearings (CAT.No.E126).

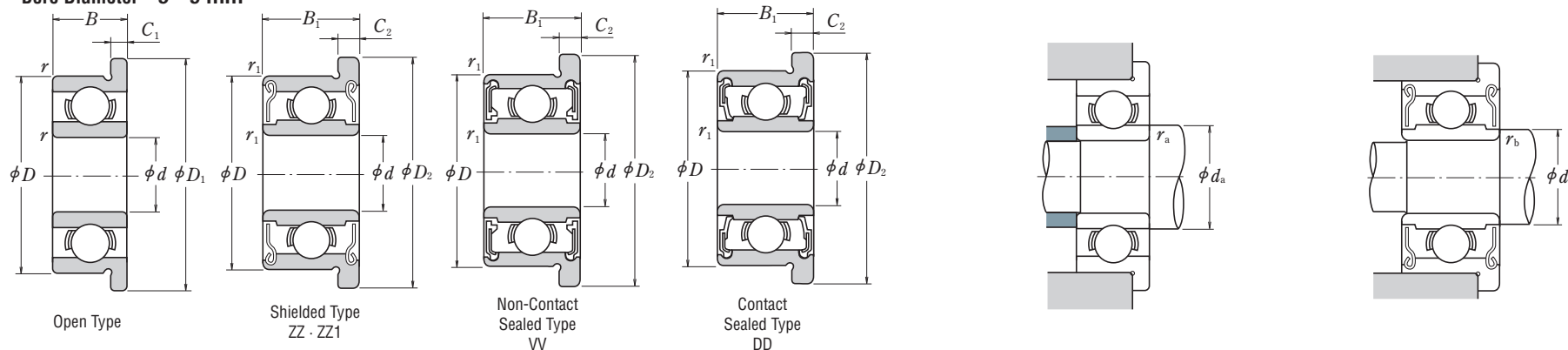
INTERNAL CLEARANCES Table 8.11 (Page A169)

LIMITING SPEEDS

The limiting speeds listed in the bearing tables should be adjusted depending on the bearing load conditions. Also, higher speeds are attainable by making changes in the lubrication method, cage design, etc. Refer to Page A098 for detailed information.

EXTRA SMALL BALL BEARINGS · MINIATURE BALL BEARINGS

Metric Design With Flange
Bore Diameter 5 – 9 mm



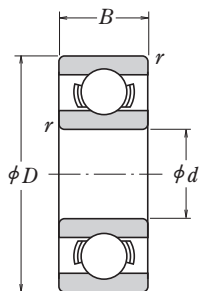
d	Boundary Dimensions (mm)									Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)			Bearing Numbers			Abutment and Fillet Dimensions (mm)				Mass (g)			
	D	D ₁	D ₂	B	B ₁	C ₁	C ₂	r min.	r ₁ min.	C _r	C _{0r}	Grease	Oil	Open	Shielded	Sealed	d _a min.	d _b max.	r _a max.	r _b max.	approx. Open	Shielded			
5	8	9.2	—	2	—	0.6	—	0.1	—	310	120	53 000	—	63 000	MF 85	—	—	5.8	—	0.1	—	0.33	—		
	8	—	9.2	—	2.5	—	0.6	—	0.1	278	131	53 000	—	63 000	—	MF 85 ZZ	—	—	—	5.8	—	0.1	—	0.41	
	9	10.2	10.2	2.5	3	0.6	0.6	0.15	0.15	430	168	50 000	—	60 000	MF 95	MF 95 ZZ1	—	—	6.2	6.0	0.15	0.15	0.59	0.66	
	10	11.2	11.6	3	4	0.6	0.8	0.15	0.15	430	168	50 000	—	60 000	MF 105	MF 105 ZZ	—	—	6.2	6.0	0.15	0.15	1.05	1.46	
	11	12.5	12.5	3	5	0.8	1	0.15	0.15	715	281	45 000	—	53 000	F 685	F 685 ZZ	—	—	6.2	6.2	0.15	0.15	1.37	2.18	
	13	15	15	4	4	1	1	0.2	0.2	1 080	430	43 000	40 000	50 000	F 695	F 695 ZZ	VV	DD	6.6	6.6	0.2	0.2	2.79	2.84	
	14	16	16	5	5	1	1	0.2	0.2	1 330	505	40 000	38 000	50 000	F 605	F 605 ZZ	—	DD	6.6	6.9	0.2	0.2	3.9	3.85	
	16	18	18	5	5	1	1	0.3	0.3	1 730	670	36 000	32 000	43 000	F 625	F 625 ZZ1	VV	DD	7.0	7.5	0.3	0.3	5.37	5.27	
	19	22	22	6	6	1.5	1.5	0.3	0.3	2 340	885	32 000	30 000	40 000	F 635	F 635 ZZ1	VV	DD	7.0	8.5	0.3	0.3	9.49	9.49	
	6	10	11.2	11.2	2.5	3	0.6	0.6	0.15	0.1	495	218	45 000	—	53 000	MF 106	MF 106 ZZ1	—	—	7.2	7.0	0.15	0.1	0.65	0.77
		12	13.2	13.6	3	4	0.6	0.8	0.2	0.15	715	292	43 000	40 000	50 000	MF 126	MF 126 ZZ	—	DD	7.6	7.2	0.2	0.15	1.38	1.94
		13	15	15	3.5	5	1	1.1	0.15	0.15	1 080	440	40 000	38 000	50 000	F 686 A	F 686 AZZ	VV	DD	7.2	7.4	0.15	0.15	2.25	3.04
15		17	17	5	5	1.2	1.2	0.2	0.2	1 730	670	40 000	36 000	45 000	F 696	F 696 ZZ1	VV	DD	7.6	7.9	0.2	0.2	4.34	4.26	
17		19	19	6	6	1.2	1.2	0.3	0.3	2 260	835	38 000	34 000	45 000	F 606	F 606 ZZ	VV	DD	8.0	8.2	0.3	0.3	6.58	6.61	
19		22	22	6	6	1.5	1.5	0.3	0.3	2 340	885	32 000	30 000	40 000	F 626	F 626 ZZ1	VV	DD	8.0	8.5	0.3	0.3	9.09	9.09	
22		25	25	7	7	1.5	1.5	0.3	0.3	3 300	1 370	30 000	28 000	36 000	F 636	F 636 ZZ	VV	DD	8.0	10.5	0.3	0.3	14.6	14.7	
7		11	12.2	12.2	2.5	3	0.6	0.6	0.15	0.1	455	201	43 000	—	50 000	MF 117	MF 117 ZZ	—	—	8.2	8.0	0.15	0.1	0.72	0.82
		13	14.2	14.6	3	4	0.6	0.8	0.2	0.15	540	276	40 000	—	48 000	MF 137	MF 137 ZZ	—	—	8.6	9.0	0.2	0.15	1.7	2.23
		14	16	16	3.5	5	1	1.1	0.15	0.15	1 170	510	40 000	34 000	45 000	F 687	F 687 ZZ1	VV	DD	8.2	8.5	0.15	0.15	2.48	3.37
		17	19	19	5	5	1.2	1.2	0.3	0.3	1 610	715	36 000	28 000	43 000	F 697	F 697 ZZ1	VV	DD	9.0	10.2	0.3	0.3	5.65	5.65
		19	22	22	6	6	1.5	1.5	0.3	0.3	2 340	885	36 000	32 000	43 000	F 607	F 607 ZZ1	VV	DD	9.0	9.1	0.3	0.3	8.66	8.66
	22	25	25	7	7	1.5	1.5	0.3	0.3	3 300	1 370	30 000	28 000	36 000	F 627	F 627 ZZ	VV	DD	9.0	10.5	0.3	0.3	14.2	14.2	
8	12	13.2	13.6	2.5	3.5	0.6	0.8	0.15	0.1	545	274	40 000	—	48 000	MF 128	MF 128 ZZ1	—	—	9.2	9.0	0.15	0.1	0.82	1.15	
	14	15.6	15.6	3.5	4	0.8	0.8	0.2	0.15	820	385	38 000	32 000	45 000	MF 148	MF 148 ZZ	VV	DD	9.6	9.2	0.2	0.15	2.09	2.39	
	16	18	18	4	5	1	1.1	0.2	0.2	1 610	710	36 000	30 000	43 000	F 688 A	F 688 AZZ	VV	DD	9.6	10.2	0.2	0.2	3.54	4.47	
	19	22	22	6	6	1.5	1.5	0.3	0.3	2 240	910	36 000	28 000	43 000	F 698	F 698 ZZ	VV	DD	10.0	10.0	0.3	0.3	8.35	8.3	
	22	25	25	7	7	1.5	1.5	0.3	0.3	3 300	1 370	34 000	28 000	40 000	F 608	F 608 ZZ	VV	DD	10.0	10.5	0.3	0.3	13.4	13.5	
	9	17	19	19	4	5	1	1.1	0.2	0.2	1 330	665	36 000	24 000	43 000	F 689	F 689 ZZ1	VV	DD	10.6	11.5	0.2	0.2	3.97	4.91
20		23	23	6	6	1.5	1.5	0.3	0.3	1 720	840	34 000	24 000	40 000	F 699	F 699 ZZ1	VV	DD	11.0	12.0	0.3	0.3	9.51	9.51	

Remark When using bearings with a rotating outer ring, please contact NSK if they are shielded.

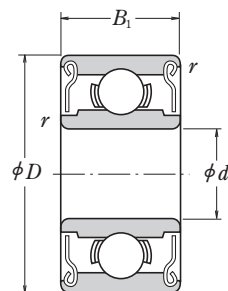
EXTRA SMALL BALL BEARINGS · MINIATURE BALL BEARINGS

Inch Design

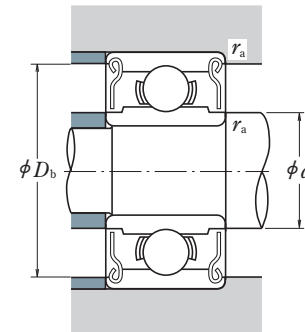
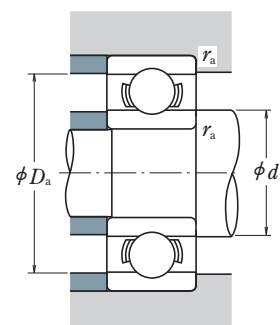
Bore Diameter 1.016 – 9.525 mm



Open Type



Shielded Type
ZZ · ZS



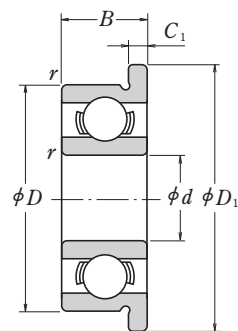
d	Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing	Numbers	Abutment and Fillet Dimensions (mm)					Mass (g)	
	D	B	B ₁	r min.	C _r	C _{0r}	Grease Open Z · ZZ	Oil Open Z			Open	Shielded	d _a min.	d _b max.	D _a max.	D _b min.	r _a max.
1.016	3.175	1.191	—	0.1	80	23	130 000	150 000	R 09	—	1.9	—	2.3	—	0.1	0.04	—
1.191	3.967	1.588	2.380	0.1	138	35	110 000	130 000	R 0	R 0 ZZ	2.0	1.9	3.1	3.5	0.1	0.09	0.11
1.397	4.762	1.984	2.779	0.1	231	66	90 000	110 000	R 1	R 1 ZZ	2.2	2.3	3.9	4.1	0.1	0.15	0.19
1.984	6.350	2.380	3.571	0.1	310	108	67 000	80 000	R 1-4	R 1-4 ZZ	2.8	3.9	5.5	5.9	0.1	0.35	0.50
2.380	4.762	1.588	—	0.1	188	60	80 000	95 000	R 133	—	3.2	—	3.9	—	0.1	0.10	—
	4.762	—	2.380	0.1	143	52	80 000	95 000	R 133 ZZS	R 133 ZZS	—	3.0	—	4.2	0.1	—	0.13
	7.938	2.779	3.571	0.15	550	175	60 000	71 000	R 1-5	R 1-5 ZZ	3.6	4.1	6.7	7.0	0.15	0.60	0.72
3.175	6.350	2.380	2.779	0.1	283	95	67 000	80 000	R 144	R 144 ZZ	4.0	3.9	5.5	5.9	0.1	0.25	0.27
	7.938	2.779	3.571	0.1	560	179	60 000	67 000	R 2-5	R 2-5 ZZ	4.0	4.3	7.1	7.3	0.1	0.55	0.72
	9.525	2.779	3.571	0.15	640	225	53 000	63 000	R 2-6	R 2-6 ZZS	4.4	4.6	8.3	8.2	0.15	0.96	1.13
3.175	9.525	3.967	3.967	0.3	630	218	56 000	67 000	R 2	R 2 ZZ	5.2	4.8	7.5	8.0	0.3	1.36	1.39
	12.700	4.366	4.366	0.3	640	225	53 000	63 000	R 2A	R 2A ZZ	5.2	4.6	10.7	8.2	0.3	3.3	3.23
	3.967	7.938	2.779	3.175	0.1	360	149	53 000	63 000	R 155	R 155 ZZS	4.8	5.5	7.1	7.3	0.1	0.51
4.762	7.938	2.779	3.175	0.1	360	149	53 000	63 000	R 156	R 156 ZZS	5.6	5.5	7.1	7.3	0.1	0.39	0.42
	9.525	3.175	3.175	0.1	710	270	50 000	60 000	R 166	R 166 ZZ	5.6	5.9	8.7	8.8	0.1	0.81	0.85
	12.700	3.967	4.978	0.3	1 300	485	43 000	53 000	R 3	R 3 ZZ	6.8	6.5	10.7	11.2	0.3	2.21	2.79
6.350	9.525	3.175	3.175	0.1	420	204	48 000	56 000	R 168B	R 168 BZZ	7.2	7.0	8.7	8.9	0.1	0.58	0.62
	12.700	3.175	4.762	0.15	1 080	440	40 000	50 000	R 188	R 188 ZZ	7.6	7.4	11.5	11.6	0.15	1.53	2.21
	15.875	4.978	4.978	0.3	1 610	660	38 000	45 000	R 4B	R 4B ZZ	8.4	8.4	13.8	13.8	0.3	4.5	4.43
7.938	19.050	5.558	7.142	0.4	2 620	1 060	36 000	43 000	R 4AA	R 4AA ZZ	9.4	9.0	16.0	16.6	0.4	7.48	9.17
	12.700	3.967	3.967	0.15	540	276	40 000	48 000	R 1810	R 1810 ZZ	9.2	9.0	11.5	11.6	0.15	1.56	1.48
	9.525	22.225	5.558	7.142	0.4	3 350	1 410	32 000	38 000	R 6	R 6 ZZ	12.6	11.9	19.2	20.0	0.4	9.02

- Remarks**
- When using bearings with a rotating outer ring, please contact NSK if they are shielded.
 - Bearings with double shields (ZZ, ZZS) are also available with single shields (Z, ZS).

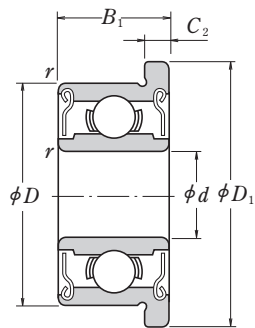
EXTRA SMALL BALL BEARINGS · MINIATURE BALL BEARINGS

Inch Design With Flange

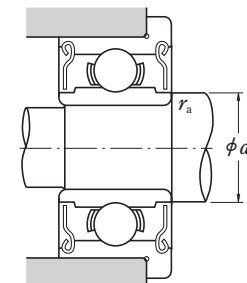
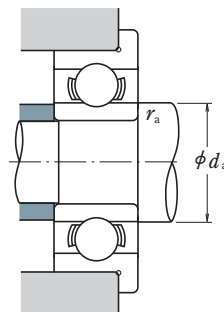
Bore Diameter 1.191 – 9.525 mm



Open Type



Shielded Type
ZZ · ZS



d	Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers		Abutment and Fillet Dimensions (mm)			Mass (g)	
	D	D ₁	B	B ₁	C ₁	C ₂	r _{min.}	C _r	C _{0r}	Grease Open Z · ZZ	Oil Open Z	Open	Shielded	d _a min.	d _b max.	r _a max.	approx. Open	Shielded
1.191	3.967	5.156	1.588	2.380	0.330	0.790	0.1	138	35	110 000	130 000	FR 0	FR 0 ZZ	2.0	1.9	0.1	0.11	0.16
1.397	4.762	5.944	1.984	2.779	0.580	0.790	0.1	231	66	90 000	110 000	FR 1	FR 1 ZZ	2.2	2.3	0.1	0.20	0.25
1.984	6.350	7.518	2.380	3.571	0.580	0.790	0.1	310	108	67 000	80 000	FR 1-4	FR 1-4 ZZ	2.8	3.9	0.1	0.41	0.58
2.380	4.762	5.944	1.588	—	0.460	—	0.1	188	60	80 000	95 000	FR 133	—	3.2	—	0.1	0.13	—
	4.762	5.944	—	2.380	—	0.790	0.1	143	52	80 000	95 000	—	FR 133 ZS	—	3.0	0.1	—	0.19
	7.938	9.119	2.779	3.571	0.580	0.790	0.15	550	175	60 000	71 000	FR 1-5	FR 1-5 ZZ	3.6	4.1	0.15	0.68	0.82
3.175	6.350	7.518	2.380	2.779	0.580	0.790	0.1	283	95	67 000	80 000	FR 144	FR 144 ZZ	4.0	3.9	0.1	0.31	0.35
	7.938	9.119	2.779	3.571	0.580	0.790	0.1	560	179	60 000	67 000	FR 2-5	FR 2-5 ZZ	4.0	4.3	0.1	0.62	0.81
	9.525	10.719	2.779	3.571	0.580	0.790	0.15	640	225	53 000	63 000	FR 2-6	FR 2-6 ZZ	4.4	4.6	0.15	1.04	1.25
	9.525	11.176	3.967	3.967	0.760	0.760	0.3	630	218	56 000	67 000	FR 2	FR 2 ZZ	5.2	4.8	0.3	1.51	1.55
3.967	7.938	9.119	2.779	3.175	0.580	0.910	0.1	360	149	53 000	63 000	FR 155	FR 155 ZS	4.8	5.5	0.1	0.59	0.67
4.762	7.938	9.119	2.779	3.175	0.580	0.910	0.1	360	149	53 000	63 000	FR 156	FR 156 ZS	5.6	5.5	0.1	0.47	0.53
	9.525	10.719	3.175	3.175	0.580	0.790	0.1	710	270	50 000	60 000	FR 166	FR 166 ZZ	5.6	5.9	0.1	0.90	0.98
	12.700	14.351	4.978	4.978	1.070	1.070	0.3	1 300	485	43 000	53 000	FR 3	FR 3 ZZ	6.8	6.5	0.3	2.97	3.09
6.350	9.525	10.719	3.175	3.175	0.580	0.910	0.1	420	204	48 000	56 000	FR 168B	FR 168 BZZ	7.2	7.0	0.1	0.66	0.75
	12.700	13.894	3.175	4.762	0.580	1.140	0.15	1 080	440	40 000	50 000	FR 188	FR 188 ZZ	7.6	7.4	0.15	1.64	2.49
	15.875	17.526	4.978	4.978	1.070	1.070	0.3	1 610	660	38 000	45 000	FR 4B	FR 4B ZZ	8.4	8.4	0.3	4.78	4.78
7.938	12.700	13.894	3.967	3.967	0.790	0.790	0.15	540	276	40 000	48 000	FR 1810	FR 1810 ZZ	9.2	9.0	0.15	1.71	1.63
9.525	22.225	24.613	7.142	7.142	1.570	1.570	0.4	3 350	1 410	32 000	38 000	FR 6	FR 6 ZZ	12.6	11.9	0.4	10.1	12.1

- Remarks**
1. When using bearings with a rotating outer ring, please contact NSK if they are shielded.
 2. Bearings with double shields (ZZ, ZS) are also available with single shields (Z, ZS).

3. ANGULAR CONTACT BALL BEARINGS

INTRODUCTION C 072

TECHNICAL DATA

Free Space of Angular Contact Ball Bearings..... C 078

**Dynamic Equivalent Load of
Triplex Angular Contact Ball Bearings**..... C 080

**Angular Clearances in Double-Row
Angular Contact Ball Bearings**..... C 082

**Relationship between Radial
and Axial Clearances in Double-Row
Angular Contact Ball Bearings**..... C 084

BEARINGS TABLE

Single-Row and Matched Angular Contact Ball Bearings

Bore Diameter 10 – 200 mm..... C 086

Double-Row Angular Contact Ball Bearings

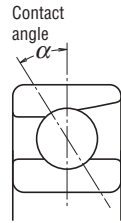
Bore Diameter 10 – 85 mm C 106

Four-Point Contact Ball Bearings

Bore Diameter 30 – 200 mm..... C 108



DESIGN, TYPES, AND FEATURES



SINGLE-ROW ANGULAR CONTACT BALL BEARINGS

Since these bearings have a contact angle, they can sustain significant axial loads in one direction together with radial loads. Because of their design, when a radial load is applied, an axial force component is produced; therefore, two opposed bearings or a combination of more than two must be used.

Since the rigidity of single-row angular contact ball bearings can be increased by preloading, they are often used in the main spindles of machine tools, for which high running accuracy is required. (Refer to Chapter 9, Preload, Page A192).

Usually, the cages for angular contact ball bearings with a contact angle of 30° (Symbol **A**) or 40° (Symbol **B**) are in accordance with Table 1, but depending on the application, machined synthetic resin cages or molded polyamide resin cages are also used. The basic load ratings given in the bearing tables are based on the standard cages.

Though the figures in the bearing tables (Pages C086 to C101; bearing bore diameters of 10 to 120) show bearings with single-shoulder-type inner rings, both-shoulder-type bearings are also available. Please consult NSK for more detailed information.

Table 1 Features of Single-Row Angular Contact Ball Bearings

Cage	Material	Steel	Nylon 46		L-PPS resin	Brass	
		pressed	Molded		Molded	machined	
			W	TYN		T85	T7
Features	High Load Capacity	◎	○	◎	◎	○	◎
	High-Speed	△	◎	○	○	△	○
	High-Temperature	◎	△	△	◎	◎	◎
	Vibration	△	△	△	△	◎	◎

In addition, for bearings with the same serial number, if the type of cages are different, the number of balls may also be different. In such a case, the load rating will differ from the one listed in the bearing tables.

Angular Contact Ball Bearings with contact angles of 15° (Symbol **C**) and 25° (Symbol **A5**) are primarily for high precision or high speed applications, and molded polyamide cages (Symbol TYN) or machined brass cages or synthetic resin cages (Symbol T) are used.

The maximum operating temperature of molded polyamide cages is 150°C.

MATCHED ANGULAR CONTACT BALL BEARINGS

The types and features of matched angular contact ball bearings are shown in Table 2.

Table 2 Types and Features of Matched Angular Contact Ball Bearings

Figure	Arrangement	Features
	Back-to-back (DB) (Example) 7208 A DB	Radial loads and axial loads in both directions can be sustained. Since the distance between the effective load centers a_0 is big, this type is suitable if moments are applied.
	Face-to-face (DF) (Example) 7208 B DF	Radial loads and axial loads in both directions can be sustained. Compared with the DB Type, the distance between the effective load centers is small, so the capacity to sustain moments is inferior to the DB Type.
	Tandem (DT) (Example) 7208 A DT	Radial loads and axial loads in one direction can be sustained. Since two bearings share the axial load, this arrangement is used when the load in one direction is heavy.

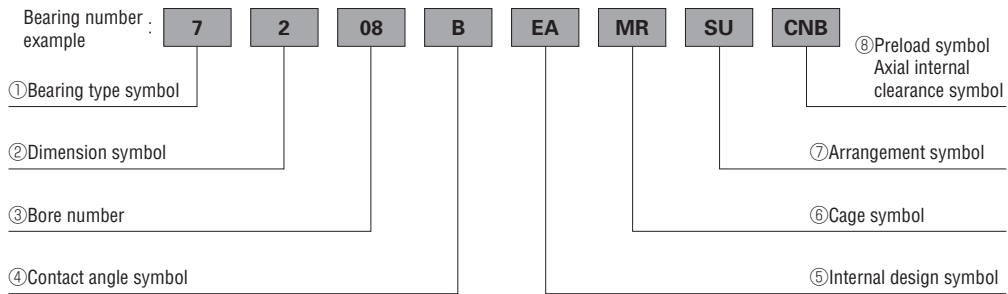
NSKHPS ANGULAR CONTACT BALL BEARINGS

In comparison with standard angular contact ball bearings, these bearings have high capacity, high limiting speed, and highly accurate universal matching as the features. The molded polyamide cages are standard specification for the HPS type.

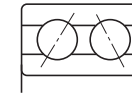
ANGULAR CONTACT BALL BEARINGS

Formulation of Bearing Numbers

Single-Row Angular Contact Ball Bearings Matched Angular Contact Ball Bearings



- ① Bearing type symbol 7 : Single-Row Angular Contact Ball Bearings, Matched Angular Contact Ball Bearings
- ② Dimension symbol 2 : 02 Series, 3 : 03 Series, 9 : 19 Series, 0 : 10 Series
- ③ Bore number Less than 03, Bearing bore 00 : 10mm, 01 : 12mm, 02 : 15mm, 03 : 17mm
Over 04, Bearing bore Bore number × 5 (mm)
- ④ Contact angle symbol C : 15°, A5 : 25°, A : 30°, B : 40°
- ⑤ Internal design symbol EA : High Load Capacity
- ⑥ Cage symbol W : Pressed Steel Cage, MR : Machined Brass Cage (Ball guided),
No symbol : Machined Brass Cage (Outer Ring guided), TYN : Polyamide Resin Cage,
T85 : Polyamide 46 Resin Cage, T7 : L-PPS Resin Cage
- ⑦ Arrangement symbol SU: Universal arrangement (Single row), DU : Universal arrangement (Double row),
DB : Back-to-back arrangement, DF : Face-to-face arrangement, DT : Tandem arrangement
- ⑧ Preload symbol Axial internal clearance symbol
EL : Extra light preload, L : Light preload, M : Medium preload, H : Heavy preload
Omitted : CN clearance, C3 : Clearance greater than CN, C4 : Clearance greater than C3,
CNB : CN Clearance equivalent (Universal arrangement)

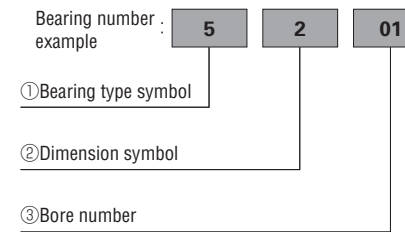


DOUBLE-ROW ANGULAR CONTACT BALL BEARINGS

This is basically a back-to-back mounting of two single-row angular contact ball bearings, but their inner and outer rings are each integrated into one. Axial loads in both directions can be sustained, and the capacity to sustain moments is good. This type is used as fixed-end bearings. Their cages are pressed steel.

Formulation of Bearing Numbers

Double-Row Angular Contact Ball Bearings



- ① Bearing type symbol 5 : Double-Row Angular Contact Ball Bearings
- ② Dimension symbol 2 : 02 Series
- ③ Bore number Less than 03, Bearing bore 00 : 10mm, 01 : 12mm, 02 : 15mm, 03 : 17mm
Over 04, Bearing bore Bore number × 5 (mm)

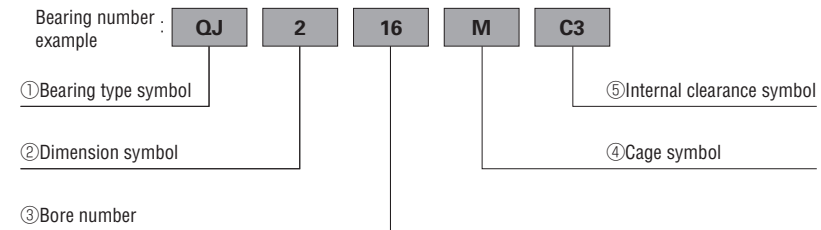


FOUR-POINT CONTACT BALL BEARINGS

The inner ring is split radially into two pieces. Their design allows one bearing to sustain significant axial loads in either direction. The contact angle is 35°, so the axial load capacity is high. This type is suitable for carrying pure axial loads or combined loads where the axial loads are high. The cages are made of machined brass.

Formulation of Bearing Numbers

Four-Point Contact Ball Bearings



- ① Bearing type symbol QJ : Four-Point Contact Ball Bearings
- ② Dimension symbol 10 : 10 Series, 2 : 02 Series, 3 : 03 Series
- ③ Bore number Less than 03, Bearing bore 00 : 10mm, 01 : 12mm, 02 : 15mm, 03 : 17mm
Over 04, Bearing bore Bore number × 5 (mm)
- ④ Cage symbol M : Machined Brass Cage
- ⑤ Internal clearance symbol C2 : Clearance less than CN, Omitted : CN clearance,
C3 : Clearance greater than CN, C4 : Clearance greater than C3

PRECAUTIONS FOR USE OF ANGULAR CONTACT BALL BEARINGS

Under severe operating conditions where the speed and temperature are close to their limits, lubrication is marginal, vibration and moment loads are heavy, they may not be suitable, particularly for certain types of cages. In such a case, please consult with NSK beforehand.

And if the load on angular contact ball bearings becomes too small, or if the ratio of the axial and radial loads for matched bearings exceeds 'e' (e is listed in the bearings tables) during operation, slippage occurs between the balls and raceways, which may result in smearing. Especially with large bearings since the weight of the balls and cage is high. If such load conditions are expected, please consult with NSK for selection of the bearings.

TOLERANCES AND RUNNING ACCURACY

- SINGLE-ROW ANGULAR CONTACT BALL BEARINGS** Table 7.2 (Pages A128 to A131)
- NSKHPS ANGULAR CONTACT BALL BEARINGS**
Tolerance for Dimensions: Class 6,
Running Accuracy: Class 5 Table 7.2 (Pages A128 to A131)
- MATCHED ANGULAR CONTACT BALL BEARINGS** Table 7.2 (Pages A128 to A131)
- DOUBLE-ROW ANGULAR CONTACT BALL BEARINGS** Table 7.2 (Pages A128 to A131)
- FOUR-POINT CONTACT BALL BEARINGS** Table 7.2 (Pages A128 to A131)

RECOMMENDED FITS

- SINGLE-ROW ANGULAR CONTACT BALL BEARINGS AND HPS ANGULAR CONTACT BALL BEARINGS** Table 8.3 (Page A164)
Table 8.5 (Page A165)
- MATCHED ANGULAR CONTACT BALL BEARINGS** Table 8.3 (Page A164)
Table 8.5 (Page A165)
- DOUBLE-ROW ANGULAR CONTACT BALL BEARINGS** Table 8.3 (Page A164)
Table 8.5 (Page A165)
- FOUR-POINT CONTACT BALL BEARINGS** Table 8.3 (Page A164)
Table 8.5 (Page A165)

INTERNAL CLEARANCES

MATCHED ANGULAR CONTACT BALL BEARINGS Table 8.18 (Page A174)

Matched angular contact ball bearings with precision better than P5 are primarily used in the main spindles of machine tools, so they are used with a preload for rigidity. For convenience of selection, internal clearances are adjusted to produce Very Light, Light, Medium, and Heavy Preloads. Their fitting is also special. Concerning these matters, please refer to Tables 9.1 and 9.5 (Pages A194 and A197).

The clearance (or preload) of matched bearings is obtained by axially tightening a pair of bearings till the side faces of their inner or outer rings are pressed against each other.

NSKHPS ANGULAR CONTACT BALL BEARINGS

Axial Internal Clearance (Measured Clearances) Units : μm

Nominal Bore Diameter d (mm)		Axial Internal Clearance			
		CNB		GA	
over	incl.	min.	max.	min.	max.
12	18	17	25	-2	6
18	30	20	28		
30	50	24	32		
50	80	29	41	-3	9

DOUBLE-ROW ANGULAR CONTACT BALL BEARINGS

For the clearance in double-row angular contact ball bearings, please consult with NSK.

FOUR-POINT CONTACT BALL BEARINGS Table 8.19 (Page A174)

LIMITING SPEEDS (Grease/Oil)

In cases of single-row and matched angular contact ball bearings, The limiting speeds (grease) and limiting speeds (oil) listed in the bearing table are for bearings with standard cage. For those with option cages, limiting speeds (grease/oil) may differ depending on cages. Please consult with NSK. For example, limiting speeds (grease/oil) of machined cage (No symbol) is 1.25 times higher than pressed cage.

The limiting speeds of bearings with contact angles of 15° (Symbol **C**) and 25° (Symbol **A5**) are for bearings with precision of P5 and better (with machined synthetic-resin cages (T) or molded polyamide cages (TYN)).

The limiting speeds listed in the bearing tables should be adjusted depending on the bearing load conditions. Also, higher speeds are attainable by making changes in the lubrication method, cage design, etc. Refer to Page A098 for detailed information.

ANGULAR CONTACT BALL BEARINGS

TECHNICAL DATA

Free Space of Angular Contact Ball Bearings

Angular contact ball bearings are used in various components, such as spindles of machine tools, vertical pump motors, and worm gear reducers.

This kind of bearing is used mostly with grease lubrication. But such grease lubrication may affect the bearing in terms of temperature rise or durability. To allow a bearing to demonstrate its full performance, it is essential to fill the bearing with the proper amount of a suitable grease. A prerequisite for this job is a knowledge of the bearing's free space.

The angular ball bearing is available in various kinds which are independent of the combinations of bearing series, contact angle, and cage type. The free space of the bearing used most frequently is described below. Table 1 shows the free space of a bearing with a pressed cage for general use and Table 2 shows that of a bearing with a high-tension brass machined cage. The contact angle symbols A, B, and C in each table refer to the nominal contact angle of 30°, 40°, and 15° of each bearing.

**Table 1 Free Space of Angular Contact Ball Bearing (1)
(With Pressed Steel Cage)**

Units: cm³

Bearing bore No.	Bearing free space			
	Bearing series — Contact angle symbol			
	72-A	72-B	73-A	73-B
00	1.5	1.4	2.9	2.8
01	2.1	2.0	3.7	3.5
02	2.8	2.7	4.8	4.6
03	3.7	3.6	6.2	5.9
04	6.2	5.9	8.4	8.0
05	7.8	7.4	13	12
06	12	11	20	19
07	16	15	26	24
08	20	19	36	34
09	25	24	48	45
10	28	27	63	60

**Table 2 Free Space of Angular Contact Ball Bearing (2)
(With High-Tension Brass Machined Cage)**

Units: cm³

Bearing bore No.	Bearing free space				
	Bearing series — Contact angle symbol				
	70-C	72-A 72-C	72-B	73-A 73-C	73-B
00	0.9	1.0	1.0	2.2	2.1
01	0.9	1.6	1.6	2.5	2.5
02	1.2	1.9	1.9	3.4	3.3
03	1.6	2.7	2.7	4.6	4.4
04	3.0	4.7	4.2	6.1	5.9
05	3.5	6.0	5.3	9.2	9.0
06	4.3	8.5	8.1	14	13
07	6.5	12	11	18	17
08	8.3	14	14	25	24
09	10	18	17	34	33
10	11	20	20	45	44
11	16	26	25	57	55
12	17	33	31	71	69
13	18	38	37	87	83
14	24	43	42	107	103
15	24	47	45	129	123
16	34	58	57	152	146
17	37	71	70	179	172
18	44	88	85	207	201
19	44	105	105	261	244
20	47	127	127	282	278

Dynamic Equivalent Load of Triplex Angular Contact Ball Bearings

Three separate single-row bearings may be used side by side as shown in the figure when angular contact ball bearings are to be used to carry a large axial load. There are three patterns of combination, which are expressed by combination symbols of DBD, DFD, and DTD.

As in the case of single-row and double-row bearings, the dynamic equivalent load, which is determined from the radial and axial loads acting on a bearing, is used to calculate the fatigue life for these combined bearings.

Assuming the dynamic equivalent radial load as P_r , the radial load as F_r , and axial load as F_a , the relationship between the dynamic equivalent radial load and bearing load may be approximated as follows:

$$P_r = XF_r + YF_a \quad (1)$$

where, X : Radial load factor
 Y : Axial load factor } See Table 1

The axial load factor varies with the contact angle. In an angular contact ball bearing, whose contact angle is small, the contact angle varies substantially when the axial load increases.

A change in the contact angle can be expressed by the ratio between the basic static load rating C_{0r} and axial load F_a . Accordingly, for the angular contact ball bearing with a contact angle of 15° , the axial load factor at a contact angle corresponding to this ratio is shown. If the angular contact ball bearings have contact angles of 25° , 30° and 40° , the effect of change in the contact angle on the axial load factor may be ignored and thus the axial load factor is assumed as constant.

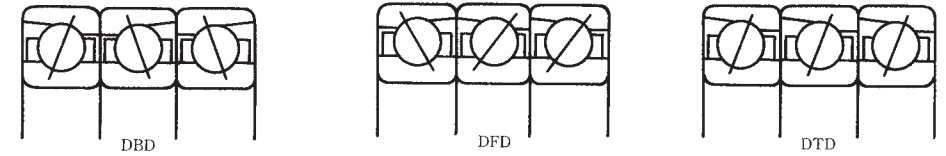


Table 1 Factors X and Y of Triplex Angular Contact Ball Bearing

Contact angle α	j	$\frac{C_{0r}}{jF_a}$	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$		e	Basic load rating of 3 row ball bearings	
			X	Y	X	Y		C_r	C_{0r}
15°	1.5	5	1	0.64	0.58	1.46	0.51	2.16 times of single bearing	3 times of single bearing
		10		0.70		1.61			
		15		0.74		1.70			
		20		0.76		1.75			
		25		0.78		1.81			
		30		0.80		1.83			
40	0.83	1.91							
25°	—	—	1	0.48	0.54	1.16	0.68		
30°	—	—	1	0.41	0.52	1.01	0.80		
40°	—	—	1	0.29	0.46	0.76	1.14		
15°	3	5	1	2.28	0.95	2.37	0.51	2.16 times of single bearing	3 times of single bearing
		10		2.51		2.61			
		15		2.64		2.76			
		20		2.73		2.85			
		25		2.80		2.93			
		30		2.85		2.98			
40	2.98	3.11							
25°	—	—	1	1.70	0.88	1.88	0.68		
30°	—	—	1	1.45	0.84	1.64	0.80		
40°	—	—	1	1.02	0.76	1.23	1.14		
15°	1	5	1	0	0.44	1.10	0.51	2.16 times of single bearing	3 times of single bearing
		10				1.21			
		15				1.28			
		20				1.32			
		25				1.36			
		30				1.38			
40	1.44								
25°	—	—	1	0	0.41	0.87	0.68		
30°	—	—	1	0	0.39	0.76	0.80		
40°	—	—	1	0	0.35	0.57	1.14		

Arrangement	Load direction
3 row matched stack, axial load is supported by 2 rows. (Symbol DBD or DFD)	 DBD
	 DFD
3 row matched stack, axial load is supported by 1 row. (Symbol DBD or DFD)	 DBD
	 DFD
3 row tandem matched stack (Symbol DTD)	 DTD

Angular Clearances in Double-Row Angular Contact Ball Bearings

The angular clearance in double-row bearings is defined in exactly the same way as for single-row bearings; i.e., with one of the bearing rings fixed, the angular clearance is the greatest possible angular displacement of the axis of the other ring.

Since the angular clearance is the greatest total relative displacement of the two ring axes, it is twice the possible angle of inner and outer ring movement (the maximum angular displacement in one direction from the center without creating a moment).

The relationship between axial and angular clearance for double-row angular contact ball bearings is given by Equation (1) below.

$$\Delta_a = 2m_0 \left\{ \sin\alpha_0 + \frac{\theta R_i}{2m_0} - \sqrt{1 - \left(\cos\alpha_0 + \frac{\theta l}{4m_0} \right)^2} \right\} \dots\dots\dots (1)$$

- where, Δ_a : Axial clearance (mm)
- m_0 : Distance between inner and outer ring groove curvature centers,
- $m_0 = r_o + r_i - D_w$ (mm)
- r_o : Outer-ring groove radius (mm)
- r_i : Inner-ring groove radius (mm)
- α_0 : Initial contact angle (°)
- θ : Angular clearance (rad)
- R_i : Distance between shaft center and inner-ring groove curvature center (mm)
- l : Distance between left and right groove centers of inner-ring (mm)

The above equation is shown plotted in Fig. 1 for NSK double-row angular contact ball bearings series 52, 53, 32, and 33.

The relationship between radial clearance Δ_r and axial clearance Δ_a for double-row angular contact ball bearings was explained in pages C086 and C087. Based on those equations, Fig. 2 shows the relationship between angular clearance θ and radial clearance Δ_r .

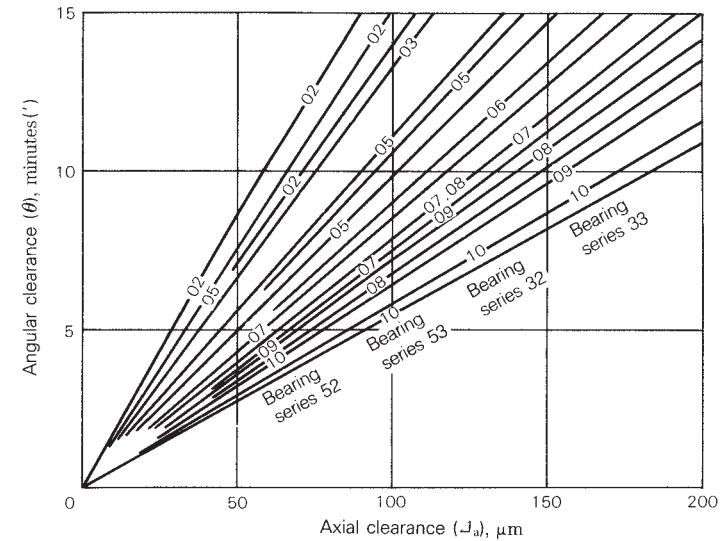


Fig. 1 Relationship between Axial and Angular Clearances

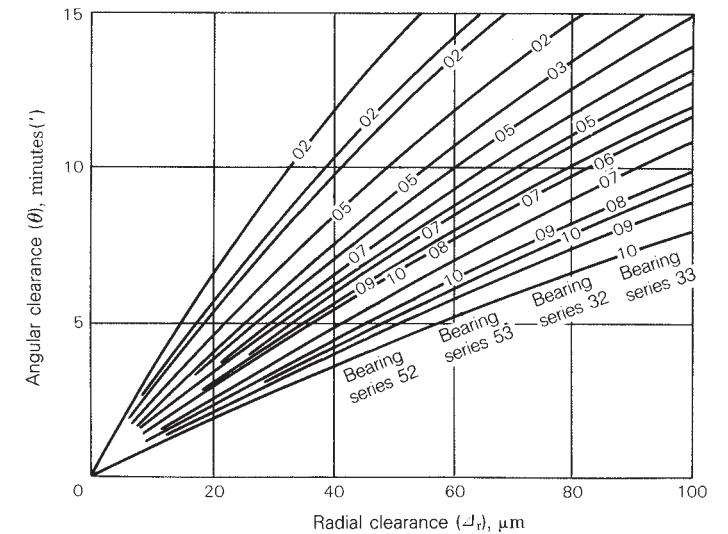


Fig. 2 Relationship between Radial and Angular Clearances

ANGULAR CONTACT BALL BEARINGS

Relationship between Radial and Axial Clearances in Double-Row Angular Contact Ball Bearings

The relationship between the radial and axial internal clearances in double-row angular contact ball bearings can be determined geometrically as shown in Fig. 1 below.

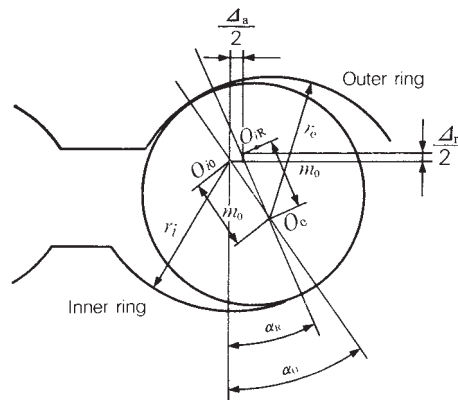


Fig. 1

- where, Δ_r : Radial clearance (mm)
- Δ_a : Axial clearance (mm)
- α_0 : Initial contact angle, inner or outer ring displaced axially
- α_R : Initial contact angle, inner or outer ring displaced radially
- O_e : Center of outer-ring groove curvature (outer ring fixed)
- O_i : Center of inner-ring groove curvature (inner ring displaced axially)
- O_{iR} : Center of inner-ring groove curvature (inner ring displaced radially)
- m_0 : Distance between inner and outer ring groove-curvature centers,
 $m_0 = r_i + r_e - D_w$
- D_w : Ball diameter (mm)
- r_i : Radius of inner-ring groove (mm)
- r_e : Radius of outer-ring groove (mm)

The following relations can be derived from Fig. 1:

$$m_0 \sin \alpha_0 = m_0 \sin \alpha_R + \frac{\Delta_a}{2} \quad (1)$$

$$m_0 \cos \alpha_0 = m_0 \cos \alpha_R + \frac{\Delta_r}{2} \quad (2)$$

since $\sin^2 \alpha_0 = 1 - \cos^2 \alpha_0$,
 $(m_0 \sin \alpha_0)^2 = m_0^2 - (m_0 \cos \alpha_0)^2 \quad (3)$

Combined Equations (1), (2), and (3), we obtain:

$$\left(m_0 \sin \alpha_R + \frac{\Delta_a}{2}\right)^2 = m_0^2 - \left(m_0 \cos \alpha_R + \frac{\Delta_r}{2}\right)^2 \quad (4)$$

$$\therefore \Delta_a = 2 \sqrt{m_0^2 - \left(m_0 \cos \alpha_R + \frac{\Delta_r}{2}\right)^2} - 2m_0 \sin \alpha_R \quad (5)$$

α_R is 25° for 52 and 53 series bearings and 32° for 32 and 33 series bearings. If we set α_R equal to 0°, Equation (5) becomes:

$$\begin{aligned} \Delta_a &= 2 \sqrt{m_0^2 - \left(m_0 - \frac{\Delta_r}{2}\right)^2} \\ &= 2 \sqrt{m_0 \Delta_r - \frac{\Delta_r^2}{4}} \end{aligned}$$

However, $\frac{\Delta_r^2}{4}$ is negligible.

$$\therefore \Delta_a \doteq 2m_0^{1/2} \Delta_r^{1/2} \quad (6)$$

This is identical to the relationship between the radial and axial clearances in single-row deep groove ball bearings.

The value of m_0 is dependent on the inner and outer ring groove radii. The relation between Δ_r and Δ_a , as given by Equation (5), is shown in Figs. 2 and 3 for NSK 52, 53, 32, and 33 series double-row angular contact ball bearings. When the clearance range is small, the axial clearance is given approximately by

$$\Delta_a \doteq \Delta_r \cot \alpha_R \quad (7)$$

However, when the clearance is relatively large, (when $\Delta_r/D_w > 0.002$) the error in Equation (7) can be quite large.

The contact angle α_R is independent of the radial

clearance; however, the initial contact angle α_0 varies with the radial clearance when the inner or outer ring is displaced axially. This relationship is given by Equation (2).

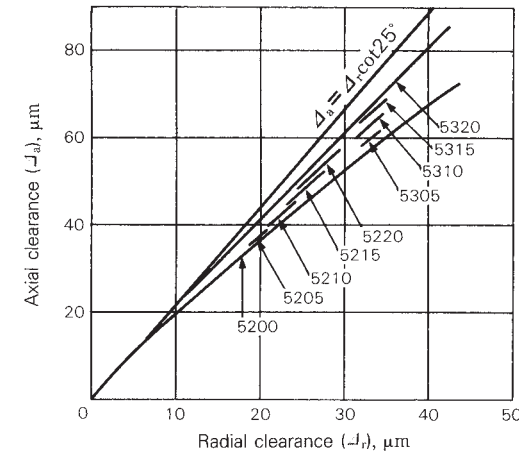


Fig. 2 Radial and Axial Clearances of Bearing Series 52 and 53

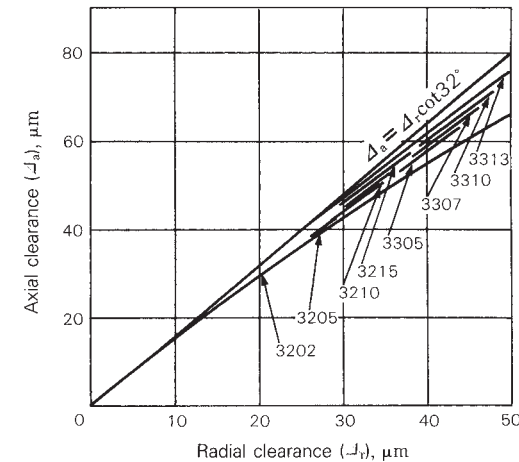
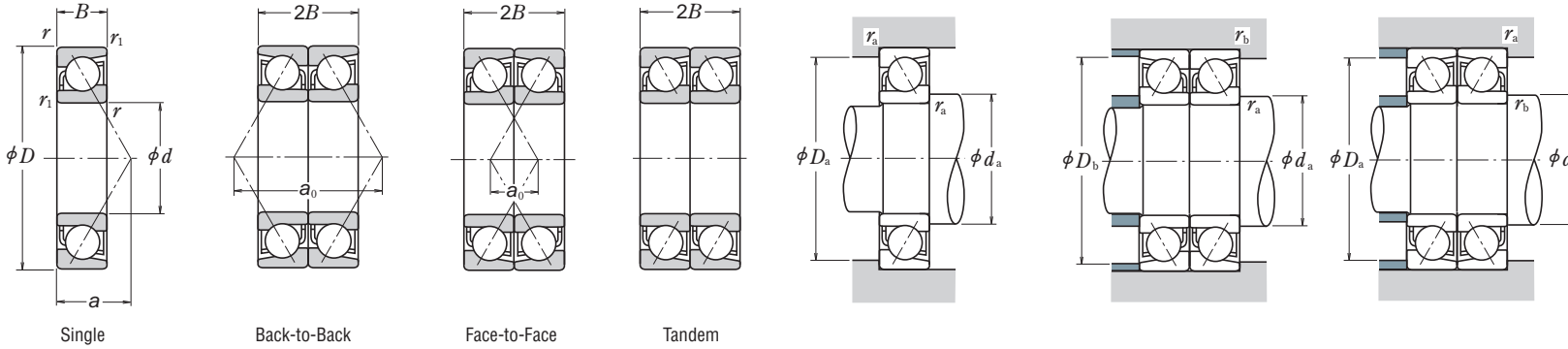


Fig. 3 Radial and Axial Clearances of Bearing Series 32 and 33

ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

Bore Diameter 10 - 15 mm



Dynamic Equivalent Load $P = X F_r + Y F_a$

Table with Contact Angle (15°, 25°, 30°, 40°) on the y-axis and load ratios (F_a/F_r) on the x-axis. It provides X and Y factors for Single, DB, and DF configurations.

*For i, use 2 for DB, DF and 1 for DT

Static Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

Table with Contact Angle (15°, 25°, 30°, 40°) on the y-axis and load ratios (F_a/F_r) on the x-axis. It provides X_0 and Y_0 factors for Single, DB, and DF configurations.

Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$

Main bearing specification table with columns for Boundary Dimensions (d, D, B, r, r1), Basic Load Ratings (Cr, Cor), Factor (f0), Limiting Speeds (Grease, Oil), Eff. Load Centers (a), Abutment and Fillet Dimensions (da, Da, ra), Mass (kg), Bearing Numbers (Cage Symbol, Duplex), Basic Load Ratings (Cr, Cor), Limiting Speeds (Grease, Oil), Load Center Spacings (DB, DF), and Abutment and Fillet Dimensions (db, Dd, rb).

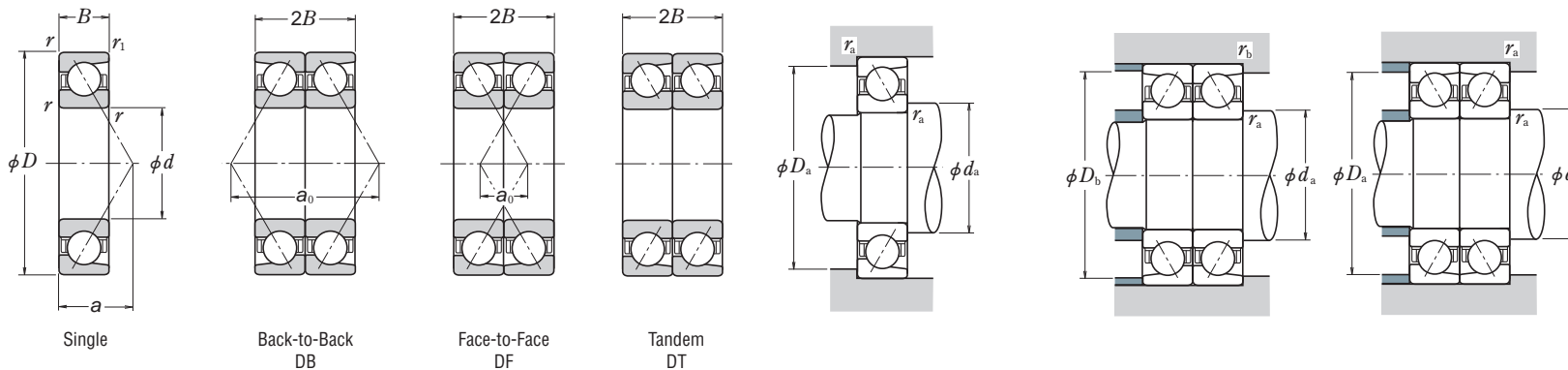
Notes (1) For applications operating near the limiting speed, refer to Page C077. (2) The suffixes A, A5, B, and C represent contact angles of 30°, 25°, 40°, and 15° respectively. (3) For bearings marked — in the column for da, db, and rb for shafts are da (min) and ra (max) respectively.

Note (4) (M) in the column of cage symbols are usually omitted from the bearing number. Remark The bearings denoted by an asterisk (*) are NSKHPST™ Angular contact ball bearings and the column of Duplex in Bearing Numbers indicates the universal matching.

ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

Bore Diameter 180 – 200 mm



Dynamic Equivalent Load $P = X F_r + Y F_a$

Contact Angle	$i f_0 F_a^*$ C_{0r}	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
30°	—	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

*For i , use 2 for DB, DF and 1 for DT

Static Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

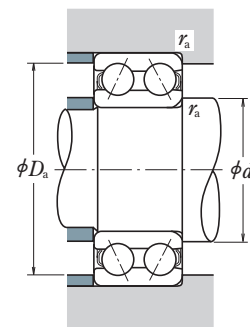
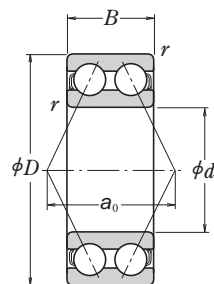
	Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor f_0	Limiting Speeds ⁽¹⁾ (min ⁻¹)		Eff. Load Centers (mm) a	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.	Bearing Numbers ⁽²⁾ Cage Symbol ⁽⁴⁾				Basic Load Ratings (Matched) (N)		Limiting Speeds ⁽¹⁾ (Matched) (min ⁻¹)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
	d	D	B	r min.	r_1 min.	C_r	C_{0r}		Grease	Oil		d_a min.	D_a max.	r_a max.		Single	Standard	Option	Duplex	C_r	C_{0r}	Grease	Oil	DB a_0	DF	d_b ⁽³⁾ min.	D_b max.	r_b ⁽³⁾ max.
	180	250	33	2	1	145 000	184 000		16.6	3 200		4 500	45.3	190		240	2	4.90	7936 C (M) —	DB DF DT	236 000	370 000	2 600	3 600	90.6	24.6	—	244
	280	46	2.1	1.1	207 000	252 000	—	1 900	2 400	89.4	192	268	2	10.5	7036 A (M) —	DB DF DT	335 000	505 000	1 500	2 000	178.8	86.8	—	273	1			
	320	52	4	1.5	305 000	385 000	—	1 700	2 200	98.2	198	302	3	18.1	7236 A (M) —	DB DF DT	495 000	770 000	1 400	1 800	196.3	92.3	—	311	1.5			
	320	52	4	1.5	276 000	350 000	—	1 500	2 000	130.9	198	302	3	18.4	7236 B (M) —	DB DF DT	450 000	700 000	1 200	1 700	261.8	157.8	—	311	1.5			
	380	75	4	1.5	410 000	535 000	—	1 500	2 000	118.3	198	362	3	42.1	7336 A (M) —	DB DF DT	665 000	1 070 000	1 200	1 600	236.6	86.6	—	371	1.5			
	380	75	4	1.5	375 000	490 000	—	1 300	1 800	155.0	198	362	3	42.6	7336 B (M) —	DB DF DT	605 000	975 000	1 100	1 500	309.9	159.9	—	371	1.5			
190	260	33	2	1	147 000	192 000	16.7	3 000	4 300	46.6	200	250	2	4.98	7938 C (M) TYN	DB DF DT	239 000	385 000	2 400	3 400	93.3	27.3	—	254	1			
	290	46	2.1	1.1	224 000	280 000	—	1 800	2 400	92.3	202	278	2	11.3	7038 A (M) —	DB DF DT	365 000	560 000	1 400	1 900	184.6	92.6	—	283	1			
	340	55	4	1.5	315 000	410 000	—	1 600	2 200	104.0	208	322	3	22.4	7238 A (M) —	DB DF DT	510 000	825 000	1 300	1 700	208.0	98.0	—	331	1.5			
	340	55	4	1.5	284 000	375 000	—	1 400	2 000	138.7	208	322	3	22.5	7238 B (M) —	DB DF DT	460 000	750 000	1 100	1 600	277.3	167.3	—	331	1.5			
	400	78	5	2	450 000	600 000	—	1 400	1 900	124.2	212	378	4	47.5	7338 A (M) T	DB DF DT	730 000	1 200 000	1 100	1 500	248.3	92.3	—	390	2			
	400	78	5	2	410 000	550 000	—	1 300	1 700	162.8	212	378	4	47.2	7338 B (M) —	DB DF DT	670 000	1 100 000	1 000	1 400	325.5	169.5	—	390	2			
200	280	38	2.1	1.1	189 000	244 000	16.5	2 800	4 000	51.2	212	268	2	6.85	7940 C (M) —	DB DF DT	305 000	490 000	2 200	3 200	102.3	26.3	—	273	1			
	310	51	2.1	1.1	240 000	310 000	—	1 700	2 200	99.1	212	298	2	13.7	7040 A (M) T	DB DF DT	390 000	620 000	1 300	1 800	198.2	96.2	—	303	1			
	360	58	4	1.5	335 000	450 000	—	1 500	2 000	109.8	218	342	3	26.5	7240 A (M) —	DB DF DT	550 000	900 000	1 200	1 600	219.6	103.6	—	351	1.5			
	360	58	4	1.5	305 000	410 000	—	1 300	1 800	146.5	218	342	3	26.6	7240 B (M) —	DB DF DT	495 000	815 000	1 100	1 500	292.9	176.9	—	351	1.5			
	420	80	5	2	475 000	660 000	—	1 300	1 800	129.5	222	398	4	54.4	7340 A (M) T	DB DF DT	770 000	1 320 000	1 100	1 400	259.0	99.0	—	410	2			
	420	80	5	2	430 000	600 000	—	1 200	1 600	170.1	222	398	4	55.3	7340 B (M) —	DB DF DT	700 000	1 200 000	950	1 300	340.1	180.1	—	410	2			

Notes ⁽¹⁾ For applications operating near the limiting speed, refer to Page C077.
⁽²⁾ The suffixes A, A5, B, and C represent contact angles of 30°, 25°, 40°, and 15° respectively.
⁽³⁾ For bearings marked — in the column for d_b , D_b and r_b for shafts are d_a (min) and r_a (max) respectively.

Note ⁽⁴⁾ (M) in the column of cage symbols are usually omitted from the bearing number.

DOUBLE-ROW ANGULAR CONTACT BALL BEARINGS

Bore Diameter 10 – 85 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$		e
X	Y	X	Y	
1	0.92	0.67	1.41	0.68

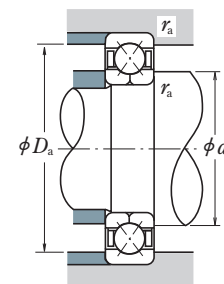
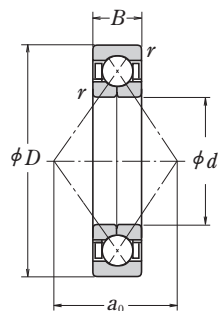
Static Equivalent Load

$$P_0 = F_r + 0.76 F_a$$

d	Boundary Dimensions (mm)			Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers	Load Center Spacings (mm) a_0	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.
	D	B	r min.	C_r	C_{0r}	Grease	Oil			d_a min.	D_a max.	r_a max.	
10	30	14.3	0.6	7 150	3 900	17 000	22 000	5200	14.5	15	25	0.6	0.050
12	32	15.9	0.6	10 500	5 800	15 000	20 000	5201	16.7	17	27	0.6	0.060
15	35	15.9	0.6	11 700	7 050	13 000	17 000	5202	18.3	20	30	0.6	0.070
	42	19	1	17 600	10 200	11 000	15 000	5302	22.0	21	36	1	0.13
17	40	17.5	0.6	14 600	9 050	11 000	15 000	5203	20.8	22	35	0.6	0.10
	47	22.2	1	21 000	12 600	10 000	13 000	5303	25.0	23	41	1	0.18
20	47	20.6	1	19 600	12 400	10 000	13 000	5204	24.3	26	41	1	0.16
	52	22.2	1.1	24 600	15 000	9 000	12 000	5304	26.7	27	45	1	0.22
25	52	20.6	1	21 300	14 700	8 500	11 000	5205	26.8	31	46	1	0.18
	62	25.4	1.1	32 500	20 700	7 500	10 000	5305	31.8	32	55	1	0.35
30	62	23.8	1	29 600	21 100	7 100	9 500	5206	31.6	36	56	1	0.30
	72	30.2	1.1	40 500	28 100	6 300	8 500	5306	36.5	37	65	1	0.57
35	72	27	1.1	39 000	28 700	6 300	8 000	5207	36.6	42	65	1	0.46
	80	34.9	1.5	51 000	36 000	5 600	7 500	5307	41.6	44	71	1.5	0.76
40	80	30.2	1.1	44 000	33 500	5 600	7 100	5208	41.5	47	73	1	0.62
	90	36.5	1.5	56 500	41 000	5 300	6 700	5308	45.5	49	81	1.5	1.03
45	85	30.2	1.1	49 500	38 000	5 000	6 700	5209	43.4	52	78	1	0.67
	100	39.7	1.5	68 500	51 000	4 500	6 000	5309	50.6	54	91	1.5	1.37
50	90	30.2	1.1	53 000	43 500	4 800	6 000	5210	45.9	57	83	1	0.72
	110	44.4	2	81 500	61 500	4 300	5 600	5310	55.6	60	100	2	1.84
55	100	33.3	1.5	56 000	49 000	4 300	5 600	5211	50.1	64	91	1.5	1.01
	120	49.2	2	95 000	73 000	3 800	5 000	5311	60.6	65	110	2	2.40
60	110	36.5	1.5	69 000	62 000	3 800	5 000	5212	56.5	69	101	1.5	1.33
	130	54	2.1	125 000	98 500	3 400	4 500	5312	69.2	72	118	2	2.92
65	120	38.1	1.5	76 500	69 000	3 600	4 500	5213	59.7	74	111	1.5	1.71
	140	58.7	2.1	142 000	113 000	3 200	4 300	5313	72.8	77	128	2	3.67
70	125	39.7	1.5	94 000	82 000	3 400	4 500	5214	63.8	79	116	1.5	1.75
	150	63.5	2.1	159 000	128 000	3 000	3 800	5314	78.3	82	138	2	4.55
75	130	41.3	1.5	93 500	83 000	3 200	4 300	5215	66.1	84	121	1.5	1.88
80	140	44.4	2	99 000	93 000	3 000	3 800	5216	69.6	90	130	2	2.51
85	150	49.2	2	116 000	110 000	2 800	3 600	5217	75.3	95	140	2	3.16

FOUR-POINT CONTACT BALL BEARINGS

Bore Diameter 30 – 95 mm



Dynamic Equivalent Load

$$P_a = F_a$$

Static Equivalent Load

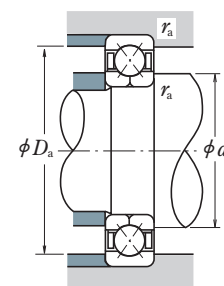
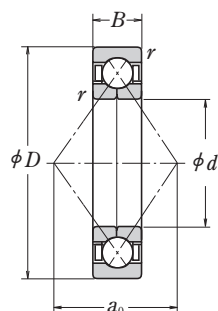
$$P_{0a} = F_a$$

d	Boundary Dimensions (mm)			Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	Load Center Spacings (mm) a ₀	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.	
	D	B	r min.	C _a	C _{0a}	Grease	Oil			d _a min.	D _a max.	r _a max.		
30	62	16	1	31 000	45 000	8 500	12 000	QJ 206	32.2	36	56	1	0.24	
	72	19	1.1	46 000	63 000	8 000	11 000		QJ 306	35.7	37	65	1	0.42
35	72	17	1.1	41 000	61 500	7 500	10 000	QJ 207	37.5	42	65	1	0.35	
	80	21	1.5	55 000	80 000	7 100	9 500		QJ 307	40.3	44	71	1.5	0.57
40	80	18	1.1	49 000	77 500	6 700	9 000	QJ 208	42.0	47	73	1	0.45	
	90	23	1.5	67 000	100 000	6 300	8 500		QJ 308	45.5	49	81	1.5	0.78
45	85	19	1.1	55 000	88 500	6 300	8 500	QJ 209	45.5	52	78	1	0.52	
	100	25	1.5	87 500	133 000	5 600	7 500		QJ 309	50.8	54	91	1.5	1.05
50	90	20	1.1	57 000	97 000	5 600	8 000	QJ 210	49.0	57	83	1	0.59	
	110	27	2	102 000	159 000	5 000	6 700		QJ 310	56.0	60	100	2	1.35
55	100	21	1.5	71 000	122 000	5 300	7 100	QJ 211	54.3	64	91	1.5	0.77	
	120	29	2	118 000	187 000	4 500	6 300		QJ 311	61.3	65	110	2	1.75
60	110	22	1.5	85 500	150 000	4 800	6 300	QJ 212	59.5	69	101	1.5	0.98	
	130	31	2.1	135 000	217 000	4 300	5 600		QJ 312	66.5	72	118	2	2.15
65	120	23	1.5	97 500	179 000	4 300	6 000	QJ 213	64.8	74	111	1.5	1.2	
	140	33	2.1	153 000	250 000	3 800	5 300		QJ 313	71.8	77	128	2	2.7
70	125	24	1.5	106 000	197 000	4 000	5 600	QJ 214	68.3	79	116	1.5	1.3	
	150	35	2.1	172 000	285 000	3 600	5 000		QJ 314	77.0	82	138	2	3.18
75	130	25	1.5	110 000	212 000	3 800	5 300	QJ 215	71.8	84	121	1.5	1.5	
	160	37	2.1	187 000	320 000	3 400	4 800		QJ 315	82.3	87	148	2	3.9
80	125	22	1.1	77 000	167 000	3 800	5 300	QJ 1016	71.8	87	118	1	1.05	
	140	26	2	124 000	236 000	3 600	5 000		QJ 216	77.0	90	130	2	1.85
	170	39	2.1	202 000	360 000	3 200	4 300		QJ 316	87.5	92	158	2	4.6
85	130	22	1.1	79 000	176 000	3 800	5 000	QJ 1017	75.3	92	123	1	1.1	
	150	28	2	143 000	276 000	3 400	4 800		QJ 217	82.3	95	140	2	2.2
	180	41	3	218 000	405 000	3 000	4 000		QJ 317	92.8	99	166	2.5	5.34
90	140	24	1.5	94 000	208 000	3 400	4 800	QJ 1018	80.5	99	131	1.5	1.45	
	160	30	2	164 000	320 000	3 200	4 300		QJ 218	87.5	100	150	2	2.75
	190	43	3	235 000	450 000	2 800	3 800		QJ 318	98.0	104	176	2.5	6.4
95	145	24	1.5	96 500	220 000	3 400	4 500	QJ 1019	84.0	104	136	1.5	1.5	
	170	32	2.1	177 000	340 000	3 000	4 000		QJ 219	92.8	107	158	2	3.35
	200	45	3	251 000	495 000	2 600	3 600		QJ 319	103.3	109	186	2.5	7.4

Remark When using four-point contact ball bearings, please contact NSK.

FOUR-POINT CONTACT BALL BEARINGS

Bore Diameter 100 – 200 mm



Dynamic Equivalent Load

$$P_a = F_a$$

Static Equivalent Load

$$P_{0a} = F_a$$

d	Boundary Dimensions (mm)			Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	Load Center Spacings (mm) a ₀	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.
	D	B	r min.	C _a	C _{0a}	Grease	Oil			d _a min.	D _a max.	r _a max.	
100	150	24	1.5	98 500	232 000	3 200	4 300	QJ 1020	87.5	109	141	1.5	1.6
	180	34	2.1	199 000	390 000	2 800	3 800	QJ 220	98.0	112	168	2	4.0
	215	47	3	300 000	640 000	2 400	3 400	QJ 320	110.3	114	201	2.5	9.3
105	160	26	2	115 000	269 000	3 000	4 000	QJ 1021	92.8	115	150	2	2.0
	190	36	2.1	217 000	435 000	2 600	3 600	QJ 221	103.3	117	178	2	4.7
	225	49	3	305 000	640 000	2 400	3 200	QJ 321	115.5	119	211	2.5	10.5
110	170	28	2	139 000	315 000	2 800	3 800	QJ 1022	98.0	120	160	2	2.5
	200	38	2.1	235 000	490 000	2 600	3 400	QJ 222	108.5	122	188	2	5.6
	240	50	3	320 000	710 000	2 200	3 000	QJ 322	122.5	124	226	2.5	12.5
120	180	28	2	147 000	350 000	2 600	3 600	QJ 1024	105.0	130	170	2	2.65
	215	40	2.1	265 000	585 000	2 400	3 200	QJ 224	117.3	132	203	2	6.9
	260	55	3	360 000	835 000	2 000	2 800	QJ 324	133.0	134	246	2.5	15.4
130	200	33	2	169 000	415 000	2 400	3 200	QJ 1026	115.5	140	190	2	4.0
	230	40	3	274 000	635 000	2 200	3 000	QJ 226	126.0	144	216	2.5	7.7
	280	58	4	400 000	970 000	1 900	2 600	QJ 326	143.5	148	262	3	19
140	210	33	2	172 000	435 000	2 200	3 000	QJ 1028	122.5	150	200	2	4.3
	250	42	3	315 000	775 000	2 000	2 800	QJ 228	136.5	154	236	2.5	9.8
	300	62	4	440 000	1 110 000	1 700	2 400	QJ 328	154.0	158	282	3	24
150	225	35	2.1	197 000	505 000	2 000	2 800	QJ 1030	131.3	162	213	2	5.2
	270	45	3	360 000	925 000	1 800	2 600	QJ 230	147.0	164	256	2.5	12
	320	65	4	460 000	1 230 000	1 600	2 200	QJ 330	164.5	168	302	3	29
160	240	38	2.1	224 000	580 000	1 900	2 600	QJ 1032	140.0	172	228	2	6.4
	290	48	3	380 000	1 010 000	1 700	2 400	QJ 232	157.5	174	276	2.5	15
	340	68	4	505 000	1 400 000	1 500	2 000	QJ 332	175.1	178	322	3	31
170	260	42	2.1	268 000	705 000	1 800	2 400	QJ 1034	150.5	182	248	2	8.6
	310	52	4	425 000	1 180 000	1 600	2 200	QJ 234	168.0	188	292	3	19.5
	360	72	4	565 000	1 610 000	1 400	2 000	QJ 334	185.6	188	342	3	41
180	280	46	2.1	299 000	830 000	1 700	2 200	QJ 1036	161.0	192	268	2	11
	320	52	4	440 000	1 270 000	1 500	2 000	QJ 236	175.1	198	302	3	20.5
	380	75	4	595 000	1 770 000	1 300	1 800	QJ 336	196.1	198	362	3	48
190	290	46	2.1	325 000	925 000	1 600	2 200	QJ 1038	168.0	202	278	2	11.5
	340	55	4	440 000	1 290 000	1 400	2 000	QJ 238	185.6	208	322	3	23
	400	78	5	655 000	1 980 000	1 300	1 700	QJ 338	206.6	212	378	4	54.5
200	310	51	2.1	345 000	1 020 000	1 500	2 000	QJ 1040	178.6	212	298	2	15
	360	58	4	490 000	1 480 000	1 300	1 800	QJ 240	196.1	218	342	3	27
	420	80	5	690 000	2 180 000	1 200	1 600	QJ 340	217.1	222	398	4	61.5

Remark When using four-point contact ball bearings, please contact NSK.

4. SELF-ALIGNING BALL BEARINGS

INTRODUCTION C 114

BEARINGS TABLE

SELF-ALIGNING BALL BEARINGS

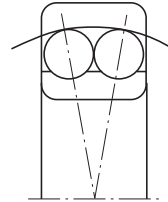
Bore Diameter 5 – 110 mm C 116



DESIGN, TYPES, AND FEATURES

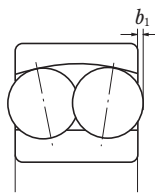
The outer ring has a spherical raceway and its center of curvature coincides with that of the bearing; therefore, the axis of the inner ring, balls and cage can deflect to some extent around the bearing center. This type is recommended when the alignment of the shaft and housing is difficult and when the shaft may bend. Since the contact angle is small, the axial load capacity is low.

Pressed steel cages are usually used.



PROTRUSION AMOUNT OF BALLS

Among self-aligning ball bearings, there are some in which the balls protrude from the side face as shown below. This protrusion amount b_1 is listed in the following table.



Bearing No.	b_1 (mm)
2222(K), 2316(K)	0.5
2319(K), 2320(K) 2321, 2322(K)	0.5
1318(K)	1.5
1319(K)	2
1320(K), 1321 1322(K)	3

TOLERANCES AND RUNNING

ACCURACY Table 7.2 (Pages A128 to A131)

RECOMMENDED FITS Table 8.3 (Page A164)

Table 8.5 (Page A165)

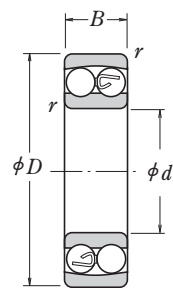
INTERNAL CLEARANCE Table 8.13 (Page A170)

PERMISSIBLE MISALIGNMENT

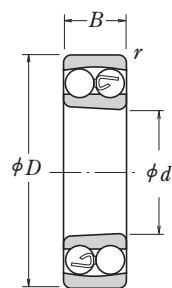
The permissible misalignment of self-aligning ball bearings is approximately 0.07 to 0.12 radian (4° to 7°) under normal loads. However, depending on the surrounding structure, such an angle may not be possible. Use care in the structural design.

SELF-ALIGNING BALL BEARINGS

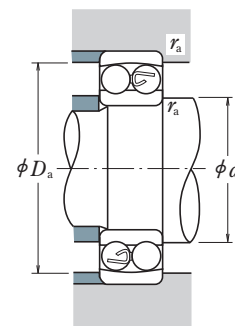
Bore Diameter 5 – 30 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_3	0.65	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are listed in the table below.

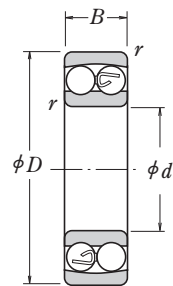
Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)			Constant e	Axial Load Factors			Mass (kg) approx.	
d	D	B	r min.	C_r	C_{0r}	Grease	Oil		Cylindrical Bore	Tapered Bore ⁽¹⁾	d_a min.		D_a max.	r_a max.	Y_2		Y_3
5	19	6	0.3	2 530	475	30 000	36 000	135	—	7	17	0.3	0.34	2.9	1.9	1.9	0.009
6	19	6	0.3	2 530	475	30 000	36 000	126	—	8	17	0.3	0.34	2.9	1.9	1.9	0.008
7	22	7	0.3	2 750	600	26 000	32 000	127	—	9	20	0.3	0.31	3.1	2.0	2.1	0.013
8	22	7	0.3	2 750	600	26 000	32 000	108	—	10	20	0.3	0.31	3.1	2.0	2.1	0.016
9	26	8	0.6	4 150	895	26 000	30 000	129	—	13	22	0.6	0.32	3.1	2.0	2.1	0.021
10	30	9	0.6	5 550	1 190	22 000	28 000	1200	—	14	26	0.6	0.32	3.1	2.0	2.1	0.041
	30	14	0.6	7 450	1 590	24 000	28 000	2200	—	14	26	0.6	0.64	1.5	0.98	1.0	0.046
	35	11	0.6	7 350	1 620	20 000	24 000	1300	—	14	31	0.6	0.35	2.8	1.8	1.9	0.059
	35	17	0.6	9 200	2 010	18 000	22 000	2300	—	14	31	0.6	0.71	1.4	0.89	0.93	0.078
12	32	10	0.6	5 700	1 270	22 000	26 000	1201	—	16	28	0.6	0.36	2.7	1.8	1.8	0.039
	32	14	0.6	7 750	1 730	22 000	26 000	2201	—	16	28	0.6	0.58	1.7	1.1	1.1	0.051
	37	12	1	9 650	2 160	18 000	22 000	1301	—	17	32	1	0.33	2.9	1.9	2.0	0.068
	37	17	1	12 100	2 730	17 000	22 000	2301	—	17	32	1	0.60	1.6	1.1	1.1	0.087
15	35	11	0.6	7 600	1 750	18 000	22 000	1202	—	19	31	0.6	0.32	3.1	2.0	2.1	0.051
	35	14	0.6	7 800	1 850	18 000	22 000	2202	—	19	31	0.6	0.50	1.9	1.3	1.3	0.058
	42	13	1	9 700	2 290	16 000	20 000	1302	—	20	37	1	0.33	2.9	1.9	2.0	0.101
	42	17	1	12 300	2 910	14 000	18 000	2302	—	20	37	1	0.51	1.9	1.2	1.3	0.113
17	40	12	0.6	8 000	2 010	16 000	20 000	1203	—	21	36	0.6	0.31	3.1	2.0	2.1	0.072
	40	16	0.6	9 950	2 420	16 000	20 000	2203	—	21	36	0.6	0.50	1.9	1.3	1.3	0.089
	47	14	1	12 700	3 200	14 000	17 000	1303	—	22	42	1	0.32	3.1	2.0	2.1	0.13
	47	19	1	14 700	3 550	13 000	16 000	2303	—	22	42	1	0.51	1.9	1.2	1.3	0.16
20	47	14	1	10 000	2 610	14 000	17 000	1204	1204 K	25	42	1	0.29	3.4	2.2	2.3	0.12
	47	18	1	12 800	3 300	14 000	17 000	2204	2204 K	25	42	1	0.47	2.1	1.3	1.4	0.142
	52	15	1.1	12 600	3 350	12 000	15 000	1304	1304 K	26.5	45.5	1	0.29	3.4	2.2	2.3	0.164
	52	21	1.1	18 500	4 700	11 000	14 000	2304	2304 K	26.5	45.5	1	0.50	1.9	1.2	1.3	0.207
25	52	15	1	12 200	3 300	12 000	14 000	1205	1205 K	30	47	1	0.28	3.5	2.3	2.4	0.14
	52	18	1	12 400	3 450	12 000	14 000	2205	2205 K	30	47	1	0.41	2.4	1.5	1.6	0.16
	62	17	1.1	18 200	5 000	10 000	13 000	1305	1305 K	31.5	55.5	1	0.28	3.5	2.3	2.4	0.261
	62	24	1.1	24 900	6 600	9 500	12 000	2305	2305 K	31.5	55.5	1	0.47	2.1	1.4	1.4	0.332
30	62	16	1	15 800	4 650	10 000	12 000	1206	1206 K	35	57	1	0.25	3.9	2.5	2.6	0.22
	62	20	1	15 300	4 550	10 000	12 000	2206	2206 K	35	57	1	0.38	2.5	1.6	1.7	0.262
	72	19	1.1	21 400	6 300	8 500	11 000	1306	1306 K	36.5	65.5	1	0.26	3.7	2.4	2.5	0.391
	72	27	1.1	32 000	8 750	8 000	10 000	2306	2306 K	36.5	65.5	1	0.44	2.2	1.4	1.5	0.5

Note (1) The suffix K represents bearings with tapered bores (1 : 12)

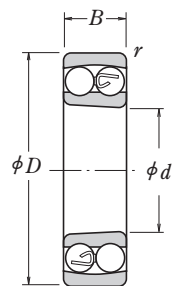
Remark For the dimensions related to adapters, refer to Page C348.

SELF-ALIGNING BALL BEARINGS

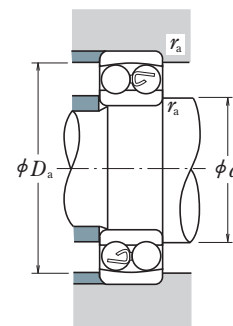
Bore Diameter 35 – 70 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_3	0.65	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are listed in the table below.

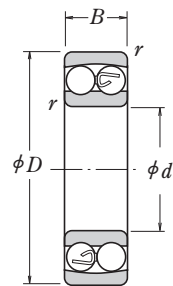
Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)			Constant e	Axial Load Factors			Mass (kg) approx.	
d	D	B	r min.	C_r	C_{0r}	Grease	Oil		Cylindrical Bore	Tapered Bore ⁽¹⁾	d_a min.		D_a max.	r_a max.	Y_2		Y_3
35	72	17	1.1	15 900	5 100	8 500	10 000	1207	1207 K	41.5	65.5	1	0.23	4.2	2.7	2.8	0.33
	72	23	1.1	21 700	6 600	8 500	10 000	2207	2207 K	41.5	65.5	1	0.37	2.6	1.7	1.8	0.403
	80	21	1.5	25 300	7 850	7 500	9 500	1307	1307 K	43	72	1.5	0.26	3.8	2.5	2.6	0.52
	80	31	1.5	40 000	11 300	7 100	9 000	2307	2307 K	43	72	1.5	0.46	2.1	1.4	1.4	0.671
40	80	18	1.1	19 300	6 500	7 500	9 000	1208	1208 K	46.5	73.5	1	0.22	4.3	2.8	2.9	0.42
	80	23	1.1	22 400	7 350	7 500	9 000	2208	2208 K	46.5	73.5	1	0.33	3.0	1.9	2.0	0.506
	90	23	1.5	29 800	9 700	6 700	8 500	1308	1308 K	48	82	1.5	0.24	4.0	2.6	2.7	0.727
	90	33	1.5	45 500	13 500	6 300	8 000	2308	2308 K	48	82	1.5	0.43	2.3	1.5	1.5	0.918
45	85	19	1.1	22 000	7 350	7 100	8 500	1209	1209 K	51.5	78.5	1	0.21	4.7	3.0	3.1	0.47
	85	23	1.1	23 300	8 150	7 100	8 500	2209	2209 K	51.5	78.5	1	0.30	3.2	2.1	2.2	0.556
	100	25	1.5	38 500	12 700	6 000	7 500	1309	1309 K	53	92	1.5	0.25	4.0	2.6	2.7	0.971
	100	36	1.5	55 000	16 700	5 600	7 100	2309	2309 K	53	92	1.5	0.41	2.4	1.5	1.6	1.2
50	90	20	1.1	22 800	8 100	6 300	8 000	1210	1210 K	56.5	83.5	1	0.21	4.7	3.1	3.2	0.535
	90	23	1.1	23 300	8 450	6 300	8 000	2210	2210 K	56.5	83.5	1	0.28	3.4	2.2	2.3	0.598
	110	27	2	43 500	14 100	5 600	6 700	1310	1310 K	59	101	2	0.23	4.2	2.7	2.8	1.23
	110	40	2	65 000	20 200	5 000	6 300	2310	2310 K	59	101	2	0.42	2.3	1.5	1.6	1.63
55	100	21	1.5	26 900	10 000	6 000	7 100	1211	1211 K	63	92	1.5	0.20	4.9	3.2	3.3	0.708
	100	25	1.5	26 700	9 900	6 000	7 100	2211	2211 K	63	92	1.5	0.28	3.5	2.3	2.4	0.807
	120	29	2	51 500	17 900	5 000	6 300	1311	1311 K	64	111	2	0.23	4.2	2.7	2.8	1.6
	120	43	2	76 500	24 000	4 800	6 000	2311	2311 K	64	111	2	0.41	2.4	1.5	1.6	2.08
60	110	22	1.5	30 500	11 500	5 300	6 300	1212	1212 K	68	102	1.5	0.18	5.3	3.4	3.6	0.91
	110	28	1.5	34 000	12 600	5 300	6 300	2212	2212 K	68	102	1.5	0.28	3.5	2.3	2.4	1.1
	130	31	2.1	57 500	20 800	4 500	5 600	1312	1312 K	71	119	2	0.23	4.3	2.8	2.9	2.0
	130	46	2.1	88 500	28 300	4 300	5 300	2312	2312 K	71	119	2	0.40	2.4	1.6	1.6	2.58
65	120	23	1.5	31 000	12 500	4 800	6 000	1213	1213 K	73	112	1.5	0.17	5.7	3.7	3.8	1.16
	120	31	1.5	43 500	16 400	4 800	6 000	2213	2213 K	73	112	1.5	0.28	3.5	2.3	2.4	1.5
	140	33	2.1	62 500	22 900	4 300	5 300	1313	1313 K	76	129	2	0.23	4.2	2.7	2.9	2.47
	140	48	2.1	97 000	32 500	3 800	4 800	2313	2313 K	76	129	2	0.39	2.5	1.6	1.7	3.2
70	125	24	1.5	35 000	13 800	4 800	5 600	1214	—	78	117	1.5	0.18	5.3	3.4	3.6	1.3
	125	31	1.5	44 000	17 100	4 500	5 600	2214	—	78	117	1.5	0.26	3.7	2.4	2.5	1.55
	150	35	2.1	75 000	27 700	4 000	5 000	1314	—	81	139	2	0.22	4.4	2.8	3.0	3.03
	150	51	2.1	111 000	37 500	3 600	4 500	2314	—	81	139	2	0.38	2.6	1.7	1.8	3.9

Note (1) The suffix K represents bearings with tapered bores (1 : 12)

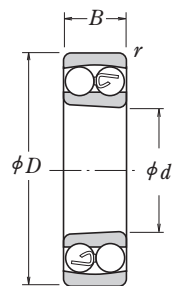
Remark For the dimensions related to adapters, refer to Pages C348 and C349.

SELF-ALIGNING BALL BEARINGS

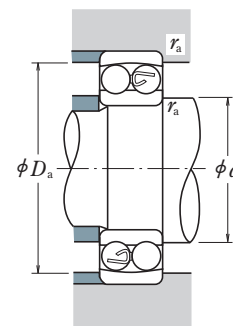
Bore Diameter 75 – 110 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.65	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are listed in the table below.

Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)			Constant e	Axial Load Factors			Mass (kg) approx.	
d	D	B	r min.	C_r	C_{0r}	Grease	Oil		Cylindrical Bore	Tapered Bore ⁽¹⁾	d_a min.		D_a max.	r_a max.	Y_2		Y_3
75	130	25	1.5	39 000	15 700	4 300	5 300	1215	1215 K	83	122	1.5	0.17	5.6	3.6	3.8	1.41
	130	31	1.5	44 500	17 800	4 300	5 300	2215	2215 K	83	122	1.5	0.25	3.9	2.5	2.6	1.6
	160	37	2.1	80 000	30 000	3 800	4 500	1315	1315 K	86	149	2	0.22	4.4	2.8	2.9	3.63
	160	55	2.1	125 000	43 000	3 400	4 300	2315	2315 K	86	149	2	0.38	2.5	1.6	1.7	4.78
80	140	26	2	40 000	17 000	4 000	5 000	1216	1216 K	89	131	2	0.16	6.0	3.9	4.1	1.73
	140	33	2	49 000	19 900	4 000	5 000	2216	2216 K	89	131	2	0.25	3.9	2.5	2.7	2.02
	170	39	2.1	89 000	33 000	3 600	4 300	1316	1316 K	91	159	2	0.22	4.5	2.9	3.1	4.24
	170	58	2.1	130 000	45 000	3 200	4 000	* 2316	* 2316 K	91	159	2	0.39	2.5	1.6	1.7	5.63
85	150	28	2	49 500	20 800	3 800	4 500	1217	1217 K	94	141	2	0.17	5.7	3.7	3.8	2.09
	150	36	2	58 500	23 600	3 800	4 800	2217	2217 K	94	141	2	0.25	3.9	2.5	2.6	2.56
	180	41	3	98 500	38 000	3 400	4 000	1317	1317 K	98	167	2.5	0.21	4.6	2.9	3.1	5.03
	180	60	3	142 000	51 500	3 000	3 800	2317	2317 K	98	167	2.5	0.37	2.6	1.7	1.8	6.56
90	160	30	2	57 500	23 500	3 600	4 300	1218	1218 K	99	151	2	0.17	5.8	3.8	3.9	2.55
	160	40	2	70 500	28 700	3 600	4 300	2218	2218 K	99	151	2	0.27	3.7	2.4	2.5	3.22
	190	43	3	117 000	44 500	3 200	3 800	* 1318	* 1318 K	103	177	2.5	0.22	4.3	2.8	2.9	5.83
	190	64	3	154 000	57 500	2 800	3 600	2318	2318 K	103	177	2.5	0.38	2.6	1.7	1.7	7.75
95	170	32	2.1	64 000	27 100	3 400	4 000	1219	1219 K	106	159	2	0.17	5.8	3.7	3.9	3.21
	170	43	2.1	84 000	34 500	3 400	4 000	2219	2219 K	106	159	2	0.27	3.7	2.4	2.5	3.96
	200	45	3	129 000	51 000	3 000	3 600	* 1319	* 1319 K	108	187	2.5	0.23	4.3	2.8	2.9	6.79
	200	67	3	161 000	64 500	2 800	3 400	* 2319	* 2319 K	108	187	2.5	0.38	2.6	1.7	1.8	8.97
100	180	34	2.1	69 500	29 700	3 200	3 800	1220	1220 K	111	169	2	0.17	5.6	3.6	3.8	3.82
	180	46	2.1	94 500	38 500	3 200	3 800	2220	2220 K	111	169	2	0.27	3.7	2.4	2.5	4.71
	215	47	3	140 000	57 500	2 800	3 400	* 1320	* 1320 K	113	202	2.5	0.24	4.1	2.7	2.8	8.4
	215	73	3	187 000	79 000	2 400	3 200	* 2320	* 2320 K	113	202	2.5	0.38	2.6	1.7	1.8	11.5
105	190	36	2.1	75 000	32 500	3 000	3 600	1221	—	116	179	2	0.18	5.5	3.6	3.7	4.52
	190	50	2.1	109 000	45 000	3 000	3 600	2221	—	116	179	2	0.28	3.5	2.3	2.4	5.73
	225	49	3	154 000	64 500	2 600	3 200	* 1321	—	118	212	2.5	0.23	4.2	2.7	2.9	9.58
	225	77	3	200 000	87 000	2 400	3 000	* 2321	—	118	212	2.5	0.38	2.6	1.7	1.7	14.5
110	200	38	2.1	87 000	38 500	2 800	3 400	1222	1222 K	121	189	2	0.17	5.7	3.7	3.9	5.33
	200	53	2.1	122 000	51 500	2 800	3 400	* 2222	* 2222 K	121	189	2	0.28	3.5	2.2	2.3	6.75
	240	50	3	161 000	72 000	2 400	3 000	* 1322	* 1322 K	123	227	2.5	0.22	4.4	2.8	3.0	11.5
	240	80	3	211 000	94 500	2 200	2 800	* 2322	* 2322 K	123	227	2.5	0.37	2.6	1.7	1.8	17.5

Notes (1) The suffix K represents bearings with tapered bores (1 : 12)

(*) The balls of the bearings marked * protrude slightly from the bearing face. The protrusion amounts are shown on Page C114.

Remark For the dimensions related to adapters, refer to Pages C350 and C351.

5. CYLINDRICAL ROLLER BEARINGS

SINGLE-ROW AND DOUBLE-ROW CYLINDRICAL ROLLER BEARINGS

INTRODUCTION C 124

TECHNICAL DATA

Free Space of Cylindrical Roller Bearings C 130

BEARINGS TABLE

Single-Row Cylindrical Roller Bearings

Bore Diameter 20 – 500 mm C 132

L-Shaped Thrust Collars For Cylindrical Roller Bearings

Bore Diameter 20 – 320 mm C 156

Double-Row Cylindrical Roller Bearings

Bore Diameter 25 – 360 mm C 158

FULL COMPLEMENT CYLINDRICAL ROLLER BEARINGS

SINGLE-ROW(NCF), DOUBLE-ROW(NNCF) AND FOR SHEAVES

INTRODUCTION C 162

BEARINGS TABLE

Single-Row(NCF) Bore Diameter 100 – 800 mm C 166

Double-Row(NNCF) Bore Diameter 100 – 500 mm C 170

For Sheaves Open Type Fixed-End Bearing RS-48E4, RS-49E4

Free-End Bearing RSF-48E4, RSF-49E4

Bore Diameter 50 – 560 mm C 174

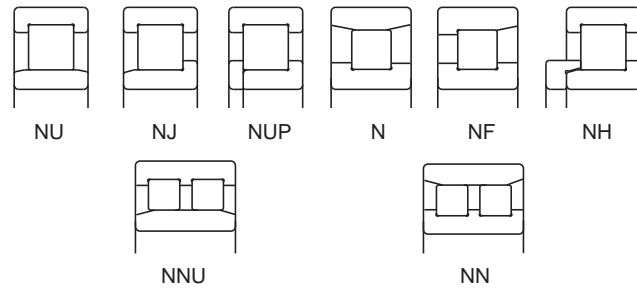
For Sheaves Prelubricated Type RS-50, RS-50NR

Bore Diameter 40 – 400 mm C 178



DESIGN, TYPES, AND FEATURES

Depending on the existence of ribs on their rings, Cylindrical Roller Bearings are classified into the following types.



Types NU, N, NNU, and NN are suitable as free-end bearings. Types NJ and NF can sustain limited axial loads in one direction. Types NH and NUP can be used as fixed-end bearings.

NH-type cylindrical roller bearings consist of the NJ-type cylindrical roller bearings and HJ-type L-shaped thrust collars (See Pages C156 and C157).

The inner ring loose rib of a NUP-type cylindrical roller bearing should be mounted so that the marked side is on the outside.

Features of Single-Row Cylindrical Roller Bearings

Cage Spec.	Material	Steel	Steel	Polyamide 66 resin	L-PPS resin	Brass	
		pressed		Molded		machined	
	Method	W	EW	ET	ET7	M	EM
Features	High Load Capacity	○	◎	◎	◎	△	◎
	High-Speed	△	○	○	○	○	◎
	High-Temperature	○	○	△	○	○	○
	Vibration	×	×	×	×	△	○

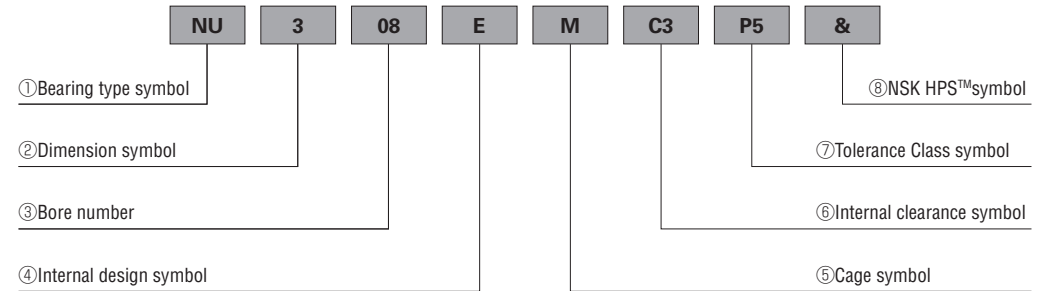
For a given bearing number, if the type of cage is not the standard one, the number of rollers may vary; in such a case, the load rating will differ from the one listed in the bearing tables.

Among the NN Type of double-row bearings, there are many of high precision that have tapered bores, and they are primarily used in the main spindles of machine tools. Their cages are either molded polyphenylenesulfide (PPS) or machined brass.

Formulation of Bearing Numbers

Single-Row Cylindrical Rollers

Bearing number example :



- ① Bearing type symbol
 NU : Single-Row Cylindrical Roller Bearings
 (Outer ring with both ribs + Inner ring without rib)
 Please refer to page C124 for detailed information.
- ② Dimension symbol
 10 : 10 Series, 2: 02 Series, 22 : 22 Series, 3 : 03 Series, 23 : 23 Series, 4 : 04 Series,
- ③ Bore number
 Less than 03, Bearing bore 01 : 12mm, 02 : 15mm, 03 : 17mm
 Over 04, Bearing bore Bore number X 5 (mm)
- ④ Internal design symbol
 E : High Load Capacity
- ⑤ Cage symbol
 W : Pressed Steel Cage, M : Machined Brass Cage, No symbol : Machined Brass Cage(In case of 10 Series) T : Polyamide 66 Resin Cage, T7 : L-PPS Resin Cage
- ⑥ Radial
 Internal clearance symbol
 Omitted : CN clearance, C3 : Clearance greater than CN, C4 : Clearance greater than C3, CG : Special Clearance
 For Non-Interchangeable Cylindrical Roller Bearings
 CC : Normal Clearance, CC3 : Clearance greater than CC, CC4 : Clearance greater than CC3, CCG : Special Clearance
- ⑦ Tolerance Class symbol
 Omitted : ISO Normal, P6 : ISO Class 6,
 P5 : ISO Class 5, P4 : ISO Class 4
- ⑧ NSK HPS™ symbol
 & : NSK HPS™ Symbol

PRECAUTIONS FOR USE OF CYLINDRICAL ROLLER BEARINGS

If the load on cylindrical roller bearings becomes too small during operation, slippage between the rollers and raceways occurs, which may result in smearing. Especially with large bearings since the weight of the roller and cage is high.

In case of strong shock loads or vibration, pressed-steel cages are sometimes inadequate.

If very small bearing load or strong shock loads or vibration are expected, please consult with NSK for selection of the bearings.

Bearings with molded polyamide cages (ET type) can be used continuously at temperatures between -40 and 120°C. If the bearings are used in gear oil, nonflammable hydraulic oil, or ester oil at a high temperature over 100°C, please contact NSK beforehand.

TOLERANCES AND RUNNING ACCURACY

CYLINDRICAL ROLLER BEARINGS Table 7.2 (Pages A128 to A131)

DOUBLE-ROW CYLINDRICAL ROLLER BEARINGS Table 7.2 (Pages A128 to A131)

Table 2 Tolerances for Roller Inscribed Circle Diameter F_w and Roller Circumscribed Circle Diameter E_w of Cylindrical Roller Bearings Having Interchangeable Rings
Units : μm

Nominal Bore Diameter d (mm)		Tolerances for F_w of types NU, NJ, NUP, NH, and NNU ΔF_w		Tolerances for E_w of types N, NF, and NN ΔE_w	
over	incl.	high	low	high	low
—	20	+10	0	0	-10
20	50	+15	0	0	-15
50	120	+20	0	0	-20
120	200	+25	0	0	-25
200	250	+30	0	0	-30
250	315	+35	0	0	-35
315	400	+40	0	0	-40
400	500	+45	0	—	—

RECOMMENDED FITS

CYLINDRICAL ROLLER BEARINGS Table 8.3 (Page A164)
Table 8.5 (Page A165)

DOUBLE-ROW CYLINDRICAL ROLLER BEARINGS Table 8.3 (Page A164)
Table 8.5 (Page A165)

INTERNAL CLEARANCES

CYLINDRICAL ROLLER BEARINGS Table 8.15 (Page A171)
DOUBLE-ROW CYLINDRICAL ROLLER BEARINGS Table 8.15 (Page A171)

PERMISSIBLE MISALIGNMENT

The permissible misalignment of cylindrical roller bearings varies depending on the type and internal specifications, but under normal loads, the angles are approximately as follows:

- Cylindrical Roller Bearings of width series 0 or 1 0.0012 radian (4')
 - Cylindrical Roller Bearings of width series 2 0.0006 radian (2')
- For double-row cylindrical roller bearings, nearly no misalignment is allowed.

LIMITING SPEEDS (Mechanical)

In some single row cylindrical roller bearings, optional cage types are available for special purposes or customer requests. The limiting speeds (mechanical) in the bearing tables are the values for the standard cage type. Please consult with NSK about the limiting speeds (mechanical) of optional cage.

LIMITING SPEEDS (Grease/Oil)

The limiting speeds (grease) and limiting speeds (oil) listed in the bearing tables should be adjusted depending on the bearing load condition. Also, higher speeds are attainable by making changes in the lubrication method, cage design, etc. Refer to page A098 for detailed information.



■ CYLINDRICAL ROLLER BEARINGS

TECHNICAL DATA

Free Space of Cylindrical Roller Bearings

Cylindrical roller bearings employ grease lubrication in many cases because it makes maintenance easier and simplifies the peripheral construction of the housing. It is essential to select a grease brand appropriate for the operating conditions while paying due attention to the filling amount and position of the bearing as well as its housing.

The cylindrical roller bearings can be divided into NU, NJ, N, NF, NH, and NUP types of construction according to the collar, collar ring, and position of the inner or outer ring ribs. Even if bearings belong to the same dimension series, they may have different amounts of free space. The free space also differs depending on whether the cage provided is

made from pressed steel or from machined high-tension brass. When determining the grease filling amount, please refer to Tables 1 and 2 which show the free space of NU type bearings. (By the way, the cylindrical roller bearing type is used most frequently).

For types other than the NU type, the free space can be determined from the free space ratio with the NU type. Table 3 shows the approximate free space ratio for each type of cylindrical roller bearing. For example, the free space of NJ310 with a pressed steel cage may be calculated approximately at 47 cm³. This result was calculated by multiplying the free space 52 cm³ of NU310 in Table 1 by the space ratio 0.90 for the NJ type (Table 3).

Table 1 Free Space of Cylindrical Roller Bearing (NU Type) (1) (with Pressed Cage)

Units: cm³

Bearing bore No.	Bearing free space			
	Bearing series			
	NU2	NU3	NU22	NU23
05	6.6	11	7.8	16
06	9.6	17	12	24
07	14	22	18	35
08	18	31	22	44
09	20	42	23	62
10	23	52	26	80
11	30	68	35	102
12	37	85	45	130
13	44	107	57	156
14	51	124	62	179
15	58	155	70	226
16	71	177	85	260
17	85	210	104	300
18	103	244	134	365
19	132	283	164	415
20	151	335	200	540

Table 2 Free Space of Cylindrical Roller Bearing (NU Type) (2) (with High-Tension Brass Machined Cage)

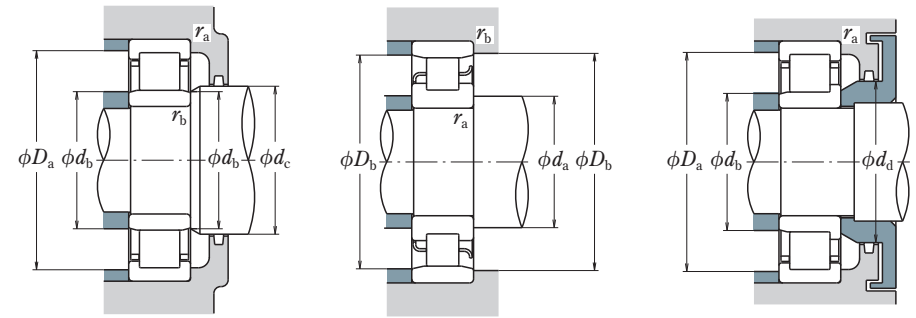
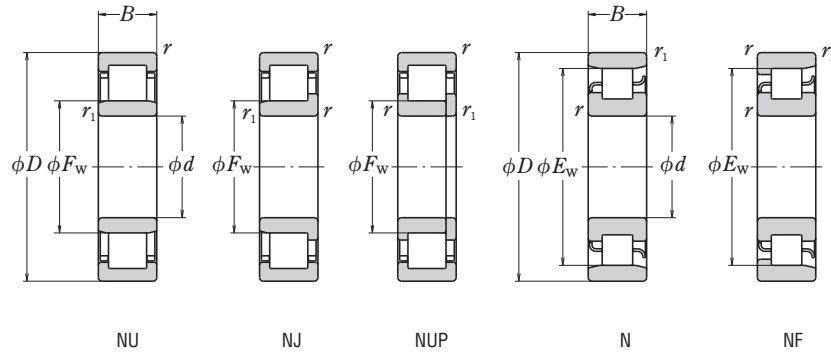
Units: cm³

Bearing bore No.	Bearing free space			
	Bearing series			
	NU2	NU3	NU22	NU23
05	5.0	7.6	5.7	10
06	7.4	12	7.9	16
07	9.6	16	12	27
08	12	21	15	32
09	15	29	16	45
10	18	38	17	58
11	22	52	24	77
12	26	62	31	88
13	31	74	43	104
14	37	92	44	129
15	42	102	50	149
16	51	122	60	181
17	64	164	74	200
18	79	193	96	279
19	94	218	116	280
20	115	221	137	355

Table 3 Free Space Ratio of Each Type of Cylindrical Roller Bearing

NU Type	NJ Type	N Type	NF Type
1	0.90	1.05	0.95

Bore Diameter 20 – 30 mm



d	Boundary Dimensions (mm)						Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
	D	B	r min.	r_1 min.	F_W	E_W	C_r	C_{0r}		Limiting Speeds	
									(⁵) Mechanical	Grease	
20	47	14	1	0.6	—	40	15 400	12 700	18 000	—	12 000
	47	14	1	0.6	26.5	—	25 700	22 600	16 000	—	13 000
	47	18	1	0.6	27	—	20 700	18 400	19 000	—	11 000
	52	15	1.1	0.6	—	44.5	21 400	17 300	14 000	—	10 000
	52	15	1.1	0.6	27.5	—	31 500	26 900	13 000	—	12 000
	52	21	1.1	0.6	28.5	—	33 000	30 000	14 000	—	11 000
	52	21	1.1	0.6	27.5	—	42 000	39 000	13 000	—	11 000
25	47	12	0.6	0.3	30.5	—	14 300	13 100	15 000	—	15 000
	52	15	1	0.6	—	45	17 700	15 700	16 000	—	10 000
	52	15	1	0.6	31.5	—	33 500	27 700	14 000	17 000	9 000
	52	15	1	0.6	—	—	29 300	27 700	14 000	17 000	9 000
	52	18	1	0.6	31.5	—	40 000	34 500	14 000	20 000	12 000
	52	18	1	0.6	—	—	35 000	34 500	14 000	20 000	12 000
	62	17	1.1	1.1	—	53	29 300	25 200	12 000	—	8 000
	62	17	1.1	1.1	34	—	48 000	37 500	11 000	15 000	7 100
	62	17	1.1	1.1	34	—	41 500	37 500	11 000	15 000	7 100
	62	24	1.1	1.1	34	—	65 500	56 000	11 000	18 000	9 000
30	62	24	1.1	1.1	34	—	57 000	56 000	11 000	18 000	9 000
	80	21	1.5	1.5	38.8	62.8	46 500	40 000	9 500	—	7 100
	55	13	1	0.6	36.5	48.5	19 700	19 600	13 000	—	12 000
	62	16	1	0.6	—	53.5	24 900	23 300	13 000	—	8 500
	62	16	1	0.6	37.5	—	45 000	37 500	12 000	14 000	7 500
	62	16	1	0.6	—	—	39 000	37 500	12 000	14 000	7 500
	62	20	1	0.6	37.5	—	56 500	50 000	12 000	17 000	9 500
	62	20	1	0.6	37.5	—	49 000	50 000	12 000	17 000	9 500
	72	19	1.1	1.1	—	62	38 500	35 000	10 000	—	7 100
	72	19	1.1	1.1	40.5	—	61 000	50 000	9 500	13 000	6 300
	72	19	1.1	1.1	40.5	—	53 000	50 000	9 500	13 000	6 300
	72	27	1.1	1.1	40.5	—	86 000	77 500	9 500	16 000	8 000
	72	27	1.1	1.1	40.5	—	74 500	77 500	9 500	16 000	8 000
	90	23	1.5	1.5	45	73	62 500	55 000	8 500	—	6 000

Notes (1) (M) in the column of cage symbols are usually omitted from the bearing number.
(2) When L-Shaped thrust collars (See section for L-Shaped Thrust Collars starting on page C156) are used, the bearings become the NH type.

Bearing Numbers	Abutment and Fillet Dimensions (mm)														Mass (kg)			
	Cage symbol ⁽¹⁾ Standard Option	NU	NJ	NUP	N	NF	$d_a^{(2)}$	d_b	$d_b^{(4)}$	d_c	d_d	$D_a^{(3)}$	D_b	D_b		r_a	r_b	
							min.	min.	max.	min.	min.	max.	min.	max.		min.	max.	min.
N 204	W	—	—	—	N	NF	25	—	—	—	—	—	43	42	1	0.6	0.107	
NU204E	T	T7	NU	NJ	NUP	—	25	24	25	29	32	42	—	—	1	0.6	0.107	
NU2204	W	M	NU	NJ	—	—	25	24	25	29	32	42	—	—	1	0.6	0.144	
N 304	W	—	—	—	N	NF	26.5	—	—	—	—	—	48	46	1	0.6	0.148	
NU304E	T	T7	NU	NJ	NUP	—	26.5	24	26	30	33	45.5	—	—	1	0.6	0.145	
NU2304	M	—	NU	NJ	NUP	—	26.5	24	27	30	33	45.5	—	—	1	0.6	0.217	
NU2304E	T7	—	NU	NJ	NUP	—	26.5	24	26	30	33	45.5	—	—	1	0.6	0.209	
NU1005	(M)	—	NU	—	—	—	—	27	30	32	—	43	—	—	0.6	0.3	0.094	
N 205	W	M	—	—	N	NF	30	—	—	—	—	—	48	46	1	0.6	0.135	
*NU205E	W	M, T, T7	NU	NJ	NUP	—	30	29	30	34	37	47	—	—	1	0.6	0.136	
NU205E	W	M, T, T7	NU	NJ	NUP	—	30	29	30	34	37	47	—	—	1	0.6	0.136	
*NU2205E	M	T, T7	NU	NJ	NUP	—	30	29	30	34	37	47	—	—	1	0.6	0.16	
NU2205E	M	T, T7	NU	NJ	NUP	—	30	29	30	34	37	47	—	—	1	0.6	0.16	
N 305	W	M	—	—	N	NF	31.5	—	—	—	—	—	55.5	50	1	1	0.233	
*NU305E	W	M, T, T7	NU	NJ	NUP	—	31.5	31.5	32	37	40	55.5	—	—	1	1	0.269	
NU305E	W	M, T, T7	NU	NJ	NUP	—	31.5	31.5	32	37	40	55.5	—	—	1	1	0.269	
*NU2305E	M	T, T7	NU	NJ	NUP	—	31.5	31.5	32	37	40	55.5	—	—	1	1	0.338	
NU2305E	M	T, T7	NU	NJ	NUP	—	31.5	31.5	32	37	40	55.5	—	—	1	1	0.338	
NU405	W	—	NU	NJ	—	N	NF	33	33	37	41	46	72	72	64	1.5	1.5	0.57
NU1006	(M)	—	NU	—	—	N	—	35	34	36	38	—	50	51	49	1	0.5	0.136
N 206	W	M	—	—	N	NF	35	—	—	—	—	—	58	56	1	0.6	0.208	
*NU206E	W	M, T, T7	NU	NJ	NUP	—	35	34	36	40	44	57	—	—	1	0.6	0.205	
NU206E	W	M, T, T7	NU	NJ	NUP	—	35	34	36	40	44	57	—	—	1	0.6	0.205	
*NU2206E	M	T, T7	NU	NJ	NUP	—	35	34	36	40	44	57	—	—	1	0.6	0.255	
NU2206E	M	T, T7	NU	NJ	NUP	—	35	34	36	40	44	57	—	—	1	0.6	0.255	
N 306	W	M	—	—	N	NF	36.5	—	—	—	—	—	65.5	64	1	1	0.353	
*NU306E	W	M, T, T7	NU	NJ	NUP	—	36.5	36.5	39	44	48	65.5	—	—	1	1	0.409	
NU306E	W	M, T, T7	NU	NJ	NUP	—	36.5	36.5	39	44	48	65.5	—	—	1	1	0.409	
*NU2306E	M	T, T7	NU	NJ	NUP	—	36.5	36.5	39	44	48	65.5	—	—	1	1	0.518	
NU2306E	M	T, T7	NU	NJ	NUP	—	36.5	36.5	39	44	48	65.5	—	—	1	1	0.518	
NU406	W	M	NU	NJ	—	N	NF	38	38	43	47	52	82	82	75	1.5	1.5	0.758

Notes (3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.

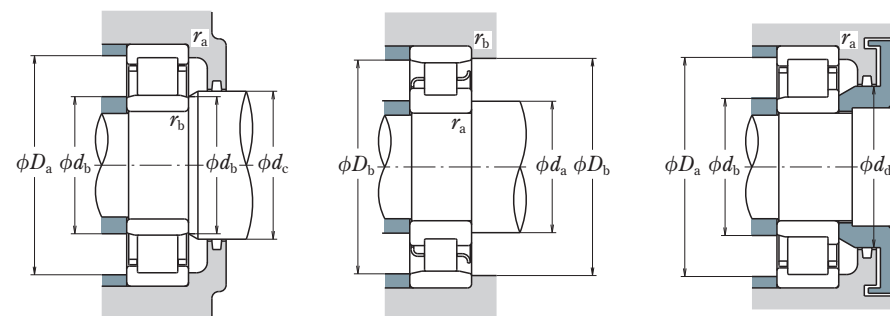
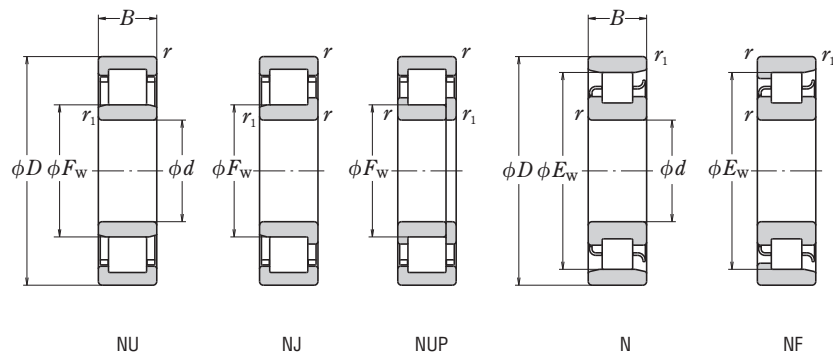
(4) d_b (max.) are values for adjusting rings for NU, NJ Types.

(5) The limiting speeds (mechanical) in the bearing tables are the value for the standard cage type.

Remark The bearings denoted by an asterisk (*) are NSKHPS™ Cylindrical roller bearings.

■ SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 35 – 40 mm



d	Boundary Dimensions (mm)						Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
	D	B	r	r ₁	F _w	E _w	C _r	C _{0r}		Limiting Speeds	
			min.	min.						(⁵) Mechanical	Grease
35	62	14	1	0.6	42	55	22 600	23 200	11 000	—	11 000
	72	17	1.1	0.6	—	61.8	35 500	34 000	11 000	—	7 500
	72	17	1.1	0.6	44	—	58 000	50 000	10 000	12 000	6 700
	72	17	1.1	0.6	44	—	50 500	50 000	10 000	12 000	6 700
	72	23	1.1	0.6	44	—	71 000	65 500	11 000	15 000	8 500
	72	23	1.1	0.6	44	—	61 500	65 500	11 000	15 000	8 500
	80	21	1.5	1.1	—	68.2	49 500	47 000	9 500	—	6 300
	80	21	1.5	1.1	46.2	—	76 500	65 500	8 500	11 000	5 600
	80	21	1.5	1.1	46.2	—	66 500	65 500	8 500	11 000	5 600
	80	31	1.5	1.1	46.2	—	107 000	101 000	9 000	14 000	6 700
80	31	1.5	1.1	46.2	—	93 000	101 000	9 000	14 000	6 700	
100	25	1.5	1.5	53	83	75 500	69 000	7 500	—	5 300	
40	68	15	1	0.6	47	61	27 300	29 000	10 000	—	10 000
	80	18	1.1	1.1	—	70	43 500	43 000	9 500	—	6 700
	80	18	1.1	1.1	49.5	—	64 000	55 500	9 000	11 000	6 000
	80	18	1.1	1.1	49.5	—	55 500	55 500	9 000	11 000	6 000
	80	23	1.1	1.1	49.5	—	83 000	77 500	9 000	13 000	7 500
	80	23	1.1	1.1	49.5	—	72 500	77 500	9 000	13 000	7 500
	90	23	1.5	1.5	—	77.5	58 500	57 000	8 500	—	5 600
	90	23	1.5	1.5	52	—	95 500	81 500	7 500	10 000	4 800
	90	23	1.5	1.5	52	—	83 000	81 500	7 500	10 000	4 800
	90	33	1.5	1.5	52	—	131 000	122 000	8 000	12 000	6 000
90	33	1.5	1.5	52	—	114 000	122 000	8 000	12 000	6 000	
110	27	2	2	58	92	95 500	89 000	6 700	—	4 800	

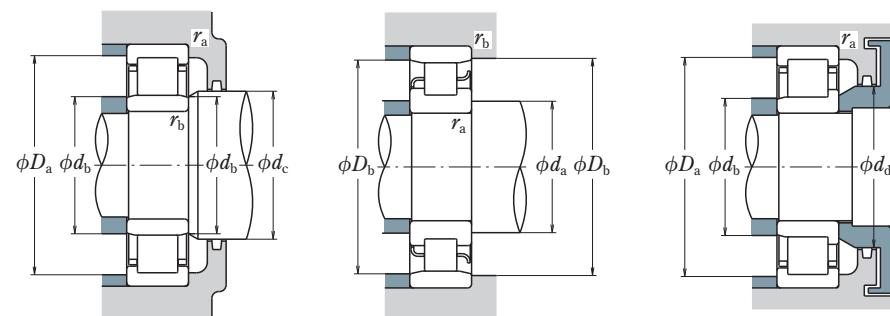
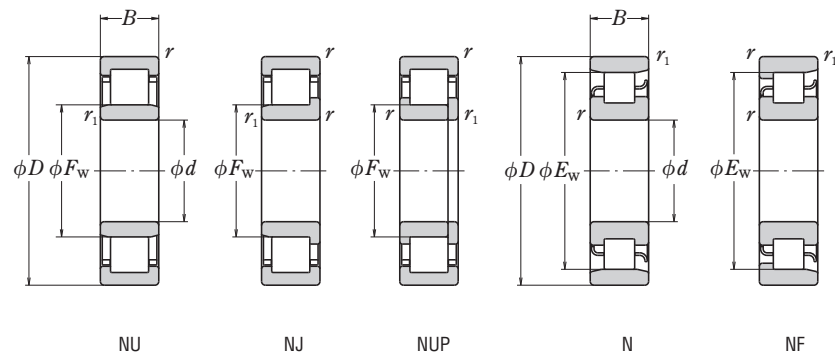
Notes (1) (M) in the column of cage symbols are usually omitted from the bearing number.
 (2) When L-Shaped thrust collars (See section for L-Shaped Thrust Collars starting on page C156) are used, the bearings become the NH type.

Bearing Numbers	Cage symbol ⁽¹⁾ Standard Option	Abutment and Fillet Dimensions (mm)											Mass (kg) approx.									
		NU		NJ		NUP		N		NF		d _a ⁽³⁾ min.		d _b min.	d _b ⁽⁴⁾ max.	d _c min.	d _d min.	D _a ⁽³⁾ max.	D _b max.	D _b min.	r _a max.	r _b max.
		M	T, T7	M	T, T7	M	T, T7	M	T, T7	M	T, T7											
NU1007	(M) —	—	—	—	—	—	—	—	—	—	—	40	39	41	44	—	57	58	56	1	0.5	0.18
N 207	W M	—	—	—	—	—	—	—	—	—	—	41.5	—	—	—	—	68	64	1	0.6	0.301	
*NU207E	W M, T, T7	—	—	—	—	—	—	—	—	—	—	41.5	39	42	46	50	65.5	—	—	1	0.6	0.304
NU207E	W M, T, T7	—	—	—	—	—	—	—	—	—	—	41.5	39	42	46	50	65.5	—	—	1	0.6	0.304
*NU2207E	M T, T7	—	—	—	—	—	—	—	—	—	—	41.5	39	42	46	50	65.5	—	—	1	0.6	0.40
NU2207E	M T, T7	—	—	—	—	—	—	—	—	—	—	41.5	39	42	46	50	65.5	—	—	1	0.6	0.40
N 307	W M	—	—	—	—	—	—	—	—	—	—	43	—	—	—	—	73.5	70	1.5	1	0.476	
*NU307E	W M, T, T7	—	—	—	—	—	—	—	—	—	—	41.5	41.5	44	48	53	72	—	—	1.5	1	0.545
NU307E	W M, T, T7	—	—	—	—	—	—	—	—	—	—	41.5	41.5	44	48	53	72	—	—	1.5	1	0.545
*NU2307E	M T, T7	—	—	—	—	—	—	—	—	—	—	43	41.5	44	48	53	72	—	—	1.5	1	0.711
NU2307E	M T, T7	—	—	—	—	—	—	—	—	—	—	43	41.5	44	48	53	72	—	—	1.5	1	0.711
NU407	W —	—	—	—	—	—	—	—	—	—	—	43	43	51	55	61	92	92	85	1.5	1.5	1.01
NU1008	(M) —	—	—	—	—	—	—	—	—	—	—	45	44	46	49	—	63	64	62	1	0.6	0.223
N 208	W M	—	—	—	—	—	—	—	—	—	—	46.5	—	—	—	—	73.5	72	1	1	0.375	
*NU208E	W M, T, T7	—	—	—	—	—	—	—	—	—	—	46.5	46.5	48	52	56	73.5	—	—	1	1	0.379
NU208E	W M, T, T7	—	—	—	—	—	—	—	—	—	—	46.5	46.5	48	52	56	73.5	—	—	1	1	0.379
*NU2208E	M T, T7	—	—	—	—	—	—	—	—	—	—	46.5	46.5	48	52	56	73.5	—	—	1	1	0.480
NU2208E	M T, T7	—	—	—	—	—	—	—	—	—	—	46.5	46.5	48	52	56	73.5	—	—	1	1	0.480
N 308	W M	—	—	—	—	—	—	—	—	—	—	48	—	—	—	—	82	79	1.5	1.5	0.649	
*NU308E	W M, T, T7	—	—	—	—	—	—	—	—	—	—	48	48	50	55	60	82	—	—	1.5	1.5	0.747
NU308E	W M, T, T7	—	—	—	—	—	—	—	—	—	—	48	48	50	55	60	82	—	—	1.5	1.5	0.747
*NU2308E	M T, T7	—	—	—	—	—	—	—	—	—	—	48	48	50	55	60	82	—	—	1.5	1.5	0.933
NU2308E	M T, T7	—	—	—	—	—	—	—	—	—	—	48	48	50	55	60	82	—	—	1.5	1.5	0.933
NU408	W —	—	—	—	—	—	—	—	—	—	—	49	49	56	60	67	101	101	94	2	2	1.28

Notes (3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
 (4) d_b (max.) are values for adjusting rings for NU, NJ Types.
 (5) The limiting speeds (mechanical) in the bearing tables are the value for the standard cage type.
Remark The bearings denoted by an asterisk (*) are NSKHPST™ Cylindrical roller bearings.

■ SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 45 – 50 mm



d	Boundary Dimensions (mm)						Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
	D	B	r	r ₁	F _w	E _w	C _r	C _{0r}		Limiting Speeds	
			min.	min.						(⁵) Mechanical	Grease
45	75	16	1	0.6	52.5	67.5	32 500	35 500	9 500	—	9 000
	85	19	1.1	1.1	—	75	46 000	47 000	9 000	—	6 300
	85	19	1.1	1.1	54.5	—	72 500	66 500	8 500	10 000	5 600
	85	19	1.1	1.1	54.5	—	63 000	66 500	8 500	10 000	5 600
	85	23	1.1	1.1	54.5	—	87 500	84 500	8 500	12 000	6 700
	85	23	1.1	1.1	54.5	—	76 000	84 500	8 500	12 000	6 700
	100	25	1.5	1.5	—	86.5	79 000	77 500	7 500	—	5 000
	100	25	1.5	1.5	58.5	—	112 000	98 500	7 100	9 000	4 300
	100	25	1.5	1.5	58.5	—	97 500	98 500	7 100	9 000	4 300
	100	36	1.5	1.5	58.5	—	158 000	153 000	7 100	11 000	5 300
	100	36	1.5	1.5	58.5	—	137 000	153 000	7 100	11 000	5 300
	120	29	2	2	64.5	100.5	107 000	102 000	6 300	—	4 300
50	80	16	1	0.6	57.5	72.5	32 000	36 000	8 500	—	8 000
	90	20	1.1	1.1	—	80.4	48 000	51 000	8 500	—	5 600
	90	20	1.1	1.1	59.5	—	79 500	76 500	8 000	9 000	5 000
	90	20	1.1	1.1	59.5	—	69 000	76 500	8 000	9 000	5 000
	90	23	1.1	1.1	59.5	—	96 000	97 000	7 500	11 000	6 300
	90	23	1.1	1.1	59.5	—	83 500	97 000	7 500	11 000	6 300
	110	27	2	2	—	95	87 000	86 000	7 100	—	4 500
	110	27	2	2	65	—	127 000	113 000	6 700	8 000	4 000
	110	27	2	2	65	—	110 000	113 000	6 700	8 000	4 000
	110	40	2	2	65	—	187 000	187 000	6 700	10 000	5 000
	110	40	2	2	65	—	163 000	187 000	6 700	10 000	5 000
	130	31	2.1	2.1	—	110.8	139 000	136 000	5 600	—	4 000
130	31	2.1	2.1	70.8	—	129 000	124 000	5 600	—	4 000	

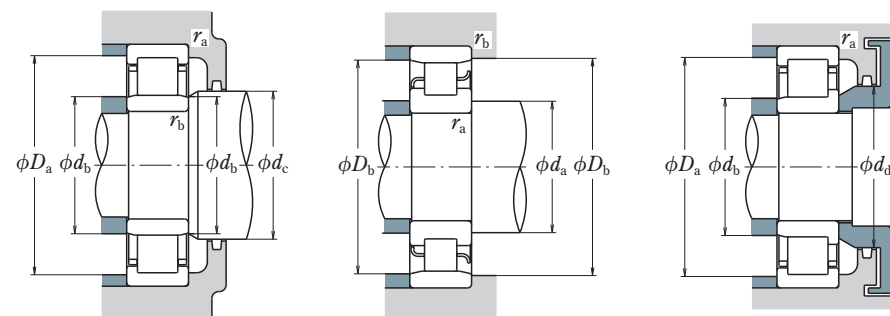
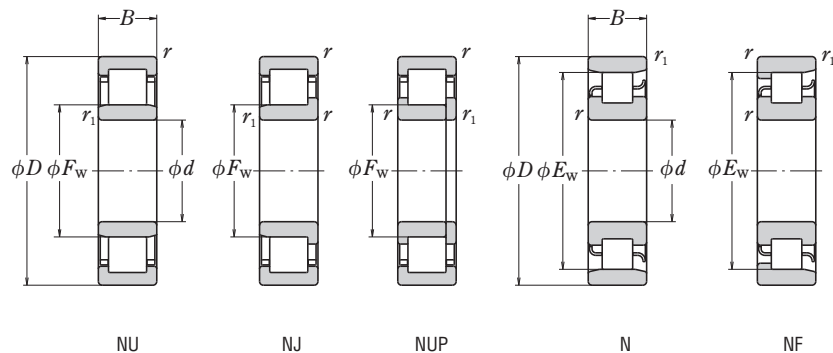
Bearing Numbers	Cage symbol ⁽¹⁾ Standard Option	Abutment and Fillet Dimensions (mm)											Mass (kg) approx.									
		NU		NJ		NUP		N		NF		d _a ⁽³⁾ min.		d _b min.	d _b ⁽⁴⁾ max.	d _c min.	d _d min.	D _a ⁽³⁾ max.	D _b max.	D _b min.	r _a max.	r _b max.
		M	T, T7	M	T, T7	M	T, T7	M	T, T7	M	T, T7											
NU1009	(M)	—	NU	—	—	N	NF	50	49	51	54	—	70	71	68	1	0.6	0.279				
N 209	W	M	—	—	—	N	NF	51.5	—	—	—	—	78.5	77	1	1	0.429					
*NU209E	W	M, T, T7	NU	NJ	NUP	—	—	51.5	51.5	52	57	61	78.5	—	—	1	1	0.438				
NU209E	W	M, T, T7	NU	NJ	NUP	—	—	51.5	51.5	52	57	61	78.5	—	—	1	1	0.438				
*NU2209E	M	T, T7	NU	NJ	NUP	—	—	51.5	51.5	52	57	61	78.5	—	—	1	1	0.521				
NU2209E	M	T, T7	NU	NJ	NUP	—	—	51.5	51.5	52	57	61	78.5	—	—	1	1	0.521				
N 309	W	M	—	—	—	N	NF	53	—	—	—	—	92	77	1.5	1.5	0.869					
*NU309E	W	M, T, T7	NU	NJ	NUP	—	—	53	53	56	60	66	92	—	—	1.5	1.5	1.01				
NU309E	W	M, T, T7	NU	NJ	NUP	—	—	53	53	56	60	66	92	—	—	1.5	1.5	1.01				
*NU2309E	M	T, T7	NU	NJ	NUP	—	—	53	53	56	60	66	92	—	—	1.5	1.5	1.28				
NU2309E	M	T, T7	NU	NJ	NUP	—	—	53	53	56	60	66	92	—	—	1.5	1.5	1.28				
NU409	W	—	NU	NJ	NUP	N	NF	54	54	62	66	74	111	111	103	2	2	1.62				
NU1010	(M)	—	NU	NJ	NUP	N	—	55	54	56	59	—	75	76	73	1	0.6	0.301				
N 210	W	M	—	—	—	N	NF	56.5	—	—	—	—	83.5	82	1	1	0.483					
*NU210E	W	M, T, T7	NU	NJ	NUP	—	—	56.5	56.5	57	62	67	83.5	—	—	1	1	0.50				
NU210E	W	M, T, T7	NU	NJ	NUP	—	—	56.5	56.5	57	62	67	83.5	—	—	1	1	0.50				
*NU2210E	M	T, T7	NU	NJ	NUP	—	—	56.5	56.5	57	62	67	83.5	—	—	1	1	0.562				
NU2210E	M	T, T7	NU	NJ	NUP	—	—	56.5	56.5	57	62	67	83.5	—	—	1	1	0.562				
N 310	W	M	—	—	—	N	NF	59	—	—	—	—	101	97	2	2	1.11					
*NU310E	W	M, T, T7	NU	NJ	NUP	—	—	59	59	63	67	73	101	—	—	2	2	1.3				
NU310E	W	M, T, T7	NU	NJ	NUP	—	—	59	59	63	67	73	101	—	—	2	2	1.3				
*NU2310E	M	T, T7	NU	NJ	NUP	—	—	59	59	63	67	73	101	—	—	2	2	1.7				
NU2310E	M	T, T7	NU	NJ	NUP	—	—	59	59	63	67	73	101	—	—	2	2	1.7				
N 410	W	M	—	—	—	N	NF	65	—	—	—	—	117	113	2	2	2					
NU410	W	M	—	—	—	N	NF	61	61	68	73	81	119	119	113.3	2	2	1.99				

Notes ⁽¹⁾ (M) in the column of cage symbols are usually omitted from the bearing number.
⁽²⁾ When L-Shaped thrust collars (See section for L-Shaped Thrust Collars starting on page C156) are used, the bearings become the NH type.

Notes ⁽³⁾ If axial loads are applied, increase d_a and reduce D_a from the values listed above.
⁽⁴⁾ d_b (max.) are values for adjusting rings for NU, NJ Types.
⁽⁵⁾ The limiting speeds (mechanical) in the bearing tables are the value for the standard cage type.
Remark The bearings denoted by an asterisk (*) are NSKHPS™ Cylindrical roller bearings.

■ SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 55 – 60 mm



d	Boundary Dimensions (mm)						Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
	D	B	r	r ₁	F _w	E _w	C _r	C _{0r}		Limiting Speeds	
			min.	min.						(⁵) Mechanical	Grease
55	90	18	1.1	1	64.5	80.5	37 500	44 000	8 000	—	7 500
	100	21	1.5	1.1	—	88.5	58 000	62 500	7 500	—	5 300
	100	21	1.5	1.1	66	—	99 000	98 500	6 700	8 500	4 500
	100	21	1.5	1.1	66	—	86 500	98 500	6 700	8 500	4 500
	100	25	1.5	1.1	66	—	117 000	122 000	6 700	10 000	5 600
	100	25	1.5	1.1	66	—	101 000	122 000	6 700	10 000	5 600
	120	29	2	2	—	104.5	111 000	111 000	6 300	—	4 000
	120	29	2	2	70.5	—	158 000	143 000	6 000	7 500	3 600
	120	29	2	2	70.5	—	137 000	143 000	6 000	7 500	3 600
	120	43	2	2	70.5	—	231 000	233 000	6 000	9 000	4 500
	120	43	2	2	70.5	—	201 000	233 000	6 000	9 000	4 500
	140	33	2.1	2.1	77.2	117.2	139 000	138 000	5 300	—	3 800
60	95	18	1.1	1	69.5	85.5	40 000	48 500	7 500	—	6 700
	110	22	1.5	1.5	—	97.5	68 500	75 000	7 100	—	4 800
	110	22	1.5	1.5	72	—	112 000	107 000	6 300	7 500	4 300
	110	22	1.5	1.5	72	—	97 500	107 000	6 300	7 500	4 300
	110	28	1.5	1.5	72	—	151 000	157 000	6 300	9 500	5 300
	110	28	1.5	1.5	72	—	131 000	157 000	6 300	9 500	5 300
	130	31	2.1	2.1	—	113	124 000	126 000	6 000	—	3 800
	130	31	2.1	2.1	77	—	124 000	126 000	6 000	—	3 800
	130	31	2.1	2.1	77	—	169 000	157 000	5 600	9 500	4 800
	130	31	2.1	2.1	77	—	150 000	157 000	5 600	9 500	4 800
	130	46	2.1	2.1	77	—	251 000	262 000	5 600	8 500	4 300
	130	46	2.1	2.1	77	—	222 000	262 000	5 600	8 500	4 300
150	35	2.1	2.1	83	127	167 000	168 000	5 000	—	3 400	

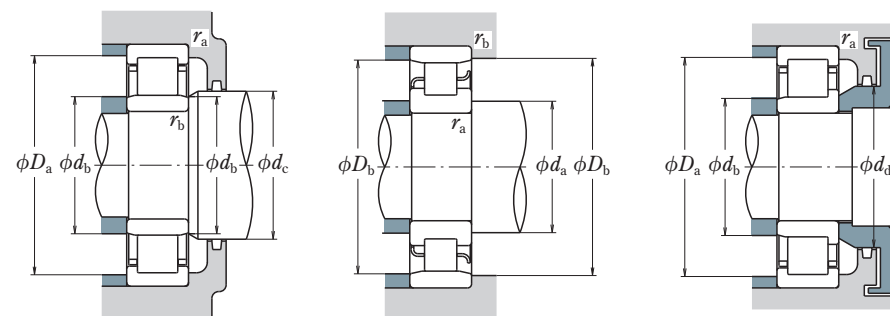
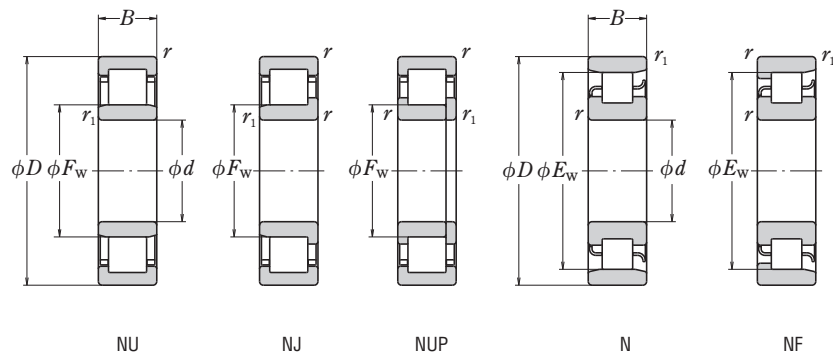
Bearing Numbers	Cage symbol ⁽¹⁾ Standard Option	Abutment and Fillet Dimensions (mm)												Mass (kg) approx.				
		NU		NJ		NUP		N		NF								
		d _a ⁽³⁾ min.	d _b min.	d _b ⁽⁴⁾ max.	d _c min.	d _d min.	D _a ⁽³⁾ max.	D _b max.	D _b min.	r _a max.	r _b max.							
NU1011	(M)	—	NU	NJ	—	N	—	61.5	60	63	66	—	83.5	85	82	1	1	0.445
N 211	W	M	—	—	—	N	NF	63	—	—	—	—	—	93.5	91	1.5	1	0.634
*NU211E	W	M, T, T7	NU	NJ	NUP	—	—	63	61.5	64	68	73	92	—	—	1.5	1	0.669
NU211E	W	M, T, T7	NU	NJ	NUP	—	—	63	61.5	64	68	73	92	—	—	1.5	1	0.669
*NU2211E	M	T, T7	NU	NJ	NUP	—	—	63	61.5	64	68	73	92	—	—	1.5	1	0.783
NU2211E	M	T, T7	NU	NJ	NUP	—	—	63	61.5	64	68	73	92	—	—	1.5	1	0.783
N 311	W	M	—	—	—	N	NF	64	—	—	—	—	—	111	107	2	2	1.42
*NU311E	W	M, T, T7	NU	NJ	NUP	—	—	64	64	68	72	80	111	—	—	2	2	1.64
NU311E	W	M, T, T7	NU	NJ	NUP	—	—	64	64	68	72	80	111	—	—	2	2	1.64
*NU2311E	M	T, T7	NU	NJ	NUP	—	—	64	64	68	72	80	111	—	—	2	2	2.18
NU2311E	M	T, T7	NU	NJ	NUP	—	—	64	64	68	72	80	111	—	—	2	2	2.18
NU411	W	—	NU	NJ	NUP	N	NF	66	66	75	79	87	129	129	119	2	2	2.5
NU1012	(M)	—	NU	NJ	—	N	NF	66.5	65	68	71	—	88.5	90	87	1	1	0.474
N 212	W	M	—	—	—	N	NF	68	—	—	—	—	—	102	100	1.5	1.5	0.823
*NU212E	W	M, T, T7	NU	NJ	NUP	—	—	68	68	70	75	80	102	—	—	1.5	1.5	0.824
NU212E	W	M, T, T7	NU	NJ	NUP	—	—	68	68	70	75	80	102	—	—	1.5	1.5	0.824
*NU2212E	M	T, T7	NU	NJ	NUP	—	—	68	68	70	75	80	102	—	—	1.5	1.5	1.06
NU2212E	M	T, T7	NU	NJ	NUP	—	—	68	68	70	75	80	102	—	—	1.5	1.5	1.06
N 312	W	M	—	—	—	N	NF	71	—	—	—	—	—	119	115	2	2	1.78
NU312	W	M	NU	NJ	NUP	—	—	71	71	75	79	86	119	—	—	2	2	1.82
*NU312E	M	T, T7	NU	NJ	NUP	—	—	71	71	75	79	86	119	—	—	2	2	2.06
NU312E	M	T, T7	NU	NJ	NUP	—	—	71	71	75	79	86	119	—	—	2	2	2.06
*NU2312E	M	T, T7	NU	NJ	NUP	—	—	71	71	75	79	86	119	—	—	2	2	2.7
NU2312E	M	T, T7	NU	NJ	NUP	—	—	71	71	75	79	86	119	—	—	2	2	2.7
NU412	W	M	NU	NJ	NUP	N	NF	71	71	80	85	94	139	139	130	2	2	3.04

Notes ⁽¹⁾ (M) in the column of cage symbols are usually omitted from the bearing number.
⁽²⁾ When L-Shaped thrust collars (See section for L-Shaped Thrust Collars starting on page C156) are used, the bearings become the NH type.

Notes ⁽³⁾ If axial loads are applied, increase d_a and reduce D_a from the values listed above.
⁽⁴⁾ d_b (max.) are values for adjusting rings for NU, NJ Types.
⁽⁵⁾ The limiting speeds (mechanical) in the bearing tables are the value for the standard cage type.
Remark The bearings denoted by an asterisk (*) are NSKHPS™ Cylindrical roller bearings.

■ SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 65 – 70 mm



d	Boundary Dimensions (mm)						Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
	D	B	r min.	r ₁ min.	F _w	E _w	C _r	C _{0r}		Limiting Speeds	
										(⁵) Mechanical	Grease
65	100	18	1.1	1	74.5	90.5	41 000	51 000	6 700	—	6 300
	120	23	1.5	1.5	—	105.6	84 000	94 500	6 300	—	4 300
	120	23	1.5	1.5	78.5	—	124 000	119 000	6 000	7 100	3 800
	120	23	1.5	1.5	78.5	—	108 000	119 000	6 000	7 100	3 800
	120	31	1.5	1.5	78.5	—	171 000	181 000	6 000	8 500	4 800
	120	31	1.5	1.5	78.5	—	149 000	181 000	6 000	8 500	4 800
	140	33	2.1	2.1	—	121.5	135 000	139 000	5 600	—	3 600
	140	33	2.1	2.1	83.5	—	135 000	139 000	5 600	—	3 600
	140	33	2.1	2.1	82.5	—	204 000	191 000	5 300	8 500	4 300
	140	33	2.1	2.1	82.5	—	181 000	191 000	5 300	8 500	4 300
	140	48	2.1	2.1	82.5	—	263 000	265 000	5 600	7 500	3 800
	140	48	2.1	2.1	82.5	—	233 000	265 000	5 600	7 500	3 800
70	160	37	2.1	2.1	—	135.3	195 000	203 000	4 500	—	4 000
	160	37	2.1	2.1	89.3	—	182 000	186 000	4 800	—	3 200
	110	20	1.1	1	80	100	58 500	70 500	6 300	—	6 000
	125	24	1.5	1.5	—	110.5	83 500	95 000	6 300	—	4 000
	125	24	1.5	1.5	83.5	—	136 000	137 000	5 600	9 000	5 000
	125	24	1.5	1.5	83.5	—	119 000	137 000	5 600	9 000	5 000
	125	31	1.5	1.5	83.5	—	179 000	194 000	5 600	8 000	4 500
	125	31	1.5	1.5	83.5	—	156 000	194 000	5 600	8 000	4 500
	150	35	2.1	2.1	—	130	149 000	156 000	5 600	—	3 200
	150	35	2.1	2.1	90	—	158 000	168 000	5 300	—	3 200
	150	35	2.1	2.1	89	—	231 000	222 000	4 800	8 000	4 000
	150	35	2.1	2.1	89	—	205 000	222 000	4 800	8 000	4 000
	150	51	2.1	2.1	89	—	310 000	325 000	5 000	7 100	3 600
	150	51	2.1	2.1	89	—	274 000	325 000	5 000	7 100	3 600
	180	42	3	3	100	152	228 000	236 000	4 500	—	2 800

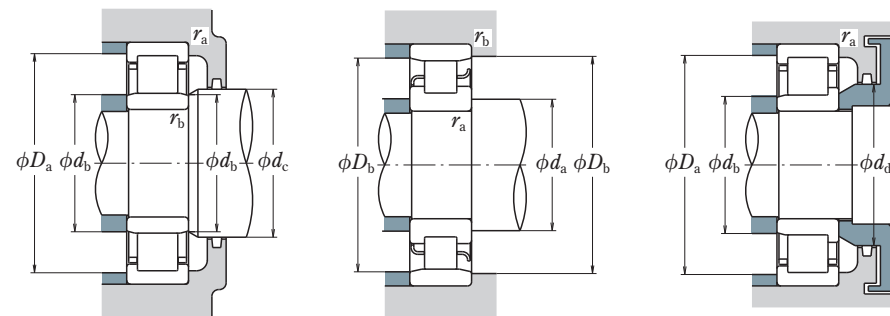
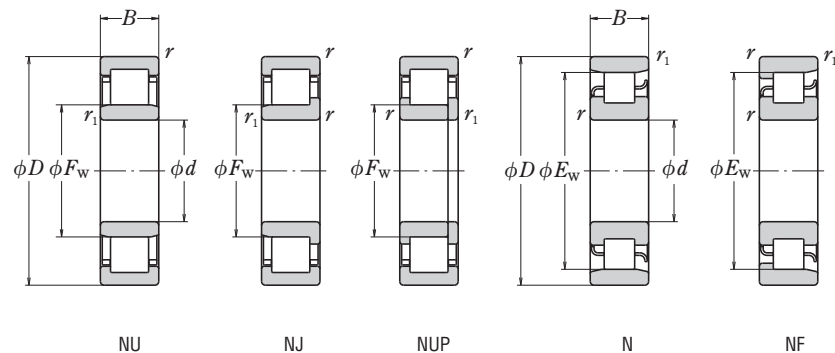
Bearing Numbers	Abutment and Fillet Dimensions (mm)												Mass (kg)					
	Cage symbol ⁽¹⁾					d _a ⁽²⁾ min.	d _b min.	d _b ⁽⁴⁾ max.	d _c min.	d _d min.	D _a ⁽³⁾ max.	D _b max.		D _b min.	r _a max.	r _b max.		
	Standard Option																	
NU1013	(M)	—	NU	NJ	—	N	NF	71.5	70	73	76	—	93.5	95	92	1	1	0.504
N 213	W	M	—	—	—	N	NF	73	—	—	—	—	112	108	1.5	1.5	1.05	
*NU213E	W	M, T, T7	NU	NJ	NUP	—	—	73	73	76	81	87	112	—	—	1.5	1.5	1.05
NU213E	W	M, T, T7	NU	NJ	NUP	—	—	73	73	76	81	87	112	—	—	1.5	1.5	1.05
*NU2213E	M	T, T7	NU	NJ	NUP	—	—	73	73	76	81	87	112	—	—	1.5	1.5	1.41
NU2213E	M	T, T7	NU	NJ	NUP	—	—	73	73	76	81	87	112	—	—	1.5	1.5	1.41
N 313	W	M	—	—	—	N	NF	76	—	—	—	—	129	125	2	2	2.17	
NU313	W	M	NU	NJ	NUP	—	—	76	76	81	85	93	129	—	—	2	2	2.23
*NU313E	M	T, T7	NU	NJ	NUP	—	—	76	76	80	85	93	129	—	—	2	2	2.56
NU313E	M	T, T7	NU	NJ	NUP	—	—	76	76	80	85	93	129	—	—	2	2	2.56
*NU2313E	M	T, T7	NU	NJ	NUP	—	—	76	76	80	85	93	129	—	—	2	2	3.16
NU2313E	M	T, T7	NU	NJ	NUP	—	—	76	76	80	85	93	129	—	—	2	2	3.16
N 413	M	—	—	—	—	N	NF	76	—	—	—	—	149	138.8	2	2	3.63	
NU413	W	M	NU	NJ	—	—	—	76	76	86	91	100	149	—	—	2	2	3.63
NU1014	(M)	—	NU	NJ	NUP	N	NF	76.5	75	79	82	—	103.5	105	101	1	1	0.693
N 214	W	M	—	—	—	N	NF	78	—	—	—	—	117	113	1.5	1.5	1.14	
*NU214E	M	T, T7	NU	NJ	NUP	—	—	78	78	81	86	92	117	—	—	1.5	1.5	1.29
NU214E	M	T, T7	NU	NJ	NUP	—	—	78	78	81	86	92	117	—	—	1.5	1.5	1.29
*NU2214E	M	T, T7	NU	NJ	NUP	—	—	78	78	81	86	92	117	—	—	1.5	1.5	1.49
NU2214E	M	T, T7	NU	NJ	NUP	—	—	78	78	81	86	92	117	—	—	1.5	1.5	1.49
N 314	W	M	—	—	—	N	NF	81	—	—	—	—	139	133.5	2	2	2.67	
NU314	W	M	NU	NJ	NUP	—	—	81	81	87	92	100	139	—	—	2	2	2.75
*NU314E	M	T, T7	NU	NJ	NUP	—	—	81	81	86	92	100	139	—	—	2	2	3.09
NU314E	M	T, T7	NU	NJ	NUP	—	—	81	81	86	92	100	139	—	—	2	2	3.09
*NU2314E	M	T, T7	NU	NJ	NUP	—	—	81	81	86	92	100	139	—	—	2	2	3.92
NU2314E	M	T, T7	NU	NJ	NUP	—	—	81	81	86	92	100	139	—	—	2	2	3.92
NU414	W	M	NU	NJ	NUP	N	NF	83	83	97	102	112	167	167	155	2.5	2.5	5.28

Notes (1) (M) in the column of cage symbols are usually omitted from the bearing number.
 (2) When L-Shaped thrust collars (See section for L-Shaped Thrust Collars starting on page C156) are used, the bearings become the NH type.

Notes (3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
 (4) d_b (max.) are values for adjusting rings for NU, NJ Types.
 (5) The limiting speeds (mechanical) in the bearing tables are the value for the standard cage type.
 Remark The bearings denoted by an asterisk (*) are NSKHPS™ Cylindrical roller bearings.

■ SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 75 mm



d	Boundary Dimensions (mm)						Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
	D	B	r	r ₁	F _w	E _w	C _r	C _{0r}		Limiting Speeds	
			min.	min.						(⁵) Mechanical	Grease
75	115	20	1.1	1	85	105	60 000	74 500	6 000	—	5 600
	130	25	1.5	1.5	—	116.5	96 500	111 000	6 000	—	3 800
	130	25	1.5	1.5	88.5	—	150 000	156 000	5 300	8 500	4 800
	130	25	1.5	1.5	88.5	—	130 000	156 000	5 300	8 500	4 800
	130	31	1.5	1.5	88.5	—	186 000	207 000	5 300	7 500	4 300
	130	31	1.5	1.5	88.5	—	162 000	207 000	5 300	7 500	4 300
	160	37	2.1	2.1	—	139.5	179 000	189 000	5 000	—	3 000
	160	37	2.1	2.1	95.5	—	179 000	189 000	5 000	—	3 000
	160	37	2.1	2.1	95	—	271 000	263 000	4 500	7 500	3 800
	160	37	2.1	2.1	95	—	240 000	263 000	4 500	7 500	3 800
160	55	2.1	2.1	95	—	370 000	395 000	4 800	6 700	3 400	
160	55	2.1	2.1	95	—	330 000	395 000	4 800	6 700	3 400	
190	45	3	3	104.5	160.5	262 000	274 000	4 300	—	2 600	

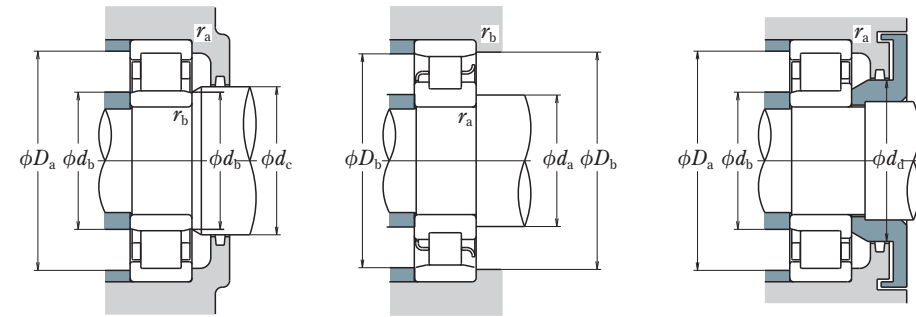
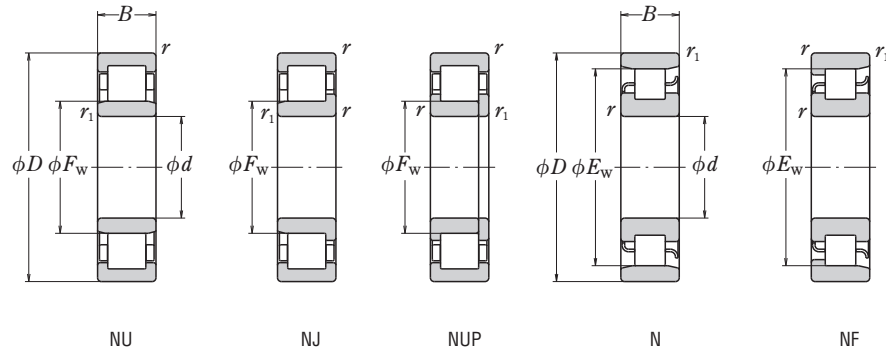
Bearing Numbers	Abutment and Fillet Dimensions (mm)											Mass (kg) approx.										
	Cage symbol ⁽¹⁾					Standard Option							d _a ⁽²⁾ min.	d _b min.	d _b ⁽⁴⁾ max.	d _c min.	d _d min.	D _a ⁽³⁾ max.	D _b max.	D _b min.	r _a max.	r _b max.
	(M)	(W)	(T, T7)	(NU)	(NJ)	(NUP)	(N)	(NF)	d _a ⁽²⁾ min.	d _b min.	d _b ⁽⁴⁾ max.											
NU1015	(M)	—	—	—	—	—	N	NF	81.5	80	83	87	—	108.5	110	106	1	1	0.731			
N 215	(W)	(M)	—	—	—	—	N	NF	83	—	—	—	—	—	122	119	1.5	1.5	1.23			
*NU215E	(M)	(T, T7)	—	—	—	—	—	—	83	83	86	90	96	122	—	—	1.5	1.5	1.44			
NU215E	(M)	(T, T7)	—	—	—	—	—	—	83	83	86	90	96	122	—	—	1.5	1.5	1.44			
*NU2215E	(M)	(T, T7)	—	—	—	—	—	—	83	83	86	90	96	122	—	—	1.5	1.5	1.57			
NU2215E	(M)	(T, T7)	—	—	—	—	—	—	83	83	86	90	96	122	—	—	1.5	1.5	1.57			
N 315	(W)	(M)	—	—	—	—	N	NF	86	—	—	—	—	—	149	143	2	2	3.2			
NU315	(W)	(M)	—	—	—	—	—	—	86	86	93	97	106	149	—	—	2	2	3.26			
*NU315E	(M)	(T, T7)	—	—	—	—	—	—	86	86	92	97	106	149	—	—	2	2	3.73			
NU315E	(M)	(T, T7)	—	—	—	—	—	—	86	86	92	97	106	149	—	—	2	2	3.73			
*NU2315E	(M)	(T, T7)	—	—	—	—	—	—	86	86	92	97	106	149	—	—	2	2	4.86			
NU2315E	(M)	(T, T7)	—	—	—	—	—	—	86	86	92	97	106	149	—	—	2	2	4.86			
NU415	(W)	(M)	—	—	—	—	N	NF	88	88	102	107	118	177	177	164	2.5	2.5	6.27			

Notes ⁽¹⁾ (M) in the column of cage symbols are usually omitted from the bearing number.
⁽²⁾ When L-Shaped thrust collars (See section for L-Shaped Thrust Collars starting on page C156) are used, the bearings become the NH type.

Notes ⁽³⁾ If axial loads are applied, increase d_a and reduce D_a from the values listed above.
⁽⁴⁾ d_b (max.) are values for adjusting rings for NU, NJ Types.
⁽⁵⁾ The limiting speeds (mechanical) in the bearing tables are the value for the standard cage type.
Remark The bearings denoted by an asterisk (*) are NSKHPS™ Cylindrical roller bearings.

■ SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 80 – 90 mm



d	Boundary Dimensions (mm)						Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
	D	B	r	r ₁	F _W	E _W	C _r	C _{0r}		Limiting Speeds	
			min.	min.						(⁵) Mechanical	Grease
80	125	22	1.1	1	91.5	113.5	72 500	90 500	6 000	—	5 300
	140	26	2	2	—	125.3	106 000	122 000	5 600	—	3 600
	140	26	2	2	95.3	—	160 000	167 000	5 000	8 000	4 500
	140	26	2	2	95.3	—	139 000	167 000	5 000	8 000	4 500
	140	33	2	2	95.3	—	214 000	243 000	5 000	7 100	4 000
	140	33	2	2	95.3	—	186 000	243 000	5 000	7 100	4 000
	170	39	2.1	2.1	—	147	190 000	207 000	4 800	—	2 800
	170	39	2.1	2.1	101	—	289 000	282 000	4 300	7 100	3 600
	170	39	2.1	2.1	101	—	256 000	282 000	4 300	7 100	3 600
	170	58	2.1	2.1	101	—	400 000	430 000	4 500	6 300	3 200
85	130	22	1.1	1	96.5	118.5	74 500	95 500	5 600	—	5 000
	150	28	2	2	—	133.8	120 000	140 000	5 300	—	3 400
	150	28	2	2	100.5	—	192 000	199 000	4 800	7 500	4 300
	150	28	2	2	100.5	—	167 000	199 000	4 800	7 500	4 300
	150	36	2	2	100.5	—	250 000	279 000	4 800	6 700	3 800
	150	36	2	2	100.5	—	217 000	279 000	4 800	6 700	3 800
	180	41	3	3	—	156	225 000	247 000	4 500	—	2 600
	180	41	3	3	108	—	212 000	228 000	4 800	—	2 600
	180	41	3	3	108	—	291 000	330 000	4 000	6 700	3 400
	180	60	3	3	108	—	395 000	485 000	4 300	6 000	3 000
90	140	24	1.5	1.1	103	127	88 000	114 000	5 300	—	4 500
	160	30	2	2	—	143	152 000	178 000	5 000	—	3 200
	160	30	2	2	107	—	205 000	217 000	4 800	7 100	4 000
	160	30	2	2	107	—	182 000	217 000	4 800	7 100	4 000
	160	40	2	2	107	—	274 000	315 000	4 800	6 300	3 600
	160	40	2	2	107	—	242 000	315 000	4 800	6 300	3 600
	190	43	3	3	—	165	240 000	265 000	4 500	—	2 600
	190	43	3	3	115	—	240 000	265 000	4 500	—	2 600
	190	43	3	3	113.5	—	315 000	355 000	4 000	6 300	3 200
	190	64	3	3	113.5	—	435 000	535 000	4 000	5 600	2 800
225	54	4	4	123.5	191.5	375 000	400 000	3 600	—	2 800	

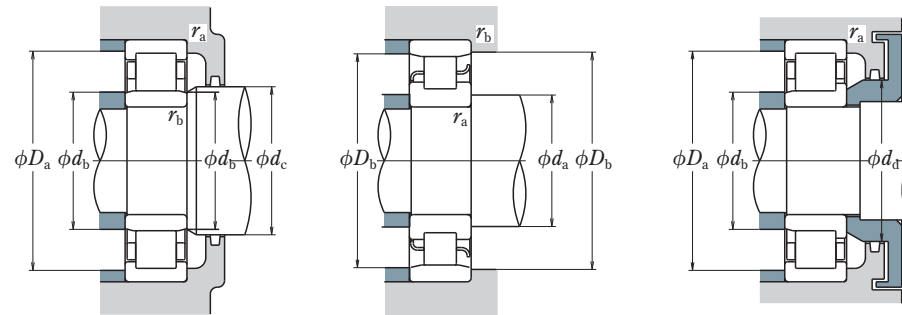
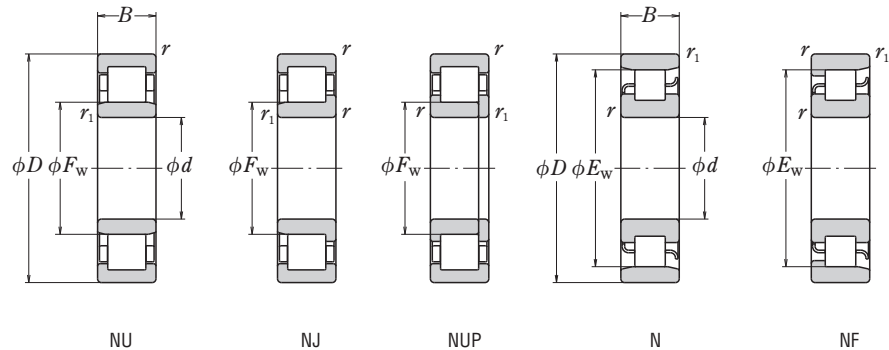
Bearing Numbers	Abutment and Fillet Dimensions (mm)											Mass (kg)	
	Cage symbol ⁽¹⁾		NU		NJ		NUP		N		NF		
	Standard	Option	d _a ⁽²⁾ min.	d _b min.	d _b ⁽⁴⁾ max.	d _c min.	d _d min.	D _a ⁽³⁾ max.	D _b max.	D _b min.	r _a max.		r _b max.
NU1016	(M)	—	86.5	85	90	94	—	118.5	120	115	1	1	0.969
N 216	W	M	89	—	—	—	—	131	128	2	2	2	1.47
*NU216E	M	T, T7	89	89	92	97	104	131	—	—	2	2	1.7
NU216E	M	T, T7	89	89	92	97	104	131	—	—	2	2	1.7
*NU2216E	M	T, T7	89	89	92	97	104	131	—	—	2	2	1.96
NU2216E	M	T, T7	89	89	92	97	104	131	—	—	2	2	1.96
N 316	W	M	91	—	—	—	—	159	150	2	2	2	3.85
*NU316E	M	T, T7	91	91	98	105	114	159	—	—	2	2	4.45
NU316E	M	T, T7	91	91	98	105	114	159	—	—	2	2	4.45
*NU2316E	M	T, T7	91	91	98	105	114	159	—	—	2	2	5.73
NU2316E	M	T, T7	91	91	98	105	114	159	—	—	2	2	5.73
NU416	W	M	93	93	107	112	124	187	187	173	2.5	2.5	7.36
NU1017	(M)	—	91.5	90	95	99	—	123.5	125	120	1	1	1.01
N 217	W	M	94	—	—	—	—	141	137	2	2	2	1.87
*NU217E	M	T, T7	94	94	98	104	110	141	—	—	2	2	2.11
NU217E	M	T, T7	94	94	98	104	110	141	—	—	2	2	2.11
*NU2217E	M	T, T7	94	94	98	104	110	141	—	—	2	2	2.44
NU2217E	M	T, T7	94	94	98	104	110	141	—	—	2	2	2.44
N 317	W	M	98	—	—	—	—	167	159	2.5	2.5	2.5	4.53
NU317	W	N	98	98	105	110	119	167	—	—	2.5	2.5	4.6
NU317E	M	T, T7	98	98	105	110	119	167	—	—	2.5	2.5	5.26
NU2317E	M	T, T7	98	98	105	110	119	167	—	—	2.5	2.5	6.77
NU417	M	—	101	101	110	115	128	194	194	180	3	3	9.56
NU1018	(M)	—	98	96.5	101	106	—	132	133.5	129	1.5	1	1.35
N 218	W	M	99	—	—	—	—	151	146	2	2	2	2.31
*NU218E	M	T, T7	99	99	104	109	116	151	—	—	2	2	2.6
NU218E	M	T, T7	99	99	104	109	116	151	—	—	2	2	2.6
*NU2218E	M	T, T7	99	99	104	109	116	151	—	—	2	2	3.11
NU2218E	M	T, T7	99	99	104	109	116	151	—	—	2	2	3.11
N 318	W	M	103	—	—	—	—	177	168	2.5	2.5	2.5	5.31
NU318	W	M	103	103	112	117	127	177	—	—	2.5	2.5	5.38
NU318E	M	T, T7	103	103	111	117	127	177	—	—	2.5	2.5	6.1
NU2318E	M	T, T7	103	103	111	117	127	177	—	—	2.5	2.5	7.9
NU418	M	—	106	106	120	125	139	209	209	196	3	3	11.5

Notes ⁽¹⁾ (M) in the column of cage symbols are usually omitted from the bearing number.
⁽²⁾ When L-Shaped thrust collars (See section for L-Shaped Thrust Collars starting on pages C156 and C157) are used, the bearings become the NH type.

Notes ⁽³⁾ If axial loads are applied, increase d_a and reduce D_a from the values listed above.
⁽⁴⁾ d_b (max.) are values for adjusting rings for NU, NJ Types.
⁽⁵⁾ The limiting speeds (mechanical) in the bearing tables are the value for the standard cage type.
Remark The bearings denoted by an asterisk (*) are NSKHPS™ Cylindrical roller bearings.

■ SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 95 – 110 mm



d	Boundary Dimensions (mm)						Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
	D	B	r min.	r ₁ min.	F _w	E _w	C _r	C _{0r}		Limiting Speeds	Grease
95	145	24	1.5	1.1	108	132	90 000	120 000	5 000	—	4 300
	170	32	2.1	2.1	—	151.5	166 000	195 000	4 800	—	3 000
	170	32	2.1	2.1	112.5	—	249 000	265 000	4 300	6 700	3 800
	170	32	2.1	2.1	112.5	—	220 000	265 000	4 300	6 700	3 800
	170	43	2.1	2.1	112.5	—	325 000	370 000	4 500	6 000	3 400
	170	43	2.1	2.1	112.5	—	286 000	370 000	4 500	6 000	3 400
	200	45	3	3	—	173.5	259 000	289 000	4 300	—	2 400
	200	45	3	3	121.5	—	259 000	289 000	4 300	—	2 400
	200	45	3	3	121.5	—	335 000	385 000	3 800	6 000	3 000
	200	67	3	3	121.5	—	460 000	585 000	3 800	5 300	2 600
240	55	4	4	133.5	201.5	400 000	445 000	3 200	—	2 600	
100	150	24	1.5	1.1	113	137	93 000	126 000	4 800	—	4 300
	180	34	2.1	2.1	—	160	183 000	217 000	4 500	—	2 800
	180	34	2.1	2.1	119	—	249 000	305 000	4 300	6 300	3 600
	180	46	2.1	2.1	119	—	335 000	445 000	4 300	5 600	3 200
	215	47	3	3	—	185.5	299 000	335 000	4 000	—	2 200
	215	47	3	3	129.5	—	299 000	335 000	4 000	—	2 200
	215	47	3	3	127.5	—	380 000	425 000	3 600	5 600	2 800
	215	73	3	3	127.5	—	570 000	715 000	3 400	5 000	2 400
	250	58	4	4	139	211	450 000	500 000	3 000	—	2 600
	250	58	4	4	139	211	450 000	500 000	3 000	—	2 600
105	160	26	2	1.1	119.5	145.5	109 000	149 000	4 500	—	4 000
	190	36	2.1	2.1	—	168.8	201 000	241 000	4 500	—	2 600
	190	36	2.1	2.1	125	—	262 000	310 000	4 300	6 000	3 400
	225	49	3	3	—	195	340 000	390 000	3 800	—	2 200
	225	49	3	3	133	—	425 000	480 000	3 400	5 300	2 600
	260	60	4	4	144.5	220.5	495 000	555 000	2 800	—	2 400
110	170	28	2	1.1	125	155	131 000	174 000	4 500	—	3 800
	200	38	2.1	2.1	—	178.5	229 000	272 000	4 300	—	2 600
	200	38	2.1	2.1	132.5	—	293 000	365 000	4 000	5 600	3 200
	200	53	2.1	2.1	132.5	—	385 000	515 000	4 000	5 000	2 800
	240	50	3	3	—	207	380 000	435 000	3 400	—	2 000
	240	50	3	3	143	—	450 000	525 000	3 200	5 000	2 600
	280	65	4	4	155	—	550 000	620 000	2 600	—	2 200

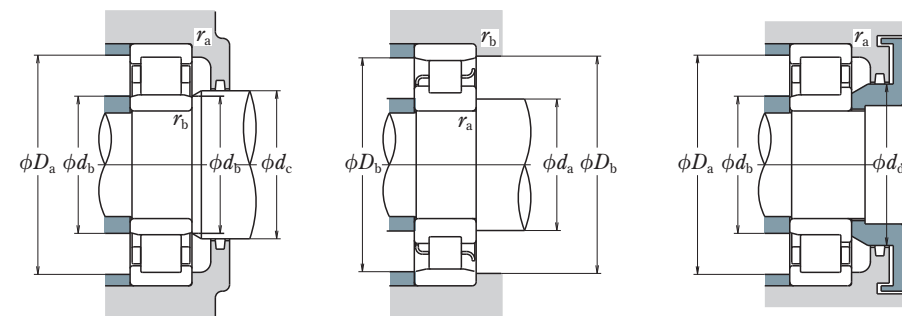
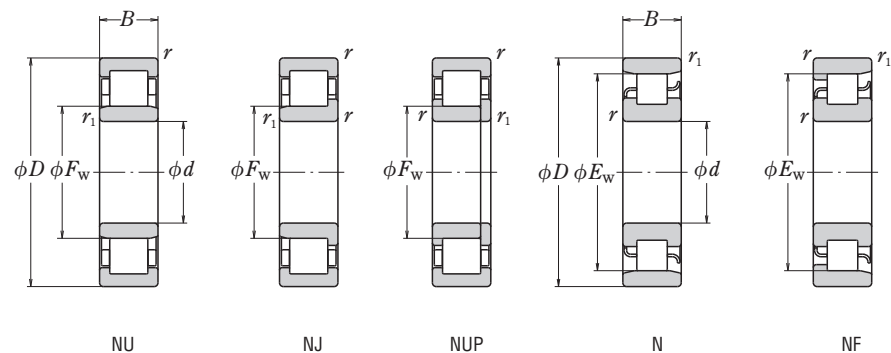
Notes (1) (M) in the column of cage symbols are usually omitted from the bearing number.
 (2) When L-Shaped thrust collars (See section for L-Shaped Thrust Collars starting on page C157) are used, the bearings become the NH type.

Bearing Numbers		Abutment and Fillet Dimensions (mm)											Mass (kg)				
Cage symbol ⁽¹⁾ Standard Option		NU	NJ	NUP	N	NF	d _a ⁽²⁾ min.	d _b min.	d _b ⁽⁴⁾ max.	d _c min.	d _d min.	D _a ⁽³⁾ max.		D _b max.	D _b min.	r _a max.	r _b max.
NU1019	(M) —	—	—	—	—	—	103	101.5	106	111	—	137	138.5	134	1.5	1	1.41
N 219	W M	—	—	—	—	N NF	106	—	—	—	—	—	159	155	2	2	2.79
*NU219E	M T, T7	—	—	—	—	—	106	106	110	116	123	159	—	—	2	2	3.17
NU219E	M T, T7	—	—	—	—	—	106	106	110	116	123	159	—	—	2	2	3.17
*NU2219E	M T, T7	—	—	—	—	—	106	106	110	116	123	159	—	—	2	2	3.81
NU2219E	M T, T7	—	—	—	—	—	106	106	110	116	123	159	—	—	2	2	3.81
N 319	W M	—	—	—	—	N NF	108	—	—	—	—	—	187	177	2.5	2.5	6.09
NU319	W M	—	—	—	—	N NF	108	108	118	124	134	187	—	—	2.5	2.5	6.23
NU319E	M T, T7	—	—	—	—	—	108	108	118	124	134	187	—	—	2.5	2.5	7.13
NU2319E	M T, T7	—	—	—	—	—	108	108	118	124	134	187	—	—	2.5	2.5	9.21
NU419	M	—	—	—	—	NF	111	111	130	136	149	224	206	3	3	13.6	
NU1020	(M) —	—	—	—	—	—	108	106.5	111	116	—	142	143.5	139	1.5	1	1.47
N 220	W M	—	—	—	—	N NF	111	—	—	—	—	—	169	163	2	2	3.36
NU220E	M T, T7	—	—	—	—	—	111	111	116	122	130	169	—	—	2	2	3.81
NU2220E	M T, T7	—	—	—	—	—	111	111	116	122	130	169	—	—	2	2	4.69
N 320	W M	—	—	—	—	N NF	113	—	—	—	—	—	202	190	2.5	2.5	7.59
NU320	W M	—	—	—	—	NF	113	113	126	132	143	202	—	—	2.5	2.5	7.69
NU320E	M T, T7	—	—	—	—	—	113	113	124	132	143	202	—	—	2.5	2.5	8.63
NU2320E	M T, T7	—	—	—	—	—	113	113	124	132	143	202	—	—	2.5	2.5	11.8
NU420	M	—	—	—	—	NF	116	116	135	141	156	234	215	3	3	15.5	
NU1021	(M) —	—	—	—	—	NF	114	111.5	118	122	—	151	153.5	147	2	1	1.83
N 221	W M	—	—	—	—	N NF	116	—	—	—	—	—	179	172	2	2	4.0
NU221E	M	—	—	—	—	—	116	116	121	129	137	179	—	—	2	2	4.58
N 321	W M	—	—	—	—	N NF	118	—	—	—	—	—	212	199	2.5	2.5	8.69
NU321E	M	—	—	—	—	NF	118	118	131	137	149	212	—	—	2.5	2.5	9.84
NU421	M	—	—	—	—	NF	121	121	141	147	162	244	244	225	3	3	17.3
NU1022	(M) —	—	—	—	—	NF	119	116.5	123	128	—	161	163.5	157	2	1	2.27
N 222	W M	—	—	—	—	N NF	121	—	—	—	—	—	189	182	2	2	4.64
NU222E	M T, T7	—	—	—	—	—	121	121	129	135	144	189	—	—	2	2	5.37
NU222E	M	—	—	—	—	—	121	121	129	135	144	189	—	—	2	2	7.65
N 322	W M	—	—	—	—	N NF	123	—	—	—	—	—	227	211	2.5	2.5	10.3
NU322E	M	—	—	—	—	NF	123	123	139	145	158	227	—	—	2.5	2.5	11.8
NU422	M	—	—	—	—	—	126	126	151	157	173	264	—	—	3	3	22.1

Notes (3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
 (4) d_b (max.) are values for adjusting rings for NU, NJ Types.
 (5) The limiting speeds (mechanical) in the bearing tables are the value for the standard cage type.
Remark The bearings denoted by an asterisk (*) are NSKHPS™ Cylindrical roller bearings.

SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 120 – 150 mm



d	Boundary Dimensions (mm)						Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
	D	B	r min.	r ₁ min.	F _w	E _w	C _r	C _{0r}		Limiting Speeds	
										Mechanical	Grease
120	180	28	2	1.1	135	165	139 000	191 000	4 000	—	3 400
	215	40	2.1	2.1	—	191.5	260 000	320 000	4 000	—	2 400
	215	40	2.1	2.1	143.5	—	335 000	420 000	3 600	5 300	3 000
	215	58	2.1	2.1	143.5	—	450 000	620 000	3 600	4 800	2 600
	260	55	3	3	—	226	450 000	510 000	3 000	—	1 800
	260	55	3	3	154	—	530 000	610 000	2 800	4 800	2 200
	260	86	3	3	154	—	795 000	1 030 000	2 600	4 300	2 000
310	72	5	5	170	260	675 000	770 000	2 400	—	2 000	
130	200	33	2	1.1	148	182	172 000	238 000	4 000	—	3 200
	230	40	3	3	—	204	270 000	340 000	3 800	—	2 200
	230	40	3	3	153.5	—	365 000	455 000	3 400	5 000	2 600
	230	64	3	3	153.5	—	530 000	735 000	3 400	4 500	2 400
	280	58	4	4	—	243	500 000	570 000	2 800	—	2 200
	280	58	4	4	167	—	615 000	735 000	2 600	4 300	2 200
	280	93	4	4	167	—	920 000	1 230 000	2 400	3 800	1 900
340	78	5	5	185	285	825 000	955 000	2 000	—	1 800	
140	210	33	2	1.1	158	192	176 000	250 000	3 800	—	3 000
	250	42	3	3	—	221	297 000	375 000	3 400	—	2 000
	250	42	3	3	169	—	395 000	515 000	3 200	4 500	2 400
	250	68	3	3	169	—	550 000	790 000	3 200	4 000	2 200
	300	62	4	4	—	260	550 000	640 000	2 600	—	2 000
	300	62	4	4	180	—	665 000	795 000	2 400	4 000	2 000
	300	102	4	4	180	—	1 020 000	1 380 000	2 200	2 600	1 700
360	82	5	5	198	302	875 000	1 020 000	1 900	—	1 700	
150	225	35	2.1	1.5	169.5	205.5	202 000	294 000	3 600	—	2 800
	270	45	3	3	—	238	360 000	465 000	3 000	—	1 800
	270	45	3	3	182	—	450 000	595 000	2 800	4 300	2 200
	270	73	3	3	182	—	635 000	930 000	2 800	3 800	2 000
	320	65	4	4	—	277	665 000	805 000	2 200	—	1 800
	320	65	4	4	193	—	760 000	920 000	2 200	3 800	1 800
	320	108	4	4	193	—	1 160 000	1 600 000	2 000	2 400	1 600
380	85	5	5	213	—	930 000	1 120 000	1 700	—	1 600	

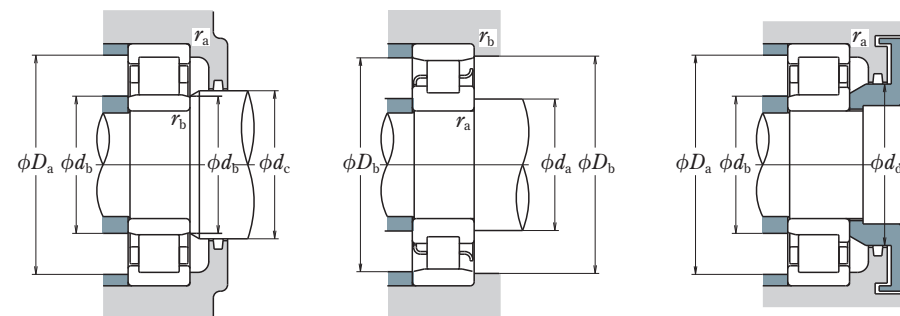
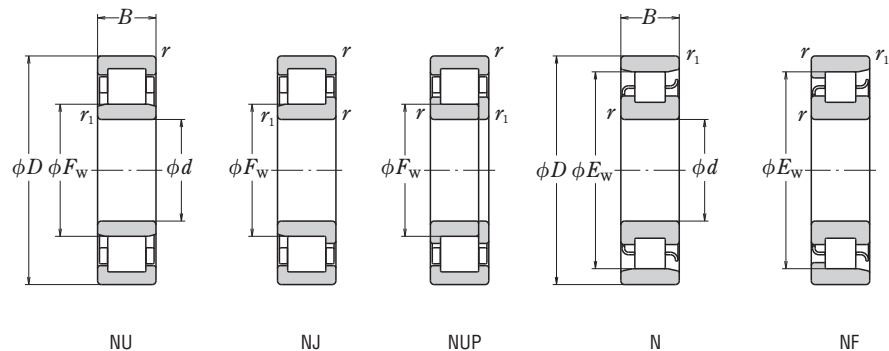
Notes (1) (M) in the column of cage symbols are usually omitted from the bearing number.
(2) When L-Shaped thrust collars (See section for L-Shaped Thrust Collars starting on page C157) are used, the bearings become the NH type.

Bearing Numbers	Cage symbol ⁽¹⁾ Standard Option	Abutment and Fillet Dimensions (mm)											Mass (kg)									
		NU		NJ		NUP		N		NF		d _a ⁽³⁾ min.		d _b min.	d _b ⁽⁴⁾ max.	d _c min.	d _d min.	D _a ⁽³⁾ max.	D _b max.	D _b min.	r _a max.	r _b max.
		d _a ⁽³⁾ min.	d _b min.	d _b ⁽⁴⁾ max.	d _c min.	d _d min.	D _a ⁽³⁾ max.	D _b max.	D _b min.	r _a max.	r _b max.											
NU1024	(M)	—	NU	NJ	NUP	N	—	129	126.5	133	138	—	171	173.5	167	2	1	2.43				
N 224	W	M	—	—	—	N	NF	131	—	—	—	—	—	204	196	2	2	5.63				
NU224E	M	—	NU	NJ	NUP	—	—	131	131	140	146	156	204	—	—	2	2	6.43				
NU2224E	M	—	NU	NJ	NUP	—	—	131	131	140	146	156	204	—	—	2	2	9.51				
N 324	W	M	—	—	—	N	NF	133	—	—	—	—	—	247	230	2.5	2.5	12.9				
NU324E	M	—	NU	NJ	NUP	—	—	133	133	150	156	171	247	—	—	2.5	2.5	15				
NU2324E	M	—	NU	NJ	NUP	—	—	133	133	150	156	171	247	—	—	2.5	2.5	25				
NU424	M	—	NU	NJ	NUP	N	—	140	140	166	172	190	290	290	266	4	4	30.2				
NU1026	(M)	—	NU	NJ	—	N	NF	139	136.5	146	151	—	191	193.5	184	2	1	3.66				
N 226	W	M	—	—	—	N	NF	143	—	—	—	—	—	217	208	2.5	2.5	6.48				
NU226E	M	T, T7	NU	NJ	NUP	—	—	143	143	150	158	168	217	—	—	2.5	2.5	8.03				
NU2226E	M	—	NU	NJ	NUP	—	—	143	143	150	158	168	217	—	—	2.5	2.5	9.44				
N 326	M	—	—	—	—	N	NF	146	—	—	—	—	—	264	247.5	3	3	17.7				
NU326E	M	—	NU	NJ	NUP	—	—	146	146	163	169	184	264	—	—	3	3	18.7				
NU2326E	M	—	NU	NJ	NUP	—	—	146	146	163	169	184	264	—	—	3	3	30				
NU426	M	—	NU	NJ	—	N	NF	150	150	180	187	208	320	320	291	4	4	39.6				
NU1028	(M)	—	NU	NJ	NUP	N	—	149	146.5	156	161	—	201	203.5	194	2	1	3.87				
N 228	W	M	—	—	—	N	NF	153	—	—	—	—	—	237	225	2.5	2.5	8.08				
NU228E	M	—	NU	NJ	NUP	—	—	153	153	165	171	182	237	—	—	2.5	2.5	9.38				
NU2228E	M	—	NU	NJ	NUP	—	—	153	153	165	171	182	237	—	—	2.5	2.5	15.2				
N 328	M	—	—	—	—	N	NF	156	—	—	—	—	—	284	266	3	3	21.7				
NU328E	M	—	NU	NJ	NUP	—	—	156	156	176	182	198	284	—	—	3	3	22.8				
NU2328E	M	—	NU	NJ	NUP	—	—	156	156	176	182	198	284	—	—	3	3	37.7				
NU428	M	—	NU	NJ	—	N	—	160	160	193	200	222	340	340	308	4	4	46.4				
NU1030	(M)	—	NU	NJ	—	N	NF	161	158	167	173	—	214	217	208	2	1.5	4.77				
N 230	W	M	—	—	—	N	NF	163	—	—	—	—	—	257	242	2.5	2.5	10.4				
NU230E	M	—	NU	NJ	NUP	—	—	163	163	177	184	196	257	—	—	2.5	2.5	11.9				
NU2230E	M	—	NU	NJ	NUP	—	—	163	163	177	184	196	257	—	—	2.5	2.5	19.3				
N 330	M	—	—	—	—	N	NF	166	—	—	—	—	—	304	283	3	3	25.8				
NU330E	M	—	NU	NJ	NUP	—	—	166	166	188	195	213	304	—	—	3	3	27.1				
NU2330E	M	—	NU	NJ	NUP	—	—	166	166	188	195	213	304	—	—	3	3	45.1				
NU430	M	—	NU	NJ	—	—	—	170	170	208	216	237	360	—	—	4	4	55.8				

Notes (3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
(4) d_b (max.) are values for adjusting rings for NU, NJ Types.
(5) The limiting speeds (mechanical) in the bearing tables are the value for the standard cage type.

■ SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 160 mm



d	Boundary Dimensions (mm)						Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
	D	B	r	r ₁	F _w	E _w	C _r	C _{0r}		Limiting Speeds	
			min.	min.						(⁵) Mechanical	Grease
160	240	38	2.1	1.5	180	220	238 000	340 000	3 400	—	2 600
	290	48	3	3	—	255	430 000	570 000	2 800	—	2 200
	290	48	3	3	195	—	500 000	665 000	2 600	4 000	2 200
290	80	3	3	193	—	810 000	1 190 000	2 400	3 600	1 900	
340	68	4	4	—	292	700 000	875 000	2 000	—	1 700	
340	68	4	4	204	—	860 000	1 050 000	1 900	3 600	1 700	
340	114	4	4	204	—	1 310 000	1 820 000	1 800	2 400	1 500	

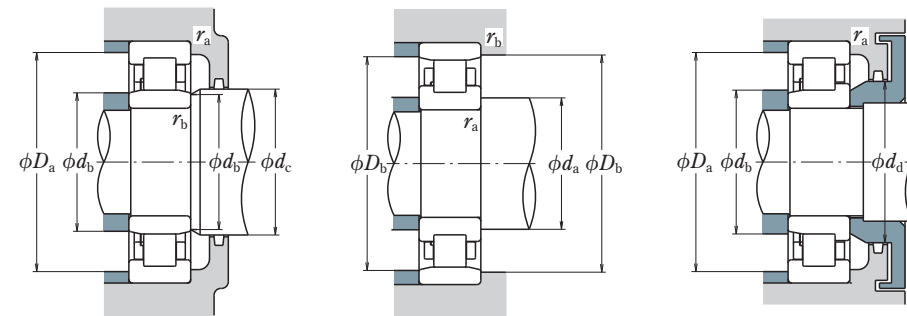
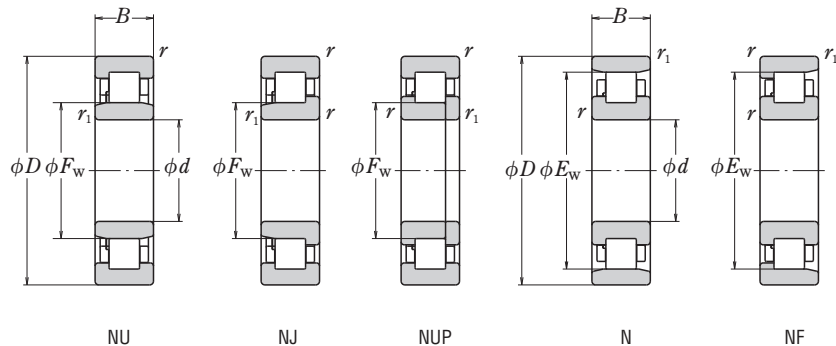
Notes ⁽¹⁾ (M) in the column of cage symbols are usually omitted from the bearing number.
⁽²⁾ When L-Shaped thrust collars (See section for L-Shaped Thrust Collars starting on page C157) are used, the bearings become the NH type.

Cage symbol ⁽¹⁾ Standard Option	Bearing Numbers						Abutment and Fillet Dimensions (mm)										Mass (kg) approx.	
	⁽²⁾						d _a ⁽³⁾	d _b	d _b ⁽⁴⁾	d _c	d _d	D _a ⁽³⁾	D _b	D _b	r _a	r _b		
	NU	NJ	NUP	N	NF	—	min.	min.	max.	min.	min.	max.	max.	min.	max.	max.		max.
NU1032	(M)	—	NU	NJ	—	N	NF	171	168	178	184	—	229	232	222	2	1.5	5.81
N 232	M	—	—	—	—	N	NF	173	—	—	—	—	277	261	2.5	2.5	14.1	
NU232E	M	—	NU	NJ	NUP	—	—	173	173	190	197	210	277	—	—	2.5	2.5	14.7
NU2232E	M	—	NU	NJ	NUP	—	—	173	173	188	197	210	277	—	—	2.5	2.5	24.5
N 332	M	—	—	—	—	N	—	176	—	—	—	—	—	324	298	3	3	30.8
NU332E	M	—	NU	NJ	NUP	—	—	176	176	199	211	228	324	—	—	3	3	32.1
NU2332E	M	—	NU	NJ	NUP	—	—	176	176	199	211	228	324	—	—	3	3	53.9

Notes ⁽³⁾ If axial loads are applied, increase d_a and reduce D_a from the values listed above.
⁽⁴⁾ d_b (max.) are values for adjusting rings for NU, NJ Types.
⁽⁵⁾ The limiting speeds(mechanical) in the bearing tables are the value for the standard cage type.

■ SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 170 – 220 mm



d	Boundary Dimensions (mm)						Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
	D	B	r	r ₁	F _w	E _w	C _r	C _{0r}		Limiting Speeds	
			min.	min.						(⁴) Mechanical	Grease
170	260	42	2.1	2.1	193	237	287 000	415 000	3 200	—	2 400
	310	52	4	4	—	272	475 000	635 000	2 600	—	2 000
	310	52	4	4	207	—	605 000	800 000	2 400	3 800	2 000
	310	86	4	4	205	—	925 000	1 330 000	2 200	3 200	1 800
	360	72	4	4	—	310	795 000	1 010 000	1 900	—	1 600
180	280	46	2.1	2.1	205	255	355 000	510 000	3 000	—	2 200
	320	52	4	4	—	282	495 000	675 000	2 400	—	1 900
	320	52	4	4	217	—	625 000	850 000	2 200	3 600	1 900
	320	86	4	4	215	—	1 010 000	1 510 000	2 000	3 200	1 700
	380	75	4	4	—	328	905 000	1 150 000	1 700	—	1 500
190	290	46	2.1	2.1	215	265	365 000	535 000	2 800	—	2 000
	340	55	4	4	—	299	555 000	770 000	2 200	—	1 800
	340	55	4	4	230	—	695 000	955 000	2 000	3 400	1 800
	340	92	4	4	228	—	1 100 000	1 670 000	1 900	3 000	1 600
	400	78	5	5	—	345	975 000	1 260 000	1 600	—	1 400
200	310	51	2.1	2.1	229	281	390 000	580 000	2 600	—	2 000
	360	58	4	4	—	316	620 000	865 000	2 000	—	1 700
	360	58	4	4	243	—	765 000	1 060 000	1 900	3 200	1 700
	360	98	4	4	241	—	1 220 000	1 870 000	1 800	2 200	1 500
	420	80	5	5	—	360	975 000	1 270 000	1 600	—	1 300
220	340	56	3	3	250	310	500 000	750 000	2 400	—	1 800
	400	65	4	4	—	350	760 000	1 080 000	1 800	—	1 500
	400	65	4	4	270	—	760 000	1 080 000	1 800	—	1 500
	400	108	4	4	270	—	1 140 000	1 810 000	1 700	—	1 300
	460	88	5	5	—	396	1 190 000	1 570 000	1 400	—	1 200

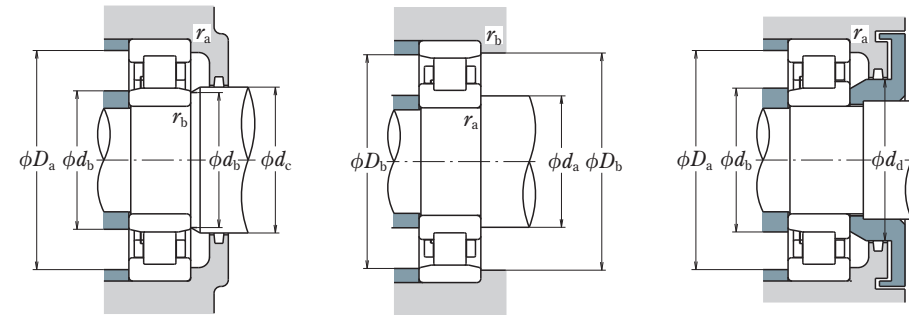
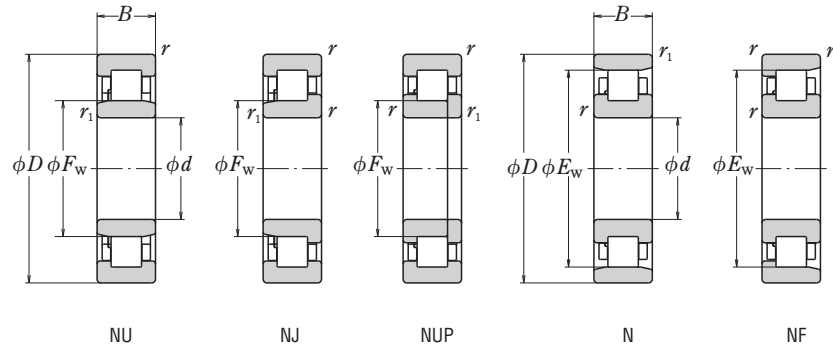
Bearing Numbers	Cage symbol	Standard Option	Abutment and Fillet Dimensions (mm)												Mass (kg)			
			NU		NJ		NUP		N		NF		r _a			r _b		
			d _a (²) min.	d _b min.	d _b (³) max.	d _c min.	d _d min.	D _a (²) max.	D _b max.	D _b min.	r _a max.	r _b max.	approx.					
NU1034	(M)	—	NU	NJ	—	N	—	181	181	190	197	—	249	249	239	2	2	7.91
N 234	M	—	—	—	—	N	NF	186	—	—	—	—	—	294	278	3	3	17.4
NU234E	M	—	NU	NJ	NUP	—	—	186	186	202	211	223	294	—	—	3	3	18.3
NU234E	M	—	NU	NJ	NUP	—	—	186	186	200	211	223	294	—	—	3	3	29.9
N 334	M	—	—	—	—	N	NF	186	—	—	—	—	—	344	316	3	3	36.6
NU334E	M	—	NU	NJ	NUP	—	—	186	186	213	223	241	344	—	—	3	3	37.9
NU2334E	M	—	NU	NJ	NUP	—	—	186	186	210	223	241	344	—	—	3	3	63.4
NU1036	(M)	—	NU	NJ	—	N	NF	191	191	202	209	—	269	269	258	2	2	10.2
N 236	M	—	—	—	—	N	NF	196	—	—	—	—	—	304	288	3	3	18.1
NU236E	M	—	NU	NJ	NUP	—	—	196	196	212	221	233	304	—	—	3	3	19
NU2236E	M	—	NU	NJ	NUP	—	—	196	196	210	221	233	304	—	—	3	3	31.4
N 336	M	—	—	—	—	N	NF	196	—	—	—	—	—	364	335	3	3	42.6
NU336E	M	—	NU	NJ	NUP	—	—	196	196	226	235	255	364	—	—	3	3	44
NU2336E	M	—	NU	NJ	NUP	—	—	196	196	222	235	255	364	—	—	3	3	74.6
NU1038	(M)	—	NU	NJ	—	N	—	201	201	212	219	—	279	279	268	2	2	10.7
N 238	M	—	—	—	—	N	NF	206	—	—	—	—	—	324	305	3	3	22
NU238E	M	—	NU	NJ	NUP	—	—	206	206	225	234	247	324	—	—	3	3	23
NU2238E	M	—	NU	NJ	NUP	—	—	206	206	223	234	247	324	—	—	3	3	38.3
N 338	M	—	—	—	—	N	—	210	—	—	—	—	—	380	352	4	4	48.7
NU338E	M	—	NU	NJ	NUP	—	—	210	210	240	248	268	380	—	—	4	4	50.6
NU2338E	M	—	NU	NJ	NUP	—	—	210	210	235	248	268	380	—	—	4	4	86.2
NU1040	(M)	—	NU	NJ	—	N	NF	211	211	226	233	—	299	299	284	2	2	14
N 240	M	—	—	—	—	N	NF	216	—	—	—	—	—	344	323	3	3	26.2
NU240E	M	—	NU	NJ	NUP	—	—	216	216	238	247	261	344	—	—	3	3	27.4
NU2240E	M	—	NU	NJ	NUP	—	—	216	216	235	247	261	344	—	—	3	3	46.1
N 340	M	—	—	—	—	N	NF	220	—	—	—	—	—	400	367	4	4	55.3
NU340E	M	—	NU	NJ	NUP	—	—	220	220	252	263	283	400	—	—	4	4	57.1
NU2340E	M	—	NU	NJ	NUP	—	—	220	220	247	263	283	400	—	—	4	4	99.3
NU1044	(M)	—	NU	NJ	—	N	—	233	233	247	254	—	327	327	313	2.5	2.5	18.2
N 244	M	—	—	—	—	N	NF	236	—	—	—	—	—	384	357	3	3	37
NU244	M	—	NU	NJ	NUP	—	—	236	236	264	273	289	384	—	—	3	3	37.3
NU2244	M	—	NU	—	—	—	—	—	236	264	273	289	384	—	—	3	3	61.8
N 344	M	—	—	—	—	N	NF	240	—	—	—	—	—	440	403	4	4	72.8
NU344	M	—	NU	NJ	—	—	—	240	240	278	287	307	440	—	—	4	4	74.6

Notes (¹) When L-Shaped thrust collars (See section for L-Shaped Thrust Collars starting on page C157) are used, the bearings become the NH type.
 (²) If axial loads are applied, increase d_a and reduce D_a from the values listed above.

Notes (³) d_b (max.) are values for adjusting rings for NU, NJ Types.
 (⁴) The limiting speeds (mechanical) in the bearing tables are the value for the standard cage type.

■ SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 240 – 500 mm



d	Boundary Dimensions (mm)						Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
	D	B	r	r ₁	F _w	E _w	C _r	C _{0r}		Limiting Speeds	
	min.	min.	min.	min.	min.	min.				Mechanical	Grease
240	360	56	3	3	270	330	530 000	820 000	2 200	—	1 600
	440	72	4	4	—	385	935 000	1 340 000	1 600	—	1 300
	440	72	4	4	295	—	935 000	1 340 000	1 600	—	1 300
	440	120	4	4	295	—	1 440 000	2 320 000	1 500	—	1 200
	500	95	5	5	—	430	1 360 000	1 820 000	1 200	—	1 100
500	95	5	5	310	—	1 360 000	1 820 000	1 200	—	1 100	
260	400	65	4	4	296	364	645 000	1 000 000	1 900	—	1 500
	480	80	5	5	—	420	1 100 000	1 580 000	1 500	—	1 200
	480	80	5	5	320	—	1 100 000	1 580 000	1 500	—	1 200
	480	130	5	5	320	—	1 710 000	2 770 000	1 300	—	1 100
	540	102	6	6	336	—	1 540 000	2 090 000	1 100	—	1 000
280	420	65	4	4	316	384	660 000	1 050 000	1 800	—	1 400
	500	80	5	5	—	440	1 140 000	1 680 000	1 300	—	1 100
	500	80	5	5	340	—	1 140 000	1 680 000	1 300	—	1 100
300	460	74	4	4	340	420	885 000	1 400 000	1 600	—	1 300
	540	85	5	5	364	—	1 400 000	2 070 000	1 200	—	1 100
320	480	74	4	4	360	440	905 000	1 470 000	1 500	—	1 200
	580	92	5	5	—	510	1 540 000	2 270 000	1 100	—	950
	580	92	5	5	390	—	1 540 000	2 270 000	1 100	—	950
340	520	82	5	5	385	475	1 080 000	1 740 000	1 400	—	1 100
360	540	82	5	5	405	495	1 110 000	1 830 000	1 300	—	1 000
380	560	82	5	5	425	—	1 140 000	1 910 000	1 200	—	1 000
400	600	90	5	5	450	550	1 360 000	2 280 000	1 100	—	900
420	620	90	5	5	470	570	1 390 000	2 380 000	1 100	—	850
440	650	94	6	6	493	—	1 470 000	2 530 000	1 000	—	800
460	680	100	6	6	516	624	1 580 000	2 740 000	950	—	750
480	700	100	6	6	536	644	1 620 000	2 860 000	900	—	750
500	720	100	6	6	556	664	1 660 000	2 970 000	900	—	710

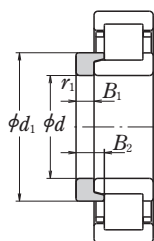
- Notes (1) When L-Shaped thrust collars (See section for L-Shaped Thrust Collars starting on page C157) are used, the bearings become the NH type.
 (2) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
 (3) d_b (max.) are values for adjusting rings for NU, NJ Types.

Bearing Numbers		Abutment and Fillet Dimensions (mm)														Mass (kg)		
Cage symbol	Standard Option	⁽¹⁾					$d_a^{(2)}$ min.	d_b min.	$d_b^{(3)}$ max.	d_c min.	d_d min.	$D_a^{(2)}$		D_b min.	D_b max.		r_a max.	r_b max.
		NU	NJ	NUP	N	NF						max.	max.					
NU1048	(M)	—	NU	NJ	—	N	—	253	253	266	275	—	347	347	333	2.5	2.5	19.5
N 248	M	—	—	—	—	N	NF	256	—	—	—	—	—	424	392	3	3	49.6
NU248	M	—	NU	NJ	NUP	—	—	256	256	289	298	316	424	—	—	3	3	50.4
NU2248	M	—	NU	—	—	—	—	—	256	289	298	316	424	—	—	3	3	84.9
N 348	M	—	—	—	—	N	NF	260	—	—	—	—	—	480	438	4	4	92.3
NU348	M	—	NU	NJ	—	—	—	260	260	304	313	333	480	—	—	4	4	94.6
NU1052	(M)	—	NU	NJ	—	N	NF	276	276	292	300	—	384	384	367	3	3	29.1
N 252	M	—	—	—	—	N	NF	280	—	—	—	—	—	460	428	4	4	66.2
NU252	M	—	NU	NJ	—	—	—	280	280	314	323	343	460	—	—	4	4	67.1
NU2252	M	—	NU	—	NUP	—	—	280	280	314	323	343	460	—	—	4	4	111
NU352	M	—	NU	NJ	—	—	—	286	286	330	339	359	514	—	—	5	5	118
NU1056	(M)	—	NU	NJ	NUP	N	NF	296	296	312	320	—	404	404	387	3	3	30.8
N 256	M	—	—	—	—	N	NF	300	—	—	—	—	—	480	448	4	4	69.6
NU256	M	—	NU	NJ	—	—	—	300	300	334	344	364	480	—	—	4	4	70.7
NU1060	(M)	—	NU	NJ	—	N	NF	316	316	336	344	—	444	444	424	3	3	43.7
NU260	M	—	NU	NJ	—	—	—	320	320	358	368	391	520	—	—	4	4	89.2
NU1064	(M)	—	NU	—	—	N	NF	336	336	356	365	—	464	464	444	3	3	46.1
N 264	M	—	—	—	—	N	NF	340	—	—	—	—	—	560	519	4	4	110
NU264	M	—	NU	NJ	—	—	—	340	340	384	394	420	560	—	—	4	4	112
NU1068	(M)	—	NU	NJ	—	N	NF	360	360	381	390	—	500	500	479	4	4	61.8
NU1072	(M)	—	NU	—	—	N	NF	380	380	400	410	—	520	520	499	4	4	64.6
NU1076	(M)	—	NU	—	—	—	—	—	400	420	430	—	540	—	—	4	4	67.5
NU1080	(M)	—	NU	—	NUP	N	—	420	420	445	455	—	580	580	554.5	4	4	88.2
NU1084	(M)	—	NU	—	—	N	—	440	440	465	475	—	600	600	574.5	4	4	91.7
NU1088	(M)	—	NU	—	—	—	—	—	466	488	498	—	624	—	—	5	5	105
NU1092	(M)	—	NU	—	NUP	N	—	486	486	511	521	—	654	654	628.5	5	5	123
NU1096	(M)	—	NU	NJ	—	N	—	506	506	531	541	—	674	674	654	5	5	127
NU10/500	(M)	—	NU	—	—	N	—	526	526	551	558	—	694	694	674	5	5	131

CYLINDRICAL ROLLER BEARINGS

L-Shaped Thrust Collars

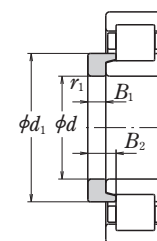
Bore Diameter 20 – 85 mm



L-Shaped Thrust Collar

d	Boundary Dimensions (mm)				Bearing Numbers	Mass (kg) approx.
	d ₁	B ₁	B ₂	r ₁ min.		
20	30	3	6.75	0.6	HJ 204	0.012
	29.8	3	5.5	0.6	HJ 204 E	0.011
	30	3	7.5	0.6	HJ 2204	0.012
	29.8	3	6.5	0.6	HJ 2204 E	0.012
25	31.7	4	7.5	0.6	HJ 304	0.017
	31.4	4	6.5	0.6	HJ 304 E	0.017
	31.8	4	8.5	0.6	HJ 2304	0.017
	31.4	4	7.5	0.6	HJ 2304 E	0.018
25	34.8	3	6	0.6	HJ 205 E	0.014
	34.8	3	6.5	0.6	HJ 2205 E	0.014
	38.2	4	7	1.1	HJ 305 E	0.025
	38.2	4	8	1.1	HJ 2305 E	0.026
30	43.6	6	10.5	1.5	HJ 405	0.057
	41.3	4	7	0.6	HJ 206 E	0.025
	41.4	4	7.5	0.6	HJ 2206 E	0.025
	45.1	5	8.5	1.1	HJ 306 E	0.042
35	45.1	5	9.5	1.1	HJ 2306 E	0.043
	50.5	7	11.5	1.5	HJ 406	0.080
	48.2	4	7	0.6	HJ 207 E	0.033
	48.2	4	8.5	0.6	HJ 2207 E	0.035
40	51.1	6	9.5	1.1	HJ 307 E	0.060
	51.1	6	11	1.1	HJ 2307 E	0.062
	59	8	13	1.5	HJ 407	0.12
	54.1	5	8.5	1.1	HJ 208 E	0.049
45	54.1	5	9	1.1	HJ 2208 E	0.050
	57.6	7	11	1.5	HJ 308 E	0.088
	57.7	7	12.5	1.5	HJ 2308 E	0.091
	64.8	8	13	2	HJ 408	0.14
50	59.1	5	8.5	1.1	HJ 209 E	0.055
	59.1	5	9	1.1	HJ 2209 E	0.055
	64.5	7	11.5	1.5	HJ 309 E	0.11
	64.5	7	13	1.5	HJ 2309 E	0.113
50	71.7	8	13.5	2	HJ 409	0.175
	64.1	5	9	1.1	HJ 210 E	0.061
	64.1	5	9	1.1	HJ 2210 E	0.061
	71.4	8	13	2	HJ 310 E	0.151
50	71.4	8	14.5	2	HJ 2310 E	0.155
	78.8	9	14.5	2.1	HJ 410	0.23

Bore Diameter 90 – 320 mm



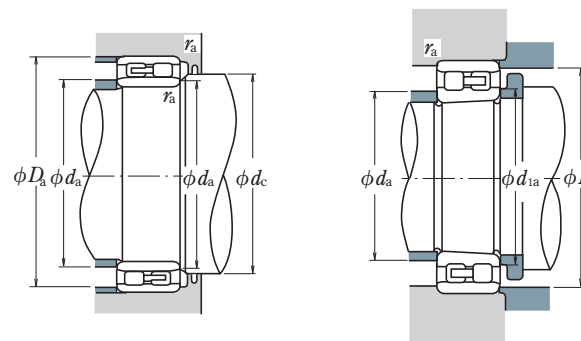
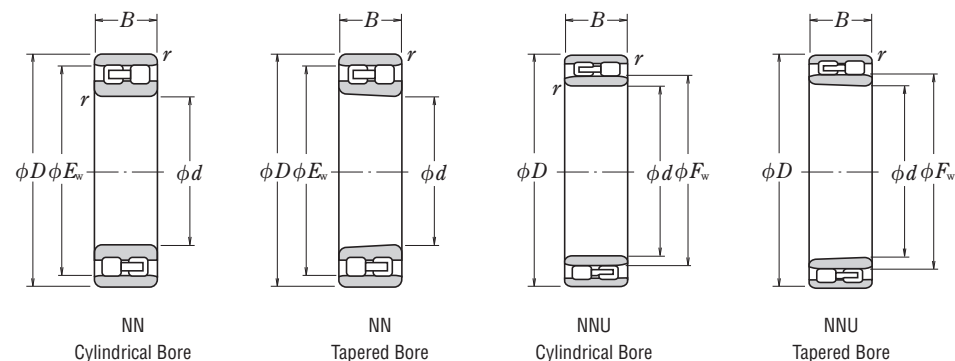
L-Shaped Thrust Collar

d	Boundary Dimensions (mm)				Bearing Numbers	Mass (kg) approx.
	d ₁	B ₁	B ₂	r ₁ min.		
90	114.3	9	14	2	HJ 218 E	0.32
	114.3	9	15	2	HJ 2218 E	0.325
	124.2	12	18.5	3	HJ 318 E	0.63
	124.2	12	22	3	HJ 2318 E	0.66
95	137	14	24	4	HJ 418	1.05
	120.6	9	14	2.1	HJ 219 E	0.355
	120.6	9	15.5	2.1	HJ 2219 E	0.365
	132.2	13	20.5	3	HJ 319 E	0.785
100	132.2	13	24.5	3	HJ 2319 E	0.815
	147	15	25.5	4	HJ 419	1.3
	127.5	10	15	2.1	HJ 220 E	0.44
	127.5	10	16	2.1	HJ 2220 E	0.45
105	139.6	13	20.5	3	HJ 320 E	0.89
	139.6	13	23.5	3	HJ 2320 E	0.92
	153.5	16	27	4	HJ 420	1.5
	145	13	20.5	3	HJ 321 E	0.97
110	159.5	16	27	4	HJ 421	1.65
	141.7	11	17	2.1	HJ 222 E	0.62
	141.7	11	19.5	2.1	HJ 2222 E	0.645
	155.8	14	22	3	HJ 322 E	1.21
120	155.8	14	26.5	3	HJ 2322 E	1.27
	171	17	29.5	4	HJ 422	2.1
	153.4	11	17	2.1	HJ 224 E	0.71
	153.4	11	20	2.1	HJ 2224 E	0.745
130	168.6	14	22.5	3	HJ 324 E	1.41
	168.6	14	26	3	HJ 2324 E	1.46
	188	17	30.5	5	HJ 424	2.6
	164.2	11	17	3	HJ 226 E	0.79
140	164.2	11	21	3	HJ 2226 E	0.84
	182.3	14	23	4	HJ 326 E	1.65
	182.3	14	28	4	HJ 2326 E	1.73
	205	18	32	5	HJ 426	3.3
140	180	11	18	3	HJ 228 E	0.99
	180	11	23	3	HJ 2228 E	1.07
	196	15	25	4	HJ 328 E	2.04
	196	15	31	4	HJ 2328 E	2.14
140	219	18	33	5	HJ 428	3.75

d	Boundary Dimensions (mm)				Bearing Numbers	Mass (kg) approx.
	d ₁	B ₁	B ₂	r ₁ min.		
150	193.7	12	19.5	3	HJ 230 E	1.26
	193.7	12	24.5	3	HJ 2230 E	1.35
	210	15	25	4	HJ 330 E	2.35
160	210	15	31.5	4	HJ 2330 E	2.48
	234	20	36.5	5	HJ 430	4.7
	207.3	12	20	3	HJ 232 E	1.48
170	206.1	12	24.5	3	HJ 2232 E	1.55
	222	15	25	4	HJ 332 E	2.59
	222.1	15	32	4	HJ 2332 E	2.76
	220.8	12	20	4	HJ 234 E	1.7
180	219.5	12	24	4	HJ 2334 E	1.79
	238	16	33.5	4	HJ 430 E	3.25
	230.8	12	20	4	HJ 236 E	1.79
	229.5	12	24	4	HJ 2236 E	1.88
190	252	17	35	4	HJ 2336 E	3.85
	244.5	13	21.5	4	HJ 238 E	2.19
	243.2	13	26.5	4	HJ 2238 E	2.31
	260.6	18	36.5	5	HJ 2338 E	4.45
200	258.2	14	23	4	HJ 240 E	2.65
	258	14	34	4	HJ 2240	2.6
	256.9	14	28	4	HJ 2240 E	2.78
	280	18	30	5	HJ 340 E	5.0
220	286	15	27.5	4	HJ 244	3.55
	286	15	36.5	4	HJ 2244	3.55
	307	20	36	5	HJ 344	7.05
	313	16	29.5	4	HJ 248	4.65
240	313	16	38.5	4	HJ 2248	4.65
	334	22	39.5	5	HJ 348	8.2
	340	18	33	5	HJ 252	6.2
	340	18	40.5	5	HJ 2252	6.2
260	362	24	43	6	HJ 352	11.4
	360	18	33	5	HJ 256	7.4
	387	20	34.5	5	HJ 260	9.15
	415	21	37	5	HJ 264	11.3

DOUBLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 25 – 140 mm



d	Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
	D	B	r min.	F _w	E _w	C _r	C _{0r}	Grease	Oil
25	47	16	0.6	—	41.3	25 800	30 000	14 000	17 000
30	55	19	1	—	48.5	31 000	37 000	12 000	14 000
35	62	20	1	—	55	39 500	50 000	10 000	12 000
40	68	21	1	—	61	43 500	55 500	9 000	11 000
45	75	23	1	—	67.5	52 000	68 500	8 500	10 000
50	80	23	1	—	72.5	53 000	72 500	7 500	9 000
55	90	26	1.1	—	81	69 500	96 500	6 700	8 000
60	95	26	1.1	—	86.1	73 500	106 000	6 300	7 500
65	100	26	1.1	—	91	77 000	116 000	6 000	7 100
70	110	30	1.1	—	100	97 500	148 000	5 600	6 700
75	115	30	1.1	—	105	96 500	149 000	5 300	6 300
80	125	34	1.1	—	113	119 000	186 000	4 800	6 000
85	130	34	1.1	—	118	125 000	201 000	4 500	5 600
90	140	37	1.5	—	127	143 000	228 000	4 300	5 000
95	145	37	1.5	—	132	150 000	246 000	4 000	5 000
100	140	40	1.1	112	—	155 000	295 000	4 000	5 000
	150	37	1.5	—	137	157 000	265 000	4 000	4 800
105	145	40	1.1	117	—	161 000	315 000	3 800	4 800
	160	41	2	—	146	198 000	320 000	3 800	4 500
110	150	40	1.1	122	—	167 000	335 000	3 600	4 500
	170	45	2	—	155	229 000	375 000	3 400	4 300
120	165	45	1.1	133.5	—	183 000	360 000	3 200	4 000
	180	46	2	—	165	239 000	405 000	3 200	3 800
130	180	50	1.5	144	—	274 000	545 000	3 000	3 800
	200	52	2	—	182	284 000	475 000	3 000	3 600
140	190	50	1.5	154	—	283 000	585 000	2 800	3 600
	210	53	2	—	192	298 000	515 000	2 800	3 400

Bearing Numbers		Abutment and Fillet Dimensions (mm)						Mass (kg)
Cylindrical Bore	Tapered Bore ⁽¹⁾	d _a ⁽²⁾		d _{1a}	d _c	D _a	r _a	approx.
		min.	max.	min.	max.	min.	max.	
NN 3005	NN 3005 KR	29	—	29	—	43	42	0.127
NN 3006	NN 3006 KR	35	—	36	—	50	50	0.198
NN 3007	NN 3007 KR	40	—	41	—	57	56	0.258
NN 3008	NN 3008 KR	45	—	46	—	63	62	0.309
NN 3009	NN 3009 KR	50	—	51	—	70	69	0.407
NN 3010	NN 3010 KR	55	—	56	—	75	74	0.436
NN 3011	NN 3011 KR	61.5	—	62	—	83.5	83	0.647
NN 3012	NN 3012 KR	66.5	—	67	—	88.5	88	0.693
NN 3013	NN 3013 KR	71.5	—	72	—	93.5	93	0.741
NN 3014	NN 3014 KR	76.5	—	77	—	103.5	102	1.06
NN 3015	NN 3015 KR	81.5	—	82	—	108.5	107	1.11
NN 3016	NN 3016 KR	86.5	—	87	—	118.5	115	1.54
NN 3017	NN 3017 KR	91.5	—	92	—	123.5	120	1.63
NN 3018	NN 3018 KR	98	—	99	—	132	129	2.09
NN 3019	NN 3019 KR	103	—	104	—	137	134	2.19
NNU 4920	NNU 4920 KR	106.5	111	108	115	133.5	—	1.9
NN 3020	NN 3020 KR	108	—	109	—	142	139	2.28
NNU 4921	NNU 4921 KR	111.5	116	113	120	138.5	—	1.99
NN 3021	NN 3021 KR	114	—	115	—	151	148	2.88
NNU 4922	NNU 4922 KR	116.5	121	118	125	143.5	—	2.07
NN 3022	NN 3022 KR	119	—	121	—	161	157	3.71
NNU 4924	NNU 4924 KR	126.5	133	128	137	158.5	—	2.85
NN 3024	NN 3024 KR	129	—	131	—	171	167	4.04
NNU 4926	NNU 4926 KR	138	143	140	148	172	—	3.85
NN 3026	NN 3026 KR	139	—	141	—	191	185	5.88
NNU 4928	NNU 4928 KR	148	153	150	158	182	—	4.08
NN 3028	NN 3028 KR	149	—	151	—	201	195	6.34

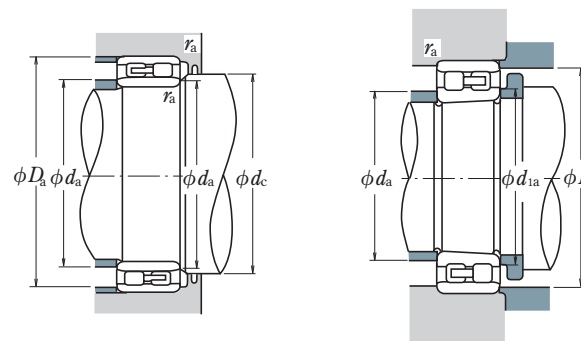
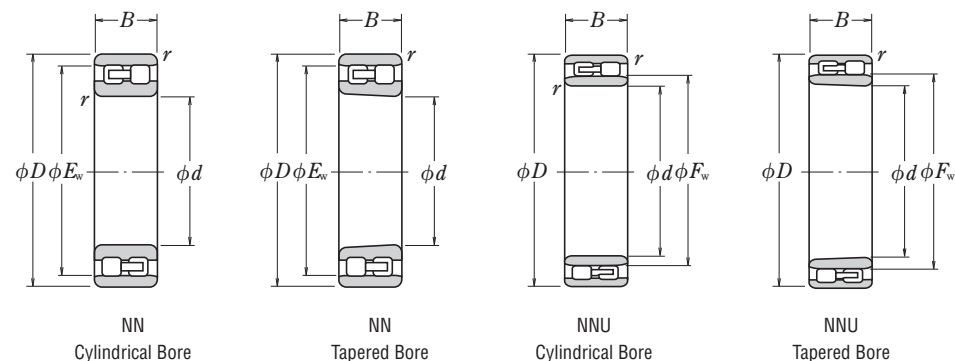
Note ⁽¹⁾ The suffix K represents bearings with tapered bores (taper 1 : 12).

Remark Production of double-row cylindrical roller bearings is generally in the high precision classes (Class 5 or better).

Note ⁽²⁾ d_a (max.) are values for adjusting rings for the NNU Type.

DOUBLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 150 – 360 mm



d	Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
	D	B	r min.	F _W	E _W	C _r	C _{0r}	Grease	Oil
150	210	60	2	167	—	350 000	715 000	2 600	3 200
	225	56	2.1	—	206	335 000	585 000	2 600	3 000
160	220	60	2	177	—	365 000	760 000	2 400	3 000
	240	60	2.1	—	219	375 000	660 000	2 400	2 800
170	230	60	2	187	—	375 000	805 000	2 400	2 800
	260	67	2.1	—	236	450 000	805 000	2 200	2 600
180	250	69	2	200	—	480 000	1 020 000	2 200	2 600
	280	74	2.1	—	255	565 000	995 000	2 000	2 400
190	260	69	2	211.5	—	485 000	1 060 000	2 000	2 600
	290	75	2.1	—	265	595 000	1 080 000	2 000	2 400
200	280	80	2.1	223	—	570 000	1 220 000	1 900	2 400
	310	82	2.1	—	282	655 000	1 170 000	1 800	2 200
220	300	80	2.1	243	—	600 000	1 330 000	1 700	2 200
	340	90	3	—	310	815 000	1 480 000	1 700	2 000
240	320	80	2.1	263	—	625 000	1 450 000	1 600	2 000
	360	92	3	—	330	855 000	1 600 000	1 500	1 800
260	360	100	2.1	289	—	935 000	2 100 000	1 400	1 800
	400	104	4	—	364	1 030 000	1 920 000	1 400	1 700
280	380	100	2.1	309	—	960 000	2 230 000	1 300	1 700
	420	106	4	—	384	1 080 000	2 080 000	1 300	1 500
300	420	118	3	336	—	1 230 000	2 870 000	1 200	1 500
	460	118	4	—	418	1 290 000	2 460 000	1 200	1 400
320	440	118	3	356	—	1 260 000	3 050 000	1 100	1 400
	480	121	4	—	438	1 350 000	2 670 000	1 100	1 300
340	520	133	5	—	473	1 670 000	3 300 000	1 000	1 200
360	540	134	5	—	493	1 700 000	3 450 000	950	1 200

Bearing Numbers		Abutment and Fillet Dimensions (mm)							Mass (kg)
Cylindrical Bore	Tapered Bore ⁽¹⁾	d _a ⁽²⁾		d _{1a}	d _c	D _a	r _a	approx.	
		min.	max.	min.	min.	max.	min.		
NNU 4930 NN 3030	NNU 4930 KR NN 3030 KR	159	166	162	171	201	—	2	6.39
		161	—	162	—	214	209	2	7.77
NNU 4932 NN 3032	NNU 4932 KR NN 3032 KR	169	176	172	182	211	—	2	6.76
		171	—	172	—	229	222	2	9.41
NNU 4934 NN 3034	NNU 4934 KR NN 3034 KR	179	186	182	192	221	—	2	7.12
		181	—	183	—	249	239	2	12.8
NNU 4936 NN 3036	NNU 4936 KR NN 3036 KR	189	199	193	205	241	—	2	10.4
		191	—	193	—	269	258	2	16.8
NNU 4938 NN 3038	NNU 4938 KR NN 3038 KR	199	211	203	217	251	—	2	10.9
		201	—	203	—	279	268	2	17.8
NNU 4940 NN 3040	NNU 4940 KR NN 3040 KR	211	222	214	228	269	—	2	15.3
		211	—	214	—	299	285	2	22.7
NNU 4944 NN 3044	NNU 4944 KR NN 3044 KR	231	242	234	248	289	—	2	16.6
		233	—	236	—	327	313	2.5	29.6
NNU 4948 NN 3048	NNU 4948 KR NN 3048 KR	251	262	254	269	309	—	2	18
		253	—	256	—	347	334	2.5	32.7
NNU 4952 NN 3052	NNU 4952 KR NN 3052 KR	271	288	275	295	349	—	2	31.1
		276	—	278	—	384	368	3	47.7
NNU 4956 NN 3056	NNU 4956 KR NN 3056 KR	291	308	295	315	369	—	2	33
		296	—	298	—	404	388	3	51.1
NNU 4960 NN 3060	NNU 4960 KR NN 3060 KR	313	335	318	343	407	—	2.5	51.9
		316	—	319	—	444	422	3	70.7
NNU 4964 NN 3064	NNU 4964 KR NN 3064 KR	333	355	338	363	427	—	2.5	54.9
		336	—	340	—	464	442	3	76.6
NN 3068	NN 3068 KR	360	—	365	—	500	477	4	102
NN 3072	NN 3072 KR	380	—	385	—	520	497	4	106

Note ⁽¹⁾ The suffix K represents bearings with tapered bores (taper 1 : 12).

Remark Production of double-row cylindrical roller bearings is generally in the high precision classes (Class 5 or better).

Note ⁽²⁾ d_a (max.) are values for adjusting rings for the NNU Type.

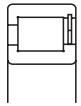
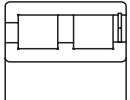
FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS SINGLE-ROW(NCF), DOUBLE-ROW(NNCF)

Design, Types, and Features

Cageless, full-complement cylindrical roller bearings have the maximum possible number of rollers and can sustain much heavier loads than cylindrical roller bearings of the same size with cages. On the other hand, high-speed capability is inferior to the bearings with cages.

The open-type single- and double-row bearings are mostly used in general industrial applications at low speed and under heavy load, and the shielded-type double-row bearings are often used in crane sheaves.

Table 1 Features of Various Types

Figure	Type	Design and Features
	NCF	The outer and inner rings and rollers are non-separable since a retaining snap ring is installed at the side opposite the outer ring rib. They can sustain axial loads in only one direction.
	NNCF	NNCF is a double-row version of NCF. They can sustain heavy radial loads.

Tolerances and Running AccuracyTable 7.2 (Pages A128 to A131)

Single-Row
Double-Row

Recommended Fits

Single-Row
Double-Row

Inner Ring RotationTable 8.3 (Page A164)
Table 8.5 (Page A165)

Outer Ring RotationTable 2 below

Table 2 Fits and Internal Clearances for Full-Complement Cylindrical Roller Bearings

Operating Conditions		Fitting between Inner Ring and Shaft	Fitting between Outer Ring and Housing Bore	Recommended Internal Clearance
Outer Ring Rotation	Thin walled housings and heavy loads	g6 or h6	P7	C 3
	Normal to heavy loads	g6 or h6	N7	C 3
	Light or fluctuating loads	g6 or h6	M7	CN

Permissible Misalignment

The permissible misalignment of full-complement single-row cylindrical roller bearings is generally 0.0006 radian (2') under normal load. For double-row bearings, nearly on misalignment is allowed.

FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS FOR SHEAVES

DESIGN, TYPES, AND FEATURES

Cylindrical Roller Bearings for sheaves are specially designed thin-walled, broad-width, full-complement type double-row cylindrical roller bearings, but they are widely used also for general industrial machines running at low speed and under heavy loads. There are several series as shown in Table 1.

Table 1 Series of Cylindrical Roller Bearings for Sheaves

Bearing Type		Fixed-End	Free-End
Open Type	Without Snap Ring	RS-48E4 RS-49E4	RSF-48E4 RSF-49E4
	Shielded Type	Without Snap Ring With Snap Ring	RS-50 RS-50NR

Since all are non-separable type bearings, the inner and outer rings cannot be separated, but the RSF type can be used as a free-end bearing. In this case, the permissible axial displacement is listed in the bearing tables.

Since cylindrical roller bearings for sheaves are a double-row, full-complement type, they can withstand heavy shock loads and moments and have sufficient axial load capacity for use in sheaves.

Since the shielded type is a kind of bearing unit, the number of parts surrounding the bearing can be reduced, so it allows for a simple compact design.

The surface of these bearings is treated for rust prevention.

Table 2 Features of Various Types

Figure	Type	Design and Features
	RS-48E4 RS-49E4	Double-row outer ring with center rib, two single-row inner rings with ribs. The outer and inner rings and rollers are non-separable since there are two retaining snap rings at the sides of the outer ring. They can sustain an axial load in either direction so they can be used as fixed-end bearings. An oil groove and holes are provided at the center of the outer ring.
	RSF-48E4 RSF-49E4	Double-row outer ring without ribs, double-row inner ring with three ribs. The outer and inner rings and rollers are non-separable since there is a retaining snap ring at the middle of the outer ring. They can be used as free-end bearings. The permissible axial movement is listed in the dimensional tables. An oil groove and holes are provided at the center of the outer ring.
	RS-50 RS-50NR	Both sides shielded, double-row outer ring with center rib, two inner rings with ribs. They can sustain an axial load in either direction. They are prelubricated, but it is possible to replenish the grease through an oil groove and holes in parts mating with the inner rings. If there are snap rings at the outside of the outer ring, this type becomes RS-50NR. They are surface-treated for rust prevention.

TOLERANCES AND RUNNING ACCURACY..... Table 7.2 (Pages A128 to A131)

RECOMMENDED FITS AND INTERNAL CLEARANCES

When used with outer ring rotation for sheaves or wheels, the fit and radial internal clearance should conform to Table 3.

Table 3 Fits and Internal Clearances for Cylindrical Roller Bearings for Sheaves

Operating Conditions		Fitting between Inner Ring and Shaft	Fitting between Outer Ring and Housing Bore	Recommended Internal Clearance
Outer Ring Rotation	Thin walled housings and heavy loads	g6 or h6	P7	C3
	Normal to heavy loads	g6 or h6	N7	C3
	Light or fluctuating loads	g6 or h6	M7	CN

The fits listed in Tables 8.3 (Page A164) and 8.5 (Page A165) apply when they are used with inner ring rotation in general applications, and the internal clearance should conform to Table 4.

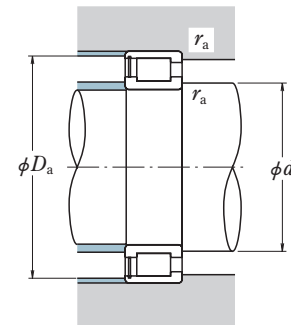
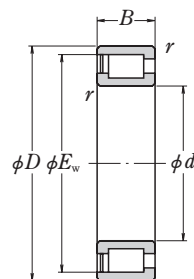
Table 4 Units : μm

Nominal Bore Dia. d (mm)	Clearances			
	CN		C3	
over incl.	min.	max.	min.	max.
30 40	15	50	35	70
40 50	20	55	40	75
50 65	20	65	45	90
65 80	25	75	55	105
80 100	30	80	65	115
100 120	35	90	80	135
120 140	40	105	90	155
140 160	50	115	100	165
160 180	60	125	110	175
180 200	65	135	125	195
200 225	75	150	140	215
225 250	90	165	155	230
250 280	100	180	175	255
280 315	110	195	195	280
315 355	125	215	215	305
355 400	140	235	245	340
400 450	155	275	270	390
450 500	180	300	300	420

■ FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS

NCF Type, Single-Row

Bore Diameter 100 – 260 mm



d	Boundary Dimensions (mm)				Basic Load Ratings (kN)		Bearing Numbers
	D	B	r min.	E _W	C _r	C _{0r}	
100	140	24	1.1	130.5	132	209	NCF2920V NCF3020V
	150	37	1.5	139.7	209	310	
110	150	24	1.1	141	138	229	NCF2922V NCF3022V
	170	45	2	156.3	278	405	
120	165	27	1.1	154	177	305	NCF2924V NCF3024V
	180	46	2	167.58	293	440	
130	180	30	1.5	166.5	210	370	NCF2926V NCF3026V
	200	52	2	183.81	415	615	
140	190	30	1.5	179.4	227	395	NCF2928V NCF3028V
	210	53	2	197.82	435	680	
150	210	36	2	195	289	505	NCF2930V NCF3030V
	225	56	2.1	206.82	460	710	
160	220	36	2	207	310	535	NCF2932V NCF3032V
	240	60	2.1	224.8	520	810	
170	215	22	1.5	203.5	149	272	NCF1834V NCF2934V NCF3034V
	230	36	2	218	320	570	
	260	67	2.1	242.87	675	1 070	
180	225	22	1.5	215	154	290	NCF1836V NCF2936V NCF3036V
	250	42	2	231.5	390	695	
	280	74	2.1	260.3	785	1 260	
190	240	24	1.5	228.7	178	335	NCF1838V NCF2938V NCF3038V
	260	42	2	243.6	435	785	
	290	75	2.1	269.9	805	1 320	
200	250	24	1.5	237	182	350	NCF1840V NCF2940V NCF3040V
	280	48	2.1	261	530	955	
	310	82	2.1	287.8	910	1 510	
220	270	24	2	257.7	191	385	NCF1844V NCF2944V NCF3044V
	300	48	2.1	282	555	1 050	
	340	90	3	312.3	1 100	1 820	
240	300	28	2	283	236	470	NCF1848V NCF2948V NCF3048V
	320	48	2.1	303	580	1 140	
	360	92	3	335.25	1 160	1 990	
260	320	28	2	307	247	510	NCF1852V NCF2952V NCF3052V
	360	60	2.1	333.2	750	1 460	
	400	104	4	376.1	1 570	2 600	

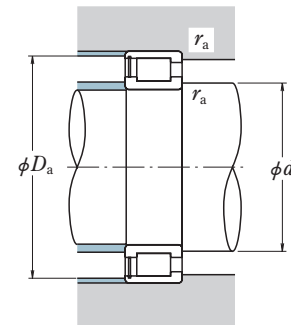
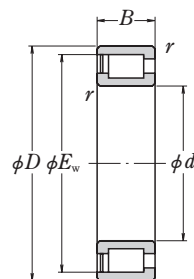
Abutment and Fillet Dimensions (mm)			Mass (kg) approx.
d _a	D _a	r _a max.	
109	131	1	1.0
111	140	1.5	2.1
119	142	1	1.1
122	157	2	3.3
130	155	1	1.7
132	168	2	3.6
141	168	1.5	2.2
142	187	2	5.6
151	180	1.5	2.3
152	198	2	5.9
163	196	2	3.7
165	209	2	7.1
173	208	2	3.8
175	225	2	8.6
182	204	1.5	1.8
183	219	2	4.1
185	244	2	11.9
192	216	1.5	1.8
193	236	2	6.0
195	263	2	15.8
202	229	1.5	2.4
203	245	2	6.5
206	273	2	16.7
213	238	1.5	2.5
216	263	2	8.9
216	293	2	21.4
234	258	2	2.7
236	283	2	9.6
238	320	2.5	28.2
254	285	2	4.2
257	304	2	10.4
259	340	2.5	31.2
275	308	2	4.5
277	342	2	18.1
282	377	3	45.3

Remark Full-complement cylindrical roller bearings are designed for specific applications, when using them, please contact NSK.

■ FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS

NCF Type, Single-Row

Bore Diameter 300 – 800 mm



<i>d</i>	Boundary Dimensions (mm)				Basic Load Ratings (kN)		Bearing Numbers
	<i>D</i>	<i>B</i>	<i>r</i> min.	<i>E_W</i>	<i>C_r</i>	<i>C_{0r}</i>	
300	380	38	2.5	359	445	870	NCF1860V
	420	72	3	389.6	1 120	2 200	NCF2960V
	460	118	4	431.7	1 980	3 500	NCF3060V
320	400	38	2.1	380	460	925	NCF1864V
	440	72	3	410	1 150	2 340	NCF2964V
	480	121	4	449.6	2 170	3 900	NCF3064V
340	420	38	2.1	401	475	985	NCF1868V
	460	72	3	430.3	1 190	2 470	NCF2968V
	520	133	5	485.8	2 480	4 350	NCF3068V
360	440	38	2.5	422	490	1 040	NCF1872V
	480	72	3	450.7	1 220	2 610	NCF2972V
	540	134	5	503.6	2 550	4 600	NCF3072V
380	480	46	2.5	452.8	575	1 230	NCF1876V
	520	82	4	486.7	1 600	3 350	NCF2976V
	560	135	5	521.4	2 610	4 800	NCF3076V
400	500	46	2.5	475.7	590	1 300	NCF1880V
	540	82	4	511	1 650	3 550	NCF2980V
	600	148	5	558.7	3 050	5 750	NCF3080AV
420	520	46	2.1	491	600	1 340	NCF1884V
	560	82	4	523.2	1 680	3 650	NCF2984V
	620	150	5	577.7	3 000	5 650	NCF3084V
440	540	46	2.1	514	615	1 410	NCF1888V
	600	95	4	562	2 070	4 300	NCF2988V
	580	56	3	552.7	920	1 950	NCF1892V
460	620	95	4	576.5	2 100	4 450	NCF2992V
	600	56	3	573	940	2 040	NCF1896V
	650	100	5	615	2 380	5 100	NCF2996V
500	620	56	3	593.5	960	2 120	NCF18/500V
	670	100	5	630.2	2 420	5 250	NCF29/500V
	650	56	3	624	990	2 240	NCF18/530V
560	680	56	3	654.7	1 020	2 360	NCF18/560V
	820	195	6	770	5 600	11 300	NCF30/560V
	730	60	3	695.5	1 140	2 680	NCF18/600V
600	800	118	5	752	3 050	7 300	NCF29/600V
	780	69	4	742	1 470	3 400	NCF18/630V
	820	69	4	780	1 520	3 550	NCF18/670V
710	870	74	4	832.5	1 650	3 900	NCF18/710V
750	920	78	5	882.3	1 930	4 600	NCF18/750V
800	980	82	5	936	2 110	5 100	NCF18/800V

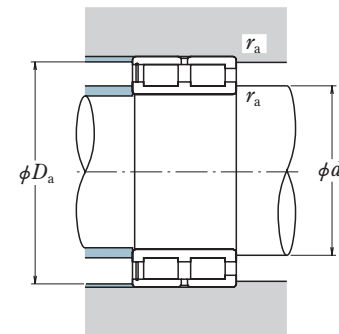
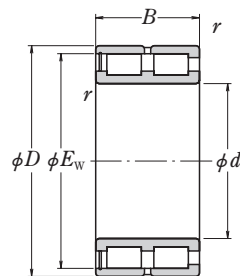
Abutment and Fillet Dimensions (mm)			Mass (kg)
<i>d_a</i>	<i>D_a</i>	<i>r_a</i> max.	approx.
319	360	2	9.7
320	398	2.5	30.7
323	435	3	67.6
338	381	2	10.3
340	418	2.5	33
343	454	3	73
359	402	2	10.7
361	438	2.5	34.1
368	490	4	97
380	423	2	11.5
381	457	2.5	36
388	509	4	102
400	458	2	18.6
404	493	3	52
408	529	4	108
421	478	2	19.5
425	513	3	53.4
429	568	4	139
440	498	2	20.5
445	533	3	55.7
449	588	4	147
461	518	2	21.3
466	572	3	78.2
483	555	2.5	32.5
486	591	3	81.2
503	575	2.5	33.8
510	617	4	95.1
524	594	2.5	35
531	637	4	98.4
554	625	2.5	36.9
585	655	2.5	39.3
598	778	5	332.5
626	702	2.5	48.9
633	764	4	164.9
659	748	3	68.8
700	787	3	72.7
741	836	3	87.6
786	883	4	103.3
832	950	4	123.1

Remark Full-complement cylindrical roller bearings are designed for specific applications, when using them, please contact NSK.

■ FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS

NNCF Type, Double-Row

Bore Diameter 100 – 260 mm



<i>d</i>	Boundary Dimensions (mm)				Basic Load Ratings (kN)		Bearing Numbers
	<i>D</i>	<i>B</i>	<i>r</i> min.	<i>E_w</i>	<i>C_r</i>	<i>C_{0r}</i>	
100	140	40	1.1	129.8	194	400	NNCF4920V NNCF5020V
	150	67	1.5	139.7	360	615	
110	150	40	1.1	138.4	202	430	NNCF4922V NNCF5022V
	170	80	2	156.3	490	840	
120	165	45	1.1	153.8	226	480	NNCF4924V NNCF5024V
	180	80	2	167.58	500	885	
130	180	50	1.5	165.7	262	555	NNCF4926V NNCF5026V
	200	95	2	183.81	710	1 230	
140	190	50	1.5	176.2	272	595	NNCF4928V NNCF5028V
	210	95	2	197.82	750	1 360	
150	210	60	2	191.6	390	865	NNCF4930V NNCF5030V
	225	100	2.1	206.82	785	1 420	
160	220	60	2	204.1	410	930	NNCF4932V NNCF5032V
	240	109	2.1	224.8	895	1 620	
170	230	60	2	212.4	415	975	NNCF4934V NNCF5034V
	260	122	2.1	242.87	1 160	2 140	
180	250	69	2	230.5	550	1 230	NNCF4936V NNCF5036V
	280	136	2.1	260.3	1 340	2 510	
190	260	69	2	240.7	565	1 290	NNCF4938V NNCF5038V
	290	136	2.1	269.9	1 380	2 630	
200	250	50	1.5	235.9	320	825	NNCF4840V NNCF4940V NNCF5040V
	280	80	2.1	259.5	665	1 500	
	310	150	2.1	287.75	1 560	3 000	
220	270	50	1.5	256.9	340	905	NNCF4844V NNCF4944V NNCF5044V
	300	80	2.1	277	695	1 620	
	340	160	3	312.3	1 890	3 650	
240	300	60	2	282.6	495	1 340	NNCF4848V NNCF4948V NNCF5048V
	320	80	2.1	300	725	1 770	
	360	160	3	335.25	1 990	4 000	
260	320	60	2	303.6	515	1 450	NNCF4852V NNCF4952V NNCF5052V
	360	100	2.1	331.5	1 050	2 530	
	400	190	4	376.1	2 690	5 200	

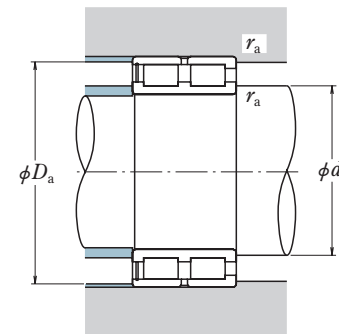
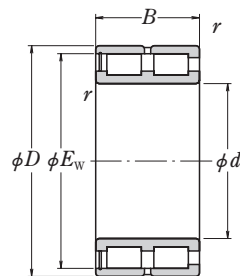
Abutment and Fillet Dimensions (mm)			Mass (kg) approx.
<i>d_a</i>	<i>D_a</i>	<i>r_a</i> max.	
109	130	1	2.0
111	140	1.5	3.8
119	140	1	2.1
122	157	2	6.1
130	155	1	2.9
132	168	2	6.5
141	168	1.5	3.9
142	187	2	10.3
151	178	1.5	4.2
152	198	2	10.8
163	196	2	6.6
165	209	2	13
173	206	2	7.0
175	225	2	15.8
183	216	2	7.3
185	244	2	22.1
193	236	2	10.7
195	263	2	29.4
203	245	2	11.1
206	273	2	30.8
213	237	1.5	5.9
216	263	2	15.7
216	293	2	39.7
233	257	1.5	6.4
236	283	2	17
238	320	2.5	50.7
254	285	2	10.3
257	302	2	18.4
259	340	2.5	54.3
275	304	2	11
277	342	2	32
282	377	3	82.7

Remark Full-complement cylindrical roller bearings are designed for specific applications, when using them, please contact NSK.

■ FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS

NNCF Type, Double-Row

Bore Diameter 280 – 500 mm



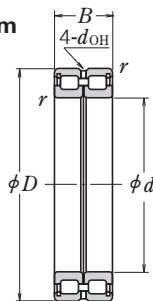
d	Boundary Dimensions (mm)				Basic Load Ratings (kN)		Bearing Numbers
	D	B	r min.	E _w	C _r	C _{0r}	
280	350	69	2	332.5	685	1 860	NNCF4856V
	380	100	2.1	352.5	1 090	2 720	NNCF4956V
	420	190	4	390.5	2 770	5 450	NNCF5056V
300	380	80	2.1	357.2	805	2 160	NNCF4860V
	420	118	3	386.5	1 580	3 800	NNCF4960V
	460	218	4	431.7	3 400	7 000	NNCF5060V
320	400	80	2.1	380.2	835	2 310	NNCF4864V
	440	118	3	404.5	1 620	4 000	NNCF4964V
	480	218	4	446.9	3 500	7 350	NNCF5064V
340	420	80	2.1	397.4	855	2 430	NNCF4868V
	460	118	3	431	1 690	4 300	NNCF4968V
	520	243	5	485.8	4 250	8 750	NNCF5068V
360	440	80	2.1	420.4	885	2 580	NNCF4872V
	480	118	3	449	1 730	4 500	NNCF4972V
	540	243	5	503.6	4 350	9 150	NNCF5072V
380	480	100	2.1	450.6	1 260	3 600	NNCF4876V
	520	140	4	482.5	2 180	5 650	NNCF4976V
	560	243	5	521.4	4 500	9 600	NNCF5076V
400	500	100	2.1	471.7	1 290	3 750	NNCF4880V
	540	140	4	503	2 240	5 900	NNCF4980V
	600	272	5	558.7	5 050	10 900	NNCF5080V
420	520	100	2.1	492	1 320	3 950	NNCF4884V
	560	140	4	523	2 290	6 200	NNCF4984V
	620	272	5	577.7	5 150	11 300	NNCF5084V
440	540	100	2.1	513	1 350	4 150	NNCF4888V
	600	160	4	560.5	3 000	7 850	NNCF4988V
460	580	118	3	549.2	1 730	5 150	NNCF4892V
	620	160	4	573	3 050	8 050	NNCF4992V
480	600	118	3	565.8	1 760	5 300	NNCF4896V
	650	170	5	603	3 350	8 900	NNCF4996V
500	620	118	3	590.7	1 810	5 600	NNCF48/500V
	670	170	5	629	3 400	9 350	NNCF49/500V

Abutment and Fillet Dimensions (mm)			Mass (kg) approx.
d _a	D _a	r _a max.	
295	334	2	16
297	361	2	34
302	395	3	87.7
318	361	2	23
320	398	2.5	52
323	435	3	125
338	381	2	24.3
340	418	2.5	55
343	454	3	131
359	400	2	25.6
361	438	2.5	58
368	490	4	177
379	421	2	27
381	457	2.5	61
388	509	4	186
399	459	2	45.5
404	493	3	90.5
408	529	4	194
420	479	2	47.5
425	513	3	94.5
429	568	4	256
440	498	2	49.5
445	533	3	98.5
449	588	4	267
461	518	2	51.5
466	572	3	136
483	555	2.5	77.5
486	591	3	142
503	575	2.5	80.5
510	617	4	167
524	594	2.5	83.5
531	637	4	173

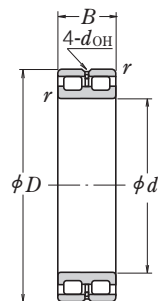
Remark Full-complement cylindrical roller bearings are designed for specific applications, when using them, please contact NSK.

■ FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS FOR SHEAVES

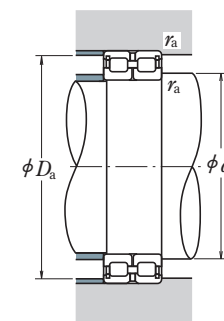
RS-48 · RS-49 Types
 RSF-48 · RSF-49 Types
 Bore Diameter 50 – 220 mm



Fixed-End Bearing
RS



Free-End Bearing
RSF



Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> min.	<i>C_r</i>	<i>C_{0r}</i>	Grease	Oil
50	72	22	0.6	48 000	75 500	2 000	4 000
60	85	25	1	68 500	118 000	1 600	3 200
65	90	25	1	70 500	125 000	1 600	3 200
70	100	30	1	102 000	168 000	1 400	2 800
80	110	30	1	109 000	191 000	1 300	2 600
90	125	35	1.1	147 000	268 000	1 100	2 200
100	125	25	1	87 500	189 000	1 100	2 200
	140	40	1.1	194 000	400 000	1 000	2 000
105	130	25	1	89 000	196 000	1 000	2 000
	145	40	1.1	199 000	420 000	950	1 900
110	140	30	1	114 000	260 000	950	1 900
	150	40	1.1	202 000	430 000	900	1 800
120	150	30	1	119 000	283 000	900	1 800
	165	45	1.1	226 000	480 000	800	1 600
130	165	35	1.1	162 000	390 000	800	1 600
	180	50	1.5	262 000	555 000	750	1 500
140	175	35	1.1	167 000	415 000	750	1 500
	190	50	1.5	272 000	595 000	710	1 400
150	190	40	1.1	235 000	575 000	670	1 400
	210	60	2	390 000	865 000	670	1 300
160	200	40	1.1	243 000	615 000	630	1 300
	220	60	2	410 000	930 000	600	1 200
170	215	45	1.1	265 000	650 000	600	1 200
	230	60	2	415 000	975 000	600	1 200
180	225	45	1.1	272 000	685 000	560	1 100
	250	69	2	495 000	1 130 000	530	1 100
190	240	50	1.5	315 000	785 000	530	1 100
	260	69	2	510 000	1 180 000	500	1 000
200	250	50	1.5	320 000	825 000	500	1 000
	280	80	2.1	665 000	1 500 000	480	950
220	270	50	1.5	340 000	905 000	450	900
	300	80	2.1	695 000	1 620 000	430	850

Remark Cylindrical roller bearings for sheaves are designed for specific applications, when using them, please contact NSK.

Bearing Numbers ⁽¹⁾		Dimensions (mm)		Abutment and Fillet Dimensions (mm)			Mass (kg)
Fixed-End Bearing	Free-End Bearing	<i>d</i> _{OH} ⁽²⁾	Axial Disp. ⁽³⁾	<i>d</i> _a min.	<i>D</i> _a max.	<i>r</i> _a max.	approx.
RS-4910E4	RSF-4910E4	2.5	1.5	54	68	0.6	0.30
RS-4912E4	RSF-4912E4	2.5	1.5	65	80	1	0.46
RS-4913E4	RSF-4913E4	2.5	2	70	85	1	0.50
RS-4914E4	RSF-4914E4	3	2	75	95	1	0.79
RS-4916E4	RSF-4916E4	3	2	85	105	1	0.89
RS-4918E4	RSF-4918E4	3	2	96.5	118.5	1	1.35
RS-4820E4	RSF-4820E4	2.5	1.5	105	120	1	0.74
RS-4920E4	RSF-4920E4	3	2	106.5	133.5	1	1.97
RS-4821E4	RSF-4821E4	2.5	1.5	110	125	1	0.77
RS-4921E4	RSF-4921E4	3	2	111.5	138.5	1	2.05
RS-4822E4	RSF-4822E4	3	2	115	135	1	1.09
RS-4922E4	RSF-4922E4	3	2	116.5	143.5	1	2.15
RS-4824E4	RSF-4824E4	3	2	125	145	1	1.28
RS-4924E4	RSF-4924E4	4	3	126.5	158.5	1	2.95
RS-4826E4	RSF-4826E4	3	2	136.5	158.5	1	1.9
RS-4926E4	RSF-4926E4	5	3.5	138	172	1.5	3.95
RS-4828E4	RSF-4828E4	3	2	146.5	168.5	1	2.03
RS-4928E4	RSF-4928E4	5	3.5	148	182	1.5	4.25
RS-4830E4	RSF-4830E4	3	2	156.5	183.5	1	2.85
RS-4930E4	RSF-4930E4	5	3.5	159	201	2	6.65
RS-4832E4	RSF-4832E4	3	2	166.5	193.5	1	3.05
RS-4932E4	RSF-4932E4	5	3.5	169	211	2	7.0
RS-4834E4	RSF-4834E4	4	3	176.5	208.5	1	4.1
RS-4934E4	RSF-4934E4	4	3.5	179	221	2	7.35
RS-4836E4	RSF-4836E4	4	3	186.5	218.5	1	4.3
RS-4936E4	RSF-4936E4	6	4.5	189	241	2	10.7
RS-4838E4	RSF-4838E4	5	3.5	198	232	1.5	5.65
RS-4938E4	RSF-4938E4	6	4.5	199	251	2	11.1
RS-4840E4	RSF-4840E4	5	3.5	208	242	1.5	5.95
RS-4940E4	RSF-4940E4	7	5	211	269	2	15.7
RS-4844E4	RSF-4844E4	5	3.5	228	262	1.5	6.45
RS-4944E4	RSF-4944E4	7	5	231	289	2	17

Notes ⁽¹⁾ The suffix E4 indicates that the outer ring is provided with oil holes and oil groove.

⁽²⁾ *d*_{OH} represents the oil hole diameter in the outer ring.

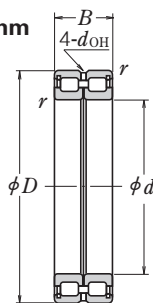
⁽³⁾ Permissible axial displacement for free-end bearings.

■ FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS FOR SHEAVES

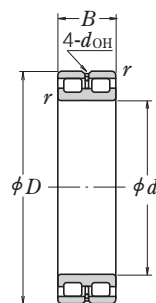
RS-48 · RS-49 Types

RSF-48 · RSF-49 Types

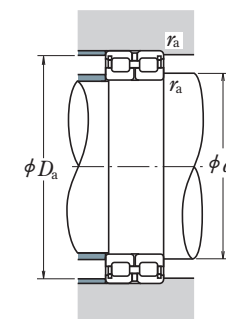
Bore Diameter 240 – 560 mm



Fixed-End Bearing
RS



Free-End Bearing
RSF



d	Boundary Dimensions (mm)			Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
	D	B	r min.	C _r	C _{0r}	Grease	Oil
240	300	60	2	495 000	1 340 000	430	850
	320	80	2.1	725 000	1 770 000	400	800
260	320	60	2	515 000	1 450 000	380	750
	360	100	2.1	1 050 000	2 530 000	360	710
280	350	69	2	610 000	1 690 000	340	710
	380	100	2.1	1 090 000	2 720 000	340	670
300	380	80	2.1	805 000	2 160 000	320	630
	420	118	3	1 460 000	3 400 000	300	600
320	400	80	2.1	835 000	2 310 000	300	600
	440	118	3	1 500 000	3 600 000	280	560
340	420	80	2.1	855 000	2 430 000	280	560
	460	118	3	1 560 000	3 900 000	260	530
360	440	80	2.1	885 000	2 580 000	260	530
	480	118	3	1 600 000	4 050 000	260	500
380	480	100	2.1	1 260 000	3 600 000	240	500
	520	140	4	2 040 000	5 200 000	240	450
400	500	100	2.1	1 290 000	3 750 000	240	480
	540	140	4	2 100 000	5 450 000	220	450
420	520	100	2.1	1 320 000	3 950 000	220	450
	560	140	4	2 150 000	5 700 000	200	430
440	540	100	2.1	1 350 000	4 150 000	200	430
	600	160	4	2 840 000	7 350 000	190	380
460	580	118	3	1 730 000	5 150 000	190	380
	620	160	4	2 870 000	7 500 000	190	380
480	600	118	3	1 760 000	5 300 000	190	380
	650	170	5	3 200 000	8 500 000	180	360
500	620	118	3	1 810 000	5 600 000	180	360
	670	170	5	3 300 000	8 900 000	170	340
530	710	180	5	3 400 000	9 200 000	160	320
	750	190	5	3 800 000	10 100 000	150	300

Remark Cylindrical roller bearings for sheaves are designed for specific applications, when using them, please contact NSK.

Bearing Numbers ⁽¹⁾		Dimensions (mm)		Abutment and Fillet Dimensions (mm)			Mass (kg) approx.
Fixed-End Bearing	Free-End Bearing	d _{OH} ⁽²⁾	Axial Disp. ⁽³⁾	d _a min.	D _a max.	r _a max.	
RS-4848E4	RSF-4848E4	5	3.5	249	291	2	10.3
RS-4948E4	RSF-4948E4	7	5	251	309	2	18.4
RS-4852E4	RSF-4852E4	5	3.5	269	311	2	11
RS-4952E4	RSF-4952E4	8	6	271	349	2	32
RS-4856E4	RSF-4856E4	6	4.5	289	341	2	16
RS-4956E4	RSF-4956E4	8	6	291	369	2	34
RS-4860E4	RSF-4860E4	6	5	311	369	2	23
RS-4960E4	RSF-4960E4	9	7	313	407	2.5	52
RS-4864E4	RSF-4864E4	6	5	331	389	2	24.3
RS-4964E4	RSF-4964E4	9	7	333	427	2.5	55
RS-4868E4	RSF-4868E4	6	5	351	409	2	25.6
RS-4968E4	RSF-4968E4	9	7	353	447	2.5	58
RS-4872E4	RSF-4872E4	6	5	371	429	2	27
RS-4972E4	RSF-4972E4	9	7	373	467	2.5	61
RS-4876E4	RSF-4876E4	8	6	391	469	2	45.5
RS-4976E4	RSF-4976E4	11	8	396	504	3	90.5
RS-4880E4	RSF-4880E4	8	6	411	489	2	47.5
RS-4980E4	RSF-4980E4	11	8	416	524	3	94.5
RS-4884E4	RSF-4884E4	8	6	431	509	2	49.5
RS-4984E4	RSF-4984E4	11	8	436	544	3	98.5
RS-4888E4	RSF-4888E4	8	6	451	529	2	51.5
RS-4988E4	RSF-4988E4	11	8	456	584	3	136
RS-4892E4	RSF-4892E4	9	7	473	567	2.5	77.5
RS-4992E4	RSF-4992E4	11	8	476	604	3	142
RS-4896E4	RSF-4896E4	9	7	493	587	2.5	80.5
RS-4996E4	RSF-4996E4	12	9	500	630	4	167
RS-48/500E4	RSF-48/500E4	9	7	513	607	2.5	83.5
RS-49/500E4	RSF-49/500E4	12	9	520	650	4	173
RS-49/530E4	RSF-49/530E4	12	11	550	690	4	206
RS-49/560E4	RSF-49/560E4	12	11	580	730	4	231

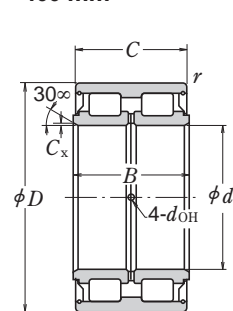
Notes ⁽¹⁾ The suffix E4 indicates that the outer ring is provided with oil holes and oil groove.

⁽²⁾ d_{OH} represents the oil hole diameter in the outer ring.

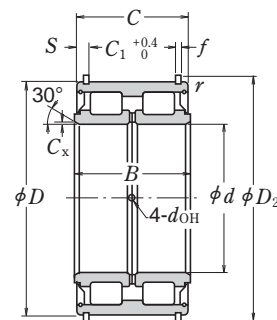
⁽³⁾ Permissible axial displacement for free-end bearings.

■ FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS FOR SHEAVES

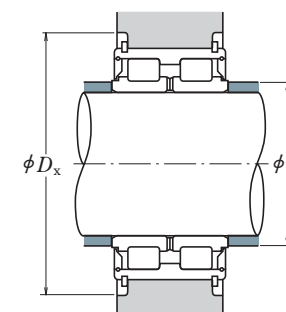
RS-50 Type (Prelubricated)
Bore Diameter 40 – 400 mm



Without Locating Ring



With Locating Ring



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹) Grease
<i>d</i>	<i>D</i>	<i>B</i>	<i>C</i>	<i>C_x</i> ⁽¹⁾ min.	<i>r</i> min.	<i>C_r</i>	<i>C_{0r}</i>	
40	68	38	37	0.4	0.6	79 500	116 000	2 400
45	75	40	39	0.4	0.6	95 500	144 000	2 200
50	80	40	39	0.4	0.6	100 000	158 000	2 000
55	90	46	45	0.6	0.6	118 000	193 000	1 800
60	95	46	45	0.6	0.6	123 000	208 000	1 700
65	100	46	45	0.6	0.6	128 000	224 000	1 600
70	110	54	53	0.6	0.6	171 000	285 000	1 400
75	115	54	53	0.6	0.6	179 000	305 000	1 400
80	125	60	59	0.6	0.6	251 000	430 000	1 200
85	130	60	59	0.6	0.6	256 000	445 000	1 200
90	140	67	66	1	0.6	305 000	540 000	1 100
95	145	67	66	1	0.6	310 000	565 000	1 100
100	150	67	66	1	0.6	320 000	585 000	1 000
110	170	80	79	1.1	1	385 000	695 000	900
120	180	80	79	1.1	1	400 000	750 000	850
130	200	95	94	1.1	1	535 000	1 000 000	750
140	210	95	94	1.1	1	550 000	1 040 000	710
150	225	100	99	1.3	1	620 000	1 210 000	670
160	240	109	108	1.3	1.1	695 000	1 370 000	630
170	260	122	121	1.3	1.1	860 000	1 680 000	600
180	280	136	135	1.3	1.1	980 000	1 910 000	530
190	290	136	135	1.3	1.1	1 120 000	2 230 000	500
200	310	150	149	1.3	1.1	1 310 000	2 650 000	480
220	340	160	159	1.5	1.1	1 510 000	3 100 000	430
240	360	160	159	1.5	1.1	1 570 000	3 350 000	400
260	400	190	189	2	1.5	2 130 000	4 500 000	360
280	420	190	189	2	1.5	2 170 000	4 700 000	340
300	460	218	216	2	1.5	2 670 000	5 850 000	300
320	480	218	216	2	1.5	2 720 000	6 100 000	300
340	520	243	241	2.1	2	3 350 000	7 550 000	260
360	540	243	241	2.1	2	3 450 000	7 850 000	260
380	560	243	241	2.1	2	3 550 000	8 400 000	240
400	600	272	270	2.1	2	4 250 000	9 950 000	220

Note ⁽¹⁾ Chamfer dimension of inner ring in radial direction.

- Remarks 1. Good quality grease is prepacked in bearings.
2. Grease can be supplied through oil holes in the inner rings.

Bearing Numbers		Locating Ring Dimensions (mm)				Oil Holes (mm) <i>d_{OH}</i>	Abutment and Fillet Dimensions (mm)		Mass (kg) approx.
Without Locating Ring	With Locating Ring	<i>C₁</i>	<i>S</i>	<i>D₂</i>	<i>f</i>		<i>d_a</i> min.	<i>D_x</i> min.	
RS-5008	RS-5008NR	28	4.5	71.8	2	2.5	43.5	77.5	0.56
RS-5009	RS-5009NR	30	4.5	78.8	2	2.5	48.5	84.5	0.70
RS-5010	RS-5010NR	30	4.5	83.8	2	2.5	53.5	89.5	0.76
RS-5011	RS-5011NR	34	5.5	94.8	2.5	3	60	101	1.17
RS-5012	RS-5012NR	34	5.5	99.8	2.5	3	65	106	1.25
RS-5013	RS-5013NR	34	5.5	104.8	2.5	3	70	111	1.32
RS-5014	RS-5014NR	42	5.5	114.5	2.5	3	75	121	1.87
RS-5015	RS-5015NR	42	5.5	119.5	2.5	3	80	126	2.0
RS-5016	RS-5016NR	48	5.5	129.5	2.5	3	85	136	2.65
RS-5017	RS-5017NR	48	5.5	134.5	2.5	3	90	141	2.75
RS-5018	RS-5018NR	54	6	145.4	2.5	4	96	153.5	3.75
RS-5019	RS-5019NR	54	6	150.4	2.5	4	101	158.5	3.95
RS-5020	RS-5020NR	54	6	155.4	2.5	4	106	163.5	4.05
RS-5022	RS-5022NR	65	7	175.4	2.5	5	116.5	183.5	6.1
RS-5024	RS-5024NR	65	7	188	3	5	126.5	197	7.0
RS-5026	RS-5026NR	77	8.5	207	3	5	136.5	217	10.6
RS-5028	RS-5028NR	77	8.5	217	3	5	146.5	227	11.3
RS-5030	RS-5030NR	81	9	232	3	6	157	242	13.7
RS-5032	RS-5032NR	89	9.5	247	3	6	167	257	16.8
RS-5034	RS-5034NR	99	11	270	4	6	177	285	22.2
RS-5036	RS-5036NR	110	12.5	294	5	6	187	318	30
RS-5038	RS-5038NR	110	12.5	304	5	6	197	328	32
RS-5040	RS-5040NR	120	14.5	324	5	6	207	352	41
RS-5044	RS-5044NR	130	14.5	356	6	7	228.5	382	53
RS-5048	RS-5048NR	130	14.5	376	6	7	248.5	402	57
RS-5052	RS-5052NR	154	17.5	416	7	8	270	444	86
RS-5056	RS-5056NR	154	17.5	436	7	8	290	472	92
RS-5060	RS-5060NR	178	19	476	7	8	310	512	130
RS-5064	—	—	—	—	—	8	330	—	135
RS-5068	—	—	—	—	—	10	352	—	185
RS-5072	—	—	—	—	—	10	372	—	192
RS-5076	—	—	—	—	—	10	392	—	196
RS-5080	—	—	—	—	—	10	412	—	280

- Remarks 3. Cylindrical roller bearings for sheaves are designed for specific applications, when using them, please contact NSK.
4. For shield with outside diameter larger than 180mm, the above figure is different actual shape. For detail drawing, please contact NSK.

6. TAPERED ROLLER BEARINGS

INTRODUCTION C 182

TECHNICAL DATA

Free Space of Tapered Roller Bearings C 188

BEARINGS TABLE

METRIC DESIGN TAPERED ROLLER BEARINGS

Bore Diameter 15 – 100 mm C 190

Bore Diameter 105 – 240 mm C 202

Bore Diameter 260 – 440 mm C 208

INCH DESIGN TAPERED ROLLER BEARINGS

Bore Diameter 12.000 – 47.625 mm C 210

Bore Diameter 48.412 – 69.850 mm C 224

Bore Diameter 70.000 – 206.375 mm C 232

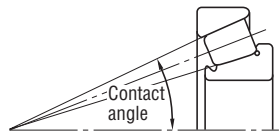
The index for inch design tapered roller bearings is in Appendix 14 (Page E020).

DOUBLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 40 – 260 mm C 246



DESIGN, TYPES, AND FEATURES

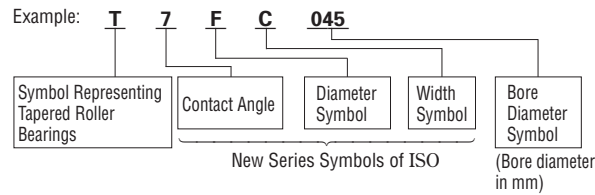


Tapered roller bearings are designed so the apices of the cones formed by the raceways of the cone and cup and the conical rollers all coincide at one point on the axis of the bearing. When a radial load is imposed, an axial force component occurs; therefore, it is necessary to use two bearings in opposition or some other multiple arrangement.

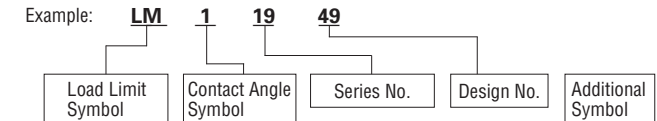
For metric-design medium-angle and steep-angle tapered roller bearings, the respective contact angle symbol C or D is added after the bore number. For normal-angle tapered roller bearings, no contact angle symbol is used. Medium-angle tapered roller bearings are primarily used for the pinion shafts of differential gears of automobiles.

Among those with high load capacity(HR series), some bearings have the basic number suffixed by J to conform to the specifications of ISO for the cup back face raceway diameter, cup width, and contact angle. Therefore, the cone assembly and cup of bearings with the same basic number suffixed by J are internationally interchangeable.

Among metric-design tapered roller bearings specified by ISO 355, there are those having new dimensions that are different than the dimension series 3XX used in the past. Part of them are listed in the bearing tables. They conform to the specifications of ISO for the smaller end diameter of the cup and contact angle. The cone and cup assemblies are internationally interchangeable. The bearing number formulation, which is different than that for past metric design, is as follows:



Besides metric design tapered roller bearings, there are also inch design bearings. For the cone assemblies and cups of inch design bearings, except four-row tapered roller bearings, the bearing numbers are approximately formulated as follows:



For tapered roller bearings, besides single-row bearings, there are also various combinations of bearings. The cages of tapered roller bearings are usually pressed steel.

Table 1 Design and Featured of Combinations of Tapered Roller Bearings

Figure	Arrangement	Examples of Bearing No.	Features
	Back-to-back	HR30210JDB+KLR10	Two standard bearings are combined. The bearing clearances are adjusted by cone spacers or cup spacers. The cones and cups and spacers are marked with serial numbers and mating marks. Components with the same serial number can be assembled referring to the matching symbols.
	Face-to-face	HR30210JDF+KR	
	KBE Type	100KBE31+L	The KBE type is a back-to-back arrangement of bearings with the cup and spacer integrated, and the KH type is a face-to-face arrangement in which the cones are integrated. Since the bearing clearance is adjusted using spacers, it is necessary for components to have the same serial number for assembly with reference to matching symbols.
	KH Type	110KH31+K	

TOLERANCES AND RUNNING ACCURACY

METRIC DESIGN TAPERED ROLLER

BEARINGS Table 7.3 (Pages A132 to A135)

INCH DESIGN TAPERED ROLLER

BEARINGS Table 7.4 (Pages A136 and A137)

Among inch design tapered roller bearings, there are those to which the following precision classes apply. For more details, please consult with NSK.

(1) J line bearings(in the bearing tables, bearings preceded by ▲)

Table 2 Tolerances for Cones(CLASS K)

Units : μm

Nominal Bore Diameter <i>d</i> (mm)		Δd_{mp}		V_{dp}	V_{dmp}	K_{ia}
over	incl.	high	low	max.	max.	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 3 Tolerances for Cups(CALSS K)

Units : μm

Nominal Outside Diameter <i>D</i> (mm)		ΔD_{mp}		V_{Dp}	V_{Dmp}	K_{ea}
over	incl.	high	low	max.	max.	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

Table 4 Tolerances for Effective Widths of Cone Assemblies and Cups, and Overall Width (CLASS K)

Units : μm

Nominal Bore Diameter <i>d</i> (mm)		Effective Width Deviation of Cone Assembly ΔT_{1s}		Effective Width Deviation of Cup ΔT_{2s}		Overall Width Deviation ΔT_s	
over	incl.	high	low	high	low	high	low
10	80	+100	0	+100	0	+200	0
80	120	+100	-100	+100	-100	+200	-200
120	315	+150	-150	+200	-100	+350	-250
315	400	+200	-200	+200	-200	+400	-400

(2) Bearings for Front Axles of Automobiles

(In the bearing tables, those preceded by t)

Table 5 Tolerances for Bore Diameter and Overall Width

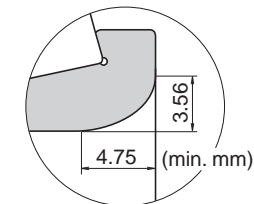
Units : μm

Nominal Bore Diameter <i>d</i>			Bore Diameter Deviation Δd_s		Overall Width Deviation ΔT_s		
over (mm)	incl. 1/25.4	incl. (mm)	high	low	high	low	
—	—	76.200	3.0000	+20	0	+356	0

The tolerances for outside diameter and those for radial runout of the cones and cups conform to Table 7.4.2 (Pages A136 and A137).

(3) Special Chamfer Dimensions

For bearings marked "spec." in the column of *r* in the bearing tables, the chamfer dimension of the cone back-face side is as shown on the following figure.



TAPERED ROLLER BEARINGS**RECOMMENDED FITS**

METRIC DESIGN TAPERED ROLLER BEARINGS	Table 8.3 (Page A164) Table 8.5 (Page A165)
INCH DESIGN TAPERED ROLLER BEARINGS	Table 8.7 (Page A166) Table 8.8 (Page A167)

INTERNAL CLEARANCE

METRIC DESIGN TAPERED ROLLER BEARINGS (Matched and Double-Row)	Table 8.17 (Page A173)
INCH DESIGN TAPERED ROLLER BEARINGS (Matched and Double-Row)	Table 8.17 (Page A173)

DIMENSIONS RELATED TO MOUNTING

The dimensions related to mounting tapered roller bearings are listed in the bearing tables. Since the cages protrude from the ring faces of tapered roller bearings, please use care when designing shafts and housings.

When heavy axial loads are imposed, the shaft shoulder dimensions and strength must be sufficient to support the cone rib.

PERMISSIBLE MISALIGNMENT

The permissible misalignment angle for tapered roller bearings is approximately 0.0009 radian (3').

LIMITING SPEEDS (GREASE/OIL)

The limiting speeds (grease) and limiting speeds (oil) listed in the bearing tables should be adjusted depending on the bearing load condition. Also, higher speeds are attainable by making changes in the lubrication method, cage design, etc. Refer to page A098 for detailed information.

PRECAUTIONS FOR USE OF TAPERED ROLLER BEARINGS

1. If the load on tapered roller bearings becomes too small, or if the ratio of the axial and radial loads for matched bearings exceeds ' e ' (e is listed in the bearing tables) during operation, slippage between the rollers and raceways occurs, which may result in smearing. Especially with large bearings since the weight of the rollers and cage is high. If such load conditions are expected, please contact NSK for selection of the bearings.
2. Confirm the dimension of "Abutment and Fillet Dimensions" of D_a , D_b , S_a , S_b at the time of the HR series adoption.

TECHNICAL DATA

Free Space of Tapered Roller Bearings

The tapered roller bearing can carry radial load and uni-direction axial loads. It offers high capacity. This type of bearing is used widely in machine systems with relatively severe loading conditions in various combinations by opposing or combining single-row bearings.

With a view towards easier maintenance and inspection, this kind of bearing is lubricated with grease in most cases. It is important to select a grease appropriate to the operating conditions and to use the proper amount of grease for the housing internal space. As a reference, the free space of a tapered roller bearing is shown in Table 6.

The free space of a tapered roller bearing is the space (shadowed portion) of the bearing outer volume less the inner and outer rings and cage, as shown in Fig. 1. The bearing is filled so that grease reaches the inner ring rib surface and pocket surface in sufficient amount. Due attention must also be paid to the grease filling amount and state, especially if grease leakage occurs or maintenance of low running torque is important.

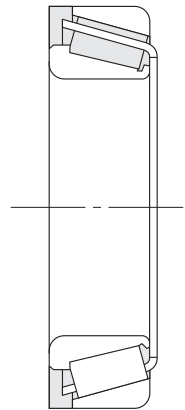


Fig. 1 Free Space of Tapered Roller Bearing

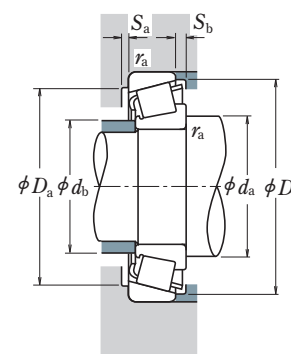
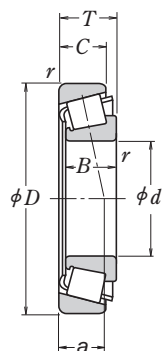
Table 6 Free Space of Tapered Roller Bearing

Units: cm³

Bearing bore No.	Bearing free space									
	Bearing series									
	HR329-J	HR320-XJ	HR330-J	HR331-J	HR302-J	HR322-J	HR332-J	HR303-J	HR303-DJ	HR323-J
02	—	—	—	—	—	—	—	4.5	—	—
03	—	—	—	—	3.3	4.3	—	5.7	—	—
04	—	3.5	—	—	5.3	6.6	—	7.2	—	9.2
/22	—	3.6	—	—	—	7.3	—	9.1	—	—
05	—	3.7	4.3	—	6.3	7.4	7.5	11	13	15
/28	—	5.3	—	—	8.8	9.8	10	16	—	—
06	—	6.2	6.7	—	9.2	11	12	18	21	23
/32	—	6.6	—	—	11	13	14	20	—	—
07	4.0	7.5	8.9	—	13	17	18	23	26	35
08	5.8	9.1	11	—	18	23	25	31	35	45
09	—	11	—	18	22	24	26	41	48	58
10	—	12	15	20	23	26	29	55	59	77
11	8.8	19	21	29	30	36	40	72	78	99
12	9.0	20	23	—	39	47	53	88	95	130
13	—	21	25	—	45	62	65	110	120	150
14	17	29	33	—	53	67	69	130	150	190
15	—	30	34	—	58	73	74	160	180	230
16	—	40	—	—	75	91	100	200	200	270
17	—	43	49	76	92	120	130	230	250	320
18	28	58	—	110	110	150	—	260	310	370
19	29	60	—	—	140	170	—	310	350	430
20	37	64	—	150	160	210	240	380	460	580

SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 15 – 28 mm

**Dynamic Equivalent Load**

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

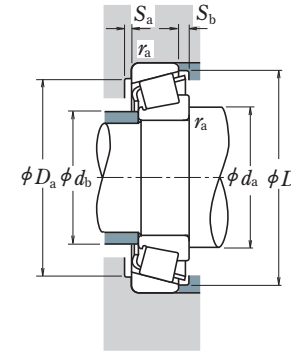
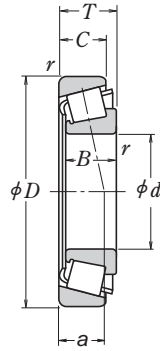
When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$ The values of e , Y_1 , and Y_0 are given in the table below.

Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers	ISO355 Dimension Series approx.	Abutment and Fillet Dimensions (mm)						Cone r_a Cup min.	Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg) approx.		
d	D	T	B	C	Cone r min.	Cup	C_r	C_{Or}	Grease	Oil			d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.				Y_1	Y_0			
15	35	11.75	11	10	0.6	0.6	14 800	13 200	11 000	15 000	30202	—	23	19	30	30	33	2	1.5	0.6	0.6	8.2	0.32	1.9	1.0	0.053
	42	14.25	13	11	1	1	23 600	21 100	9 500	13 000		HR 30302 J	2FB	24	22	36	36	38.5	2	3	1	1	9.5	0.29	2.1	1.2
17	40	13.25	12	11	1	1	20 100	19 900	9 500	13 000	HR 30203 J	2DB	26	23	34	34	37.5	2	2	1	1	9.7	0.35	1.7	0.96	0.079
	40	17.25	16	14	1	1	27 100	28 000	9 500	13 000	HR 32203 J	2DD	26	22	34	34	37	2	3	1	1	11.2	0.31	1.9	1.1	0.103
	47	15.25	14	12	1	1	29 200	26 700	8 500	12 000	HR 30303 J	2FB	26	24	41	40	43	2	3	1	1	10.4	0.29	2.1	1.2	0.134
20	47	15.25	14	10.5	1	1	22 000	20 300	8 000	11 000	30303 D	—	29	23	41	34	44	2	4.5	1	1	15.4	0.81	0.74	0.41	0.129
	47	20.25	19	16	1	1	37 500	36 500	8 500	11 000	HR 32303 J	2FD	28	23	41	39	43	2	4	1	1	12.5	0.29	2.1	1.2	0.178
	42	15	15	12	0.6	0.6	24 600	27 400	9 000	12 000	HR 32004 XJ	3CC	28	24	37	35	40	3	3	0.6	0.6	10.6	0.37	1.6	0.88	0.097
	47	15.25	14	12	1	1	27 900	28 500	8 000	11 000	HR 30204 J	2DB	29	27	41	40	44	2	3	1	1	11.0	0.35	1.7	0.96	0.127
22	47	19.25	18	15	1	1	35 500	37 500	8 500	11 000	HR 30204 C-A-	—	29	26	41	37	44	2	3	0.3	1	13.0	0.55	1.1	0.60	0.126
	47	19.25	18	15	1	1	31 500	33 500	8 000	11 000	HR 32204 J	2DD	29	25	41	38	44.5	3	4	1	1	12.6	0.33	1.8	1.0	0.161
	52	16.25	15	13	1.5	1.5	35 000	33 500	7 500	10 000	HR 32204 CJ	5DD	29	25	41	36	44	2	4	1	1	14.5	0.52	1.2	0.64	0.166
	52	16.25	15	12	1.5	1.5	25 300	24 500	7 100	10 000	HR 30304 J	2FB	31	27	44	44	47.5	2	3	1.5	1.5	11.6	0.30	2.0	1.1	0.172
	52	22.25	21	18	1.5	1.5	45 500	47 500	8 000	11 000	30304 D	—	34	26	43	37	49	2	4	1.5	1.5	16.7	0.81	0.74	0.41	0.168
	44	15	15	11.5	0.6	0.6	25 600	29 400	8 500	11 000	HR 32304 J	2FD	33	26	43	42	48	3	4	1.5	1.5	13.9	0.30	2.0	1.1	0.241
	50	15.25	14	12	1	1	29 200	30 500	7 500	10 000	HR 320/22 XJ	3CC	30	27	39	37	42	3	3.5	0.6	0.6	11.1	0.40	1.5	0.83	0.103
	50	15.25	14	12	1	1	27 200	29 500	7 500	10 000	HR 302/22	—	31	29	44	42	47	2	3	1	1	11.6	0.37	1.6	0.90	0.139
	50	19.25	18	15	1	1	36 500	40 500	7 500	11 000	HR 302/22 C	—	31	29	44	40	47	2	3	1	1	13.0	0.49	1.2	0.67	0.144
	50	19.25	18	15	1	1	33 500	39 500	7 500	10 000	HR 322/22	—	31	28	44	41	47	2	4	1	1	13.5	0.37	1.6	0.89	0.18
25	56	17.25	16	14	1.5	1.5	37 000	36 500	7 100	9 500	HR 322/22 C	—	31	29	44	39	48	2	4	1	1	15.2	0.51	1.2	0.65	0.185
	56	17.25	16	13	1.5	1.5	37 000	36 500	7 100	9 500	HR 303/22	—	33	30	47	46	50	2	3	1.5	1.5	12.4	0.32	1.9	1.0	0.208
	56	17.25	16	13	1.5	1.5	34 500	34 000	6 700	9 500	HR 303/22 C	—	33	30	47	44	52.5	3	4	1.5	1.5	15.9	0.59	1.0	0.56	0.207
	47	15	15	11.5	0.6	0.6	27 400	33 000	8 000	11 000	HR 32005 XJ	4CC	33	30	42	40	45	3	3.5	0.6	0.6	11.8	0.43	1.4	0.77	0.116
	47	17	17	14	0.6	0.6	31 000	38 000	8 000	11 000	HR 33005 J	2CE	33	29	42	41	44	3	3	0.6	0.6	11.0	0.29	2.1	1.1	0.131
	52	16.25	15	13	1	1	32 000	35 000	7 100	10 000	HR 30205 J	3CC	34	31	46	44	48.5	2	3	1	1	12.7	0.37	1.6	0.88	0.157
	52	16.25	15	12	1	1	28 100	31 500	9 700	9 500	HR 30205 C	—	34	32	46	43	49.5	2	4	1	1	14.4	0.53	1.1	0.62	0.155
	52	19.25	18	16	1	1	40 000	45 000	7 100	10 000	HR 32205 J	2CD	34	30	46	44	50	2	3	1	1	13.5	0.36	1.7	0.92	0.189
	52	19.25	18	15	1	1	35 000	42 000	7 100	9 500	HR 32205 C	—	34	30	46	40	50	2	4	1	1	15.8	0.53	1.1	0.62	0.19
	62	18.25	17	15	1.5	1.5	47 500	56 500	7 500	10 000	HR 33205 J	2DE	34	29	46	43	49.5	4	4	1	1	14.1	0.35	1.7	0.94	0.221
28	62	18.25	17	14	1.5	1.5	47 500	46 000	6 300	8 500	HR 30305 J	2FB	36	34	54	54	57	2	3	1.5	1.5	13.2	0.30	2.0	1.1	0.27
	62	18.25	17	14	1.5	1.5	42 000	45 000	6 000	8 500	HR 30305 C	—	36	35	53	49	58.5	3	4	1.5	1.5	16.4	0.55	1.1	0.60	0.276
	62	18.25	17	13	1.5	1.5	38 000	40 500	5 600	8 000	HR 30305 DJ	(7FB)	39	34	53	47	59	2	5	1.5	1.5	19.9	0.83	0.73	0.40	0.265
	62	18.25	17	13	1.5	1.5	38 000	40 500	5 600	8 000	HR 31305 J	7FB	39	33	53	47	59	3	5	1.5	1.5	19.9	0.83	0.73	0.40	0.265
	62	25.25	24	20	1.5	1.5	62 500	66 000	6 300	8 500	HR 32305 J	2FD	38	32	53	51	57	3	5	1.5	1.5	15.6	0.30	2.0	1.1	0.376
	52	16	16	12	1	1	32 000	39 000	7 100	9 500	HR 320/28 XJ	4CC	37	33	46	44	50	3	4	1	1	12.8	0.43	1.4	0.77	0.146
	58	17.25	16	14	1	1	39 500	41 500	6 300	9 000	HR 302/28	—	37	34	52	50	55	2	3	1	1	13.2	0.35	1.7	0.93	0.203
	58	17.25	16	12	1	1	34 000	38 500	6 300	8 500	HR 302/28 C	—	37	34	52	48	54	2	5	1	1	16.9	0.64	0.94	0.52	0.198
	58	20.25	19	16	1	1	47 500	54 000	6 300	9 000	HR 322/28	—	37	34	52	49	55	2	4	1	1	14.6	0.37	1.6	0.89	0.243
	58	20.25	19	16	1	1	42 000	49 500	6 300	9 000	HR 322/28 CJ	5DD	37	33	52	45	55	2	4	1	1	16.8	0.56	1.1	0.59	0.251
	68	19.75	18	15	1.5	1.5	55 000	55 500	6 000	8 000	HR 303/28	—	39	37	59	58	61	2	4.5	1.5	1.5	14.5	0.31	1.9	1.1	0.341
	68	19.75	18	14	1.5	1.5	49 500	50 500	5 600	7 500	HR 303/28 C	—	39	38	59	57	63	3	5.5	1.5	1.5	17.4	0.52	1.2	0.64	0.335

Remark The suffix C represents medium-angle tapered roller bearings. Since they are designed for specific applications, please consult NSK when using bearings with suffix C.

■ SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 30 – 35 mm



Dynamic Equivalent Load
 $P = X F_r + Y F_a$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

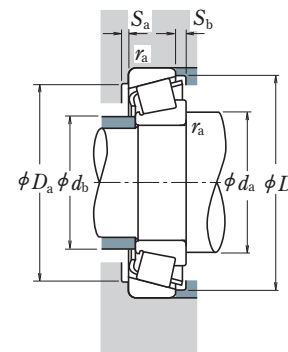
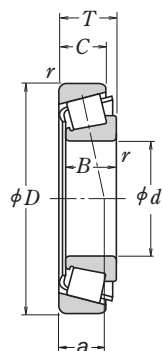
Static Equivalent Load
 $P_0 = 0.5 F_r + Y_0 F_a$
 When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$
 The values of e , Y_1 , and Y_0 are given in the table below.

Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers	ISO355 Dimension Series approx.	Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)		Axial Load Factors		Mass (kg) approx.				
d	D	T	B	C	Cone r min.	Cup r min.	C_r	C_{0r}	Grease	Oil			d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	Cone r_a max.	a	e	Y_1		Y_0			
30	47	12	12	9	0.3	0.3	17 600	24 400	7 500	10 000	HR 32906 J	2BD	34	34	44	42	44	3	3	0.3	0.3	9.2	0.32	1.9	1.0	0.074	
	55	17	17	13	1	1	36 000	44 500	6 700	9 000	HR 32006 XJ	4CC	39	35	49	47	53	3	4	1	1	13.5	0.43	1.4	0.77	0.172	
	55	20	20	16	1	1	42 000	54 000	6 700	9 000	HR 33006 J	2CE	39	35	49	48	52	3	4	1	1	13.1	0.29	2.1	1.1	0.208	
	62	17.25	16	14	1	1	43 000	47 500	6 000	8 000	HR 30206 J	3DB	39	37	56	52	58	2	3	1	1	13.9	0.37	1.6	0.88	0.238	
	62	17.25	16	12	1	1	35 500	37 000	5 600	7 500	HR 30206 C	—	39	36	56	49	59	2	5	1	1	17.8	0.68	0.88	0.49	0.221	
	62	21.25	20	17	1	1	52 000	60 000	6 000	8 500	HR 32206 J	3DC	39	36	56	51	58.5	2	4	1	1	15.4	0.37	1.6	0.88	0.297	
	62	21.25	20	16	1	1	48 000	56 000	6 000	8 000	HR 32206 C	—	39	35	56	48	59	2	5	1	1	17.8	0.55	1.1	0.60	0.293	
	62	25	25	19.5	1	1	66 500	79 500	6 000	8 000	HR 33206 J	2DE	39	35	56	52	59.5	5	5.5	1	1	16.1	0.34	1.8	0.97	0.355	
	72	20.75	19	16	1.5	1.5	59 500	60 000	5 300	7 500	HR 30306 J	2FB	41	40	63	62	66	3	4.5	1.5	1.5	15.1	0.32	1.9	1.1	0.403	
	72	20.75	19	14	1.5	1.5	56 500	55 500	5 300	7 100	HR 30306 C	—	41	38	63	59	67	3	6.5	1.5	1.5	18.5	0.55	1.1	0.60	0.383	
	72	20.75	19	14	1.5	1.5	49 000	52 500	4 800	6 700	HR 30306 DJ	(7FB)	44	40	63	55	68	3	6.5	1.5	1.5	23.1	0.83	0.73	0.40	0.393	
	72	20.75	19	14	1.5	1.5	49 000	52 500	4 800	6 800	HR 33206 J	7FB	44	40	63	55	68	3	6.5	1.5	1.5	23.1	0.83	0.73	0.40	0.393	
	72	28.75	27	23	1.5	1.5	80 000	88 500	5 600	7 500	HR 32306 J	2FD	43	38	63	59	66	3	5.5	1.5	1.5	18.0	0.32	1.9	1.1	0.57	
	72	28.75	27	23	1.5	1.5	76 000	86 500	5 600	7 500	HR 32306 CJ	5FD	43	36	63	54	68	3	5.5	1.5	1.5	22.0	0.55	1.1	0.60	0.583	
	32	58	17	17	13	1	1	37 500	47 000	6 300	8 500	HR 320/32 XJ	4CC	41	37	52	49	55	3	4	1	1	14.2	0.45	1.3	0.73	0.191
		58	21	20	16	1	1	41 000	50 000	6 300	8 500	HR 330/32	—	41	37	52	50	55	2	4	1	1	13.8	0.31	1.9	1.1	0.225
		65	18.25	17	15	1	1	48 500	54 000	5 600	8 000	HR 302/32	—	41	39	59	56	61	3	3	1	1	14.7	0.37	1.6	0.88	0.277
		65	18.25	17	14	1	1	45 500	52 500	5 600	7 500	HR 302/32 C	—	41	39	59	54	62	3	4	1	1	16.9	0.55	1.1	0.60	0.273
		65	22.25	21	18	1	1	56 000	65 000	6 000	8 000	HR 322/32	—	41	38	59	54	61	3	4	1	1	15.9	0.37	1.6	0.88	0.336
		65	22.25	21	17	1	1	49 500	60 000	5 600	7 500	HR 322/32 C	—	41	39	59	51	62	3	5	1	1	20.2	0.59	1.0	0.56	0.335
		65	26	26	20.5	1	1	70 000	86 500	5 600	8 000	HR 332/32 J	2DE	41	38	59	55	62	5	5.5	1	1	17.0	0.35	1.7	0.95	0.40
75		21.75	20	17	1.5	1.5	56 000	56 000	5 300	7 100	HR 303/32	—	44	42	66	64	68	3	4.5	1.5	1.5	15.9	0.33	1.8	1.0	0.435	
35		55	14	14	11.5	0.6	0.6	27 400	39 000	6 300	8 500	HR 32907 J	2BD	43	40	50	50	52.5	3	2.5	0.6	0.6	10.7	0.29	2.1	1.1	0.123
		62	18	18	14	1	1	43 500	55 000	5 600	8 000	HR 32007 XJ	4CC	44	40	56	54	60	4	4	1	1	15.0	0.45	1.3	0.73	0.229
		62	21	21	17	1	1	49 000	65 000	5 600	8 000	HR 33007 J	2CE	44	40	56	55	59	4	4	1	1	14.1	0.31	2.0	1.1	0.267
	72	18.25	17	15	1.5	1.5	54 000	59 500	5 300	7 100	HR 30207 J	3DB	46	43	63	62	67	3	3	1.5	1.5	15.0	0.37	1.6	0.88	0.34	
	72	18.25	17	13	1.5	1.5	47 000	54 500	5 000	6 700	HR 30207 C	—	46	44	63	59	68	3	5	1.5	1.5	19.6	0.66	0.91	0.50	0.331	
	72	24.25	23	19	1.5	1.5	70 500	83 500	5 300	7 100	HR 32207 J	3DC	46	42	63	61	67.5	3	5	1.5	1.5	17.9	0.37	1.6	0.88	0.456	
	72	24.25	23	18	1.5	1.5	60 500	71 500	5 000	7 100	HR 32207 C	—	46	42	63	58	68.5	3	6	1.5	1.5	20.6	0.55	1.1	0.60	0.442	
	72	28	28	22	1.5	1.5	86 500	108 000	5 300	7 100	HR 33207 J	2DE	46	41	63	61	68	5	6	1.5	1.5	18.3	0.35	1.7	0.93	0.54	
	80	22.75	21	18	2	1.5	76 000	79 000	4 800	6 700	HR 30307 J	2FB	47	45	71	69	74	3	4.5	2	1.5	16.7	0.32	1.9	1.1	0.538	
	80	22.75	21	16	2	1.5	68 000	70 500	4 800	6 300	HR 30307 C	—	47	44	71	65	74	3	6.5	2	1.5	20.3	0.55	1.1	0.60	0.518	
	80	22.75	21	15	2	1.5	62 000	68 000	4 300	6 000	HR 30307 DJ	7FB	51	44	71	62	77	3	7.5	2	1.5	25.2	0.83	0.73	0.40	0.519	
	80	22.75	21	15	2	1.5	62 000	68 000	4 300	6 000	HR 31307 J	7FB	51	44	71	62	77	3	7.5	2	1.5	25.2	0.83	0.73	0.40	0.52	
	80	32.75	31	25	2	1.5	99 000	111 000	5 000	6 700	HR 32307 J	2FE	49	43	71	66	74	3	7.5	2	1.5	20.7	0.32	1.9	1.1	0.765	

Remark The suffix C represents medium-angle tapered roller bearings. Since they are designed for specific applications, please consult NSK when using bearings with suffix C.

■ SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 40 – 50 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

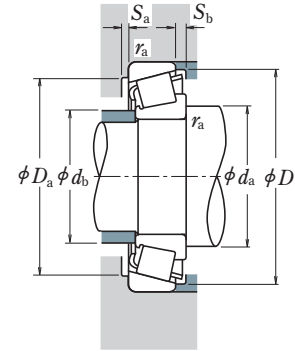
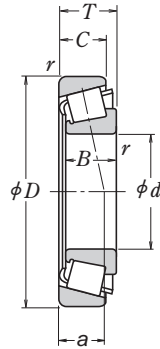
The values of e , Y_1 , and Y_0 are given in the table below.

d	Boundary Dimensions (mm)				Cone Cup		Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	ISO355 Dimension Series approx.	Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg) approx.			
	D	T	B	C	r	r _{min.}	C _r	C _{0r}	Grease	Oil			d _a min.	d _b max.	D _a max.	D _b min.	S _a min.	S _b min.			r _a min.	r _a max.		Y ₁	Y ₀	
40	62	15	15	12	0.6	0.6	34 000	47 000	5 600	7 500	HR 32908 J	2BC	48	44	57	57	59	3	3	0.6	0.6	11.5	0.29	2.1	1.1	0.161
	68	19	19	14.5	1	1	53 000	71 000	5 300	7 100	HR 32008 XJ	3CD	49	45	62	60	65.5	4	4.5	1	1	15.0	0.38	1.6	0.87	0.28
	68	22	22	18	1	1	59 000	81 500	5 300	7 100	HR 33008 J	2BE	49	45	62	61	65	4	4	1	1	14.6	0.28	2.1	1.2	0.322
	75	26	26	20.5	1.5	1.5	78 500	101 000	4 800	6 700	HR 33108 J	2CE	51	46	66	65	71	4	5.5	1.5	1.5	18.0	0.36	1.7	0.93	0.503
	80	19.75	18	16	1.5	1.5	63 500	70 000	4 800	6 300	HR 30208 J	3DB	51	48	71	69	75	3	3.5	1.5	1.5	16.6	0.37	1.6	0.88	0.437
	80	24.75	23	19	1.5	1.5	77 000	90 500	4 800	6 300	HR 32208 J	3DC	51	48	71	68	75	3	5.5	1.5	1.5	18.9	0.37	1.6	0.88	0.548
	80	24.75	23	19	1.5	1.5	74 000	90 500	4 500	6 300	HR 32208 CJ	5DC	51	47	71	65	76	3	5.5	1.5	1.5	21.9	0.55	1.1	0.60	0.558
	80	25.25	23	25	1.5	1.5	107 000	137 000	4 800	6 300	HR 33208 J	2DE	51	46	71	67	76	5	7	1.5	1.5	20.8	0.36	1.7	0.92	0.744
	90	25.25	23	20	2	1.5	90 500	101 000	4 300	5 600	HR 30308 J	2FB	52	52	81	76	82	3	5	2	1.5	19.5	0.35	1.7	0.96	0.758
	90	25.25	23	18	2	1.5	84 500	93 500	4 300	5 600	HR 30308 C	—	52	50	81	72	84	3	7	2	1.5	22.8	0.53	1.1	0.62	0.735
	90	25.25	23	17	2	1.5	80 000	89 500	3 800	5 300	HR 30308 DJ	7FB	56	50	81	70	87	3	8	2	1.5	28.7	0.83	0.73	0.40	0.728
	90	25.25	23	17	2	1.5	80 000	89 500	3 800	5 300	HR 31308 J	7FB	56	50	81	70	87	3	8	2	1.5	28.7	0.83	0.73	0.40	0.728
	90	35.25	33	27	2	1.5	120 000	145 000	4 300	6 000	HR 32308 J	2FD	54	50	81	73	82	3	8	2	1.5	23.4	0.35	1.7	0.96	1.05
	45	68	15	15	12	0.6	0.6	34 500	50 500	5 000	6 700	HR 32909 J	2BC	53	50	63	62	64	3	3	0.6	0.6	12.3	0.32	1.9	1.0
75		20	20	15.5	1	1	60 000	83 000	4 500	6 300	HR 32009 XJ	3CC	54	51	69	67	72	4	4.5	1	1	16.6	0.39	1.5	0.84	0.354
75		24	24	19	1	1	69 000	99 000	4 800	6 300	HR 33009 J	2CE	54	51	69	67	71	4	5	1	1	16.3	0.29	2.0	1.1	0.414
80		26	26	20.5	1.5	1.5	84 000	113 000	4 500	6 000	HR 33109 J	3CE	56	51	71	69	77	4	5.5	1.5	1.5	19.1	0.38	1.6	0.86	0.552
85		20.75	19	16	1.5	1.5	68 500	79 500	4 300	6 000	HR 30209 J	3DB	56	53	76	74	80	3	4.5	1.5	1.5	18.3	0.41	1.5	0.81	0.488
85		24.75	23	19	1.5	1.5	83 000	102 000	4 300	6 000	HR 32209 J	3DC	56	53	76	73	81	3	5.5	1.5	1.5	20.1	0.41	1.5	0.81	0.602
85		24.75	23	19	1.5	1.5	75 500	95 500	4 300	5 600	HR 32209 CJ	5DC	56	52	76	70	82	3	5.5	1.5	1.5	23.6	0.59	1.0	0.56	0.603
85		32	32	25	1.5	1.5	111 000	147 000	4 300	6 000	HR 33209 J	3DE	56	51	76	72	81	5	7	1.5	1.5	22.0	0.39	1.6	0.86	0.817
95		29	26.5	20	2.5	2.5	88 500	109 000	3 600	5 000	T 7 FC045	7FC	60	53	83	71	91	3	9	2	2	32.1	0.87	0.69	0.38	0.918
95		36	35	30	2.5	2.5	139 000	174 000	4 000	5 300	T 2 ED045	2ED	60	54	83	79	89	5	6	2	2	23.5	0.32	1.9	1.02	1.22
100		27.25	25	22	2	1.5	112 000	127 000	3 800	5 300	HR 30309 J	2FB	57	58	91	86	93	3	5	2	1.5	21.1	0.35	1.7	0.96	1.01
100		27.25	25	18	2	1.5	95 500	109 000	3 400	4 800	HR 30309 DJ	7FB	61	57	91	79	96	3	9	2	1.5	31.5	0.83	0.73	0.40	0.957
100		27.25	25	18	2	1.5	95 500	109 000	3 400	4 800	HR 31309 J	7FB	61	57	91	79	96	3	9	2	1.5	31.5	0.83	0.73	0.40	0.947
100		38.25	36	30	2	1.5	144 000	177 000	3 800	5 300	HR 32309 J	2FD	59	56	91	82	93	3	8	2	1.5	25.0	0.35	1.7	0.96	1.42
50	100	36	35	30	2.5	2.5	144 000	185 000	3 800	5 000	T 2 ED050	2ED	65	59	88	83	94	6	6	2	2	24.2	0.34	1.8	0.96	1.3
	72	15	15	12	0.6	0.6	36 000	54 000	4 500	6 300	HR 32910 J	2BC	58	54	67	66	69	3	3	0.6	0.6	13.5	0.34	1.8	0.97	0.193
	80	20	20	15.5	1	1	61 000	87 000	4 300	6 000	HR 32010 XJ	3CC	59	56	74	71	77	4	4.5	1	1	17.9	0.42	1.4	0.78	0.38
	80	24	24	19	1	1	70 500	104 000	4 300	6 000	HR 33010 J	2CE	59	55	74	71	76	4	5	1	1	17.4	0.32	1.9	1.0	0.452
	85	26	26	20	1.5	1.5	89 000	126 000	4 300	5 600	HR 33110 J	3CE	61	56	76	74	82	4	6	1.5	1.5	20.3	0.41	1.5	0.8	0.597
	90	21.75	20	17	1.5	1.5	76 000	91 500	4 000	5 300	HR 30210 J	3DB	61	58	81	79	85	3	4.5	1.5	1.5	19.6	0.42	1.4	0.79	0.557
	90	24.75	23	19	1.5	1.5	87 500	109 000	4 000	5 300	HR 32210 J	3DC	61	57	81	78	86	3	5.5	1.5	1.5	21.0	0.42	1.4	0.79	0.642
	90	24.75	23	18	1.5	1.5	77 500	102 000	3 800	5 300	HR 32210 CJ	5DC	61	58	81	76	87	3	6.5	1.5	1.5	24.6	0.59	1.0	0.56	0.655
	90	32	32	24.5	1.5	1.5	118 000	165 000	4 000	5 300	HR 33210 J	3DE	61	56	81	76	87	5	7.5	1.5	1.5	23.2	0.41	1.5	0.80	0.867
	105	32	29	22	3	3	109 000	133 000	3 200	4 500	T 7 FC050	7FC	74	59	91	78	100	5	10	2.5	2.5	36.4	0.87	0.69	0.38	1.22
	110	29.25	27	23	2.5	2	130 000	148 000	3 400	4 800	HR 30310 J	2FB	65	65	100	95	102	3	6	2	2	23.1	0.35	1.7	0.96	1.28
	110	29.25	27	19	2.5	2	114 000	132 000	3 200	4 300	HR 30310 DJ	7FB	70	62	100	87	105	3	10	2	2	34.3	0.83	0.73	0.40	1.26
	110	29.25	27	19	2.5	2	114 000	132 000	3 200	4 300	HR 31310 J	7FB	70	62	100	87	105	3	10	2	2	34.3	0.83	0.73	0.40	1.26
	110	42.25	40	33	2.5	2	176 000	220 000	3 600	4 800	HR 32310 J	2FD	68	62	100	91	102	3	9	2	2	28.0	0.35	1.7	0.96	1.88
110	42.25	40	33	2.5	2	164 000	218 000	3 400	4 800	HR 32310 CJ	5FD	68	59	100	82	103	3	9	2	2	32.8	0.55	1.1	0.60	1.93	

Remark The suffix C represents medium-angle tapered roller bearings. Since they are designed for specific applications, please consult NSK when using bearings with suffix C.

■ SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 55 – 65 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

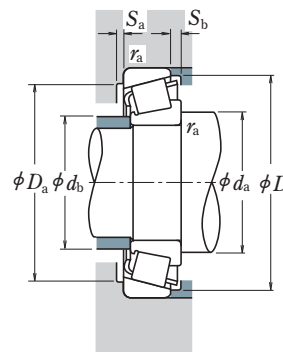
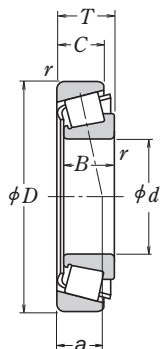
The values of e , Y_1 , and Y_0 are given in the table below.

Boundary Dimensions (mm)		Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		ISO355 Dimension Series approx.	Abutment and Fillet Dimensions (mm)						Cone Cup r_a max.	Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg) approx.									
d	D	T	B	C	Cone r min.		Cup r min.	C_r	C_{0r}	Grease	Oil	d_a min.				d_b max.	D_a max.		D_b min.	S_a min.	S_b min.	Y_1	Y_0				
55	80	17	17	14	1	1	45 500	74 500	4 300	5 600	HR 32911 J	2BC	64	60	74	73	76	4	3	1	1	14.6	0.31	1.9	1.1	0.282	
	90	23	23	17.5	1.5	1.5	81 500	117 000	3 800	5 300	HR 32011 XJ	3CC	66	62	81	80	86	4	5.5	1.5	1.5	19.7	0.41	1.5	0.81	0.568	
	90	27	27	21	1.5	1.5	91 500	138 000	3 800	5 300	HR 33011 J	2CE	66	62	81	80	86	5	6	1.5	1.5	19.2	0.31	1.9	1.1	0.657	
	95	30	30	23	1.5	1.5	112 000	158 000	3 800	5 000	HR 33111 J	3CE	66	62	86	82	91	5	7	1.5	1.5	22.4	0.37	1.6	0.88	0.877	
	100	22.75	21	18	2	1.5	94 500	113 000	3 600	5 000	HR 30211 J	3DB	67	64	91	89	94	4	4.5	2	1.5	20.9	0.41	1.5	0.81	0.736	
	100	26.75	25	21	2	1.5	110 000	137 000	3 600	5 000	HR 32211 J	3DC	67	63	91	87	95	4	5.5	2	1.5	22.7	0.41	1.5	0.81	0.859	
	100	35	35	27	2	1.5	141 000	193 000	3 600	5 000	HR 32311 J	3DE	67	62	91	86	96	6	8	2	1.5	25.2	0.40	1.5	0.83	1.18	
	115	34	31	23.5	3	3	126 000	164 000	3 000	4 300	T 7 FC055	7FC	73	66	101	86	109	4	10.5	2.5	2.5	39.0	0.87	0.69	0.38	1.58	
	120	31.5	29	25	2.5	2	150 000	171 000	3 200	4 300	HR 30311 J	2FB	70	71	110	104	111	4	6.5	2	2	24.6	0.35	1.7	0.96	1.63	
	120	31.5	29	21	2.5	2	131 000	153 000	2 800	4 000	HR 30311 DJ	7FB	75	67	110	94	114	4	10.5	2	2	37.0	0.83	0.73	0.40	1.58	
	120	31.5	29	21	2.5	2	131 000	153 000	2 800	4 000	HR 31311 J	7FB	75	67	110	94	114	4	10.5	2	2	37.0	0.83	0.73	0.40	1.58	
	120	45.5	43	35	2.5	2	204 000	258 000	3 200	4 300	HR 32311 J	2FD	73	67	110	99	111	4	10.5	2	2	29.9	0.35	1.7	0.96	2.39	
	120	45.5	43	35	2.5	2	195 000	262 000	3 200	4 300	HR 32311 CJ	5FD	73	65	110	91	112	4	10.5	2	2	35.8	0.55	1.1	0.60	2.47	
	60	85	17	17	14	1	1	49 000	84 500	3 800	5 300	HR 32912 J	2BC	69	65	79	78	81	4	3	1	1	15.5	0.33	1.8	1.0	0.306
		95	23	23	17.5	1.5	1.5	85 500	127 000	3 600	5 000	HR 32012 XJ	4CC	71	66	86	85	91	4	5.5	1.5	1.5	20.9	0.43	1.4	0.77	0.608
		95	27	27	21	1.5	1.5	96 000	150 000	3 600	5 000	HR 33012 J	2CE	71	66	86	85	90	5	6	1.5	1.5	20.0	0.33	1.8	1.0	0.713
100		30	30	23	1.5	1.5	115 000	166 000	3 400	4 800	HR 33112 J	3CE	71	68	91	88	96	5	7	1.5	1.5	23.6	0.40	1.5	0.83	0.91	
110		23.75	22	19	2	1.5	104 000	123 000	3 400	4 500	HR 30212 J	3EB	72	69	101	96	103	4	4.5	2	1.5	22.0	0.41	1.5	0.81	0.930	
110		29.75	28	24	2	1.5	131 000	167 000	3 400	4 500	HR 32212 J	3EC	72	68	101	95	104	4	5.5	2	1.5	24.1	0.41	1.5	0.81	1.18	
110		38	38	29	2	1.5	166 000	231 000	3 400	4 500	HR 33212 J	3EE	72	68	101	94	105	6	9	2	1.5	27.6	0.40	1.5	0.82	1.56	
125		37	33.5	26	3	3	151 000	197 000	2 800	3 800	T 7 FC060	7FC	78	72	111	94	119	4	11	2.5	2.5	41.4	0.82	0.73	0.40	2.03	
130		33.5	31	26	3	2.5	174 000	201 000	3 000	4 000	HR 30312 J	2FB	78	77	118	112	120	4	7.5	2.5	2	26.0	0.35	1.7	0.96	2.03	
130		33.5	31	22	3	2.5	151 000	177 000	2 600	3 800	HR 30312 DJ	7FB	84	74	118	103	125	4	11.5	2.5	2	40.3	0.83	0.73	0.40	1.98	
130		33.5	31	22	3	2.5	151 000	177 000	2 600	3 800	HR 31312 J	7FB	84	74	118	103	125	4	11.5	2.5	2	40.3	0.83	0.73	0.40	1.98	
130		48.5	46	37	3	2.5	233 000	295 000	3 000	4 000	HR 32312 J	2FD	81	74	118	107	120	4	11.5	2.5	2	31.4	0.35	1.7	0.96	2.96	
130		48.5	46	35	3	2.5	196 000	249 000	2 800	3 800	32312 C	—	81	74	116	102	125	4	13.5	2.5	2	39.9	0.58	1.0	0.57	2.86	
65		90	17	17	14	1	1	49 000	86 500	3 600	5 000	HR 32913 J	2BC	74	70	84	82	86	4	3	1	1	16.8	0.35	1.7	0.93	0.323
		100	23	23	17.5	1.5	1.5	86 500	132 000	3 400	4 500	HR 32013 XJ	4CC	76	71	91	90	97	4	5.5	1.5	1.5	22.4	0.46	1.3	0.72	0.646
		100	27	27	21	1.5	1.5	97 500	156 000	3 400	4 500	HR 33013 J	2CE	76	71	91	90	96	5	6	1.5	1.5	21.1	0.35	1.7	0.95	0.76
	110	34	34	26.5	1.5	1.5	148 000	218 000	3 200	4 300	HR 33113 J	3DE	76	73	101	96	106	6	7.5	1.5	1.5	26.0	0.39	1.5	0.85	1.32	
	120	24.75	23	20	2	1.5	122 000	151 000	3 000	4 000	HR 30213 J	3EB	77	78	111	106	113	4	4.5	2	1.5	23.8	0.41	1.5	0.81	1.18	
	120	32.75	31	27	2	1.5	157 000	202 000	3 000	4 000	HR 32213 J	3EC	77	75	111	104	115	4	5.5	2	1.5	27.1	0.41	1.5	0.81	1.55	
	120	41	41	32	2	1.5	202 000	282 000	3 000	4 000	HR 33213 J	3EE	77	74	111	102	115	6	9	2	1.5	29.2	0.39	1.5	0.85	2.04	
	140	36	33	28	3	2.5	200 000	233 000	2 600	3 600	HR 30313 J	2GB	83	83	128	121	130	4	8	2.5	2	27.9	0.35	1.7	0.96	2.51	
	140	36	33	23	3	2.5	173 000	205 000	2 400	3 400	HR 30313 DJ	7GB	89	80	128	111	133	4	13	2.5	2	43.2	0.83	0.73	0.40	2.43	
	140	36	33	23	3	2.5	173 000	205 000	2 400	3 400	HR 31313 J	7GB	89	80	128	111	133	4	13	2.5	2	43.2	0.83	0.73	0.40	2.43	
	140	51	48	39	3	2.5	267 000	340 000	2 800	3 800	HR 32313 J	2GD	86	80	128	116	130	4	12	2.5	2	34.0	0.35	1.7	0.96	3.6	

Remark The suffix C represents medium-angle tapered roller bearings. Since they are designed for specific applications, please consult NSK when using bearings with suffix C.

SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 70 – 80 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

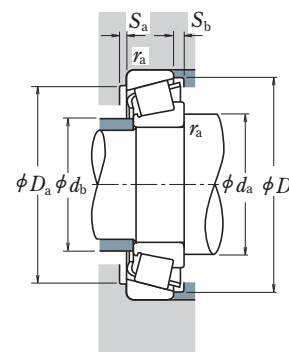
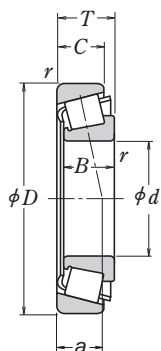
The values of e , Y_1 , and Y_0 are given in the table below.

d	Boundary Dimensions (mm)				Cone r min.	Cup r max.	Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	ISO355 Dimension Series approx.	Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg) approx.			
	D	T	B	C			C _r	C _{0r}	Grease	Oil			d _a min.	d _b max.	D _a max.	D _b min.	S _a min.	S _b min.			Cone r _a max.	Y ₁		Y ₀		
70	100	20	20	16	1	1	70 000	113 000	3 200	4 500	HR 32914 J	2BC	79	76	94	93	96	4	4	1	1	17.6	0.32	1.9	1.1	0.494
	110	25	25	19	1.5	1.5	104 000	158 000	3 200	4 300	HR 32014 XJ	4CC	81	77	101	98	105	5	6	1.5	1.5	23.7	0.43	1.4	0.76	0.869
	110	31	31	25.5	1.5	1.5	127 000	204 000	3 000	4 300	HR 33014 J	2CE	81	78	101	100	105	5	5.5	1.5	1.5	22.2	0.28	2.1	1.2	1.11
	120	37	37	29	2	1.5	177 000	262 000	3 000	4 000	HR 33114 J	3DE	82	79	111	104	115	6	8	2	1.5	27.9	0.38	1.6	0.87	1.71
	125	26.25	24	21	2	1.5	132 000	163 000	2 800	4 000	HR 30214 J	3EB	82	81	116	110	118	4	5	2	1.5	25.6	0.42	1.4	0.79	1.3
	125	33.25	31	27	2	1.5	157 000	205 000	2 800	4 000	HR 32214 J	3EC	82	80	116	108	119	4	6	2	1.5	28.6	0.42	1.4	0.79	1.66
	125	41	41	32	2	1.5	209 000	299 000	2 800	4 000	HR 33214 J	3EE	82	78	116	107	120	7	9	2	1.5	30.4	0.41	1.5	0.81	2.15
	140	39	35.5	27	3	3	177 000	229 000	2 400	3 400	T 7 FC070	7FC	88	79	126	106	133	5	12	2.5	2.5	46.4	0.87	0.69	0.38	2.55
	150	38	35	30	3	2.5	227 000	268 000	2 400	3 400	HR 30314 J	2GB	88	89	138	132	140	4	8	2.5	2	29.7	0.35	1.7	0.96	3.03
	150	38	35	25	3	2.5	192 000	229 000	2 200	3 200	HR 30314 DJ	7GB	94	85	138	118	142	4	13	2.5	2	45.8	0.83	0.73	0.40	2.94
150	38	35	25	3	2.5	192 000	229 000	2 200	3 200	HR 31314 J	7GB	94	85	138	118	142	4	13	2.5	2	45.8	0.83	0.73	0.40	2.94	
150	54	51	42	3	2.5	300 000	390 000	2 600	3 400	HR 32314 J	2GD	91	86	138	124	140	4	12	2.5	2	36.1	0.35	1.7	0.96	4.35	
150	54	51	42	3	2.5	280 000	390 000	2 400	3 400	HR 32314 CJ	5GD	91	84	138	115	141	4	12	2.5	2	43.3	0.55	1.1	0.60	4.47	
75	105	20	20	16	1	1	72 500	120 000	3 200	4 300	HR 32915 J	2BC	84	81	99	98	101	4	4	1	1	18.7	0.33	1.8	0.99	0.53
	115	25	25	19	1.5	1.5	109 000	171 000	3 000	4 000	HR 32015 XJ	4CC	86	82	106	103	110	5	6	1.5	1.5	25.1	0.46	1.3	0.72	0.925
	115	31	31	25.5	1.5	1.5	133 000	220 000	3 000	4 000	HR 33015 J	2CE	86	83	106	104	110	6	5.5	1.5	1.5	23.0	0.30	2.0	1.1	1.18
	125	37	37	29	2	2	182 000	275 000	2 800	3 800	HR 33115 J	3DE	87	83	115	109	120	6	8	2	2	29.2	0.40	1.5	0.83	1.8
	130	27.25	25	22	2	1.5	143 000	182 000	2 800	3 800	HR 30215 J	4DB	87	85	121	115	124	4	5	2	1.5	27.0	0.44	1.4	0.76	1.43
	130	33.25	31	27	2	1.5	165 000	219 000	2 800	3 800	HR 32215 J	4DC	87	84	121	113	125	4	6	2	1.5	29.8	0.44	1.4	0.76	1.72
	130	41	41	31	2	1.5	215 000	315 000	2 800	3 800	HR 33215 J	3EE	87	83	121	111	125	7	10	2	1.5	31.6	0.43	1.4	0.77	2.25
	160	40	37	31	3	2.5	253 000	300 000	2 400	3 200	HR 30315 J	2GB	93	95	148	141	149	4	9	2.5	2	31.8	0.35	1.7	0.96	3.63
	160	40	37	26	3	2.5	211 000	251 000	2 200	3 000	HR 30315 DJ	7GB	99	91	148	129	152	6	14	2.5	2	48.8	0.83	0.73	0.40	3.47
	160	40	37	26	3	2.5	211 000	251 000	2 200	3 000	HR 31315 J	7GB	99	91	148	129	152	6	14	2.5	2	48.8	0.83	0.73	0.40	3.47
160	58	55	45	3	2.5	340 000	445 000	2 400	3 200	HR 32315 J	2GD	96	91	148	134	149	4	13	2.5	2	38.9	0.35	1.7	0.96	5.31	
160	58	55	43	3	2.5	310 000	420 000	2 200	3 200	32315 CA	—	96	90	148	124	153	4	15	2.5	2	47.7	0.58	1.0	0.57	5.3	
80	110	20	20	16	1	1	75 000	128 000	3 000	4 000	HR 32916 J	2BC	89	85	104	102	106	4	4	1	1	19.8	0.35	1.7	0.94	0.56
	125	29	29	22	1.5	1.5	140 000	222 000	2 800	3 600	HR 32016 XJ	3CC	91	89	116	112	120	6	7	1.5	1.5	26.9	0.42	1.4	0.78	1.32
	125	36	36	29.5	1.5	1.5	172 000	282 000	2 800	3 600	HR 33016 J	2CE	91	88	116	112	119	6	6.5	1.5	1.5	25.5	0.28	2.2	1.2	1.66
	130	37	37	29	2	1.5	186 000	289 000	2 600	3 600	HR 33116 J	3DE	92	88	121	113	126	6	8	2	1.5	30.4	0.42	1.4	0.79	1.88
	140	28.25	26	22	2.5	2	157 000	195 000	2 600	3 400	HR 30216 J	3EB	95	91	130	124	132	4	6	2	2	28.1	0.42	1.4	0.79	1.68
	140	28.25	26	20	2.5	2	147 000	190 000	2 400	3 400	30216 CA	—	95	92	130	122	133	4	8	2	2	33.8	0.58	1.0	0.57	1.66
	140	35.25	33	28	2.5	2	192 000	254 000	2 600	3 400	HR 32216 J	3EC	95	90	130	122	134	4	7	2	2	30.6	0.42	1.4	0.79	2.13
	140	46	46	35	2.5	2	256 000	385 000	2 600	3 400	HR 33216 J	3EE	95	89	130	119	135	7	11	2	2	34.8	0.43	1.4	0.78	2.93
	170	42.5	39	33	3	2.5	276 000	330 000	2 200	3 000	HR 30316 J	2GB	98	102	158	150	159	4	9.5	2.5	2	34.0	0.35	1.7	0.96	4.27
	170	42.5	39	27	3	2.5	235 000	283 000	2 000	2 800	HR 30316 DJ	7GB	104	97	158	136	159	6	15.5	2.5	2	51.8	0.83	0.73	0.40	4.07
170	42.5	39	27	3	2.5	235 000	283 000	2 000	2 800	HR 31316 J	7GB	104	97	158	136	159	6	15.5	2.5	2	51.8	0.83	0.73	0.40	4.07	
170	61.5	58	48	3	2.5	385 000	505 000	2 200	3 000	HR 32316 J	2GD	101	98	158	143	159	4	13.5	2.5	2	41.4	0.35	1.7	0.96	6.35	
170	61.5	58	48	3	2.5	365 000	530 000	2 200	3 000	HR 32316 CJ	5GD	101	95	158	132	160	4	13.5	2.5	2	49.3	0.55	1.1	0.60	6.59	

Remark The suffix CA represents medium-angle tapered roller bearings. Since they are designed for specific applications, please consult NSK when using bearings with suffix CA.

SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 85 – 100 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

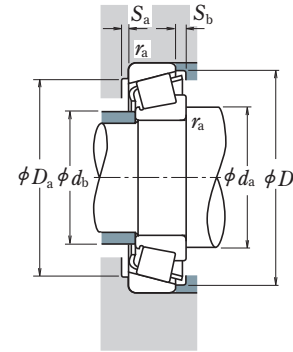
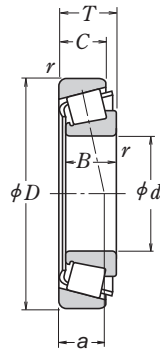
The values of e , Y_1 , and Y_0 are given in the table below.

d	Boundary Dimensions (mm)				Cone Cup		Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	ISO355 Dimension Series approx.	Abutment and Fillet Dimensions (mm)							Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg) approx.		
	D	T	B	C	r	r _{min.}	C _r	C _{0r}	Grease	Oil			d _a min.	d _b max.	D _a max.	D _b min.	S _a min.	S _b min.	r _a max.			Y ₁	Y ₀			
85	120	23	23	18	1.5	1.5	93 500	157 000	2 800	3 800	HR 32917 J	2BC	96	92	111	111	115	5	5	1.5	1.5	20.9	0.33	1.8	1.0	0.8
	130	29	29	22	1.5	1.5	143 000	231 000	2 600	3 600	HR 32017 XJ	4CC	96	94	121	116	125	6	7	1.5	1.5	28.2	0.44	1.4	0.75	1.38
	130	36	36	29.5	1.5	1.5	180 000	305 000	2 600	3 600	HR 33017 J	2CE	96	94	121	117	125	6	6.5	1.5	1.5	26.5	0.29	2.1	1.1	1.75
	140	41	41	32	2.5	2	230 000	365 000	2 400	3 400	HR 33117 J	3DE	100	94	130	122	135	7	9	2	2	32.7	0.41	1.5	0.81	2.51
	150	30.5	28	24	2.5	2	184 000	233 000	2 400	3 200	HR 30217 J	3EB	100	97	140	133	141	5	6.5	2	2	30.3	0.42	1.4	0.79	2.12
	150	30.5	28	22	2.5	2	171 000	226 000	2 200	3 200	30217 CA	—	100	98	140	131	142	5	8.5	2	2	36.2	0.58	1.0	0.57	2.07
	150	38.5	36	30	2.5	2	210 000	277 000	2 200	3 200	HR 32217 J	3EC	100	96	140	131	142	5	8.5	2	2	33.9	0.42	1.4	0.79	2.64
	150	49	49	37	2.5	2	281 000	415 000	2 400	3 200	HR 33217 J	3EE	100	95	140	129	144	7	12	2	2	37.3	0.42	1.4	0.79	3.57
	180	44.5	41	34	4	3	310 000	375 000	2 000	2 800	HR 30317 J	2GB	106	108	166	157	167	5	10.5	3	2.5	35.8	0.35	1.7	0.96	5.08
	180	44.5	41	28	4	3	261 000	315 000	1 900	2 600	HR 30317 DJ	7GB	113	103	166	144	169	6	16.5	3	2.5	55.4	0.83	0.73	0.40	4.88
	180	44.5	41	28	4	3	261 000	315 000	1 900	2 600	HR 31317 J	7GB	113	103	166	144	169	6	16.5	3	2.5	55.4	0.83	0.73	0.40	4.88
	180	63.5	60	49	4	3	410 000	535 000	2 000	2 800	HR 32317 J	2GD	110	104	166	151	167	5	14.5	3	2.5	43.6	0.35	1.7	0.96	7.31
90	125	23	23	18	1.5	1.5	97 000	167 000	2 600	3 600	HR 32918 J	2BC	101	97	116	116	120	5	5	1.5	1.5	22.0	0.34	1.8	0.96	0.838
	140	32	32	24	2	1.5	170 000	273 000	2 400	3 200	HR 32018 XJ	3CC	102	99	131	124	134	6	8	2	1.5	29.7	0.42	1.4	0.78	1.78
	140	39	39	32.5	2	1.5	220 000	360 000	2 400	3 200	HR 33018 J	2CE	102	99	131	129	135	7	6.5	2	1.5	27.9	0.27	2.2	1.2	2.21
	150	45	45	35	2.5	2	259 000	405 000	2 400	3 200	HR 33118 J	3DE	105	100	140	132	144	7	10	2	2	35.2	0.40	1.5	0.83	3.14
	160	32.5	30	26	2.5	2	201 000	256 000	2 200	3 000	HR 30218 J	3FB	105	103	150	141	150	5	6.5	2	2	31.7	0.42	1.4	0.79	2.6
	160	42.5	40	34	2.5	2	256 000	350 000	2 200	3 000	HR 32218 J	3FC	105	102	150	139	152	5	8.5	2	2	36.2	0.42	1.4	0.79	3.41
	190	46.5	43	36	4	3	345 000	425 000	1 900	2 600	HR 30318 J	2GB	111	114	176	176	176	5	10.5	3	2.5	37.3	0.35	1.7	0.96	5.91
	190	46.5	43	30	4	3	264 000	315 000	1 800	2 400	HR 30318 DJ	7GB	118	110	176	152	179	6	16.5	3	2.5	58.7	0.83	0.73	0.40	5.52
	190	46.5	43	30	4	3	264 000	315 000	1 800	2 400	HR 31318 J	7GB	118	110	176	152	179	6	16.5	3	2.5	58.7	0.83	0.73	0.40	5.52
	190	67.5	64	53	4	3	450 000	590 000	2 000	2 600	HR 32318 J	2GD	115	109	176	158	177	5	14.5	3	2.5	46.5	0.35	1.7	0.96	8.6
95	130	23	23	18	1.5	1.5	98 000	172 000	2 400	3 400	HR 32919 J	2BC	106	102	121	121	125	5	5	1.5	1.5	23.2	0.36	1.7	0.92	0.877
	145	32	32	24	2	1.5	173 000	283 000	2 400	3 200	HR 32019 XJ	4CC	107	104	136	131	140	6	8	2	1.5	31.2	0.44	1.4	0.75	1.88
	145	39	39	32.5	2	1.5	231 000	390 000	2 400	3 200	HR 33019 J	2CE	107	103	136	133	139	7	6.5	2	1.5	28.6	0.28	2.2	1.2	2.3
	160	46	46	38	3	3	283 000	445 000	2 200	3 000	T 2 ED095	2ED	113	108	146	141	152	6	8	2.5	2.5	34.5	0.34	1.8	0.97	3.74
	170	34.5	32	27	3	2.5	223 000	286 000	2 200	2 800	HR 30219 J	3FB	113	110	158	150	159	5	7.5	2.5	2	33.7	0.42	1.4	0.79	3.13
	170	45.5	43	37	3	2.5	289 000	400 000	2 200	2 800	HR 32219 J	3FC	113	108	158	147	161	5	8.5	2.5	2	39.3	0.42	1.4	0.79	4.22
	200	49.5	45	38	4	3	370 000	455 000	1 900	2 600	HR 30319 J	2GB	116	119	186	172	184	5	11.5	3	2.5	38.6	0.35	1.7	0.96	6.92
	200	49.5	45	36	4	3	350 000	435 000	1 800	2 400	30319 CA	—	116	119	186	168	188	5	13.5	3	2.5	48.6	0.54	1.1	0.61	6.71
	200	49.5	45	32	4	3	310 000	375 000	1 700	2 400	HR 30319 DJ	7GB	123	115	186	158	187	6	17.5	3	2.5	61.9	0.83	0.73	0.40	6.64
	200	49.5	45	32	4	3	310 000	375 000	1 700	2 400	HR 31319 J	7GB	123	115	186	158	187	6	17.5	3	2.5	61.9	0.83	0.73	0.40	6.64
	200	71.5	67	55	4	3	525 000	710 000	1 900	2 600	HR 32319 J	2GD	120	115	186	167	186	5	16.5	3	2.5	48.6	0.35	1.7	0.96	10.4
100	140	25	25	20	1.5	1.5	117 000	205 000	2 200	3 200	HR 32920 J	2CC	111	109	132	132	134	5	5	1.5	1.5	24.2	0.33	1.8	1.0	1.18
	145	24	22.5	17.5	3	3	113 000	163 000	2 200	3 000	T 4 CB100	4CB	118	108	135	135	142	6	6.5	2.5	2.5	30.1	0.47	1.3	0.70	1.18
	150	32	32	24	2	1.5	176 000	294 000	2 200	3 000	HR 32020 XJ	4CC	112	109	141	136	144	6	8	2	1.5	32.5	0.46	1.3	0.72	1.95
	150	39	39	32.5	2	1.5	235 000	405 000	2 200	3 000	HR 33020 J	2CE	112	107	141	137	143	7	6.5	2	1.5	29.3	0.29	2.1	1.2	2.38
	165	52	52	40	2.5	2	315 000	515 000	2 000	2 800	HR 33120 J	3EE	115	110	155	144	159	8	12	2	2	40.5	0.41	1.5	0.81	4.32
	180	37	34	29	3	2.5	255 000	330 000	2 000	2 600	HR 30220 J	3FB	118	116	168	158	168	5	8	2.5	2	36.1	0.42	1.4	0.79	3.78
	180	49	46	39	3	2.5	325 000	450 000	2 000	2 600	HR 32220 J	3FC	118	115	168	155	171	5	10	2.5	2	41.5	0.42	1.4	0.79	5.05
	180	63	63	48	3	2.5	410 000	635 000	2 000	2 600	HR 33220 J	3FE	118	113	168	152	172	10	15	2.5	2	46.0	0.40	1.5	0.82	6.76
	215	51.5	47	39	4	3	425 000	525 000	1 700	2 400	HR 30320 J	2GB	121	128	201	185	197	5	12.5	3	2.5	41.4	0.35	1.7	0.96	8.41
	215	56.5	51	35	4	3	385 000	505 000	1 500	2 200	HR 31320 J	7GB	136	125	201	169	202	7	21.5	3	2.5	67.7	0.83	0.73	0.40	9.02
	215	77.5	73	60	4	3	565 000	755 000	1 700	2 400	HR 32320 J	2GD	125	125	201	178	200	5	17.5	3	2.5	53.2	0.35	1.7	0.96	12.7

Remark The suffix CA represents medium-angle tapered roller bearings. Since they are designed for specific applications, please consult NSK when using bearings with suffix CA.

SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 105 – 130 mm



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

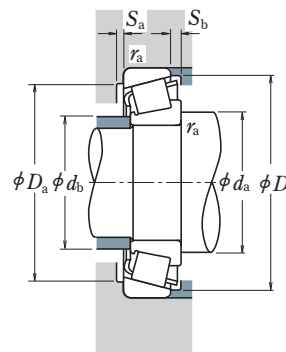
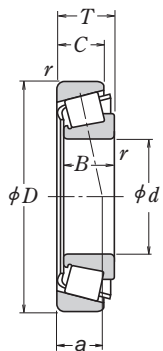
The values of e, Y_1 , and Y_0 are given in the table below.

d	Boundary Dimensions (mm)				Cone Cup		Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers	ISO355 Dimension Series approx.	Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg) approx.			
	D	T	B	C	r min.	r max.	C_r	C_{Or}	Grease	Oil			d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.			r_a min.	r_a max.		Y_1	Y_0	
105	145	25	25	20	1.5	1.5	119 000	212 000	2 200	3 000	HR 32921 J	2CC	116	114	137	137	140	5	5	1.5	1.5	25.3	0.34	1.8	0.96	1.23
	160	35	35	26	2.5	2	204 000	340 000	2 000	2 800	HR 32021 XJ	4DC	120	115	150	144	154	6	9	2	2	34.3	0.44	1.4	0.74	2.48
	160	43	43	34	2.5	2	256 000	435 000	2 000	2 800	HR 33021 J	2DE	120	115	150	146	153	7	9	2	2	30.9	0.28	2.1	1.2	3.03
	190	39	36	30	3	2.5	280 000	365 000	1 900	2 600	HR 30221 J	3FB	123	123	178	166	177	6	9	2.5	2	38.1	0.42	1.4	0.79	4.51
	190	53	50	43	3	2.5	360 000	510 000	1 900	2 600	HR 32221 J	3FC	123	120	178	162	180	5	10	2.5	2	44.8	0.42	1.4	0.79	6.25
	225	53.5	49	41	4	3	455 000	565 000	1 600	2 200	HR 30321 J	2GB	126	133	211	195	206	6	12.5	3	2.5	43.3	0.35	1.7	0.96	9.52
	225	58	53	36	4	3	415 000	540 000	1 500	2 000	HR 31321 J	7GB	141	130	211	177	211	7	22	3	2.5	70.2	0.83	0.73	0.40	10
225	81.5	77	63	4	3	670 000	925 000	1 700	2 200	HR 32321 J	2GD	130	129	211	186	209	6	18.5	3	2.5	55.2	0.35	1.7	0.96	14.9	
110	150	25	25	20	1.5	1.5	123 000	224 000	2 200	2 800	HR 32922 J	2CC	121	119	142	142	145	5	5	1.5	1.5	26.5	0.36	1.7	0.93	1.29
	170	38	38	29	2.5	2	236 000	390 000	2 000	2 600	HR 32022 XJ	4DC	125	121	160	153	163	7	9	2	2	35.9	0.43	1.4	0.77	3.09
	170	47	47	37	2.5	2	294 000	515 000	2 000	2 600	HR 33022 J	2DE	125	121	160	153	161	7	10	2	2	33.7	0.29	2.1	1.2	3.84
	180	56	56	43	2.5	2	365 000	610 000	1 900	2 600	HR 33122 J	3EE	125	121	170	156	174	9	13	2	2	44.1	0.42	1.4	0.79	5.54
	200	41	38	32	3	2.5	315 000	420 000	1 800	2 400	HR 32222 J	3FB	128	129	188	175	187	6	9	2.5	2	40.2	0.42	1.4	0.79	5.28
	200	56	53	46	3	2.5	400 000	565 000	1 800	2 400	HR 32222 J	3FC	128	127	188	171	190	5	10	2.5	2	47.2	0.42	1.4	0.79	7.35
	240	54.5	50	42	4	3	485 000	595 000	1 500	2 000	HR 30322 J	2GB	131	143	226	208	220	6	12.5	3	2.5	45.1	0.35	1.7	0.96	11
	240	63	57	38	4	3	470 000	605 000	1 400	1 900	HR 31322 J	7GB	146	136	226	191	224	7	25	3	2.5	74.8	0.83	0.73	0.40	12.3
240	84.5	80	65	4	3	675 000	910 000	1 500	2 000	HR 32322 J	2GD	135	139	226	201	222	6	19.5	3	2.5	58.6	0.35	1.7	0.96	17.1	
120	165	29	29	23	1.5	1.5	161 000	291 000	1 900	2 600	HR 32924 J	2CC	131	129	156	155	160	6	6	1.5	1.5	29.2	0.35	1.7	0.95	1.8
	170	27	25	19.5	3	3	153 000	243 000	1 800	2 600	T 4 CB120	4CB	138	129	158	158	164	7	7.5	2.5	2.5	35.0	0.47	1.3	0.70	1.78
	180	38	38	29	2.5	2	242 000	405 000	1 800	2 400	HR 32024 XJ	4DC	135	131	170	162	173	7	9	2	2	39.7	0.46	1.3	0.72	3.27
	180	48	48	38	2.5	2	300 000	540 000	1 800	2 600	HR 33024 J	2DE	135	130	168	161	171	6	10	2	2	36.0	0.31	2.0	1.1	4.2
	200	62	62	48	2.5	2	460 000	755 000	1 700	2 400	HR 33124 J	3FE	135	133	190	173	192	9	14	2	2	47.9	0.40	1.5	0.83	7.67
	215	43.5	40	34	3	2.5	335 000	450 000	1 600	2 200	HR 30224 J	4FB	138	141	203	190	201	6	9.5	2.5	2	44.4	0.44	1.4	0.76	6.28
	215	61.5	58	50	3	2.5	440 000	635 000	1 600	2 200	HR 32224 J	4FD	138	137	203	181	204	6	11.5	2.5	2	52.1	0.44	1.4	0.76	9.0
	260	59.5	55	46	4	3	535 000	655 000	1 400	1 900	HR 30324 J	2GB	141	154	246	223	237	6	13.5	3	2.5	50.0	0.35	1.7	0.96	13.9
	260	68	62	42	4	3	560 000	730 000	1 300	1 800	HR 31324 J	7GB	156	148	246	206	244	9	26	3	2.5	81.7	0.83	0.73	0.40	15.6
260	90.5	86	69	4	3	770 000	1 060 000	1 400	1 900	HR 32324 J	2GD	145	149	246	216	239	6	21.5	3	2.5	62.5	0.35	1.7	0.96	21.8	
130	180	32	30	26	2	1.5	167 000	281 000	1 800	2 400	32926	—	142	141	171	168	175	6	6	2	1.5	34.7	0.36	1.7	0.92	2.25
	180	32	32	25	2	1.5	200 000	365 000	1 800	2 400	HR 32926 J	2CC	142	140	170	168	173	6	7	2	1.5	31.4	0.34	1.8	0.97	2.46
	185	29	27	21	3	3	183 000	296 000	1 700	2 400	T 4 CB130	4CB	148	141	171	171	179	8	8	2.5	2.5	37.5	0.47	1.3	0.70	2.32
	200	45	45	34	2.5	2	320 000	535 000	1 600	2 200	HR 32026 XJ	4EC	145	144	190	179	192	8	11	2	2	43.9	0.43	1.4	0.76	5.06
	200	55	55	43	2.5	2	395 000	715 000	1 700	2 200	HR 33026 J	2EE	145	144	188	179	192	8	12	2	2	42.4	0.34	1.8	0.97	6.25
	230	43.75	40	34	4	3	375 000	505 000	1 500	2 000	HR 30226 J	4FB	151	151	216	205	217	7	9.5	3	2.5	45.9	0.44	1.4	0.76	7.25
	230	67.75	64	54	4	3	530 000	790 000	1 500	2 000	HR 32226 J	4FD	151	147	216	196	219	7	13.5	3	2.5	57.0	0.44	1.4	0.76	11.3
	280	63.75	58	49	5	4	545 000	675 000	1 300	1 800	30326	—	157	168	262	239	255	8	14.5	4	3	53.9	0.36	1.7	0.92	16.6
	280	63.75	58	49	5	4	650 000	820 000	1 300	1 800	HR 30326 J	2GB	157	166	262	241	255	8	14.5	4	3	52.8	0.35	1.7	0.96	17.2
	280	72	66	44	5	4	625 000	820 000	1 200	1 700	HR 31326 J	7GB	174	159	262	220	261	9	28	4	3	87.1	0.83	0.73	0.40	18.8
	280	98.75	93	78	5	4	830 000	1 150 000	1 300	1 800	32326	—	162	165	262	233	263	8	20.5	4	3	69.2	0.36	1.7	0.92	26.6



SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 140 – 170 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

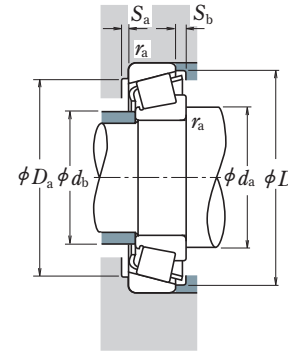
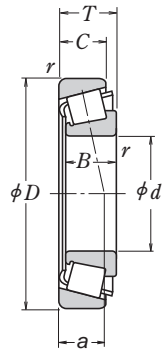
The values of e , Y_1 , and Y_0 are given in the table below.

d	Boundary Dimensions (mm)					Cone r min.	Cup r max.	Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	ISO355 Dimension Series approx.	Abutment and Fillet Dimensions (mm)						Cone r_a max.	Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg) approx.		
	D	T	B	C	C _r			C _{0r}	Grease	Oil	d _a min.			d _b max.	D _a max.	D _b min.	S _a min.	S _b min.	Y ₁				Y ₀				
140	190	32	32	25	2	1.5	206 000	390 000	1 700	2 200	HR 32928 J HR 32028 XJ HR 30328 J	2CC 4DC 2DE	152	150	180	178	184	6	7	2	1.5	33.6	0.36	1.7	0.92	2.64	
	210	45	45	34	2.5	2	325 000	555 000	1 600	2 200			155	152	200	189	202	8	11	2	2	46.6	0.46	1.3	0.72	5.32	
	210	56	56	44	2.5	2	410 000	770 000	1 600	2 200			155	153	198	189	202	7	12	2	2	45.5	0.36	1.7	0.92	6.74	
	250	45.75	42	36	4	3	390 000	515 000	1 400	1 900	HR 30228 J HR 32228 J HR 30328 J	4FB 4FD 2GB	161	164	236	221	234	7	9.5	3	2.5	48.9	0.44	1.4	0.76	8.74	
	250	71.75	68	58	4	3	610 000	915 000	1 400	1 900			161	159	236	213	238	9	13.5	3	2.5	60.5	0.44	1.4	0.76	14.3	
	300	67.75	62	53	5	4	740 000	945 000	1 200	1 700			167	177	282	256	273	9	14.5	4	3	55.7	0.35	1.7	0.96	21.1	
300	77	70	47	5	4	695 000	955 000	1 100	1 500	HR 31328 J 32328	7GB —	184	174	282	236	280	9	30	4	3	92.9	0.83	0.73	0.40	28.5		
300	107.75	102	85	5	4	985 000	1 440 000	1 200	1 600			—	172	177	282	246	281	9	22.5	4	3	76.4	0.37	1.6	0.88	33.9	
150	210	38	36	31	2.5	2	247 000	440 000	1 500	2 000	32930 HR 32930 J HR 32030 XJ	— 2DC 4EC	165	162	200	195	201	7	7	2	2	36.7	0.33	1.8	1.0	3.8	
	210	38	38	30	2.5	2	281 000	520 000	1 500	2 000			165	163	198	196	202	7	8	2	2	36.5	0.33	1.8	1.0	4.05	
	225	48	48	36	3	2.5	375 000	650 000	1 400	2 000			168	164	213	202	216	8	12	2.5	2	49.8	0.46	1.3	0.72	6.6	
	225	59	59	46	3	2.5	435 000	805 000	1 400	2 000	HR 33030 J HR 30330 J HR 32230 J	2EE 2GB 4GD	168	165	213	203	217	8	13	2.5	2	48.7	0.36	1.7	0.90	8.07	
	270	49	45	38	4	3	485 000	665 000	1 300	1 800			171	175	256	236	250	7	11	3	2.5	51.3	0.44	1.4	0.76	11.2	
	270	77	73	60	4	3	705 000	1 080 000	1 300	1 800			171	171	256	228	254	8	17	3	2.5	64.7	0.44	1.4	0.76	17.8	
	320	72	65	55	5	4	690 000	860 000	1 100	1 500	30330 HR 30330 J HR 31330 J 32330	— 2GB 7GB —	177	193	302	275	292	8	17	4	3	61.4	0.36	1.7	0.92	24.2	
	320	72	65	55	5	4	825 000	1 060 000	1 100	1 600			177	190	302	276	292	8	17	4	3	60.0	0.35	1.7	0.96	25	
	320	82	75	50	5	4	790 000	1 100 000	1 000	1 400			194	187	302	253	300	9	32	4	3	99.3	0.83	0.73	0.40	28.5	
320	114	108	90	5	4	1 120 000	1 700 000	1 100	1 500	—	182	191	302	262	297	8	24	4	3	81.5	0.37	1.6	0.88	41.4			
160	220	38	38	30	2.5	2	296 000	570 000	1 400	1 900	HR 32932 J HR 32032 XJ HR 30332 J	2DC 4EC 4GB	175	173	208	206	212	7	8	2	2	38.7	0.35	1.7	0.95	4.32	
	240	51	51	38	3	2.5	425 000	750 000	1 300	1 800			178	175	228	216	231	8	13	2.5	2	53.0	0.46	1.3	0.72	7.93	
	290	52	48	40	4	3	530 000	730 000	1 200	1 600			181	189	276	253	269	8	12	3	2.5	55.0	0.44	1.4	0.76	13.7	
	290	84	80	67	4	3	795 000	1 220 000	1 200	1 600	HR 32232 J 30332 HR 30332 J	4GD — 2GB	181	184	276	243	274	10	17	3	2.5	70.5	0.44	1.4	0.76	22.5	
	340	75	68	58	5	4	765 000	960 000	1 000	1 400			—	187	205	322	293	311	10	17	4	3	64.6	0.36	1.7	0.92	28.4
	340	75	68	58	5	4	915 000	1 180 000	1 100	1 400			2GB	187	201	322	293	310	10	17	4	3	62.9	0.35	1.7	0.96	29.7
340	75	68	48	5	4	675 000	875 000	950	1 300	30332 D 32332	— —	196	198	322	270	313	9	27	4	3	99.4	0.81	0.74	0.41	27.5		
340	121	114	95	5	4	1 210 000	1 770 000	1 000	1 400			—	192	202	322	281	319	10	26	4	3	87.1	0.37	1.6	0.88	48.3	
170	230	38	36	31	2.5	2.5	258 000	485 000	1 300	1 800	32934 HR 32034 J HR 32034 XJ	— 3DC 4EC	185	183	220	216	223	7	7	2	2	41.6	0.36	1.7	0.90	4.3	
	230	38	38	30	2.5	2	294 000	560 000	1 400	1 800			185	180	218	215	222	7	8	2	2	41.7	0.38	1.6	0.86	4.44	
	260	57	57	43	3	2.5	595 000	890 000	1 200	1 700			188	187	248	232	249	10	14	2.5	2	56.6	0.44	1.4	0.74	10.6	
	310	57	52	43	5	4	630 000	885 000	1 100	1 500	HR 30234 J HR 32234 J 30334	4GB 4GD —	197	202	292	273	288	8	14	4	3	59.4	0.44	1.4	0.76	17.1	
	310	91	86	71	5	4	930 000	1 450 000	1 100	1 500			197	197	292	262	294	10	20	4	3	76.4	0.44	1.4	0.76	28	
	360	80	72	62	5	4	845 000	1 080 000	950	1 300			—	197	221	342	312	332	10	18	4	3	70.1	0.37	1.6	0.90	33.5
	360	80	72	62	5	4	960 000	1 230 000	1 000	1 300	HR 30334 J 30334 D 32334	2GB — —	197	214	342	310	329	10	18	4	3	67.3	0.35	1.7	0.96	34.5	
	360	80	72	50	5	4	760 000	1 040 000	900	1 200			—	206	215	342	288	332	10	30	4	3	107.3	0.81	0.74	0.41	33.4
	360	127	120	100	5	4	1 370 000	2 050 000	1 000	1 300			—	202	213	342	297	337	10	27	4	3	91.3	0.37	1.6	0.88	57



■ SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 180 – 240 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

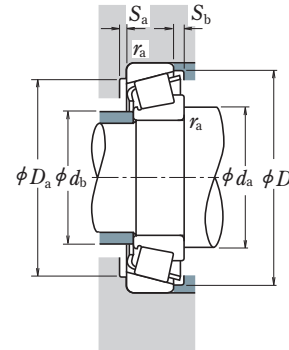
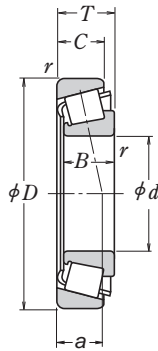
When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

The values of e , Y_1 , and Y_0 are given in the table below.

Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	ISO355 Dimension Series approx.	Abutment and Fillet Dimensions (mm)						Cone Cup $r_{a \max}$	Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg) approx.				
d	D	T	B	C	Cone r_{\min}	Cup r_{\max}	C_r	C_{0r}	Grease	Oil			$d_a \min.$	$d_b \max.$	$D_a \max.$	$D_b \min.$	$S_a \min.$	$S_b \min.$				Y_1	Y_0					
180	250	45	45	34	2.5	2	350 000	685 000	1 300	1 700	HR 32936 J HR 32036 XJ HR 30236 J	4DC	195	192	240	227	241	8	11	2	2	53.9	0.48	1.3	0.69	6.56		
	280	64	64	48	3	2.5	640 000	1 130 000	1 200	1 600		3FD	198	199	268	248	267	10	16	2.5	2	60.4	0.42	1.4	0.78	14.3		
	320	57	52	43	5	4	650 000	930 000	1 100	1 400		4GB	207	210	302	281	297	9	14	4	3	61.8	0.45	1.3	0.73	17.8		
	190	320	91	86	71	5	4	960 000	1 540 000	1 100	1 400	HR 32236 J 30336 30336 D 32336	4GD	207	205	302	270	303	10	20	4	3	78.9	0.45	1.3	0.73	29.8	
		380	83	75	64	5	4	935 000	1 230 000	900	1 300		—	207	233	362	324	345	10	19	4	3	72.5	0.36	1.7	0.92	39.3	
		380	83	75	53	5	4	820 000	1 120 000	850	1 200		—	216	229	362	304	352	10	30	4	3	113.1	0.81	0.74	0.41	38.5	
		380	134	126	106	5	4	1 520 000	2 290 000	950	1 300		—	212	225	362	310	353	10	28	4	3	96.6	0.37	1.6	0.88	66.8	
		260	45	45	34	2.5	2	365 000	715 000	1 200	1 600		HR 32938 J HR 32038 XJ HR 30238 J	4DC	205	201	250	237	251	8	11	2	2	55.3	0.48	1.3	0.69	6.83
		290	64	64	48	3	2.5	650 000	1 170 000	1 100	1 500			4FD	208	209	278	258	279	10	16	2.5	2	63.4	0.44	1.4	0.75	14.9
340	60	55	46	5	4	715 000	1 020 000	1 000	1 300	4GB	217	223		322	302	318	9	14	4	3	65.6	0.44	1.4	0.76	21.4			
200	340	97	92	75	5	4	1 110 000	1 770 000	1 000	1 400	HR 32238 J 30338 32338	4GD	217	216	322	290	323	10	22	4	3	80.5	0.44	1.4	0.76	35.2		
	400	86	78	65	6	5	1 010 000	1 340 000	850	1 200		—	223	248	378	346	366	11	21	5	4	76.1	0.36	1.7	0.92	46		
	400	140	132	109	6	5	1 660 000	2 580 000	850	1 200		—	229	243	378	332	375	11	31	5	4	102.7	0.37	1.6	0.88	78.9		
	220	280	51	48	41	3	2.5	410 000	780 000	1 100	1 500	32940 HR 32940 J HR 32040 XJ HR 30240 J HR 32240 J 30340 30340 D 32340	—	218	217	268	256	269	9	10	2.5	2	53.4	0.37	1.6	0.88	9.26	
		280	51	51	39	3	2.5	480 000	935 000	1 100	1 500		3EC	218	216	268	258	271	9	12	2.5	2	54.2	0.39	1.5	0.84	9.65	
		310	70	70	53	3	2.5	760 000	1 370 000	1 000	1 400		4FD	218	221	298	277	297	11	17	2.5	2	67.4	0.43	1.4	0.77	18.9	
		360	64	58	48	5	4	795 000	1 120 000	950	1 300		4GB	227	236	342	318	336	10	16	4	3	69.1	0.44	1.4	0.76	25.5	
		360	104	98	82	5	4	1 210 000	1 920 000	950	1 300		3GD	227	230	342	305	340	11	22	4	3	85.1	0.41	1.5	0.81	42.6	
		420	89	80	67	6	5	1 030 000	1 390 000	850	1 200		—	233	253	398	346	368	11	22	5	4	81.4	0.37	1.6	0.88	52.3	
		420	89	80	56	6	5	965 000	1 330 000	750	1 000		—	244	253	398	336	385	11	33	5	4	122.9	0.81	0.74	0.41	49.6	
		420	146	138	115	6	5	1 820 000	2 870 000	800	1 100		—	239	253	398	346	392	11	31	5	4	106.7	0.37	1.6	0.88	90.9	
240	300	51	51	39	3	2.5	490 000	990 000	1 000	1 400	HR 32944 J HR 32044 XJ 30244 32244 30344 32344	3EC	238	235	288	278	293	9	12	2.5	2	59.2	0.43	1.4	0.78	10.3		
	340	76	76	57	4	3	885 000	1 610 000	950	1 300		4FD	241	244	326	303	326	12	19	3	2.5	73.6	0.43	1.4	0.77	24.4		
	400	72	65	54	5	4	810 000	1 150 000	850	1 100		—	247	267	382	350	367	11	18	4	3	74.7	0.40	1.5	0.82	33.6		
	400	114	108	90	5	4	1 340 000	2 210 000	850	1 100		—	247	260	382	340	377	12	24	4	3	93.0	0.40	1.5	0.82	57.4		
	460	97	88	73	6	5	1 430 000	1 990 000	750	1 000		—	253	283	438	390	414	12	24	5	4	85.4	0.36	1.7	0.92	72.4		
	460	154	145	122	6	5	2 020 000	3 200 000	750	1 000		—	259	274	438	372	421	12	32	5	4	114.9	0.37	1.6	0.88	114		
240	320	51	51	39	3	2.5	500 000	1 040 000	950	1 300	HR 32948 J HR 32048 XJ 30248	4EC	258	255	308	297	314	9	12	2.5	2	65.1	0.46	1.3	0.72	11.1		
	360	76	76	57	4	3	920 000	1 730 000	850	1 200		4FD	261	262	346	321	346	12	19	3	2.5	79.1	0.46	1.3	0.72	26.2		
	440	79	72	60	5	4	990 000	1 400 000	750	1 000		—	267	288	422	384	408	11	19	4	3	85.1	0.44	1.4	0.74	45.2		
	240	440	127	120	100	5	4	1 630 000	2 730 000	750	1 000	32248 30348 32348	—	267	285	422	374	416	12	27	4	3	102.5	0.40	1.5	0.82	78	
		500	105	95	80	6	5	1 660 000	2 340 000	670	950		—	273	308	478	422	447	12	25	5	4	92.8	0.36	1.7	0.92	92.6	
		500	165	155	132	6	5	2 520 000	4 100 000	670	900		—	279	301	478	410	464	12	33	5	4	123.2	0.37	1.6	0.88	145	

■ SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 260 – 440 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

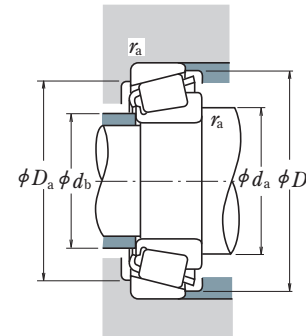
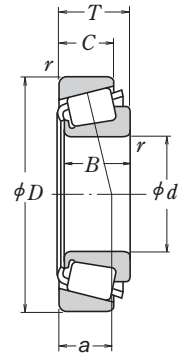
When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

The values of e , Y_1 , and Y_0 are given in the table below.

d	Boundary Dimensions (mm)				Cone r min.	Cup r max.	Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	ISO355 Dimension Series approx.	Abutment and Fillet Dimensions (mm)						Cone r_a max.	Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg) approx.		
	D	T	B	C			C_r	C_{0r}	Grease	Oil			d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.				Y_1	Y_0			
260	360	63.5	63.5	48	3	2.5	730 000	1 450 000	850	1 100	HR 32952 J HR 32052 XJ 30252	3EC	278	278	348	333	347	11	15.5	2.5	2	69.8	0.41	1.5	0.81	18.6
	400	87	87	65	5	4	1 160 000	2 160 000	800	1 100		4FC	287	287	382	357	383	14	22	4	3	86.3	0.43	1.4	0.76	38.5
	480	89	80	67	6	5	1 190 000	1 700 000	670	900		—	293	316	458	421	447	12	22	5	4	94.6	0.44	1.4	0.74	60.7
	480	137	130	106	6	5	1 900 000	3 300 000	670	950	32252 30352 32352	—	293	305	458	394	446	14	31	5	4	116.0	0.45	1.3	0.73	103
	540	113	102	85	6	6	1 870 000	2 640 000	630	850		—	293	336	512	460	487	16	28	5	5	101.6	0.36	1.7	0.92	114
	540	176	165	136	6	6	2 910 000	4 800 000	630	850		—	293	328	512	441	495	13	40	5	5	130.5	0.37	1.6	0.88	188
280	380	63.5	63.5	48	3	2.5	765 000	1 580 000	800	1 100	HR 32956 J HR 32056 XJ 30256	4EC	298	297	368	352	368	12	15.5	2.5	2	75.3	0.43	1.4	0.76	20
	420	87	87	65	5	4	1 180 000	2 240 000	710	1 000		4FC	307	305	402	374	402	14	22	4	3	91.6	0.46	1.3	0.72	40.6
	500	89	80	67	6	5	1 240 000	1 900 000	630	850		—	313	339	478	436	462	12	22	5	4	98.5	0.44	1.4	0.74	66.3
	500	137	130	106	6	5	1 950 000	3 450 000	630	850	32256 32356	—	313	325	478	412	467	14	31	5	4	123.1	0.47	1.3	0.70	109
	580	187	175	145	6	6	3 300 000	5 400 000	560	800		—	319	353	552	475	532	14	42	5	5	139.6	0.37	1.6	0.89	224
	500	137	130	106	6	5	1 950 000	3 450 000	630	850		32960 HR 32960 J HR 32060 XJ	—	321	326	406	386	405	13	14	3	2.5	79.3	0.37	1.6	0.88
420	76	76	62	4	3	895 000	1 820 000	710	950	3FD	321		324	406	387	405	13	19	3	2.5	79.9	0.39	1.5	0.84	31.4	
460	100	100	74	5	4	1 010 000	2 100 000	710	950	4GD	327		330	442	408	439	15	26	4	3	98.4	0.43	1.4	0.76	56.6	
540	96	85	71	6	5	1 440 000	2 100 000	600	800	30260 32260	—	333	355	518	470	499	14	25	5	4	105.1	0.44	1.4	0.74	80.6	
540	149	140	115	6	5	2 220 000	3 700 000	600	800		—	333	352	518	458	514	15	34	5	4	131.7	0.46	1.3	0.72	132	
440	76	72	63	4	3	900 000	1 880 000	970	900		32964 HR 32964 J HR 32064 XJ	—	341	345	426	404	425	13	13	3	2.5	84.3	0.39	1.5	0.84	32
440	76	76	57	4	3	1 040 000	2 220 000	670	900	3FD		341	344	426	406	426	13	19	3	2.5	85.0	0.42	1.4	0.79	33.3	
480	100	100	74	5	4	1 510 000	2 910 000	630	850	4GD		347	350	462	430	461	15	26	4	3	104.5	0.46	1.3	0.72	60	
580	104	92	75	6	5	1 640 000	2 420 000	530	750	30264 32264 32364	—	353	381	558	503	533	14	29	5	4	113.7	0.44	1.4	0.74	99.3	
580	159	150	125	6	5	2 860 000	5 050 000	530	750		—	353	383	558	487	550	15	34	5	4	141.7	0.46	1.3	0.72	175	
670	210	200	170	7.5	7.5	4 200 000	7 100 000	480	670		—	383	412	634	547	616	14	42	6	6	157.5	0.37	1.6	0.88	343	
340	460	76	72	63	4	3	910 000	1 940 000	630	850	32968 HR 32968 J 32068	—	361	364	446	426	446	13	13	3	2.5	89.2	0.41	1.5	0.80	33.6
	460	76	76	57	4	3	1 050 000	2 220 000	630	850		4FD	361	362	446	427	446	13	19	3	2.5	91.0	0.44	1.4	0.75	34.3
	520	112	106	92	6	5	1 650 000	3 400 000	560	750		—	373	386	498	464	496	3.5	22	5	4	104.5	0.37	1.6	0.89	83.7
360	480	76	72	62	4	3	945 000	2 100 000	600	800	32972 HR 32972 J 32072	—	381	386	466	445	465	14	14	3	2.5	91.4	0.40	1.5	0.82	35.8
	480	76	76	57	4	3	1 080 000	2 340 000	560	800		4FD	381	381	466	445	466	13	19	3	2.5	96.8	0.46	1.3	0.72	36.1
	540	112	106	92	6	5	1 680 000	3 500 000	530	750		—	393	402	518	480	514	5.5	22	5	4	108.6	0.38	1.6	0.86	86.5
380	520	87	82	71	5	4	1 210 000	2 550 000	560	750	32976	—	407	406	502	478	501	16	16	4	3	95.2	0.39	1.6	0.86	49.5
400	540	87	82	71	5	4	1 250 000	2 700 000	530	710	32980 32080	—	427	428	522	499	524	16	16	4	3	100.8	0.40	1.5	0.82	52.7
	600	125	118	100	6	5	1 960 000	4 050 000	480	670		—	433	443	578	533	565	5	25	5	4	115.3	0.36	1.7	0.92	116
420	560	87	82	72	5	4	1 300 000	2 810 000	500	670	32984 32084	—	447	448	542	521	544	3.5	15	4	3	106.1	0.41	1.5	0.81	54.8
	620	125	118	100	6	5	2 000 000	4 200 000	450	630		—	453	463	598	552	586	6.5	25	5	4	120.0	0.37	1.6	0.88	121
440	650	130	122	104	6	6	2 230 000	4 600 000	430	600	32088	—	473	487	622	582	616	5	26	5	5	126.3	0.36	1.7	0.92	136



Bore Diameter 12.000 – 22.225 mm



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 , and Y_0 are given in the table below.

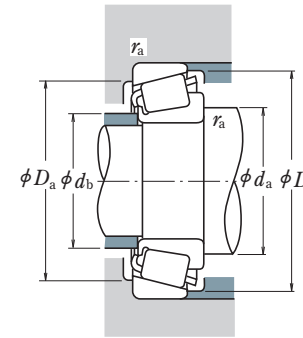
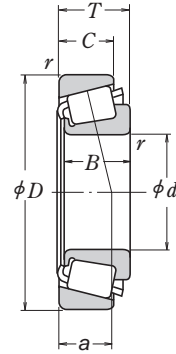
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers		Abutment and Fillet Dimensions (mm)				Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)				
d	D	T	B	C	Cone r min.	Cup r min.	C_r	C_{0r}	Grease	Oil	CONE	CUP	d_a	d_b	D_a	D_b	Cone r max.	a	e	Y_1	Y_0	approx. CONE CUP		
12.000	31.991	10.008	10.785	7.938	0.8	1.3	10 300	8 900	13 000	18 000	*A 2047	A 2126	16.5	15.5	26	29	0.8	1.3	6.8	0.41	1.5	0.81	0.023	0.017
12.700	34.988	10.998	10.988	8.730	1.3	1.3	11 700	10 900	12 000	16 000	A 4050	A 4138	18.5	17	29	32	1.3	1.3	8.2	0.45	1.3	0.73	0.033	0.022
15.000	34.988	10.998	10.988	8.730	0.8	1.3	11 700	10 900	12 000	16 000	*A 4059	A 4138	19.5	19	29	32	0.8	1.3	8.2	0.45	1.3	0.73	0.029	0.022
15.875	34.988	10.998	10.998	8.712	1.3	1.3	13 800	13 400	11 000	15 000	L 21549	L 21511	21.5	19.5	29	32.5	1.3	1.3	7.7	0.32	1.9	1.0	0.031	0.018
	39.992	12.014	11.153	9.525	1.3	1.3	14 900	15 700	9 500	13 000	A 6062	A 6157	22	20.5	34	37	1.3	1.3	10.3	0.53	1.1	0.63	0.044	0.031
	41.275	14.288	14.681	11.112	1.3	2.0	21 300	19 900	10 000	13 000	03062	03162	21.5	20	34	37.5	1.3	2	9.1	0.31	1.9	1.1	0.061	0.035
	42.862	14.288	14.288	9.525	1.5	1.5	17 300	17 200	8 500	12 000	11590	11520	24.5	22.5	34.5	39.5	1.5	1.5	13.0	0.70	0.85	0.47	0.061	0.040
	42.862	16.670	16.670	13.495	1.5	1.5	26 900	26 300	9 500	13 000	17580	17520	23	21	36.5	39	1.5	1.5	10.6	0.33	1.8	1.0	0.075	0.048
	44.450	15.494	14.381	11.430	1.5	1.5	23 800	23 900	8 500	11 000	05062	05175	23.5	21	38	42	1.5	1.5	11.2	0.36	1.7	0.93	0.081	0.039
	49.225	19.845	21.539	14.288	0.8	1.3	37 500	37 000	8 500	11 000	09062	09195	22	21.5	42	44.5	0.8	1.3	10.7	0.27	2.3	1.2	0.139	0.065
16.000	47.000	21.000	21.000	16.000	1.0	2.0	35 000	36 500	9 000	12 000	*HM 81649	**HM 81610	27.5	23	37.5	43	1	2	14.9	0.55	1.1	0.60	0.115	0.082
16.993	39.992	12.014	11.153	9.525	0.8	1.3	14 900	15 700	9 500	13 000	A 6067	A 6157	22	21	34	37	0.8	1.3	10.3	0.53	1.1	0.63	0.042	0.031
17.455	36.525	11.112	11.112	7.938	1.5	1.5	11 600	11 000	10 000	14 000	A 5069	A 5144	23.5	21.5	30	33.5	1.5	1.5	8.9	0.49	1.2	0.68	0.030	0.020
17.462	39.878	13.843	14.605	10.668	1.3	1.3	22 500	22 500	10 000	13 000	† LM 11749	† LM 11710	23	21.5	34	37	1.3	1.3	8.7	0.29	2.1	1.2	0.055	0.028
	47.000	14.381	14.381	11.112	0.8	1.3	23 800	23 900	8 500	11 000	05068	05185	23	22.5	40.5	42.5	0.8	1.3	10.1	0.36	1.7	0.93	0.082	0.047
19.050	39.992	12.014	11.153	9.525	1.0	1.3	14 900	15 700	9 500	13 000	A 6075	A 6157	24	23	34	37	1	1.3	10.3	0.53	1.1	0.63	0.037	0.031
	45.237	15.494	16.637	12.065	1.3	1.3	28 500	28 900	9 000	12 000	† LM 11949	† LM 11910	25	23.5	39.5	41.5	1.3	1.3	9.5	0.30	2.0	1.1	0.081	0.044
	47.000	14.381	14.381	11.112	1.3	1.3	23 800	23 900	8 500	11 000	05075	05185	25	23.5	40.5	42.5	1.3	1.3	10.1	0.36	1.7	0.93	0.077	0.047
	49.225	18.034	19.050	14.288	1.3	1.3	37 500	37 000	8 500	11 000	09067	09195	25.5	24	42	44.5	1.3	1.3	10.7	0.27	2.3	1.2	0.115	0.065
	49.225	19.845	21.539	14.288	1.2	1.3	37 500	37 000	8 500	11 000	09078	09195	25.5	24	42	44.5	1.2	1.3	10.7	0.27	2.3	1.2	0.124	0.065
	49.225	21.209	19.050	17.462	1.3	1.5	37 500	37 000	8 500	11 000	09067	09196	25.5	24	41.5	44.5	1.3	1.5	13.8	0.27	2.3	1.2	0.115	0.085
	49.225	23.020	21.539	17.462	C1.5	3.5	37 500	37 000	8 500	11 000	09074	09194	26	24	39	44.5	1.5	3.5	13.8	0.27	2.3	1.2	0.124	0.082
	53.975	22.225	21.839	15.875	1.5	2.3	40 500	39 500	7 500	10 000	21075	21212	31.5	26	43	50	1.5	2.3	16.3	0.59	1.0	0.56	0.156	0.097
19.990	47.000	14.381	14.381	11.112	1.5	1.3	23 800	23 900	8 500	11 000	05079	05185	26.5	24	40.5	42.5	1.5	1.3	10.1	0.36	1.7	0.93	0.073	0.047
20.000	51.994	15.011	14.260	12.700	1.5	1.3	26 000	27 900	7 500	10 000	07079	07204	27.5	27	45	48	1.5	1.3	12.1	0.40	1.5	0.82	0.105	0.061
20.625	49.225	23.020	21.539	17.462	1.5	1.5	37 500	37 000	8 500	11 000	09081	09196	27.5	25.5	41.5	44.5	1.5	1.5	13.8	0.27	2.3	1.2	0.115	0.085
20.638	49.225	19.845	19.845	15.875	1.5	1.5	36 000	37 000	8 000	11 000	12580	12520	28.5	26	42.5	45.5	1.5	1.5	12.9	0.32	1.9	1.0	0.114	0.067
21.430	50.005	17.526	18.288	13.970	1.3	1.3	38 500	40 000	8 000	11 000	† M 12649	† M 12610	27.5	25.5	44	46	1.3	1.3	10.9	0.28	2.2	1.2	0.115	0.059
22.000	45.237	15.494	16.637	12.065	1.3	1.3	29 200	33 500	8 500	11 000	*† LM 12749	† LM 12710	27.5	26	39.5	42.5	1.3	1.3	10.0	0.31	2.0	1.1	0.078	0.038
	45.975	15.494	16.637	12.065	1.3	1.3	29 200	33 500	8 500	11 000	*† LM 12749	† LM 12711	27.5	26	40	42.5	1.3	1.3	10.0	0.31	2.0	1.1	0.078	0.043
22.225	50.005	13.495	14.260	9.525	1.3	1.0	26 000	27 900	7 500	10 000	07087	07196	28.5	27	44.5	47	1.3	1	10.6	0.40	1.5	0.82	0.097	0.035
	50.005	17.526	18.288	13.970	1.3	1.3	38 500	40 000	8 000	11 000	† M 12648	† M 12610	28.5	26.5	44	46	1.3	1.3	10.9	0.28	2.2	1.2	0.111	0.059
	52.388	19.368	20.168	14.288	1.5	1.5	40 500	43 000	7 500	10 000	1380	1328	29.5	27	45	48.5	1.5	1.5	11.3	0.29	2.1	1.1	0.137	0.067
	53.975	19.368	20.168	14.288	1.5	1.5	40 500	43 000	7 500	10 000	1380	1329	29.5	27	46	49	1.5	1.5	11.3	0.29	2.1	1.1	0.137	0.082
	56.896	19.368	19.837	15.875	1.3	1.3	38 000	40 500	7 100	9 500	1755	1729	29	27.5	49	51	1.3	1.3	12.2	0.31	2.0	1.1	0.152	0.102
	57.150	22.225	22.225	17.462	0.8	1.5	48 000	50 000	7 100	9 500	1280	1220	29.5	29	49	52	0.8	1.5	15.1	0.35	1.7	0.95	0.183	0.106

Notes

- * The maximum bore diameter is listed and its tolerance is negative (See Table 7.4.1 on Page A136).
- ** The maximum outside diameter is listed and its tolerance is negative (See Table 7.4.2 on Pages A136 and A137).
- † The tolerances for the bore diameter and overall bearing width differ from the standard (See Table 5 on Page C185).
- * † The tolerance for the bore diameter is 0 to $-20 \mu\text{m}$, and for overall bearing width is $+356$ to $0 \mu\text{m}$.

■ **SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)**

Bore Diameter 22.606 – 28.575 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

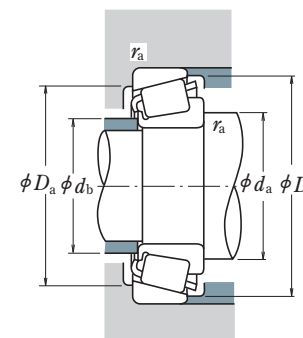
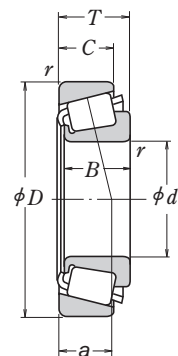
The values of e , Y_1 , and Y_0 are given in the table below.

d	Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers		Abutment and Fillet Dimensions (mm)				Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg)				
	D	T	B	C	Cone r min.	Cup r	C _r	C _{0r}	Grease	Oil	CONE	CUP	d _a	d _b	D _a			D _b	Cone r _a max.	Y ₁	Y ₀	approx. CONE	CUP	
	22.606	47.000	15.500	15.500	12.000	1.5	1.0	26 300	30 000	8 000	11 000	LM 72849	LM 72810	29	27			40.5	44.5	1.5	1	12.2	0.47	1.3
23.812	50.292	14.224	14.732	10.668	1.5	1.3	27 600	32 000	7 100	10 000	† L 44640	† L 44610	30.5	28.5	44.5	47	1.5	1.3	10.9	0.37	1.6	0.88	0.097	0.039
	56.896	19.368	19.837	15.875	0.8	1.3	38 000	40 500	7 100	9 500	1779	1729	29.5	28.5	49	51	0.8	1.3	12.2	0.31	2.0	1.1	0.143	0.102
	24.000	55.000	25.000	25.000	2.0	2.0	49 500	55 000	7 100	9 500	▲ JHM 33449	▲ JHM 33410	35	30	47	52	2	2	15.8	0.35	1.7	0.93	0.181	0.107
24.981	51.994	15.011	14.260	12.700	1.5	1.3	26 000	27 900	7 500	10 000	07098	07204	31	29	45	48	1.5	1.3	12.1	0.40	1.5	0.82	0.085	0.061
	52.001	15.011	14.260	12.700	1.5	2.0	26 000	27 900	7 500	10 000	07098	07205	31	29	44.5	48	1.5	2	12.1	0.40	1.5	0.82	0.085	0.061
	62.000	16.002	16.566	14.288	1.5	1.5	37 000	39 500	6 300	8 500	17098	17244	33	30.5	54	57	1.5	1.5	12.8	0.38	1.6	0.86	0.165	0.091
25.000	50.005	13.495	14.260	9.525	1.5	1.0	26 000	27 900	7 500	10 000	07097	07196	31	29	44.5	47	1.5	1	10.6	0.40	1.5	0.82	0.085	0.035
	51.994	15.011	14.260	12.700	1.5	1.3	26 000	27 900	7 500	10 000	07097	07204	31	29	45	48	1.5	1.3	12.1	0.40	1.5	0.82	0.085	0.061
	25.400	50.005	13.495	14.260	9.525	3.3	1.0	26 000	27 900	7 500	10 000	07100 SA	07196	35	29.5	44.5	47	3.3	1	10.6	0.40	1.5	0.82	0.082
25.400	50.005	13.495	14.260	9.525	1.0	1.0	26 000	27 900	7 500	10 000	07100	07196	30.5	29.5	44.5	47	1	1	10.6	0.40	1.5	0.82	0.084	0.035
	50.292	14.224	14.732	10.668	1.3	1.3	27 600	32 000	7 100	10 000	† L 44643	† L 44610	31.5	29.5	44.5	47	1.3	1.3	10.9	0.37	1.6	0.88	0.090	0.039
	57.150	17.462	17.462	13.495	1.3	1.5	39 500	45 500	6 700	9 000	15578	15520	32.5	30.5	51	53	1.3	1.5	12.4	0.35	1.7	0.95	0.151	0.070
25.400	57.150	19.431	19.431	14.732	1.5	1.5	42 500	49 000	6 700	9 000	M 84548	M 84510	36	33	48.5	54	1.5	1.5	16.1	0.55	1.1	0.60	0.156	0.089
	59.530	23.368	23.114	18.288	0.8	1.5	50 000	58 000	6 300	9 000	M 84249	M 84210	36	32.5	49.5	56	0.8	1.5	18.3	0.55	1.1	0.60	0.194	0.13
	62.000	19.050	20.638	14.288	0.8	1.3	46 000	53 000	6 000	8 000	15101	15245	32.5	31.5	55	58	0.8	1.3	13.3	0.35	1.7	0.94	0.222	0.081
25.400	63.500	20.638	20.638	15.875	3.5	1.5	46 000	53 000	6 000	8 000	15100	15250 X	38	31.5	55	59	3.5	1.5	14.9	0.35	1.7	0.94	0.22	0.113
	64.292	21.433	21.433	16.670	1.5	1.5	51 000	64 500	5 600	8 000	M 86643	M 86610	38	36.5	54	61	1.5	1.5	17.7	0.55	1.1	0.60	0.246	0.128
	65.088	22.225	21.463	15.875	1.5	1.5	45 000	47 500	5 600	8 000	23100	23256	39	34.5	53	61	1.5	1.5	20.0	0.73	0.82	0.45	0.214	0.142
25.400	68.262	22.225	22.225	17.462	0.8	1.5	55 000	64 000	5 600	7 500	02473	02420	34.5	33.5	59	63	0.8	1.5	16.9	0.42	1.4	0.79	0.28	0.152
	72.233	25.400	25.400	19.842	0.8	2.3	63 500	83 500	5 000	7 100	HM 88630	HM 88610	39.5	39.5	60	69	0.8	2.3	20.7	0.55	1.1	0.60	0.398	0.188
	72.626	24.608	24.257	17.462	2.3	1.5	60 000	58 000	5 600	7 500	41100	41286	41	36.5	61	68	2.3	1.5	20.7	0.60	1.0	0.55	0.32	0.177
26.988	50.292	14.224	14.732	10.668	3.5	1.3	27 600	32 000	7 100	10 000	† L 44649	† L 44610	37.5	31	44.5	47	3.5	1.3	10.9	0.37	1.6	0.88	0.081	0.039
	57.150	19.845	19.355	15.875	3.3	1.5	40 000	44 500	6 700	9 000	1997 X	1922	37.5	31.5	51	53.5	3.3	1.5	13.9	0.33	1.8	1.0	0.152	0.077
	60.325	19.842	17.462	15.875	3.5	1.5	39 500	45 500	6 700	9 000	15580	15523	38.5	32	51	54	3.5	1.5	14.7	0.35	1.7	0.95	0.141	0.123
28.575	62.000	19.050	20.638	14.288	0.8	1.3	46 000	53 000	6 000	8 000	15106	15245	33.5	33	55	58	0.8	1.3	13.3	0.35	1.7	0.94	0.211	0.081
	57.150	19.845	19.355	15.875	3.5	1.5	40 000	44 500	6 700	9 000	1988	1922	39.5	33.5	51	53.5	3.5	1.5	13.9	0.33	1.8	1.0	0.141	0.077
	59.131	15.875	16.764	11.811	spec.	1.3	34 500	41 500	6 300	8 500	† LM 67043	† LM 67010	40	33.5	52	56	3.5	1.3	12.6	0.41	1.5	0.80	0.147	0.062
28.575	62.000	19.050	20.638	14.288	3.5	1.3	46 000	53 000	6 000	8 000	15112	15245	40	34	55	58	3.5	1.3	13.3	0.35	1.7	0.94	0.199	0.081
	62.000	19.050	20.638	14.288	0.8	1.3	46 000	53 000	6 000	8 000	15113	15245	34.5	34	55	58	0.8	1.3	13.3	0.35	1.7	0.94	0.20	0.081
	64.292	21.433	21.433	16.670	1.5	1.5	51 000	64 500	5 600	8 000	M 86647	M 86610	40	38	54	61	1.5	1.5	17.7	0.55	1.1	0.60	0.223	0.128
28.575	68.262	22.225	22.225	17.462	0.8	1.5	55 000	64 000	5 600	7 500	02474	02420	36.5	36	59	63	0.8	1.5	16.9	0.42	1.4	0.79	0.257	0.152
	72.626	24.608	24.257	17.462	4.8	1.5	60 000	58 000	5 600	7 500	41125	41286	48	36.5	61	68	4.8	1.5	20.7	0.60	1.0	0.55	0.292	0.177
	72.626	24.608	24.257	17.462	1.5	1.5	60 000	58 000	5 600	7 500	41126	41286	41.5	36.5	61	68	1.5	1.5	20.7	0.60	1.0	0.55	0.295	0.177
73.025	22.225	22.225	17.462	0.8	3.3	54 500	64 500	5 300	7 100	02872	02820	37.5	37	62	68	0.8	3.3	18.3	0.45	1.3	0.73	0.321	0.16	

Notes † The tolerances for the bore diameter and overall bearing width differ from the standard (See Table 5 on Page C185).
▲ The tolerances are listed in Tables 2, 3 and 4 on Pages C184 and C185.

SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 29.000 – 32.000 mm


Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

 When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

 The values of e , Y_1 , and Y_0 are given in the table below.

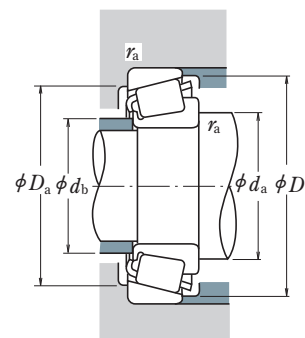
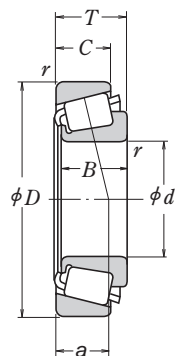
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers		Abutment and Fillet Dimensions (mm)				Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)				
d	D	T	B	C	Cone r min.	Cup r min.	C_r	C_{0r}	Grease	Oil	CONE	CUP	d_a	d_b	D_a	D_b	Cone r_a max.	Cup r_a max.	a	e	Y_1	Y_0	approx. CONE CUP	
29.000	50.292	14.224	14.732	10.668	3.5	1.3	26 800	34 000	7 100	9 500	† L 45449	† L 45410	39.5	33	44.5	48	3.5	1.3	10.8	0.37	1.6	0.89	0.079	0.036
29.367	66.421	23.812	25.433	19.050	3.5	1.3	65 000	73 000	6 000	8 000	2690	2631	41	35	58	60	3.5	1.3	14.3	0.25	2.4	1.3	0.242	0.165
30.000	62.000	16.002	16.566	14.288	1.5	1.5	37 000	39 500	6 300	8 500	* 17118	17244	37	34.5	54	57	1.5	1.5	12.8	0.38	1.6	0.86	0.136	0.091
	62.000	19.050	20.638	14.288	1.3	1.3	46 000	53 000	6 000	8 000	* 15117	15245	36.5	35	55	58	1.3	1.3	13.3	0.35	1.7	0.94	0.189	0.081
	63.500	20.638	20.638	15.875	1.3	1.3	46 000	53 000	6 000	8 000	* 15117	15250	36.5	35	56	59	1.3	1.3	14.9	0.35	1.7	0.94	0.189	0.113
	72.000	19.000	18.923	15.875	1.5	1.5	52 000	56 000	5 600	7 500	* 26118	26283	38	36	62	65	1.5	1.5	14.8	0.36	1.7	0.92	0.225	0.163
30.112	62.000	19.050	20.638	14.288	0.8	1.3	46 000	53 000	6 000	8 000	15116	15245	36	35.5	55	58	0.8	1.3	13.3	0.35	1.7	0.94	0.189	0.081
30.162	58.738	14.684	15.080	10.716	3.5	1.0	28 800	33 500	6 000	8 000	08118	08231	41.5	35	52	55	3.5	1	13.3	0.47	1.3	0.70	0.12	0.057
	64.292	21.433	21.433	16.670	1.5	1.5	51 000	64 500	5 600	8 000	M 86649	M 86610	41	38	54	61	1.5	1.5	17.7	0.55	1.1	0.60	0.211	0.128
	68.262	22.225	22.225	17.462	2.3	1.5	55 500	70 500	5 300	7 500	M 88043	M 88010	43.5	39.5	58	65	2.3	1.5	19.1	0.55	1.1	0.60	0.263	0.146
	69.850	23.812	25.357	19.050	2.3	1.3	71 000	84 000	5 600	7 500	2558	2523	40	36.5	61	64	2.3	1.3	14.5	0.27	2.2	1.2	0.297	0.169
	69.850	23.812	25.357	19.050	0.8	1.3	71 000	84 000	5 600	7 500	2559	2523	37	36.5	61	64	0.8	1.3	14.5	0.27	2.2	1.2	0.298	0.169
	76.200	24.608	24.074	16.670	1.5	C3.3	67 500	69 500	5 000	6 700	43118	43300	45	42	64	73	1.5	3.3	22.9	0.67	0.90	0.49	0.383	0.146
30.213	62.000	19.050	20.638	14.288	3.5	1.3	46 000	53 000	6 000	8 000	15118	15245	41.5	35.5	55	58	3.5	1.3	13.3	0.35	1.7	0.94	0.186	0.081
	62.000	19.050	20.638	14.288	0.8	1.3	46 000	53 000	6 000	8 000	15120	15245	36	35.5	55	58	0.8	1.3	13.3	0.35	1.7	0.94	0.188	0.081
	62.000	19.050	20.638	14.288	1.5	1.3	46 000	53 000	6 000	8 000	15119	15245	37.5	35.5	55	58	1.5	1.3	13.3	0.35	1.7	0.94	0.188	0.081
30.955	64.292	21.433	21.433	16.670	1.5	1.5	51 000	64 500	5 600	8 000	M 86648 A	M 86610	42	38	54	61	1.5	1.5	17.7	0.55	1.1	0.60	0.205	0.128
31.750	58.738	14.684	15.080	10.716	1.0	1.0	28 800	33 500	6 000	8 000	08125	08231	37.5	36	52	55	1	1	13.3	0.47	1.3	0.70	0.113	0.057
	59.131	15.875	16.764	11.811	spec.	1.3	34 500	41 500	6 300	8 500	† LM 67048	† LM 67010	42.5	36	52	56	3.5	1.3	12.6	0.41	1.5	0.80	0.127	0.062
	62.000	18.161	19.050	14.288	spec.	1.3	46 000	53 000	6 000	8 000	15123	15245	42.5	36.5	55	58	3.5	1.3	13.3	0.35	1.7	0.94	0.165	0.081
	62.000	19.050	20.638	14.288	0.8	1.3	46 000	53 000	6 000	8 000	15126	15245	37	36.5	55	58	0.8	1.3	13.3	0.35	1.7	0.94	0.176	0.081
	62.000	19.050	20.638	14.288	3.5	1.3	46 000	53 000	6 000	8 000	15125	15245	42.5	36.5	55	58	3.5	1.3	13.3	0.35	1.7	0.94	0.174	0.081
	63.500	20.638	20.638	15.875	0.8	1.3	46 000	53 000	6 000	8 000	15126	15250	37	36.5	56	59	0.8	1.3	14.9	0.35	1.7	0.94	0.176	0.113
	68.262	22.225	22.225	17.462	3.5	1.5	55 000	64 000	5 600	7 500	02475	02420	44.5	38.5	59	63	3.5	1.5	16.9	0.42	1.4	0.79	0.229	0.152
	68.262	22.225	22.225	17.462	1.5	1.5	55 500	70 500	5 300	7 500	M 88046	M 88010	43	40.5	58	65	1.5	1.5	19.1	0.55	1.1	0.60	0.25	0.146
	69.012	19.845	19.583	15.875	3.5	1.3	47 000	56 000	5 600	7 500	14125 A	14276	44	37.5	60	63	3.5	1.3	15.3	0.38	1.6	0.86	0.219	0.135
	69.012	26.982	26.721	15.875	4.3	3.3	47 000	56 000	5 600	7 500	14123 A	14274	41.5	37.5	59	63	4.3	3.3	15.1	0.38	1.6	0.87	0.289	0.132
	69.850	23.812	25.357	19.050	0.8	1.3	71 000	84 000	5 600	7 500	2580	2523	38.5	37.5	61	64	0.8	1.3	14.5	0.27	2.2	1.2	0.282	0.169
	69.850	23.812	25.357	19.050	3.5	1.3	71 000	84 000	5 600	7 500	2582	2523	44	37.5	61	64	3.5	1.3	14.5	0.27	2.2	1.2	0.28	0.169
	72.626	30.162	29.997	23.812	0.8	3.3	79 500	90 000	5 300	7 500	3188	3120	39.5	39.5	61	67	0.8	3.3	19.6	0.33	1.8	0.99	0.368	0.225
	73.025	29.370	27.783	23.020	1.3	3.3	74 500	100 000	5 000	7 100	HM 88542	HM 88510	45.5	42.5	59	70	1.3	3.3	23.5	0.55	1.1	0.60	0.379	0.242
	80.000	21.000	22.403	17.826	0.8	1.3	68 500	75 500	4 500	6 300	346	332	40	39.5	73	75	0.8	1.3	14.6	0.27	2.2	1.2	0.419	0.146
32.000	72.233	25.400	25.400	19.842	3.3	2.3	63 500	83 500	5 000	7 100	*HM 88638	HM 88610	48.5	42.5	60	69	3.3	2.3	20.7	0.55	1.1	0.60	0.337	0.188

Notes * The maximum bore diameter is listed and its tolerance is negative (See Table 7.4.1 on Page A136).

† The tolerances for the bore diameter and overall bearing width differ from the standard (See Table 5 on Page C185).

SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 33.338 – 35.000 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0 F_a$$

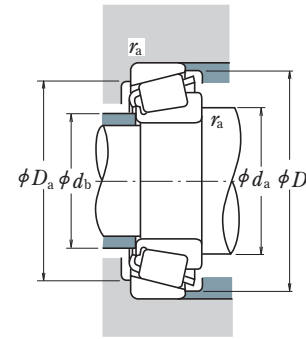
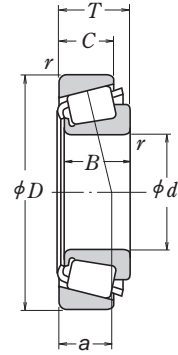
When $F_r > 0.5F_r + Y_0 F_a$, use $P_0 = F_r$ The values of e , Y_1 , and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers		Abutment and Fillet Dimensions (mm)				Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)					
d	D	T	B	C	Cone r min.	Cup r min.	C_r	C_{0r}	Grease	Oil	CONE	CUP	d_a	d_b	D_a	D_b	Cone r_a max.	Cup r_a max.	a	e	Y_1	Y_0	approx. CONE CUP		
33.338	66.675	20.638	20.638	15.875	3.5	1.5	46 000	53 500	5 600	7 500	1680	1620	44.5	38.5	58	61	3.5	1.5	15.2	0.37	1.6	0.89	0.196	0.121	
	68.262	22.225	22.225	17.462	0.8	1.5	55 500	70 500	5 300	7 500	M 88048	M 88010	42.5	41	58	65	0.8	1.5	19.0	0.55	1.1	0.60	0.236	0.146	
	69.012	19.845	19.583	15.875	3.5	3.3	47 000	56 000	5 600	7 500	14130	14274	45	38.5	59	63	3.5	3.3	15.3	0.38	1.6	0.86	0.207	0.132	
	69.012	19.845	19.583	15.875	0.8	1.3	47 000	56 000	5 600	7 500	14131	14276	39.5	38.5	60	63	0.8	1.3	15.3	0.38	1.6	0.86	0.209	0.135	
	69.850	23.812	25.357	19.050	3.5	1.3	71 000	84 000	5 600	7 500	2585	2523	45	39	61	64	3.5	1.3	14.5	0.27	2.2	1.2	0.263	0.169	
	72.000	19.000	18.923	15.875	3.5	1.5	52 000	56 000	5 600	7 500	26131	26283	44.5	38.5	62	65	3.5	1.5	14.7	0.36	1.7	0.92	0.20	0.163	
	72.626	30.162	29.997	23.812	0.8	3.3	79 500	90 000	5 300	7 500	3197	3120	41.5	40.5	61	67	0.8	3.3	19.6	0.33	1.8	0.99	0.348	0.225	
	73.025	29.370	27.783	23.020	0.8	3.3	74 000	100 000	5 000	7 100	HM 88547	HM 88510	45.5	42.5	59	70	0.8	3.3	23.5	0.55	1.1	0.60	0.362	0.242	
	76.200	29.370	28.575	23.020	3.8	0.8	78 500	106 000	4 800	6 700	HM 89444	HM 89411	53	44.5	65	73	3.8	0.8	23.6	0.55	1.1	0.60	0.419	0.261	
	76.200	29.370	28.575	23.020	0.8	3.3	78 500	106 000	4 800	6 700	HM 89443	HM 89410	46.5	44.5	62	73	0.8	3.3	23.6	0.55	1.1	0.60	0.421	0.257	
	79.375	25.400	24.074	17.462	3.5	1.5	67 500	69 500	5 000	6 700	43131	43312	51	42	67	74	3.5	1.5	23.7	0.67	0.90	0.49	0.348	0.22	
	34.925	65.088	18.034	18.288	13.970	spec.	1.3	47 500	57 500	5 600	7 500	† LM 48548	† LM 48510	46	40	58	61	3.5	1.3	14.1	0.38	1.6	0.88	0.172	0.087
		65.088	20.320	18.288	16.256	spec.	1.3	47 500	57 500	5 600	7 500	† LM 48548	† LM 48511	46	40	58	61	3.5	1.3	16.4	0.38	1.6	0.88	0.172	0.108
		66.675	20.638	20.638	16.670	3.5	2.3	53 000	62 500	5 600	7 500	M 38549	M 38510	46.5	40	58	62	3.5	2.3	15.2	0.35	1.7	0.94	0.194	0.112
		69.012	19.845	19.583	15.875	3.5	1.3	47 000	56 000	5 600	7 500	14138 A	14276	46	40	60	63	3.5	1.3	15.3	0.38	1.6	0.86	0.194	0.135
		69.012	19.845	19.583	15.875	1.5	1.3	47 000	56 000	5 600	7 500	14137 A	14276	42	40	60	63	1.5	1.3	15.1	0.38	1.6	0.86	0.196	0.135
		72.233	25.400	25.400	19.842	2.3	2.3	63 500	83 500	5 000	7 100	HM 88649	HM 88610	48.5	42.5	60	69	2.3	2.3	20.7	0.55	1.1	0.60	0.307	0.188
		73.025	22.225	22.225	17.462	0.8	3.3	54 500	64 500	5 300	7 100	02878	02820	42.5	42	62	68	0.8	3.3	18.3	0.45	1.3	0.73	0.266	0.16
		73.025	22.225	23.812	17.462	3.5	3.3	63 500	77 000	5 300	7 100	2877	2820	47	41.5	63	68	3.5	3.3	16.1	0.37	1.6	0.90	0.291	0.15
		73.025	23.812	24.608	19.050	1.5	0.8	71 000	86 000	5 300	7 100	25877	25821	43	40.5	65	68	1.5	0.8	15.7	0.29	2.1	1.1	0.306	0.167
73.025		23.812	24.608	19.050	3.5	2.3	71 000	86 000	5 300	7 100	25878	25820	47	40.5	64	68	3.5	2.3	15.7	0.29	2.1	1.1	0.304	0.165	
76.200		29.370	28.575	23.020	0.8	0.8	78 500	106 000	4 800	6 700	HM 89446 A	HM 89411	47.5	44.5	65	73	0.8	0.8	23.6	0.55	1.1	0.60	0.403	0.261	
76.200		29.370	28.575	23.020	3.5	0.8	78 500	106 000	4 800	6 700	HM 89446	HM 89411	53	44.5	65	73	3.5	0.8	23.6	0.55	1.1	0.60	0.40	0.261	
76.200	29.370	28.575	23.020	3.5	3.3	78 500	106 000	4 800	6 700	HM 89446	HM 89410	53	44.5	62	73	3.5	3.3	23.6	0.55	1.1	0.60	0.40	0.257		
76.200	29.370	28.575	23.812	1.5	3.3	80 500	96 500	5 000	6 700	31594	31520	46	43.5	64	72	1.5	3.3	21.6	0.40	1.5	0.82	0.404	0.235		
79.375	29.370	29.771	23.812	3.5	3.3	88 000	106 000	4 800	6 700	3478	3420	50	43.5	67	74	3.5	3.3	20.0	0.37	1.6	0.90	0.448	0.259		
34.976	68.262	15.875	16.520	11.908	1.5	1.5	45 000	53 500	5 300	7 100	19138	19268	42.5	40.5	61	65	1.5	1.5	14.5	0.44	1.4	0.74	0.196	0.073	
	72.085	22.385	19.583	18.415	1.3	2.3	47 000	56 000	5 600	7 500	14139	14283	41.5	40	60	65	1.3	2.3	17.7	0.38	1.6	0.87	0.198	0.21	
	80.000	21.006	20.940	15.875	1.5	1.5	56 500	64 500	5 000	6 700	28138	28315	43.5	41	69	73	1.5	1.5	16.0	0.40	1.5	0.82	0.308	0.199	
35.000	59.131	15.875	16.764	11.938	spec.	1.3	35 000	47 000	6 000	8 000	*† L 68149	† L 68110	45.5	39	52	56	3.5	1.3	13.2	0.42	1.4	0.79	0.117	0.056	
	59.975	15.875	16.764	11.938	spec.	1.3	35 000	47 000	6 000	8 000	*† L 68149	† L 68111	45.5	39	53	56	3.5	1.3	13.2	0.42	1.4	0.79	0.117	0.064	
	62.000	16.700	17.000	13.600	spec.	1.0	38 000	50 000	5 600	8 000	* LM 78349	** LM 78310	46	40	55	59	3.5	1	14.4	0.44	1.4	0.74	0.137	0.074	
	62.000	16.700	17.000	13.600	spec.	1.5	38 000	50 000	5 600	8 000	* LM 78349	** LM 78310 A	46	40	54	59	3.5	1.5	14.4	0.44	1.4	0.74	0.138	0.073	
	65.987	20.638	20.638	16.670	3.5	2.3	53 000	62 500	5 600	7 500	M 38547	M 38511	46	39.5	59	61	3.5	2.3	15.2	0.35	1.7	0.94	0.193	0.103	
73.025	26.988	26.975	22.225	3.5	0.8	75 500	88 500	5 300	7 500	23691	23621	49	42	63	68	3.5	0.8	18.1	0.37	1.6	0.89	0.309	0.212		

- Notes
- * The maximum bore diameter is listed and its tolerance is negative (See Table 7.4.1 on Page A136).
 - ** The maximum outside diameter is listed and its tolerance is negative (See Table 7.4.2 on Pages A136 and A137).
 - † The tolerances for the bore diameter and overall bearing width differ from the standard (See Table 5 on Page C185).
 - * † The tolerance for the bore diameter is 0 to -20 μm , and for overall bearing width is +356 to 0 μm .

■ SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 35.717 – 41.275 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

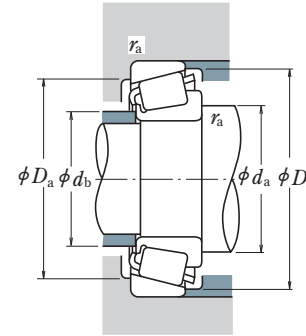
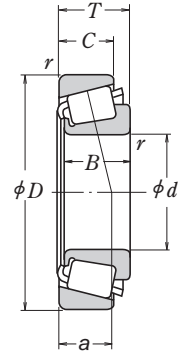
The values of e , Y_1 , and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers		Abutment and Fillet Dimensions (mm)					Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg)			
d	D	T	B	C	Cone r min.	Cup r min.	C_r	C_{0r}	Grease	Oil	CONE	CUP	d_a	d_b	D_a	D_b			Cone r_a max.	Y_1	Y_0	approx. CONE CUP		
35.717	72.233	25.400	25.400	19.842	3.5	2.3	63 500	83 500	5 000	7 100	HM 88648	HM 88610	52	43	60	69	3.5	2.3	20.7	0.55	1.1	0.60	0.298	0.188
36.487	73.025	23.812	24.608	19.050	1.5	0.8	71 000	86 000	5 300	7 100	25880	25821	44	42	65	68	1.5	0.8	15.7	0.29	2.1	1.1	0.291	0.167
36.512	76.200	29.370	28.575	23.020	3.5	3.3	78 500	106 000	4 800	6 700	HM 89449	HM 89410	54	44.5	62	73	3.5	3.3	23.6	0.55	1.1	0.60	0.38	0.257
	79.375	29.370	29.771	23.812	0.8	3.3	88 000	106 000	4 800	6 700	3479	3420	45.5	44.5	67	74	0.8	3.3	20.0	0.37	1.6	0.90	0.429	0.259
	88.501	25.400	23.698	17.462	2.3	1.5	73 000	81 000	4 000	5 600	44143	44348	54	50	75	84	2.3	1.5	27.9	0.78	0.77	0.42	0.502	0.245
	93.662	31.750	31.750	26.195	1.5	3.3	110 000	142 000	4 000	5 600	46143	46368	48.5	46.5	79	87	1.5	3.3	24.0	0.40	1.5	0.82	0.765	0.405
38.000	63.000	17.000	17.000	13.500	spec.	1.3	38 500	52 000	5 600	7 500	▲ JL 69349	▲ JL 69310	49	42.5	56	60	3.5	1.3	14.6	0.42	1.4	0.79	0.132	0.071
38.100	63.500	12.700	11.908	9.525	1.5	0.8	24 100	30 500	5 300	7 100	13889	13830	45	42.5	59	60	1.5	0.8	11.9	0.35	1.7	0.95	0.109	0.046
	65.088	18.034	18.288	13.970	2.3	1.3	42 500	55 000	5 300	7 500	LM 29749	LM 29710	46	42.5	59	62	2.3	1.3	13.7	0.33	1.8	0.99	0.16	0.079
	65.088	18.034	18.288	13.970	spec.	1.3	42 500	55 000	5 300	7 500	LM 29748	LM 29710	49	42.5	59	62	3.5	1.3	13.7	0.33	1.8	0.99	0.158	0.079
	65.088	19.812	18.288	15.748	2.3	1.3	42 500	55 000	5 300	7 500	LM 29749	LM 29711	46	42.5	58	62	2.3	1.3	15.5	0.33	1.8	0.99	0.16	0.094
	68.262	15.875	16.520	11.908	1.5	1.5	45 000	53 500	5 300	7 100	19150	19268	45	43	61	65	1.5	1.5	14.5	0.44	1.4	0.74	0.173	0.073
	69.012	19.050	19.050	15.083	2.0	2.3	49 000	61 000	5 300	7 100	13687	13621	46.5	43	61	65	2	2.3	15.8	0.40	1.5	0.82	0.193	0.104
	69.012	19.050	19.050	15.083	3.5	0.8	49 000	61 000	5 300	7 100	13685	13620	49.5	43	62	65	3.5	0.8	15.8	0.40	1.5	0.82	0.191	0.105
	72.238	20.638	20.638	15.875	3.5	1.3	48 500	59 500	5 300	7 100	16150	16284	49.5	43	63	67	3.5	1.3	16.0	0.40	1.5	0.82	0.212	0.146
	73.025	23.812	25.654	19.050	3.5	0.8	73 500	91 000	5 000	6 700	2788	2735 X	50	43.5	66	69	3.5	0.8	15.9	0.30	2.0	1.1	0.312	0.135
	76.200	23.812	25.654	19.050	3.5	3.3	73 500	91 000	5 000	6 700	2788	2720	50	43.5	66	70	3.5	3.3	15.9	0.30	2.0	1.1	0.312	0.187
	76.200	23.812	25.654	19.050	3.5	0.8	73 500	91 000	5 000	6 700	2788	2729	50	43.5	68	70	3.5	0.8	15.9	0.30	2.0	1.1	0.312	0.191
	79.375	29.370	29.771	23.812	3.5	3.3	88 000	106 000	4 800	6 700	3490	3420	52	45.5	67	74	3.5	3.3	20.0	0.37	1.6	0.90	0.404	0.259
	80.035	24.608	23.698	18.512	0.8	1.5	69 000	84 500	4 500	6 300	27880	27820	48	47	68	75	0.8	1.5	21.5	0.56	1.1	0.59	0.362	0.209
	82.550	29.370	28.575	23.020	0.8	3.3	87 000	117 000	4 500	6 000	HM 801346	HM 801310	51	49	68	78	0.8	3.3	24.2	0.55	1.1	0.60	0.483	0.282
	88.501	25.400	23.698	17.462	2.3	1.5	73 000	81 000	4 000	5 600	44150	44348	55	51	75	84	2.3	1.5	27.9	0.78	0.77	0.42	0.484	0.245
	88.501	26.988	29.083	22.225	3.5	1.5	96 500	109 000	4 500	6 000	418	414	51	44.5	77	80	3.5	1.5	17.1	0.26	2.3	1.3	0.50	0.329
	95.250	30.958	28.301	20.638	1.5	0.8	87 500	97 000	3 600	5 300	53150	53375	55	53	81	89	1.5	0.8	30.7	0.74	0.81	0.45	0.665	0.365
39.688	73.025	25.654	22.098	21.336	0.8	2.3	62 500	80 000	5 000	6 700	M 201047	M 201011	45.5	48	64	69	0.8	2.3	19.7	0.33	1.8	0.99	0.266	0.169
	76.200	23.812	25.654	19.050	3.5	3.3	73 500	91 000	5 000	6 700	2789	2720	52	45	66	70	3.5	3.3	15.9	0.30	2.0	1.1	0.292	0.187
	80.167	29.370	30.391	23.812	0.8	3.3	92 500	108 000	4 800	6 300	3386	3320	46.5	45.5	70	75	0.8	3.3	18.4	0.27	2.2	1.2	0.442	0.217
40.000	80.000	21.000	22.403	17.826	3.5	1.3	68 500	75 500	4 500	6 300	344	332	52	45.5	73	75	3.5	1.3	14.5	0.27	2.2	1.2	0.338	0.146
	80.000	21.000	22.403	17.826	0.8	1.3	68 500	75 500	4 500	6 300	344 A	332	46	45.5	73	75	0.8	1.3	14.5	0.27	2.2	1.2	0.339	0.146
	88.501	25.400	23.698	17.462	2.3	1.5	73 000	81 000	4 000	5 600	44157	44348	56	51	75	84	2.3	1.5	27.9	0.78	0.77	0.42	0.463	0.245
41.000	68.000	17.500	18.000	13.500	spec.	1.5	43 500	58 000	5 300	7 100	* LM 300849	** LM 300811	52	45	61	65	3.5	1.5	13.9	0.35	1.7	0.95	0.16	0.082
41.275	73.025	16.667	17.462	12.700	3.5	1.5	44 500	54 000	4 800	6 700	18590	18520	53	46	66	69	3.5	1.5	14.0	0.35	1.7	0.94	0.199	0.086
	73.431	19.558	19.812	14.732	3.5	0.8	54 500	67 000	4 800	6 700	LM 501349	LM 501310	53	46.5	67	70	3.5	0.8	16.3	0.40	1.5	0.83	0.226	0.108
	73.431	21.430	19.812	16.604	3.5	0.8	54 500	67 000	4 800	6 700	LM 501349	LM 501314	53	46.5	66	70	3.5	0.8	18.2	0.40	1.5	0.83	0.226	0.129

Notes * The maximum bore diameter is listed and its tolerance is negative (See Table 7.4.1 on Page A136).
 ** The maximum outside diameter is listed and its tolerance is negative (See Table 7.4.2 on Pages A136 and A137).
 ▲ The tolerances are listed in Tables 2, 3 and 4 on Pages C184 and C185.

■ **SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)**

Bore Diameter 41.275 – 44.450 mm



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$P_0 = 0.5F_r + Y_0 F_a$

When $F_r > 0.5F_r + Y_0 F_a$, use $P_0 = F_r$

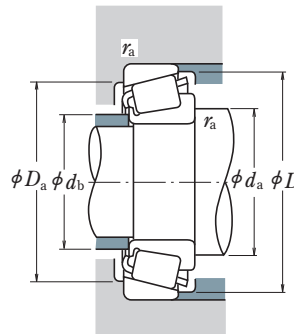
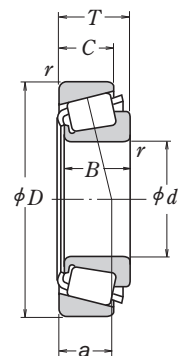
The values of e , Y_1 , and Y_0 are given in the table below.

d	Boundary Dimensions (mm)					Cone r min.	Cup r max.	Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers		Abutment and Fillet Dimensions (mm)					Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg)	
	D	T	B	C	C _r			C _{0r}	Grease	Oil	CONE	CUP	d _a	d _b	D _a	D _b	r _a	r _{max}			Y ₁	Y ₀	CONE approx.	CUP approx.
41.275	76.200	18.009	17.384	14.288	1.5	1.5	42 500	51 000	4 500	6 300	11162	11300	49	46.5	67	71	1.5	1.5	17.4	0.49	1.2	0.68	0.212	0.129
	76.200	22.225	23.020	17.462	3.5	0.8	66 000	82 000	4 800	6 700	24780	24720	53	47.5	68	72	3.5	0.8	17.0	0.39	1.5	0.84	0.279	0.15
76.200	25.400	23.020	20.638	3.5	2.3	66 000	82 000	4 800	6 700	24780	24721	54	47	66	72	3.5	2.3	20.2	0.39	1.5	0.84	0.279	0.189	
79.375	23.812	25.400	19.050	3.5	0.8	77 000	98 500	4 800	6 300	26882	26822	54	47	71	74	3.5	0.8	16.4	0.32	1.9	1.0	0.349	0.186	
80.000	21.000	22.403	17.826	0.8	1.3	68 500	75 500	4 500	6 300	336	332	47	46	73	75	0.8	1.3	14.5	0.27	2.2	1.2	0.325	0.146	
80.000	21.000	22.403	17.826	3.5	1.3	68 500	75 500	4 500	6 300	342	332	53	46	73	75	3.5	1.3	14.5	0.27	2.2	1.2	0.325	0.146	
80.167	25.400	25.400	20.638	3.5	3.3	77 000	98 500	4 800	6 300	26882	26820	54	47	69	74	3.5	3.3	18.0	0.32	1.9	1.0	0.349	0.219	
82.550	26.543	25.654	20.193	3.5	3.3	78 500	102 000	4 300	6 000	M 802048	M 802011	57	51	70	79	3.5	3.3	22.9	0.55	1.1	0.60	0.406	0.23	
85.725	30.162	30.162	23.812	3.5	3.3	91 000	115 000	4 300	6 000	3877	3820	57	50	73	81	3.5	3.3	21.8	0.40	1.5	0.82	0.506	0.285	
87.312	30.162	30.886	23.812	0.8	3.3	96 000	120 000	4 300	6 000	3576	3525	49	48	75	81	0.8	3.3	19.5	0.31	2.0	1.1	0.532	0.304	
88.501	25.400	23.698	17.462	2.3	1.5	73 000	81 000	4 000	5 600	44162	44348	57	51	75	84	2.3	1.5	28.0	0.78	0.77	0.42	0.447	0.245	
88.900	30.162	29.370	23.020	3.5	3.3	96 500	129 000	4 000	5 600	HM 803146	HM 803110	60	53	74	85	3.5	3.3	25.6	0.55	1.1	0.60	0.579	0.322	
88.900	30.162	29.370	23.020	0.8	3.3	96 500	129 000	4 000	5 600	HM 803145	HM 803110	54	53	74	85	0.8	3.3	25.6	0.55	1.1	0.60	0.582	0.322	
90.488	39.688	40.386	33.338	3.5	3.3	139 000	180 000	4 300	5 600	4388	4335	57	51	77	85	3.5	3.3	24.6	0.28	2.1	1.2	0.789	0.459	
93.662	31.750	31.750	26.195	0.8	3.3	110 000	142 000	4 000	5 600	46162	46368	52	51	79	87	0.8	3.3	24.0	0.40	1.5	0.82	0.695	0.405	
95.250	30.162	29.370	23.020	3.5	3.3	106 000	143 000	3 800	5 300	HM 804840	HM 804810	61	54	81	91	3.5	3.3	26.1	0.55	1.1	0.60	0.726	0.354	
98.425	30.958	28.301	20.638	1.5	0.8	87 500	97 000	3 600	5 300	53162	53387	57	53	82	91	1.5	0.8	30.7	0.74	0.81	0.45	0.618	0.442	
42.862	76.992	17.462	17.145	11.908	1.5	1.5	44 000	54 000	4 500	6 000	12168	12303	51	48.5	68	73	1.5	1.5	17.7	0.51	1.2	0.65	0.228	0.098
	82.550	19.842	19.837	15.080	2.3	1.5	58 500	69 000	4 500	6 300	22325	22325	52	48.5	73	76	2.3	1.5	17.6	0.43	1.4	0.77	0.283	0.176
82.931	23.812	25.400	19.050	2.3	0.8	76 500	99 000	4 500	6 000	25578	25520	53	49.5	74	77	2.3	0.8	17.6	0.33	1.8	0.99	0.383	0.203	
82.931	26.988	25.400	22.225	2.3	2.3	76 500	99 000	4 500	6 000	25578	25523	53	49.5	72	77	2.3	2.3	20.8	0.33	1.8	0.99	0.383	0.248	
42.875	76.200	25.400	25.400	20.638	3.5	1.5	77 000	98 500	4 800	6 300	26884	26823	55	48.5	69	73	3.5	1.5	18.0	0.32	1.9	1.0	0.337	0.136
	80.000	21.000	22.403	17.826	3.5	1.3	68 500	75 500	4 500	6 300	342 S	332	54	47.5	73	75	3.5	1.3	14.5	0.27	2.2	1.2	0.305	0.146
82.931	26.988	25.400	22.225	3.5	2.3	76 500	99 000	4 500	6 000	25577	25523	55	49	72	77	3.5	2.3	20.8	0.33	1.8	0.99	0.381	0.248	
83.058	23.812	25.400	19.050	3.5	3.3	76 500	99 000	4 500	6 000	25577	25521	55	49	72	77	3.5	3.3	17.6	0.33	1.8	0.99	0.381	0.201	
43.000	74.988	19.368	19.837	14.288	1.5	1.3	52 500	68 000	4 800	6 300	* 16986	16929	51	48.5	67	71	1.5	1.3	17.2	0.44	1.4	0.74	0.24	0.106
	44.450	80.962	19.050	17.462	14.288	0.3	1.5	45 000	57 000	4 300	6 000	13175	13318	50	50	72	76	0.3	1.5	20.1	0.53	1.1	0.63	0.252
82.931		23.812	25.400	19.050	3.5	0.8	76 500	99 000	4 500	6 000	25580	25520	57	50	74	77	3.5	0.8	17.6	0.33	1.8	0.99	0.359	0.203
83.058	23.812	25.400	19.050	3.5	3.3	76 500	99 000	4 500	6 000	25580	25521	56	51	72	78	3.5	3.3	17.6	0.33	1.8	0.99	0.359	0.201	
87.312	30.162	30.886	23.812	3.5	3.3	96 000	120 000	4 300	6 000	3578	3525	57	51	75	81	3.5	3.3	19.5	0.31	2.0	1.1	0.477	0.304	
88.900	30.162	29.370	23.020	3.5	3.3	96 500	129 000	4 000	5 600	HM 803149	HM 803110	62	53	74	85	3.5	3.3	25.6	0.55	1.1	0.60	0.528	0.322	
93.264	30.162	30.302	23.812	3.5	3.2	103 000	136 000	3 800	5 300	3782	3720	58	52	82	88	3.5	3.2	22.4	0.34	1.8	0.97	0.678	0.292	
93.662	31.750	31.750	25.400	0.8	3.3	120 000	147 000	4 000	5 600	49176	49368	54	53	82	87	0.8	3.3	21.6	0.36	1.7	0.92	0.648	0.371	
93.662	31.750	31.750	25.400	3.5	3.3	120 000	147 000	4 000	5 600	49175	49368	59	53	82	87	3.5	3.3	21.6	0.36	1.7	0.92	0.645	0.371	
93.662	31.750	31.750	26.195	3.5	3.3	110 000	142 000	4 000	5 600	46176	46368	60	54	79	87	3.5	3.3	24.0	0.40	1.5	0.82	0.635	0.405	
95.250	27.783	29.901	22.225	3.5	2.3	106 000	126 000	4 300	5 600	438	432	57	51	83	87	3.5	2.3	18.6	0.28	2.1	1.2	0.555	0.384	

Note * The maximum bore diameter is listed and its tolerance is negative (See Table 7.4.1 on Page A136).

SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 44.450 – 47.625 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

The values of e , Y_1 , and Y_0 are given in the table below.

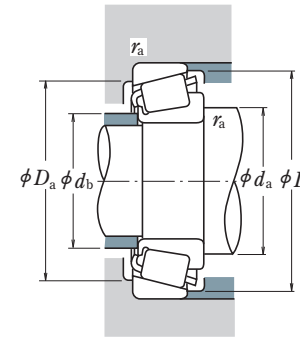
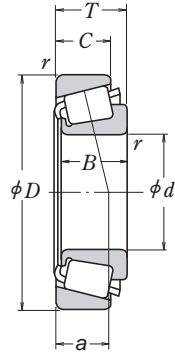
Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers		Abutment and Fillet Dimensions (mm)				Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)					
d	D	T	B	C	Cone r min.	Cup r min.	C_r	C_{0r}	Grease	Oil	CONE	CUP	d_a	d_b	D_a	D_b	Cone r_a max.	Cup r_a max.	a	e	Y_1	Y_0	approx. CONE	approx. CUP
44.450	95.250	30.162	29.370	23.020	3.5	3.3	106 000	143 000	3 800	5 300	HM 804843	HM 804810	63	57	81	91	3.5	3.3	26.1	0.55	1.1	0.60	0.677	0.354
	95.250	30.958	28.301	20.638	3.5	0.8	87 500	97 000	3 600	5 300	53177	53375	63	53	81	89	3.5	0.8	30.7	0.74	0.81	0.45	0.572	0.365
	95.250	30.958	28.301	20.638	1.3	0.8	87 500	97 000	3 600	5 300	53176	53375	59	53	81	89	1.3	0.8	30.7	0.74	0.81	0.45	0.574	0.365
	95.250	30.958	28.301	20.638	2.0	0.8	87 500	97 000	3 600	5 300	53178	53375	60	53	81	89	2	0.8	30.7	0.74	0.81	0.45	0.574	0.365
	95.250	30.958	28.301	22.225	1.3	0.8	100 000	122 000	3 600	5 000	HM 903247	HM 903210	61	54	81	91	1.3	0.8	31.5	0.74	0.81	0.45	0.651	0.389
	95.250	30.958	28.575	22.225	3.5	0.8	100 000	122 000	3 600	5 000	HM 903249	HM 903210	65	54	81	91	3.5	0.8	31.5	0.74	0.81	0.45	0.635	0.389
	98.425	30.958	28.301	20.638	3.5	0.8	87 500	97 000	3 600	5 300	53177	53387	63	53	82	91	3.5	0.8	30.7	0.74	0.81	0.45	0.568	0.442
	103.188	43.658	44.475	36.512	1.3	3.3	178 000	238 000	3 800	5 000	5356	5335	58	56	89	97	1.3	3.3	27.0	0.30	2.0	1.1	1.23	0.637
	104.775	36.512	36.512	28.575	3.5	3.3	139 000	192 000	3 400	4 800	HM 807040	HM 807010	66	59	89	100	3.5	3.3	29.7	0.49	1.2	0.68	1.14	0.502
	107.950	27.783	29.317	22.225	3.5	0.8	116 000	149 000	3 400	4 800	460	453 A	60	54	97	100	3.5	0.8	20.7	0.34	1.8	0.98	0.93	0.42
	111.125	30.162	26.909	20.638	3.5	3.3	92 500	110 000	3 200	4 300	55175	55437	67	60	92	105	3.5	3.3	37.3	0.88	0.68	0.37	0.867	0.514
114.300	44.450	44.450	34.925	3.5	3.3	172 000	205 000	3 600	4 800	65385	65320	65	59	97	107	3.5	3.3	32.2	0.43	1.4	0.77	1.39	0.894	
44.983	82.931	23.812	25.400	19.050	1.5	0.8	76 500	99 000	4 500	6 000	25584	25520	53	51	74	77	1.5	0.8	17.6	0.33	1.8	0.99	0.354	0.203
	45.000	93.264	20.638	22.225	15.082	0.8	1.3	77 000	93 000	3 800	5 300	376	374	54	54	85	88	0.8	1.3	17.1	0.34	1.8	0.97	0.492
45.230	79.985	19.842	20.638	15.080	2.0	1.3	62 000	78 500	4 500	6 000	17887	17831	57	52	68	74	2	1.3	15.9	0.37	1.6	0.90	0.274	0.136
	45.242	73.431	19.558	19.812	15.748	3.5	0.8	53 500	75 000	4 800	6 300	LM 102949	LM 102910	56	50	68	70	3.5	0.8	14.6	0.31	2.0	1.1	0.213
45.618	77.788	19.842	19.842	15.080	3.5	0.8	56 000	71 000	4 500	6 300	LM 603049	LM 603011	57	50	71	74	3.5	0.8	17.2	0.43	1.4	0.77	0.249	0.119
	77.788	21.430	19.842	16.667	3.5	0.8	56 000	71 000	4 500	6 300	LM 603049	LM 603012	57	50	70	74	3.5	0.8	18.8	0.43	1.4	0.77	0.249	0.137
	82.931	23.812	25.400	19.050	3.5	0.8	76 500	99 000	4 500	6 000	25590	25520	58	51	74	77	3.5	0.8	17.6	0.33	1.8	0.99	0.343	0.203
45.618	82.931	26.988	25.400	22.225	3.5	2.3	76 500	99 000	4 500	6 000	25590	25523	58	51	72	77	3.5	2.3	20.8	0.33	1.8	0.99	0.343	0.248
	46.000	75.000	18.000	18.000	14.000	2.3	1.5	51 000	71 500	4 500	6 300	* LM 503349	** LM 503310	55	51	67	71	2.3	1.5	15.9	0.40	1.5	0.82	0.209
46.038	79.375	17.462	17.462	13.495	2.8	1.5	46 000	57 000	4 500	6 000	18690	18620	56	51	71	74	2.8	1.5	15.5	0.37	1.6	0.88	0.211	0.126
	80.962	19.050	17.462	14.288	0.8	1.5	45 000	57 000	4 300	6 000	13181	13318	52	52	72	76	0.8	1.5	20.1	0.53	1.1	0.63	0.236	0.144
	85.000	20.638	21.692	17.462	2.3	1.3	71 500	81 500	4 300	6 000	359 S	354 A	55	51	77	80	2.3	1.3	15.4	0.31	2.0	1.1	0.343	0.162
	85.000	25.400	25.608	20.638	3.5	1.3	79 500	105 000	4 300	6 000	2984	2924	58	52	76	80	3.5	1.3	19.0	0.35	1.7	0.95	0.397	0.223
	95.250	27.783	29.901	22.225	3.5	0.8	106 000	126 000	4 300	5 600	436	432 A	59	52	84	87	3.5	0.8	18.6	0.28	2.1	1.2	0.536	0.381
47.625	88.900	20.638	22.225	16.513	3.5	1.3	73 000	85 000	4 000	5 600	369 A	362 A	60	53	81	84	3.5	1.3	16.6	0.32	1.9	1.0	0.381	0.166
	88.900	25.400	25.400	19.050	3.5	3.3	86 000	107 000	4 000	5 600	M 804049	M 804010	63	56	77	85	3.5	3.3	23.8	0.55	1.1	0.60	0.455	0.218
	95.250	30.162	29.370	23.020	3.5	3.3	106 000	143 000	3 800	5 300	HM 804846	HM 804810	66	57	81	91	3.5	3.3	26.1	0.55	1.1	0.60	0.626	0.354
	101.600	34.925	36.068	26.988	3.5	3.3	137 000	169 000	3 800	5 000	528	522	62	55	89	95	3.5	3.3	22.1	0.29	2.1	1.2	0.894	0.416
	111.125	30.162	26.909	20.638	3.5	3.3	92 500	110 000	3 200	4 300	55187	55437	69	62	92	105	3.5	3.3	37.3	0.88	0.68	0.37	0.817	0.514
	112.712	30.162	26.909	20.638	3.5	3.3	92 500	110 000	3 200	4 300	55187	55443	69	62	92	106	3.5	3.3	37.3	0.88	0.68	0.37	0.816	0.554
	117.475	33.338	31.750	23.812	3.5	3.3	137 000	156 000	3 200	4 300	66187	66462	66	62	100	111	3.5	3.3	32.1	0.63	0.96	0.53	1.19	0.552
	123.825	36.512	32.791	25.400	3.5	3.3	143 000	160 000	3 000	4 000	72187	72487	72	66	102	116	3.5	3.3	37.0	0.74	0.81	0.45	1.29	0.79

Notes * The maximum bore diameter is listed and its tolerance is negative (See Table 7.4.1 on Page A136).

** The maximum outside diameter is listed and its tolerance is negative (See Table 7.4.2 on Pages A136 and A137).

SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 48.412 – 52.388 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

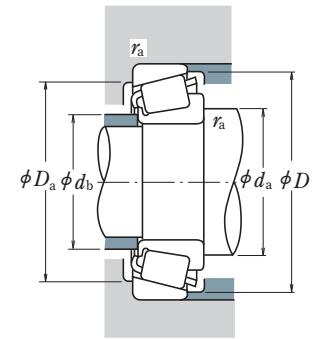
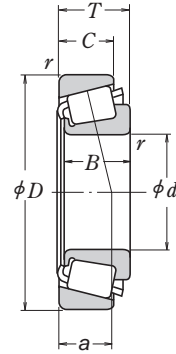
The values of e , Y_1 , and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers		Abutment and Fillet Dimensions (mm)				Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)						
d	D	T	B	C	Cone r min.	Cup r max.	C_r	C_{0r}	Grease	Oil	CONE	CUP	d_a	d_b	D_a	D_b	Cone r_a max.	a	e	Y_1	Y_0	approx.				
																						CONE	CUP	CONE	CUP	
48.412	95.250	30.162	29.370	23.020	3.5	3.3	106 000	143 000	3 800	5 300	HM 804849	HM 804810	66	57	81	91	3.5	3.3	26.1	0.55	1.1	0.60	0.61	0.354		
	95.250	30.162	29.370	23.020	2.3	3.3	106 000	143 000	3 800	5 300	HM 804848	HM 804810	63	57	81	91	2.3	3.3	26.1	0.55	1.1	0.60	0.614	0.354		
49.212	104.775	36.512	36.512	28.575	3.5	0.8	139 000	192 000	3 400	4 800	HM 807044	HM 807011	69	63	91	100	3.5	0.8	29.7	0.49	1.2	0.68	1.03	0.508		
	114.300	44.450	44.450	36.068	3.5	3.3	196 000	243 000	3 400	4 800	HH 506348	HH 506310	71	61	97	107	3.5	3.3	30.8	0.40	1.5	0.82	1.43	0.837		
50.000	82.000	21.500	21.500	17.000	3.0	0.5	71 000	96 000	4 300	5 600	▲ JLM 104948	▲ JLM 104910	60	55	76	78	3	0.5	16.1	0.31	2.0	1.1	0.306	0.129		
	82.550	21.590	22.225	16.510	0.5	1.3	71 000	96 000	4 300	5 600	* LM 104947 A	LM 104911	55	55	75	78	0.5	1.3	15.7	0.31	2.0	1.1	0.316	0.133		
	88.900	20.638	22.225	16.513	2.3	1.3	73 000	85 000	4 000	5 600	366	362 A	59	55	81	84	2.3	1.3	16.6	0.32	1.9	1.0	0.351	0.166		
	90.000	28.000	28.000	23.000	3.0	2.5	104 000	136 000	4 000	5 600	▲ JM 205149	▲ JM 205110	62	57	80	85	3	2.5	19.9	0.33	1.8	1.0	0.507	0.246		
50.800	105.000	37.000	36.000	29.000	3.0	2.5	139 000	192 000	3 400	4 800	▲ JHM 807045	▲ JHM 807012	69	63	90	100	3	2.5	29.7	0.49	1.2	0.68	1.01	0.523		
	80.962	18.258	18.258	14.288	1.5	1.5	53 000	81 000	4 300	5 600	L 305649	L 305610	58	56	73	77	1.5	1.5	15.7	0.36	1.7	0.93	0.239	0.119		
52.388	82.550	23.622	22.225	18.542	3.5	0.8	71 000	96 000	4 300	5 600	LM 104949	LM 104911 A	62	55	75	78	3.5	0.8	17.8	0.31	2.0	1.1	0.303	0.156		
	82.931	21.590	22.225	16.510	3.5	1.3	71 000	96 000	4 300	5 600	LM 104949	LM 104912	62	55	75	78	3.5	1.3	15.7	0.31	2.0	1.1	0.301	0.14		
	85.000	17.462	17.462	13.495	3.5	1.5	48 500	63 000	4 300	5 600	18790	18720	62	56	77	80	3.5	1.5	16.7	0.41	1.5	0.81	0.239	0.136		
	85.725	19.050	18.263	12.700	1.5	1.5	42 500	54 000	4 000	5 300	18200	18337	59	56	76	81	1.5	1.5	21.0	0.57	1.1	0.58	0.268	0.136		
	88.900	20.638	22.225	16.513	3.5	1.3	73 000	85 000	4 000	5 600	368 A	362 A	62	56	81	84	3.5	1.3	16.6	0.32	1.9	1.0	0.338	0.166		
	88.900	20.638	22.225	16.513	1.5	1.3	73 000	85 000	4 000	5 600	368	362 A	58	56	81	84	1.5	1.3	16.6	0.32	1.9	1.0	0.341	0.166		
	92.075	24.608	25.400	19.845	3.5	0.8	84 500	117 000	4 000	5 300	28580	28521	63	57	83	87	3.5	0.8	20.0	0.38	1.6	0.87	0.46	0.247		
	93.264	30.162	30.302	23.812	0.8	0.8	103 000	136 000	3 800	5 300	3775	3730	58	58	84	88	0.8	0.8	22.4	0.34	1.8	0.97	0.568	0.297		
	93.264	30.162	30.302	23.812	3.5	0.8	103 000	136 000	3 800	5 300	3780	3730	64	58	84	88	3.5	0.8	22.4	0.34	1.8	0.97	0.564	0.297		
		95.250	27.783	28.575	22.225	3.5	2.3	110 000	144 000	3 800	5 300	33889	33821	64	58	85	90	3.5	2.3	19.8	0.33	1.8	1.0	0.601	0.267	
	101.600	31.750	31.750	25.400	3.5	3.3	118 000	150 000	3 600	5 000	49585	49520	66	59	88	96	3.5	3.3	23.4	0.40	1.5	0.82	0.744	0.389		
	101.600	34.925	36.068	26.988	0.8	3.3	137 000	169 000	3 800	5 000	529	522	59	58	89	95	0.8	3.3	22.1	0.29	2.1	1.2	0.822	0.416		
		101.600	34.925	36.068	26.988	3.5	3.3	137 000	169 000	3 800	5 000	529 X	522	65	58	89	95	3.5	3.3	22.1	0.29	2.1	1.2	0.819	0.416	
	104.775	36.512	36.512	28.575	3.5	0.8	139 000	192 000	3 400	4 800	HM 807046	HM 807011	70	63	91	100	3.5	0.8	29.7	0.49	1.2	0.68	0.992	0.508		
	104.775	36.512	36.512	28.575	3.5	3.3	139 000	192 000	3 400	4 800	HM 807046	HM 807010	70	63	89	100	3.5	3.3	29.7	0.49	1.2	0.68	0.993	0.502		
	108.966	34.925	36.512	26.988	3.5	3.3	145 000	181 000	3 600	4 800	59200	59429	68	61	93	101	3.5	3.3	25.4	0.40	1.5	0.82	0.943	0.594		
	111.125	30.162	26.909	20.638	3.5	3.3	113 000	152 000	3 000	4 300	55200 C	55437	71	65	92	105	3.5	3.3	37.6	0.88	0.68	0.37	0.845	0.514		
	111.125	30.162	26.909	20.638	3.5	3.3	92 500	110 000	3 200	4 300	55200	55437	71	64	92	105	3.5	3.3	37.3	0.88	0.68	0.37	0.767	0.514		
		123.825	36.512	32.791	25.400	3.5	3.3	162 000	199 000	2 800	4 000	72200 C	72487	77	67	102	116	3.5	3.3	38.0	0.74	0.81	0.45	1.33	0.79	
	123.825	36.512	32.791	25.400	3.5	3.3	143 000	160 000	3 000	4 000	72200	72487	74	66	102	116	3.5	3.3	37.0	0.74	0.81	0.45	1.22	0.79		
	127.000	44.450	44.450	34.925	3.5	3.3	199 000	258 000	3 000	4 000	65200	65500	75	69	107	119	3.5	3.3	35.0	0.49	1.2	0.68	1.86	1.03		
		127.000	50.800	52.388	41.275	3.5	3.3	236 000	300 000	3 200	4 300	6279	6220	71	65	108	117	3.5	3.3	30.7	0.30	2.0	1.1	2.08	1.22	
		52.388	92.075	24.608	25.400	19.845	3.5	0.8	84 500	117 000	4 000	5 300	28584	28521	65	58	83	87	3.5	0.8	20.0	0.38	1.6	0.87	0.435	0.247
			100.000	25.000	22.225	21.824	2.3	2.0	77 000	93 000	3 800	5 300	377	372	62	58	86	90	2.3	2	21.4	0.34	1.8	0.97	0.392	0.435
		111.125	30.162	26.909	20.638	3.5	3.3	92 500	110 000	3 200	4 300	55206	55437	72	64	92	105	3.5	3.3	37.3	0.88	0.68	0.37	0.737	0.514	

Notes * The maximum bore diameter is listed and its tolerance is negative (See Table 7.4.1 on Page A136).
▲ The tolerances are listed in Tables 2, 3 and 4 on Pages C184 and C185.

SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 53.975 – 58.738 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0 F_a$$

When $F_r > 0.5F_r + Y_0 F_a$, use $P_0 = F_r$

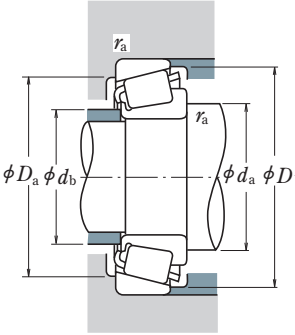
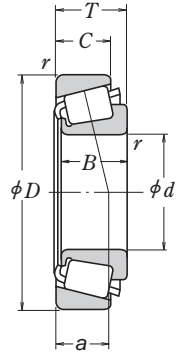
The values of e , Y_1 , and Y_0 are given in the table below.

Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers		Abutment and Fillet Dimensions (mm)				Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)			
d	D	T	B	C	Cone r min.	Cup r min.	C_r	C_{0r}	Grease	Oil	CONE	CUP	d_a	d_b	D_a	D_b	Cone r_a max.	Cup r_a max.	a	e	Y_1	Y_0	approx. CONE CUP	
53.975	104.775	39.688	40.157	33.338	3.5	3.3	148 000	207 000	3 600	4 800	4595	4535	70	63	90	99	3.5	3.3	27.4	0.34	1.79	0.98	0.989	0.589
	107.950	36.512	36.957	28.575	3.5	3.3	144 000	182 000	3 600	4 800	539	532 X	68	61	94	100	3.5	3.3	24.3	0.30	2.0	1.1	0.88	0.57
	122.238	33.338	31.750	23.812	3.5	3.3	135 000	156 000	3 000	4 000	66584	66520	75	68	105	116	3.5	3.3	34.3	0.67	0.90	0.50	1.2	0.558
	123.825	36.512	32.791	25.400	3.5	3.3	143 000	160 000	3 000	4 000	72212	72487	77	66	102	116	3.5	3.3	37.0	0.74	0.81	0.45	1.16	0.79
	123.825	36.512	32.791	25.400	3.5	3.3	162 000	199 000	2 800	4 000	72212 C	72487	79	67	102	116	3.5	3.3	38.0	0.74	0.81	0.45	1.27	0.79
	123.825	38.100	36.678	30.162	3.5	3.3	161 000	221 000	3 000	4 000	557 S	552 A	71	65	109	116	3.5	3.3	28.8	0.35	1.7	0.95	1.49	0.764
	127.000	44.450	44.450	34.925	3.5	3.3	199 000	258 000	3 000	4 000	65212	65500	77	71	107	119	3.5	3.3	35.0	0.49	1.2	0.68	1.76	1.03
	127.000	50.800	52.388	41.275	3.5	3.3	236 000	300 000	3 200	4 300	6280	6220	74	67	108	117	3.5	3.3	30.7	0.30	2.0	1.1	1.97	1.22
	130.175	36.512	33.338	23.812	3.5	3.3	133 000	154 000	2 600	3 600	HM911242	HM911210	79	74	109	124	3.5	3.3	42.2	0.82	0.73	0.40	1.45	0.725
55.000	90.000	23.000	23.000	18.500	1.5	0.5	79 000	111 000	3 800	5 300	▲ JLM506849	▲ JLM506810	63	61	82	86	1.5	0.5	19.7	0.40	1.5	0.82	0.378	0.186
	95.000	29.000	29.000	23.500	1.5	2.5	111 000	152 000	3 800	5 000	▲ JM207049	▲ JM207010	64	62	85	91	1.5	2.5	21.3	0.33	1.8	0.99	0.59	0.26
	96.838	21.000	21.946	15.875	2.3	0.8	80 500	100 000	3 600	5 000	385	382 A	65	61	89	92	2.3	0.8	17.6	0.35	1.7	0.93	0.455	0.179
	110.000	39.000	39.000	32.000	3.0	2.5	177 000	225 000	3 400	4 500	▲ JH307749	▲ JH307710	71	64	97	104	3	2.5	27.2	0.35	1.7	0.95	1.13	0.567
55.562	115.000	41.021	41.275	31.496	3.0	3.0	172 000	214 000	3 200	4 500	622 X	614 X	70	64	101	108	3	3	26.6	0.31	1.9	1.1	1.3	0.597
	97.630	24.608	24.608	19.446	3.5	0.8	89 000	129 000	3 600	5 000	28680	28622	68	62	88	92	3.5	0.8	21.3	0.40	1.5	0.82	0.499	0.27
	122.238	43.658	43.764	36.512	1.3	3.3	198 000	292 000	3 000	4 000	5566	5535	70	68	106	116	1.3	3.3	29.9	0.36	1.7	0.92	1.76	0.815
	123.825	36.512	32.791	25.400	3.5	3.3	143 000	160 000	3 000	4 000	72218	72487	78	66	102	116	3.5	3.3	37.0	0.74	0.81	0.45	1.12	0.79
	123.825	36.512	32.791	25.400	3.5	3.3	162 000	199 000	2 800	4 000	72218 C	72487	80	67	102	116	3.5	3.3	38.0	0.74	0.81	0.45	1.23	0.79
	57.150	96.838	21.000	21.946	15.875	3.5	0.8	80 500	100 000	3 600	5 000	387 A	382 A	69	62	89	92	3.5	0.8	17.6	0.35	1.7	0.93	0.42
96.838		21.000	21.946	15.875	2.3	0.8	80 500	100 000	3 600	5 000	387	382 A	66	62	89	92	2.3	0.8	17.6	0.35	1.7	0.93	0.423	0.179
96.838		25.400	21.946	20.275	3.5	2.3	80 500	100 000	3 600	5 000	387 A	382 S	69	62	87	91	3.5	2.3	22.0	0.35	1.7	0.93	0.42	0.249
98.425		21.000	21.946	17.826	3.5	0.8	80 500	100 000	3 600	5 000	387 A	382	69	62	90	92	3.5	0.8	17.6	0.35	1.7	0.93	0.42	0.226
104.775		30.162	29.317	24.605	3.5	3.3	116 000	149 000	3 400	4 800	469	453 X	70	63	92	98	3.5	3.3	23.1	0.34	1.8	0.98	0.692	0.376
104.775		30.162	29.317	24.605	2.3	3.3	116 000	149 000	3 400	4 800	462	453 X	67	63	92	98	2.3	3.3	23.1	0.34	1.8	0.98	0.694	0.376
104.775		30.162	30.958	23.812	0.8	3.3	130 000	170 000	3 400	4 800	45289	45220	65	65	93	99	0.8	3.3	21.9	0.33	1.8	0.99	0.752	0.347
104.775		30.162	30.958	23.812	0.8	0.8	130 000	170 000	3 400	4 800	45289	45221	65	65	95	99	0.8	0.8	21.9	0.33	1.8	0.99	0.76	0.35
122.238		33.338	31.750	23.812	3.5	3.3	135 000	156 000	3 000	4 000	66587	66520	77	71	105	116	3.5	3.3	34.3	0.67	0.90	0.50	1.14	0.558
123.825		36.512	32.791	25.400	3.5	3.3	162 000	199 000	2 800	4 000	72225 C	72487	81	67	102	116	3.5	3.3	38.0	0.74	0.81	0.45	1.19	0.79
123.825	38.100	36.678	30.162	3.5	3.3	161 000	221 000	3 000	4 000	555 S	552 A	83	68	109	116	3.5	3.3	28.8	0.35	1.7	0.95	1.41	0.764	
140.030	36.512	33.236	23.520	3.5	2.3	152 000	183 000	2 600	3 600	78225	78511	83	77	117	132	3.5	2.3	44.2	0.87	0.69	0.38	1.67	0.926	
144.983	36.000	33.236	23.007	3.5	3.5	152 000	183 000	2 600	3 600	78225	78511	83	77	118	132	3.5	3.5	43.6	0.87	0.69	0.38	1.68	1.08	
149.225	53.975	54.229	44.450	3.5	3.3	287 000	410 000	2 600	3 400	6455	6420	81	75	129	140	3.5	3.3	39.0	0.36	1.7	0.91	3.49	1.63	
57.531	96.838	21.000	21.946	15.875	3.5	0.8	80 500	100 000	3 600	5 000	388 A	382 A	69	63	89	92	3.5	0.8	17.6	0.35	1.7	0.93	0.416	0.179
	58.738	112.712	33.338	30.048	3.5	3.3	120 000	173 000	3 200	4 300	3981	3926	73	67	98	106	3.5	3.3	28.7	0.40	1.5	0.82	0.899	0.541

Note ▲ The tolerances are listed in Tables 2, 3 and 4 on Pages C184 and C185.

■ SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 60.000 – 64.963 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

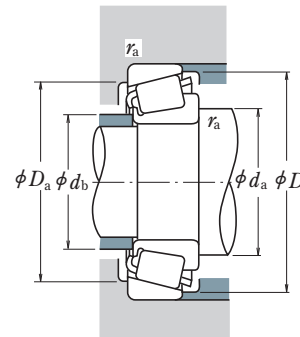
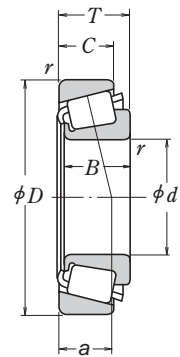
The values of e , Y_1 , and Y_0 are given in the table below.

Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers		Abutment and Fillet Dimensions (mm)				Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)			
d	D	T	B	C	Cone r	Cup	C_r	C_{0r}	Grease	Oil	CONE	CUP	d_a	d_b	D_a	D_b	Cone r_a	Cup	a	e	Y_1	Y_0	approx. CONE CUP	
					min.												max.							
60.000	95.000	24.000	24.000	19.000	5.0	2.5	86 500	125 000	3 600	5 000	▲ JLM 508748	▲ JLM 508710	75	66	85	91	5	2.5	21.6	0.40	1.5	0.82	0.43	0.20
	104.775	21.433	22.000	15.875	2.3	2.0	83 500	107 000	3 400	4 500	* 39236	39412	71	67	96	100	2.3	2	20.0	0.39	1.5	0.85	0.559	0.186
	110.000	22.000	21.996	18.824	0.8	1.3	85 500	113 000	3 200	4 300	397	394 A	69	68	101	104	0.8	1.3	20.9	0.40	1.5	0.82	0.642	0.263
	122.238	33.338	31.750	23.812	3.5	3.3	135 000	156 000	3 000	4 000	66585	66520	79	73	105	116	3.5	3.3	34.3	0.67	0.90	0.50	1.07	0.558
60.325	100.000	25.400	25.400	19.845	3.5	3.3	91 000	135 000	3 400	4 800	28985	28921	73	67	89	96	3.5	3.3	22.9	0.43	1.4	0.78	0.538	0.232
	101.600	25.400	25.400	19.845	3.5	3.3	91 000	135 000	3 400	4 800	28985	28920	73	67	90	97	3.5	3.3	22.9	0.43	1.4	0.78	0.538	0.272
	122.238	38.100	36.678	30.162	2.3	3.3	161 000	221 000	3 000	4 000	558	553 X	73	69	108	115	2.3	3.3	28.8	0.35	1.7	0.95	1.33	0.692
	122.238	38.100	38.354	29.718	8.0	1.5	188 000	245 000	3 000	4 000	HM 212044	HM 212010	85	70	110	116	8	1.5	27.0	0.34	1.8	0.98	1.43	0.604
61.912	122.238	43.658	43.764	36.512	0.8	3.3	198 000	292 000	3 000	4 000	5582	5535	73	72	106	116	0.8	3.3	29.9	0.36	1.7	0.92	1.61	0.815
	127.000	44.450	44.450	34.925	3.5	3.3	199 000	258 000	3 000	4 000	65237	65500	82	71	107	119	3.5	3.3	35.0	0.49	1.2	0.68	1.56	1.03
	130.175	41.275	41.275	31.750	3.5	3.3	195 000	263 000	2 800	3 800	637	633	78	72	116	124	3.5	3.3	29.9	0.36	1.7	0.91	1.87	0.712
	135.755	53.975	56.007	44.450	3.5	3.3	264 000	355 000	2 800	3 800	6376	6320	81	74	117	126	3.5	3.3	35.0	0.32	1.8	1.0	2.45	1.39
	136.525	46.038	46.038	36.512	3.5	3.3	233 000	370 000	2 600	3 400	H 715334	H 715311	84	78	119	132	3.5	3.3	37.1	0.47	1.3	0.70	2.51	0.961
	146.050	41.275	39.688	25.400	3.5	3.3	193 000	225 000	2 400	3 400	H 913842	H 913810	90	82	124	138	3.5	3.3	44.4	0.78	0.77	0.42	2.2	0.898
	152.400	47.625	46.038	31.750	3.5	3.3	237 000	267 000	2 400	3 400	9180	9121	90	81	130	145	3.5	3.3	44.3	0.66	0.92	0.50	2.77	1.21
	94.458	19.050	19.050	15.083	1.5	1.5	59 000	100 000	3 600	4 800	L 610549	L 610510	71	69	86	91	1.5	1.5	19.6	0.42	1.4	0.78	0.306	0.154
	104.775	21.433	22.000	15.875	2.0	2.0	83 500	107 000	3 400	4 500	39250	39412	73	69	96	100	2	2	20.0	0.39	1.5	0.85	0.501	0.186
	107.950	25.400	25.400	19.050	1.5	3.3	90 000	138 000	3 200	4 300	29586	29520	73	71	96	103	1.5	3.3	24.0	0.46	1.3	0.72	0.661	0.281
	110.000	22.000	21.996	18.824	3.5	1.3	85 500	113 000	3 200	4 300	395	394 A	77	70	101	104	3.5	1.3	20.9	0.40	1.5	0.82	0.58	0.263
110.000	22.000	21.996	18.824	1.5	1.3	85 500	113 000	3 200	4 300	390 A	394 A	73	70	101	104	1.5	1.3	20.9	0.40	1.5	0.82	0.583	0.263	
112.712	30.162	30.048	23.812	3.5	3.2	120 000	173 000	3 200	4 300	3982	3920	77	71	99	106	3.5	3.2	25.5	0.40	1.5	0.82	0.789	0.454	
112.712	30.162	30.162	23.812	3.5	3.3	142 000	202 000	3 200	4 300	39585	39520	77	71	101	107	3.5	3.3	23.5	0.34	1.8	0.97	0.899	0.359	
112.712	33.338	30.048	26.988	3.5	3.3	120 000	173 000	3 200	4 300	3982	3926	78	71	98	106	3.5	3.3	28.7	0.40	1.5	0.82	0.789	0.541	
122.238	38.100	38.354	29.718	7.0	3.3	188 000	245 000	3 000	4 000	HM 212047	HM 212011	87	73	108	116	7	3.3	26.9	0.34	1.8	0.98	1.34	0.598	
122.238	38.100	38.354	29.718	7.0	1.5	188 000	245 000	3 000	4 000	HM 212047	HM 212010	87	73	110	116	7	1.5	26.9	0.34	1.8	0.98	1.34	0.604	
122.238	38.100	38.354	29.718	3.5	1.5	188 000	245 000	3 000	4 000	HM 212046	HM 212010	80	73	110	116	3.5	1.5	26.9	0.34	1.8	0.98	1.35	0.604	
122.238	43.658	43.764	36.512	3.5	3.3	198 000	292 000	3 000	4 000	5584	5535	81	75	106	116	3.5	3.3	29.9	0.36	1.7	0.92	1.5	0.815	
123.825	38.100	36.678	30.162	3.5	3.3	161 000	221 000	3 000	4 000	559	522 A	78	73	109	116	3.5	3.3	28.8	0.35	1.7	0.95	1.23	0.764	
127.000	36.512	36.170	28.575	3.5	3.3	166 000	234 000	2 800	3 800	565	563	80	73	112	120	3.5	3.3	28.3	0.36	1.6	0.91	1.46	0.655	
130.175	41.275	41.275	31.750	3.5	3.3	195 000	263 000	2 800	3 800	639	633	81	74	116	124	3.5	3.3	29.9	0.36	1.7	0.91	1.77	0.712	
136.525	36.512	33.236	23.520	2.3	3.3	152 000	183 000	2 600	3 600	78250	78537	85	79	115	130	2.3	3.3	44.2	0.87	0.69	0.38	1.51	0.782	
136.525	41.275	41.275	31.750	3.5	3.3	195 000	263 000	2 800	3 800	639	632	79	76	119	125	3.5	3.3	29.9	0.36	1.7	0.91	1.77	1.04	
140.030	36.512	33.236	23.520	2.3	2.3	152 000	183 000	2 600	3 600	78250	78551	85	79	117	132	2.3	2.3	44.2	0.87	0.69	0.38	1.51	0.926	
64.963	127.000	36.512	36.170	28.575	3.5	3.3	166 000	234 000	2 800	3 800	569	563	81	74	112	120	3.5	3.3	28.3	0.36	1.6	0.91	1.41	0.655

Notes * The maximum bore diameter is listed and its tolerance is negative (See Table 7.4.1 on Page A136).
▲ The tolerances are listed in Tables 2, 3 and 4 on Pages C184 and C185.

■ SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 65.000 – 69.850 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

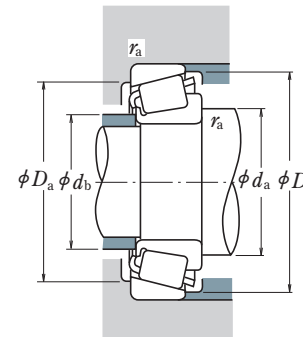
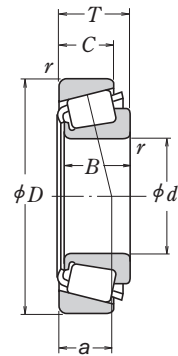
The values of e , Y_1 , and Y_0 are given in the table below.

d	Boundary Dimensions (mm)					Cone r min.	Cup r min.	Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers		Abutment and Fillet Dimensions (mm)					Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg)	
	D	T	B	C	C_r			C_{0r}	Grease	Oil	CONE	CUP	d_a	d_b	D_a	D_b	Cone r_a max.	Y_1			Y_0	approx. CONE	CUP	
65.000	105.000	24.000	23.000	18.500	3.0	1.0	93 000	126 000	3 400	4 500	▲ JLM 710949	▲ JLM 710910	77	71	96	101	3	1	23.7	0.45	1.3	0.73	0.526	0.237
	110.000	28.000	28.000	22.500	3.0	2.5	120 000	173 000	3 200	4 300	▲ JM 511946	▲ JM 511910	78	72	99	105	3	2.5	24.5	0.40	1.5	0.82	0.72	0.342
	120.000	29.002	29.007	23.444	2.3	3.3	123 000	169 000	3 000	4 000	478	472 A	77	73	106	114	2.3	3.3	24.3	0.38	1.6	0.86	0.942	0.466
	120.000	39.000	38.500	32.000	3.0	2.5	185 000	249 000	3 000	4 000	▲ JH 211749	▲ JH 211710	80	74	107	114	3	2.5	27.9	0.34	1.8	0.98	1.25	0.625
65.088	135.755	53.975	56.007	44.450	3.5	3.3	264 000	355 000	2 800	3 800	6379	6320	84	77	117	126	3.5	3.3	35.0	0.32	1.8	1.0	2.25	1.39
	136.525	46.038	46.038	36.512	3.5	3.3	233 000	370 000	2 600	3 400	H 715340	H 715311	88	82	118	132	3.5	3.3	37.1	0.47	1.3	0.70	2.4	0.961
66.675	110.000	22.000	21.996	18.824	0.8	1.3	85 500	113 000	3 200	4 300	395 A	394 A	73	73	101	104	0.8	1.3	20.9	0.40	1.5	0.82	0.528	0.263
	110.000	22.000	21.996	18.824	3.5	1.3	85 500	113 000	3 200	4 300	395 S	394 A	79	73	101	104	3.5	1.3	20.9	0.40	1.5	0.82	0.524	0.263
	112.712	30.162	30.048	23.812	3.5	3.2	120 000	173 000	3 200	4 300	3984	3920	80	74	99	106	3.5	3.2	25.5	0.40	1.5	0.82	0.712	0.454
	112.712	30.162	30.048	23.812	5.5	3.2	120 000	173 000	3 200	4 300	3994	3920	84	74	99	106	5.5	3.2	25.5	0.40	1.5	0.82	0.706	0.454
68.262	112.712	30.162	30.162	23.812	3.5	0.8	142 000	202 000	3 200	4 300	39590	39521	80	74	103	107	3.5	0.8	23.5	0.34	1.8	0.97	0.822	0.365
	112.712	30.162	30.162	23.812	3.5	3.3	142 000	202 000	3 200	4 300	39590	39520	80	74	101	107	3.5	3.3	23.5	0.34	1.8	0.97	0.822	0.359
	117.475	30.162	30.162	23.812	3.5	3.3	119 000	179 000	3 000	4 000	33262	33462	81	75	104	112	3.5	3.3	26.8	0.44	1.4	0.76	0.911	0.442
	122.238	38.100	36.678	30.162	3.5	3.3	161 000	221 000	3 000	4 000	560	553 X	81	75	108	115	3.5	3.3	28.8	0.35	1.7	0.95	1.14	0.692
	122.238	38.100	38.354	29.718	3.5	1.5	188 000	245 000	3 000	4 000	HM 212049	HM 212010	82	75	110	116	3.5	1.5	26.9	0.34	1.8	0.98	1.25	0.604
	122.238	38.100	38.354	29.718	3.5	3.3	188 000	245 000	3 000	4 000	HM 212049	HM 212011	81	74	108	116	3.5	3.3	26.9	0.34	1.8	0.98	1.25	0.598
	123.825	38.100	36.678	30.162	3.5	3.3	161 000	221 000	3 000	4 000	560	552 A	81	75	109	116	3.5	3.3	28.8	0.35	1.7	0.95	1.14	0.764
	136.525	46.038	46.038	36.512	3.5	3.3	233 000	370 000	2 600	3 400	H 715341	H 715311	89	83	118	132	3.5	3.3	37.1	0.47	1.3	0.70	2.34	0.961
	110.000	22.000	21.996	18.824	2.3	1.3	85 500	113 000	3 200	4 300	399 A	394 A	78	74	101	104	2.3	1.3	20.9	0.40	1.5	0.82	0.497	0.263
	120.000	29.795	29.007	24.237	3.5	2.0	123 000	169 000	3 000	4 000	480	472	83	76	106	113	3.5	2	25.1	0.38	1.6	0.86	0.862	0.493
	122.238	38.100	36.678	30.162	3.5	3.3	161 000	221 000	3 000	4 000	560 S	553 X	83	76	108	115	3.5	3.3	28.8	0.35	1.7	0.95	1.09	0.692
	127.000	36.512	36.170	28.575	3.5	3.3	166 000	234 000	2 800	3 800	570	563	83	77	112	120	3.5	3.3	28.3	0.36	1.6	0.91	1.32	0.655
	136.525	41.275	41.275	31.750	3.5	3.3	229 000	297 000	2 600	3 600	H 414245	H 414210	86	82	121	129	3.5	3.3	30.6	0.36	1.7	0.92	1.95	0.796
	136.525	46.038	46.038	36.512	3.5	3.3	233 000	370 000	2 600	3 400	H 715343	H 715311	90	84	118	132	3.5	3.3	37.1	0.47	1.3	0.70	2.28	0.961
152.400	47.625	46.038	31.750	3.5	3.3	237 000	267 000	2 400	3 400	9185	9121	94	81	130	145	3.5	3.3	44.3	0.66	0.92	0.50	2.53	1.21	
69.850	112.712	22.225	21.996	15.875	1.5	0.8	85 000	113 000	3 000	4 000	LM 613449	LM 613410	78	76	104	107	1.5	0.8	22.1	0.42	1.4	0.79	0.562	0.238
	112.712	25.400	25.400	19.050	1.5	3.3	96 000	152 000	2 800	4 000	29675	29620	80	77	101	109	1.5	3.3	26.3	0.49	1.2	0.68	0.695	0.273
	117.475	30.162	30.162	23.812	3.5	3.3	119 000	179 000	3 000	4 000	33275	33462	84	77	104	112	3.5	3.3	26.8	0.44	1.4	0.76	0.83	0.442
	120.000	32.545	32.545	26.195	3.5	3.3	152 000	225 000	3 000	4 000	47487	47420	84	78	107	114	3.5	3.3	26.0	0.36	1.7	0.92	1.02	0.477
	120.650	25.400	25.400	19.050	1.5	3.3	96 000	152 000	2 800	4 000	29675	29630	79	78	105	113	1.5	3.3	26.3	0.49	1.2	0.68	0.695	0.489
	127.000	36.512	36.170	28.575	3.5	0.8	166 000	234 000	2 800	3 800	566	563 X	85	78	114	120	3.5	0.8	28.3	0.36	1.6	0.91	1.27	0.658
	130.175	41.275	41.275	31.750	3.5	3.3	195 000	263 000	2 800	3 800	643	633	86	80	116	124	3.5	3.3	29.9	0.36	1.7	0.91	1.56	0.712
	146.050	41.275	39.688	25.400	3.5	3.3	193 000	225 000	2 400	3 400	H 913849	H 913810	95	82	124	138	3.5	3.3	44.4	0.78	0.77	0.42	1.95	0.898
	146.050	41.275	41.275	31.750	3.5	3.3	207 000	296 000	2 400	3 200	655	653	88	82	131	139	3.5	3.3	33.2	0.41	1.5	0.81	2.35	0.891
	149.225	53.975	54.229	44.450	5.0	3.3	287 000	410 000	2 600	3 400	6454	6420	94	85	129	140	5	3.3	39.0	0.36	1.7	0.91	2.95	1.63
	150.089	44.450	46.672	36.512	3.5	3.3	265 000	370 000	2 400	3 200	745 A	742	88	82	134	142	3.5	3.3	32.5	0.33	1.8	1.0	2.82	1.07

Note ▲ The tolerances are listed in Tables 2, 3 and 4 on Pages C184 and C185.

■ SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 70.000 – 76.200 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0 F_a$$

When $F_r > 0.5F_r + Y_0 F_a$, use $P_0 = F_r$

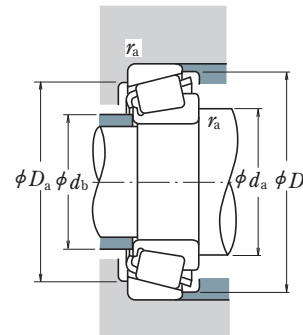
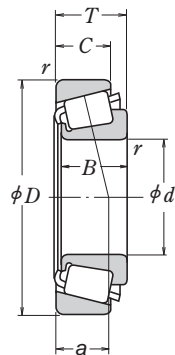
The values of e , Y_1 , and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers		Abutment and Fillet Dimensions (mm)				Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)				
d	D	T	B	C	Cone r min.	Cup r min.	C_r	C_{0r}	Grease	Oil	CONE	CUP	d_a	d_b	D_a	D_b	Cone r_a max.	a	e	Y_1	Y_0	approx. CONE CUP		
																						70.000	110.000	26.000
	115.000	29.000	29.000	23.000	3.0	2.5	126 000	177 000	3 000	4 000	▲ JM 612949	▲ JM 612910	83	77	103	110	3	2.5	26.4	0.43	1.4	0.77	0.800	0.362
	120.000	29.795	29.007	24.237	2.0	2.0	123 000	169 000	3 000	4 000	484	472	80	78	106	113	2	2	25.1	0.38	1.6	0.86	0.822	0.493
71.438	117.475	30.162	30.162	23.812	3.5	3.3	119 000	179 000	3 000	4 000	33281	33462	85	79	104	112	3.5	3.3	26.8	0.44	1.4	0.76	0.789	0.442
	120.000	32.545	32.545	26.195	3.5	3.3	152 000	225 000	3 000	4 000	47490	47420	86	79	107	114	3.5	3.3	26.0	0.36	1.7	0.92	0.983	0.477
	127.000	36.512	36.170	28.575	6.4	3.3	166 000	234 000	2 800	3 800	567 S	563	92	80	112	120	6.4	3.3	28.3	0.36	1.6	0.91	1.21	0.655
	127.000	36.512	36.170	28.575	3.5	3.3	166 000	234 000	2 800	3 800	567 A	563	86	80	112	120	3.5	3.3	28.3	0.36	1.6	0.91	1.23	0.655
	130.175	41.275	41.275	31.750	6.4	3.3	195 000	263 000	2 800	3 800	645	633	93	81	116	124	6.4	3.3	29.9	0.36	1.7	0.91	1.49	0.712
	136.525	41.275	41.275	31.750	3.5	3.3	195 000	263 000	2 800	3 800	644	632	87	81	118	125	3.5	3.3	29.9	0.36	1.7	0.91	1.5	1.04
	136.525	41.275	41.275	31.750	3.5	3.3	229 000	297 000	2 600	3 600	H 414249	H 414210	89	83	121	129	3.5	3.3	30.6	0.36	1.7	0.92	1.83	0.796
	136.525	46.038	46.038	36.512	3.5	3.3	233 000	370 000	2 600	3 400	H 715345	H 715311	92	84	119	132	3.5	3.3	37.1	0.47	1.3	0.70	2.15	0.961
73.025	112.712	25.400	25.400	19.050	3.5	3.3	96 000	152 000	2 800	4 000	29685	29620	86	80	101	109	3.5	3.3	26.3	0.49	1.2	0.68	0.62	0.273
	117.475	30.162	30.162	23.812	3.5	3.3	119 000	179 000	3 000	4 000	33287	33462	87	80	104	112	3.5	3.3	26.8	0.44	1.4	0.76	0.746	0.442
	127.000	36.512	36.170	28.575	3.5	3.3	166 000	234 000	2 800	3 800	567	563	88	81	112	120	3.5	3.3	28.3	0.36	1.6	0.91	1.17	0.655
	146.050	41.275	41.275	31.750	3.5	3.3	207 000	296 000	2 400	3 200	657	653	91	85	131	139	3.5	3.3	33.2	0.41	1.5	0.81	2.24	0.891
	149.225	53.975	54.229	44.450	3.5	3.3	287 000	410 000	2 600	3 400	6460	6420	93	87	129	140	3.5	3.3	39.0	0.36	1.7	0.91	2.8	1.63
73.817	127.000	36.512	36.170	28.575	0.8	3.3	166 000	234 000	2 800	3 800	568	563	83	82	112	120	0.8	3.3	28.3	0.36	1.6	0.91	1.15	0.655
74.612	150.000	41.275	41.275	31.750	3.5	3.0	207 000	296 000	2 400	3 200	658	653 X	92	86	133	141	3.5	3	33.2	0.41	1.5	0.81	2.37	0.932
75.000	115.000	25.000	25.000	19.000	3.0	2.5	101 000	150 000	3 000	4 000	▲ JLM 714149	▲ JLM 714110	87	81	104	110	3	2.5	25.3	0.46	1.3	0.72	0.638	0.272
	120.000	31.000	29.500	25.000	3.0	2.5	129 000	198 000	2 800	3 800	▲ JM 714249	▲ JM 714210	88	83	108	115	3	2.5	28.8	0.44	1.4	0.74	0.863	0.436
	145.000	51.000	51.000	42.000	3.0	2.5	283 000	410 000	2 600	3 400	▲ JH 415647	▲ JH 415610	94	89	129	139	3	2.5	36.7	0.36	1.7	0.91	2.64	1.19
76.200	121.442	24.608	23.012	17.462	2.0	2.0	89 000	124 000	2 800	3 800	34300	34478	86	84	111	116	2	2	26.3	0.45	1.3	0.73	0.65	0.316
	127.000	30.162	31.000	22.225	3.5	3.3	134 000	195 000	2 800	3 800	42687	42620	90	84	114	121	3.5	3.3	27.3	0.42	1.4	0.79	1.03	0.438
	127.000	30.162	31.001	22.225	6.4	3.3	134 000	195 000	2 800	3 800	42688	42620	94	84	114	121	6.4	3.3	27.3	0.42	1.4	0.79	1.01	0.438
	133.350	33.338	33.338	26.195	0.8	3.3	154 000	237 000	2 600	3 600	47680	47620	86	85	119	128	0.8	3.3	29.0	0.40	1.5	0.82	1.39	0.577
	135.733	44.450	46.101	34.925	3.5	3.3	216 000	340 000	2 600	3 600	5760	5735	94	88	119	130	3.5	3.3	32.9	0.41	1.5	0.81	1.86	0.887
	136.525	30.162	29.769	22.225	3.5	3.3	130 000	192 000	2 600	3 400	495 A	493	92	86	122	130	3.5	3.3	28.7	0.44	1.4	0.74	1.27	0.55
	136.525	30.162	29.769	22.225	6.4	3.3	130 000	192 000	2 600	3 400	495 AX	493	98	86	122	130	6.4	3.3	28.7	0.44	1.4	0.74	1.26	0.55
	139.992	36.512	36.098	28.575	3.5	3.3	175 000	260 000	2 600	3 400	575	572	92	86	125	133	3.5	3.3	31.1	0.40	1.5	0.82	1.61	0.788
	149.225	53.975	54.229	44.450	3.5	3.3	271 000	385 000	2 600	3 400	6461	6420	96	89	129	140	3.5	3.3	39.0	0.36	1.7	0.91	2.45	1.67
	152.400	39.688	36.322	30.162	3.5	3.2	183 000	285 000	2 200	3 200	590 A	592 A	95	89	135	145	3.5	3.2	37.1	0.44	1.4	0.75	2.2	1.06
	152.400	41.275	41.275	31.750	3.5	3.3	207 000	296 000	2 400	3 200	659	652	93	87	134	141	3.5	3.3	33.2	0.41	1.5	0.81	2.11	1.26
	161.925	49.212	46.038	31.750	3.5	3.3	248 000	290 000	2 200	3 000	9285	9220	103	90	138	153	3.5	3.3	49.8	0.71	0.85	0.47	2.82	1.4
	161.925	53.975	55.100	42.862	3.5	3.3	325 000	480 000	2 200	3 000	6576	6535	99	92	141	154	3.5	3.3	40.7	0.40	1.5	0.82	3.74	1.67
	161.925	53.975	55.100	42.862	6.4	3.3	325 000	480 000	2 200	3 000	6575	6535	104	92	141	154	6.4	3.3	40.7	0.40	1.5	0.82	3.73	1.67
	161.925	53.975	55.100	42.862	6.4	0.8	325 000	480 000	2 200	3 000	6575	6536	104	92	144	154	6.4	0.8	40.7	0.40	1.5	0.82	3.73	1.68

Note ▲ The tolerances are listed in Tables 2, 3 and 4 on Pages C184 and C185.

■ SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 76.200 – 83.345 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

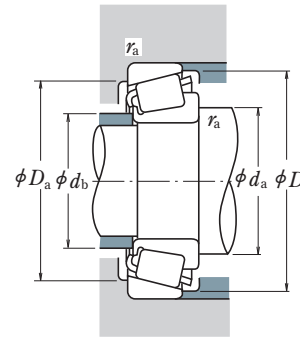
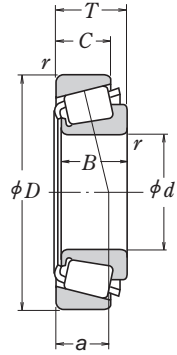
The values of e , Y_1 , and Y_0 are given in the table below.

d	Boundary Dimensions (mm)					Cone r min.	Cup r min.	Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers		Abutment and Fillet Dimensions (mm)					Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg)	
	D	T	B	C	C _r			C _{0r}	Grease	Oil	CONE	CUP	d _a	d _b	D _a	D _b	Cone r max.	Cup r max.			Y ₁	Y ₀	approx. CONE	approx. CUP
76.200	168.275	53.975	56.363	41.275	345 000	470 000	2 200	3 000	843	832	101	89	149	155	6.4	3.3	35.2	0.30	2.0	1.1	4.11	1.74		
	168.275	53.975	56.363	41.275	345 000	470 000	2 200	3 000	837	832	90	89	149	155	0.8	3.3	35.2	0.30	2.0	1.1	4.13	1.74		
	171.450	49.212	46.038	31.750	257 000	310 000	2 000	2 800	9380	9321	105	98	147	164	3.5	3.3	54.1	0.76	0.79	0.43	3.47	1.51		
	177.800	55.562	50.800	34.925	257 000	310 000	2 000	2 800	9378	9320	105	98	148	164	3.5	3.3	57.3	0.76	0.79	0.43	3.71	2.24		
77.788	121.442	24.608	23.012	17.462	89 000	124 000	2 800	3 800	34306	34478	90	84	110	116	3.5	2	26.3	0.45	1.3	0.73	0.612	0.316		
	127.000	30.162	31.000	22.225	134 000	195 000	2 800	3 800	42690	42620	91	85	114	121	3.5	3.3	27.3	0.42	1.4	0.79	0.976	0.438		
	135.733	44.450	46.101	34.925	216 000	340 000	2 600	3 600	5795	5735	96	89	119	130	3.5	3.3	32.9	0.41	1.5	0.81	1.79	0.887		
79.375	146.050	41.275	41.275	31.750	207 000	296 000	2 400	3 200	661	653	96	90	131	139	3.5	3.3	33.2	0.41	1.5	0.81	1.99	0.891		
	150.089	44.450	46.672	36.512	265 000	370 000	2 400	3 200	750	742	96	90	134	142	3.5	3.3	32.5	0.33	1.8	1.0	2.42	1.07		
80.000	130.000	35.000	34.000	28.500	166 000	251 000	2 600	3 600	▲ JM 515649	▲ JM 515610	94	88	117	125	3	2.5	29.9	0.39	1.5	0.85	1.18	0.583		
80.962	136.525	30.162	29.769	22.225	130 000	192 000	2 600	3 400	496	493	95	89	122	130	3.5	3.3	28.7	0.44	1.4	0.74	1.13	0.55		
	139.700	36.512	36.098	28.575	175 000	260 000	2 600	3 400	581	572 X	96	90	125	133	3.5	3.3	31.1	0.40	1.5	0.82	1.44	0.774		
	139.992	36.512	36.098	28.575	175 000	260 000	2 600	3 400	581	572	96	90	125	133	3.5	3.3	31.1	0.40	1.5	0.82	1.44	0.788		
82.550	125.412	25.400	25.400	19.845	102 000	164 000	2 600	3 600	27687	27620	96	89	115	120	3.5	1.5	25.7	0.42	1.4	0.79	0.747	0.348		
	133.350	30.162	29.769	22.225	130 000	192 000	2 600	3 400	495	492 A	97	90	120	128	3.5	3.3	28.7	0.44	1.4	0.74	1.08	0.434		
	133.350	33.338	33.338	26.195	154 000	237 000	2 600	3 600	47686	47620	97	90	119	128	3.5	3.3	29.0	0.40	1.5	0.82	1.18	0.577		
82.550	133.350	33.338	33.338	26.195	154 000	237 000	2 600	3 600	47685	47620	90	90	119	128	0.8	3.3	29.0	0.40	1.5	0.82	1.18	0.577		
	133.350	33.338	33.338	26.195	154 000	237 000	2 600	3 600	47687	47620	103	90	119	128	6.8	3.3	29.0	0.40	1.5	0.82	1.16	0.577		
	133.350	39.688	39.688	32.545	179 000	310 000	2 600	3 600	HM 516448	HM 516410	105	92	118	128	6.8	3.3	32.4	0.40	1.5	0.82	1.35	0.767		
82.550	136.525	30.162	29.769	22.225	130 000	192 000	2 600	3 400	495	493	97	90	122	130	3.5	3.3	28.7	0.44	1.4	0.74	1.08	0.55		
	139.700	36.512	36.098	28.575	175 000	260 000	2 600	3 400	580	572 X	98	91	125	133	3.5	3.3	31.1	0.40	1.5	0.82	1.39	0.774		
	139.992	36.512	36.098	28.575	175 000	260 000	2 600	3 400	580	572	98	91	125	133	3.5	3.3	31.1	0.40	1.5	0.82	1.39	0.788		
82.550	139.992	36.512	36.098	28.575	175 000	260 000	2 600	3 400	582	572	104	91	125	133	6.8	3.3	31.1	0.40	1.5	0.82	1.37	0.788		
	146.050	41.275	41.275	31.750	207 000	296 000	2 400	3 200	663	653	99	92	131	139	3.5	3.3	33.2	0.41	1.5	0.81	1.85	0.891		
	150.000	44.455	46.672	35.000	265 000	370 000	2 400	3 200	749 A	743	99	93	134	142	3.5	3.3	32.5	0.33	1.8	1.0	2.26	1.04		
82.550	150.089	44.450	46.672	36.512	265 000	370 000	2 400	3 200	749 A	742	98	93	135	143	3.5	3.3	32.5	0.33	1.8	1.0	2.26	1.07		
	152.400	41.275	41.275	31.750	207 000	296 000	2 400	3 200	663	652	99	92	134	141	3.5	3.3	33.2	0.41	1.5	0.81	1.85	1.26		
	161.925	47.625	48.260	38.100	274 000	390 000	2 200	3 000	757	752	100	94	144	150	3.5	3.3	35.6	0.34	1.8	0.97	2.79	1.61		
	161.925	53.975	55.100	42.862	325 000	480 000	2 200	3 000	6559	6535	104	98	141	154	3.5	3.3	40.7	0.40	1.5	0.82	3.4	1.67		
	168.275	47.625	48.260	38.100	274 000	390 000	2 200	3 000	757	753	100	94	147	150	3.5	3.3	35.6	0.34	1.8	0.97	2.79	2.1		
83.345	168.275	53.975	56.363	41.275	345 000	470 000	2 200	3 000	842	832	101	94	149	155	3.5	3.3	35.2	0.30	2.0	1.1	3.76	1.74		
	125.412	25.400	25.400	19.845	102 000	164 000	2 600	3 600	27690	27620	96	90	115	120	3.5	1.5	25.7	0.42	1.4	0.79	0.727	0.348		
	125.412	25.400	25.400	19.845	102 000	164 000	2 600	3 600	27689	27620	90	90	115	120	0.8	1.5	25.7	0.42	1.4	0.79	0.732	0.348		

Note ▲ The tolerances are listed in Tables 2, 3 and 4 on Pages C184 and C185.

■ SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 84.138 – 90.488 mm



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 , and Y_0 are given in the table below.

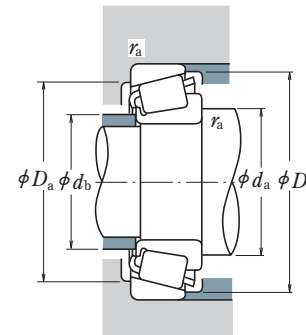
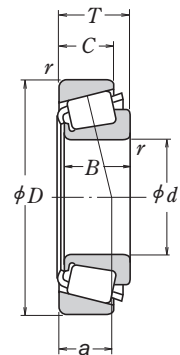
Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers		Abutment and Fillet Dimensions (mm)					Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)								
d	D	T	B	C	Cone r min.	Cup r max.	C _r	C _{0r}	Grease	Oil	CONE	CUP	d _a	d _b	D _a	D _b	Cone r max.	a	e	Y ₁	Y ₀	approx.								
																							CONE	CUP						
84.138	136.525	30.162	29.769	22.225	3.5	3.3	130 000	192 000	2 600	3 400	498	493	98	91	122	130	3.5	3.3	28.7	0.44	1.4	0.74	1.04	0.55						
	146.050	41.275	41.275	31.750	3.5	3.3	207 000	296 000	2 400	3 200	664	653	99	93	131	139	3.5	3.3	33.2	0.41	1.5	0.81	1.79	0.891						
	171.450	49.212	46.038	31.750	3.5	3.3	257 000	310 000	2 000	2 800	9385	9321	111	98	147	164	3.5	3.3	54.1	0.76	0.79	0.43	3.11	1.51						
85.000	130.000	30.000	29.000	24.000	6.0	2.5	138 000	222 000	2 600	3 600	▲ JM 716648	▲ JM 716610	104	92	117	125	6	2.5	29.5	0.44	1.4	0.74	0.931	0.461						
	130.000	30.000	29.000	24.000	3.0	2.5	138 000	222 000	2 600	3 600	▲ JM 716649	▲ JM 716610	98	92	117	125	3	2.5	29.5	0.44	1.4	0.74	0.943	0.461						
	140.000	39.000	38.000	31.500	3.0	2.5	202 000	305 000	2 400	3 400	▲ JHM 516849	▲ JHM 516810	100	94	125	134	3	2.5	33.3	0.41	1.5	0.81	1.55	0.768						
	150.000	46.000	46.000	38.000	3.0	2.5	275 000	390 000	2 400	3 200	▲ JH 217249	▲ JH 217210	101	95	134	142	3	2.5	33.9	0.33	1.8	0.99	2.29	1.09						
85.026	150.089	44.450	46.672	36.512	3.5	3.3	265 000	370 000	2 400	3 200	749	742	101	95	134	142	3.5	3.3	32.5	0.33	1.8	1.0	2.14	1.07						
	150.089	44.450	46.672	36.512	5.0	3.3	265 000	370 000	2 400	3 200	749 S	742	104	95	134	142	5	3.3	32.5	0.33	1.8	1.0	2.14	1.07						
85.725	133.350	30.162	29.769	22.225	3.5	3.3	130 000	192 000	2 600	3 400	497	492 A	99	93	120	128	3.5	3.3	28.7	0.44	1.4	0.74	0.987	0.434						
	136.525	30.162	29.769	22.225	3.5	3.3	130 000	192 000	2 600	3 400	497	493	99	93	122	130	3.5	3.3	28.7	0.44	1.4	0.74	0.987	0.55						
	142.138	42.862	42.862	34.133	4.8	3.3	221 000	360 000	2 400	3 400	HM 617049	HM 617010	106	95	125	137	4.8	3.3	35.4	0.43	1.4	0.76	1.77	0.911						
	146.050	41.275	41.275	31.750	6.4	3.3	207 000	296 000	2 400	3 200	665 A	653	107	95	131	139	6.4	3.3	33.2	0.41	1.5	0.81	1.71	0.891						
	146.050	41.275	41.275	31.750	3.5	3.3	207 000	296 000	2 400	3 200	665	653	102	95	131	139	3.5	3.3	33.2	0.41	1.5	0.81	1.72	0.891						
	152.400	39.688	36.322	30.162	3.5	3.2	183 000	285 000	2 200	3 200	596	592 A	102	96	135	144	3.5	3.2	37.1	0.44	1.4	0.75	1.85	1.06						
	161.925	47.625	48.260	38.100	3.5	3.3	274 000	390 000	2 200	3 000	758	752	103	97	144	150	3.5	3.3	35.6	0.34	1.8	0.97	2.63	1.61						
	168.275	41.275	41.275	30.162	3.5	3.3	223 000	345 000	2 000	2 800	677	672	105	99	149	160	3.5	3.3	38.3	0.47	1.3	0.70	2.91	1.24						
87.312	190.500	57.150	57.531	46.038	8.0	3.3	390 000	520 000	1 900	2 600	HH 221432	HH 221410	118	103	171	179	8	3.3	42.3	0.33	1.8	0.99	5.51	2.24						
88.900	149.225	31.750	28.971	24.608	3.0	3.3	140 000	218 000	2 200	3 000	42350	42587	104	98	134	143	3	3.3	34.9	0.49	1.2	0.67	1.39	0.711						
	152.400	39.688	36.322	30.162	3.5	3.2	183 000	285 000	2 200	3 200	593	592 A	104	98	135	144	3.5	3.2	37.1	0.44	1.4	0.75	1.73	1.06						
	152.400	39.688	39.688	30.162	6.4	3.3	253 000	365 000	2 200	3 200	HM 518445	HM 518410	107	96	137	148	6.4	3.3	33.1	0.40	1.5	0.82	2.11	0.776						
	161.925	47.625	48.260	38.100	3.5	3.3	274 000	390 000	2 200	3 000	759	752	106	99	144	150	3.5	3.3	35.6	0.34	1.8	0.97	2.47	1.61						
	161.925	47.625	48.260	38.100	7.0	3.3	274 000	390 000	2 200	3 000	766	752	113	99	144	150	7	3.3	35.6	0.34	1.8	0.97	2.45	1.61						
	161.925	53.975	55.100	42.862	3.5	3.3	325 000	480 000	2 200	3 000	6580	6535	109	102	141	154	3.5	3.3	40.7	0.40	1.5	0.82	3.03	1.67						
	168.275	47.625	48.260	38.100	3.5	3.3	274 000	390 000	2 200	3 000	759	753	106	99	147	150	3.5	3.3	35.6	0.34	1.8	0.97	2.47	2.1						
	168.275	53.975	56.363	41.275	3.5	3.3	345 000	470 000	2 200	3 000	850	832	106	100	149	155	3.5	3.3	35.2	0.30	2.0	1.1	3.39	1.74						
	190.500	57.150	57.531	44.450	8.0	3.3	355 000	500 000	1 900	2 600	855	854	118	103	170	174	8	3.3	41.8	0.33	1.8	0.99	4.99	2.55						
	190.500	57.150	57.531	46.038	8.0	3.3	390 000	520 000	1 900	2 600	HH 221434	HH 221410	120	105	171	179	8	3.3	42.3	0.33	1.8	0.99	5.41	2.24						
90.000	145.000	35.000	34.000	27.000	3.0	2.5	190 000	285 000	2 400	3 200	▲ JM 718149	▲ JM 718110	105	99	131	139	3	2.5	33.0	0.44	1.4	0.74	1.49	0.66						
	147.000	40.000	40.000	32.500	7.0	3.5	229 000	345 000	2 400	3 200	*HM 218248	**HM 218210	111	98	133	141	7	3.5	30.8	0.33	1.8	0.99	1.77	0.796						
	155.000	44.000	44.000	35.500	3.0	2.5	274 000	395 000	2 200	3 000	▲ JHM 318448	▲ JHM 318410	106	100	140	148	3	2.5	34.1	0.34	1.7	0.96	2.32	1.01						
90.488	161.925	47.625	48.260	38.100	3.5	3.3	274 000	390 000	2 200	3 000	760	752	107	101	144	150	3.5	3.3	35.6	0.34	1.8	0.97	2.38	1.61						

Notes * The maximum bore diameter is listed and its tolerance is negative (See Table 7.4.1 on Page A136).
** The maximum outside diameter is listed and its tolerance is negative (See Table 7.4.2 on Pages A136 and A137).
▲ The tolerances are listed in Tables 2, 3 and 4 on Pages C184 and C185.



■ SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 92.075 – 100.012 mm


Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

 When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

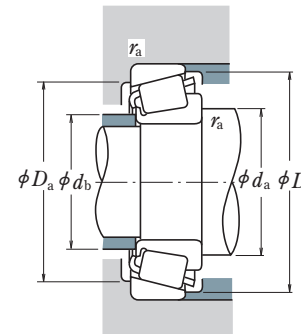
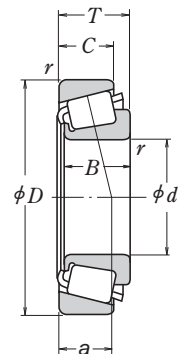
 The values of e , Y_1 , and Y_0 are given in the table below.

Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers		Abutment and Fillet Dimensions (mm)				Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)				
d	D	T	B	C	Cone r min.	Cup	C_r	C_{0r}	Grease	Oil	CONE	CUP	d_a	d_b	D_a	D_b	Cone Cup r_a max.	a	e	Y_1	Y_0	approx. CONE CUP	
92.075	146.050	33.338	34.925	26.195	3.5	3.3	169 000	280 000	2 400	3 200	47890	47820	107	101	131	140	3.5 3.3	32.3	0.45	1.3	0.74	1.46	0.664
	148.430	28.575	28.971	21.433	3.5	3.0	140 000	218 000	2 200	3 000	42362	42584	107	101	134	142	3.5 3	31.8	0.49	1.2	0.67	1.29	0.553
	152.400	39.688	36.322	30.162	3.5	3.2	183 000	285 000	2 200	3 200	598	592 A	107	101	135	144	3.5 3.2	37.1	0.44	1.4	0.75	1.6	1.06
	152.400	39.688	36.322	30.162	6.4	3.2	183 000	285 000	2 200	3 200	598 A	592 A	113	101	135	144	6.4 3.2	37.1	0.44	1.4	0.75	1.59	1.06
	168.275	41.275	41.275	30.162	3.5	3.3	223 000	345 000	2 000	2 800	681	672	110	104	149	160	3.5 3.3	38.3	0.47	1.3	0.70	2.62	1.24
	190.500	57.150	57.531	44.450	8.0	3.3	355 000	500 000	1 900	2 600	857	854	121	106	170	174	8 3.3	41.8	0.33	1.8	0.99	4.78	2.55
	148.430	28.575	28.971	21.433	3.0	3.0	140 000	218 000	2 200	3 000	42368	42584	107	102	134	142	3 3	31.8	0.49	1.2	0.67	1.24	0.553
	149.225	31.750	28.971	24.608	3.0	3.3	140 000	218 000	2 200	3 000	42368	42587	107	102	134	143	3 3.3	34.9	0.49	1.2	0.67	1.24	0.711
93.662	152.400	39.688	36.322	30.162	3.5	3.2	183 000	285 000	2 200	3 200	597	592 A	109	102	135	144	3.5 3.2	37.1	0.44	1.4	0.75	1.54	1.06
	150.000	35.000	34.000	27.000	3.0	2.5	183 000	285 000	2 200	3 200	▲ JM 719149	▲ JM 719113	109	104	135	143	3 2.5	33.4	0.44	1.4	0.75	1.46	0.765
	146.050	33.338	34.925	26.195	3.5	3.3	169 000	280 000	2 400	3 200	47896	47820	110	103	131	140	3.5 3.3	32.3	0.45	1.3	0.74	1.33	0.664
95.000	148.430	28.575	28.971	21.433	3.0	3.0	140 000	218 000	2 200	3 000	42375	42584	108	103	134	142	3 3	31.8	0.49	1.2	0.67	1.18	0.553
	149.225	31.750	28.971	24.608	3.5	3.3	140 000	218 000	2 200	3 000	42376	42587	109	103	134	143	3.5 3.3	34.9	0.49	1.2	0.67	1.18	0.711
	152.400	39.688	36.322	30.162	3.5	3.2	183 000	285 000	2 200	3 200	594	592 A	110	104	135	144	3.5 3.2	37.1	0.44	1.4	0.75	1.47	1.06
	152.400	39.688	36.322	33.338	3.5	3.3	183 000	285 000	2 200	3 200	594	592	109	103	135	145	3.5 3.3	37.1	0.44	1.4	0.75	1.47	1.12
	168.275	41.275	41.275	30.162	3.5	3.3	223 000	345 000	2 000	2 800	683	672	113	106	149	160	3.5 3.3	38.3	0.47	1.3	0.70	2.47	1.24
	171.450	47.625	48.260	38.100	3.5	3.3	282 000	415 000	2 000	2 800	77375	77675	117	105	152	159	3.5 3.3	37.8	0.37	1.6	0.90	2.91	1.67
	180.975	47.625	48.006	38.100	3.5	3.3	258 000	375 000	2 000	2 600	776	772	114	107	161	168	3.5 3.3	39.1	0.39	1.6	0.86	3.25	1.99
	190.500	57.150	57.531	44.450	8.0	3.3	355 000	500 000	1 900	2 600	864	854	123	108	170	174	8 3.3	41.8	0.33	1.8	0.99	4.57	2.55
	190.500	57.150	57.531	46.038	8.0	3.3	390 000	520 000	1 900	2 600	HH 221440	HH 221410	125	110	171	179	8 3.3	42.3	0.33	1.8	0.99	5.0	2.24
96.838	148.430	28.575	28.971	21.433	3.5	3.0	140 000	218 000	2 200	3 000	42381	42584	110	104	134	142	3.5 3	31.8	0.49	1.2	0.67	1.13	0.553
	149.225	31.750	28.971	24.606	3.5	3.3	140 000	218 000	2 200	3 000	42381	42587	111	105	135	143	3.5 3.3	34.9	0.49	1.2	0.67	1.13	0.711
98.425	161.925	36.512	36.116	26.195	3.5	3.3	191 000	310 000	2 000	2 800	52387	52637	114	108	144	154	3.5 3.3	36.1	0.47	1.3	0.69	1.89	0.942
	168.275	41.275	41.275	30.162	3.5	3.3	223 000	345 000	2 000	2 800	685	672	116	109	149	160	3.5 3.3	38.3	0.47	1.3	0.70	2.32	1.24
	180.975	47.625	48.006	38.100	3.5	3.3	258 000	375 000	2 000	2 600	779	772	116	110	161	168	3.5 3.3	39.1	0.39	1.6	0.86	3.06	1.99
	190.500	57.150	57.531	44.450	3.5	3.3	355 000	500 000	1 900	2 600	866	854	118	111	170	174	3.5 3.3	41.8	0.33	1.8	0.99	4.38	2.55
99.982	190.500	57.150	57.531	46.038	3.5	3.3	390 000	520 000	1 900	2 600	HH 221442	HH 221410	119	113	171	179	3.5 3.3	42.3	0.33	1.8	0.99	4.81	2.24
	190.500	57.150	57.531	46.038	6.4	3.3	390 000	520 000	1 900	2 600	HH 221447	HH 221410	126	114	171	179	6.4 3.3	42.3	0.33	1.8	0.99	4.68	2.24
	150.000	32.000	30.000	26.000	2.3	2.3	146 000	235 000	2 200	3 000	▲ JLM 820048	▲ JLM 820012	111	107	135	144	2.3 2.3	36.8	0.50	1.2	0.66	1.27	0.616
100.000	155.000	36.000	35.000	28.000	3.0	2.5	191 000	325 000	2 000	2 800	▲ JM 720249	▲ JM 720210	115	109	140	149	3 2.5	36.8	0.47	1.3	0.70	1.68	0.772
	160.000	41.000	40.000	32.000	3.0	2.5	239 000	380 000	2 000	2 800	▲ JHM 720249	▲ JHM 720210	117	109	143	154	3 2.5	38.2	0.47	1.3	0.70	2.09	0.974
100.012	157.162	36.512	36.116	26.195	3.5	3.3	191 000	310 000	2 000	2 800	52393	52618	116	109	142	152	3.5 3.3	36.1	0.47	1.3	0.69	1.81	0.702

Note ▲ The tolerances are listed in Tables 2, 3 and 4 on Pages C184 and C185.

SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 101.600 – 117.475 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

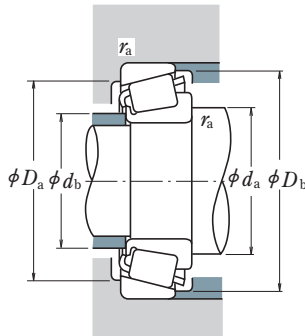
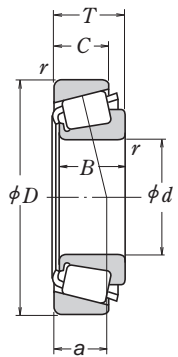
The values of e , Y_1 , and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers		Abutment and Fillet Dimensions (mm)					Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)			
d	D	T	B	C	Cone r min.	Cup r min.	C _r	C _{0r}	Grease	Oil	CONE	CUP	d _a	d _b	D _a	D _b	Cone r _a max.	a	e	Y ₁	Y ₀	approx. CONE CUP		
101.600	157.162	36.512	36.116	26.195	3.5	3.3	191 000	310 000	2 000	2 800	52400	52618	117	111	142	152	3.5	3.3	36.1	0.47	1.3	0.69	1.75	0.702
	161.925	36.512	36.116	26.195	3.5	3.3	191 000	310 000	2 000	2 800	52400	52637	117	111	144	154	3.5	3.3	36.1	0.47	1.3	0.69	1.75	0.942
	168.275	41.275	41.275	30.162	3.5	3.3	223 000	345 000	2 000	2 800	687	672	118	112	149	160	3.5	3.3	38.3	0.47	1.3	0.70	2.15	1.24
	180.975	47.625	48.006	38.100	3.5	3.3	258 000	375 000	2 000	2 600	780	772	119	113	161	168	3.5	3.3	39.1	0.39	1.6	0.86	2.88	1.99
	190.500	57.150	57.531	44.450	8.0	3.3	355 000	500 000	1 900	2 600	861	854	129	114	170	174	8	3.3	41.8	0.33	1.8	0.99	4.13	2.55
	190.500	57.150	57.531	46.038	8.0	3.3	390 000	520 000	1 900	2 600	HH 221449	HH 221410	131	116	171	179	8	3.3	42.3	0.33	1.8	0.99	4.55	2.24
212.725	66.675	66.675	53.975	7.0	3.3	570 000	810 000	1 700	2 200	HH 224335	HH 224310	132	121	192	202	7	3.3	47.3	0.33	1.8	1.0	8.14	3.06	
104.775	180.975	47.625	48.006	38.100	7.0	3.3	258 000	375 000	2 000	2 600	787	772	129	116	161	168	7	3.3	39.1	0.39	1.6	0.86	2.66	1.99
	180.975	47.625	48.006	38.100	3.5	3.3	258 000	375 000	2 000	2 600	782	772	122	116	161	168	3.5	3.3	39.1	0.39	1.6	0.86	2.68	1.99
	190.500	47.625	49.212	34.925	3.5	3.3	296 000	465 000	1 800	2 400	71412	71750	124	118	171	181	3.5	3.3	40.1	0.42	1.4	0.79	4.0	1.71
106.362	165.100	36.512	36.512	26.988	3.5	3.3	195 000	320 000	2 000	2 600	56418	56650	122	116	149	159	3.5	3.3	38.6	0.50	1.2	0.66	1.87	0.861
	158.750	23.020	21.438	15.875	3.5	3.3	102 000	165 000	2 000	2 800	37425	37625	122	115	143	152	3.5	3.3	37.0	0.61	0.99	0.54	0.886	0.488
107.950	159.987	34.925	34.925	26.988	3.5	3.3	164 000	315 000	2 000	2 800	LM 522546	LM 522510	122	116	146	154	3.5	3.3	33.7	0.40	1.5	0.82	1.65	0.784
	161.925	34.925	34.925	26.988	3.5	3.3	164 000	280 000	2 000	2 800	48190	48120	122	116	146	156	3.5	3.3	38.7	0.51	1.2	0.65	1.59	0.83
109.987	165.100	36.512	36.512	26.988	3.5	3.3	195 000	320 000	2 000	2 600	56425	56650	123	117	149	159	3.5	3.3	38.6	0.50	1.2	0.66	1.8	0.861
	190.500	47.625	49.212	34.925	3.5	3.3	296 000	465 000	1 800	2 400	71425	71750	126	120	171	181	3.5	3.3	40.1	0.42	1.4	0.79	3.79	1.71
	212.725	66.675	66.675	53.975	8.0	3.3	570 000	810 000	1 700	2 200	HH 224340	HH 224310	139	126	192	202	8	3.3	47.3	0.33	1.8	1.0	7.58	3.06
	159.987	34.925	34.925	26.988	3.5	3.3	164 000	315 000	2 000	2 800	LM 522549	LM 522510	124	118	146	154	3.5	3.3	33.7	0.40	1.5	0.82	1.55	0.784
109.992	159.987	34.925	34.925	26.988	8.0	3.3	164 000	315 000	2 000	2 800	LM 522548	LM 522510	133	118	146	154	8	3.3	33.7	0.40	1.5	0.82	1.53	0.784
	177.800	41.275	41.275	30.162	3.5	3.3	232 000	375 000	1 800	2 600	64433	64700	128	121	160	172	3.5	3.3	42.4	0.52	1.2	0.64	2.64	1.11
110.000	165.000	35.000	35.000	26.500	3.0	2.5	195 000	320 000	2 000	2 600	▲ JM 822049	▲ JM 822010	124	119	149	159	3	2.5	38.3	0.50	1.2	0.66	1.64	0.842
	180.000	47.000	46.000	38.000	3.0	2.5	310 000	490 000	1 900	2 600	▲ JHM 522649	▲ JHM 522610	127	122	162	172	3	2.5	40.9	0.41	1.5	0.81	3.12	1.51
111.125	190.500	47.625	49.212	34.925	3.5	3.3	296 000	465 000	1 800	2 400	71437	71750	129	123	171	181	3.5	3.3	40.1	0.42	1.4	0.79	3.58	1.71
	152.400	21.433	21.433	16.670	1.5	1.5	89 500	178 000	2 000	2 800	L 623149	L 623110	123	121	143	148	1.5	1.5	27.4	0.41	1.5	0.80	0.725	0.344
114.300	177.800	41.275	41.275	30.162	3.5	3.3	232 000	375 000	1 800	2 600	64450	64700	131	125	160	172	3.5	3.3	42.4	0.52	1.2	0.64	2.39	1.11
	180.000	34.925	31.750	25.400	3.5	0.8	174 000	254 000	1 800	2 400	68450	** 68709	130	123	165	172	3.5	0.8	40.0	0.50	1.2	0.66	1.95	1.0
	190.500	47.625	49.212	34.925	3.5	3.3	296 000	465 000	1 800	2 400	71450	71750	132	125	171	181	3.5	3.3	40.1	0.42	1.4	0.79	3.37	1.71
	212.725	66.675	66.675	53.975	7.0	3.3	475 000	700 000	1 700	2 400	938	932	141	128	187	193	7	3.3	46.9	0.33	1.8	1.0	6.01	4.11
212.725	66.675	66.675	53.975	7.0	3.3	570 000	810 000	1 700	2 200	HH 224346	HH 224310	143	131	192	202	7	3.3	47.3	0.33	1.8	1.0	7.01	3.06	
115.087	190.500	47.625	49.212	34.925	3.5	3.3	296 000	465 000	1 800	2 400	71453	71750	133	126	171	181	3.5	3.3	40.1	0.42	1.4	0.79	3.31	1.71
	117.475	180.975	34.925	31.750	3.5	3.3	174 000	254 000	1 800	2 400	68462	68712	132	125	163	172	3.5	3.3	40.0	0.50	1.2	0.66	1.73	1.05

Notes ** The maximum outside diameter is listed and its tolerance is negative (See Table 7.4.2 on Pages A136 and A137).
▲ The tolerances are listed in Tables 2, 3 and 4 on Pages C184 and C185.

■ SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 120.000 – 165.100 mm



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

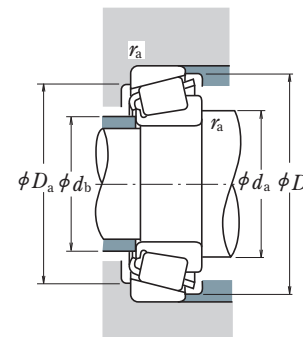
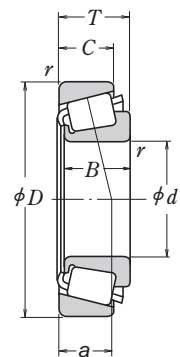
The values of e , Y_1 , and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers		Abutment and Fillet Dimensions (mm)					Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)			
<i>d</i>	<i>D</i>	<i>T</i>	<i>B</i>	<i>C</i>	Cone <i>r</i> min.	Cup <i>r</i> min.	<i>C_r</i>	<i>C_{0r}</i>	Grease	Oil	CONE	CUP	<i>d_a</i>	<i>d_b</i>	<i>D_a</i>	<i>D_b</i>	Cone <i>r_a</i> max.	<i>a</i>	<i>e</i>	<i>Y</i> ₁	<i>Y</i> ₀	approx.		
																						CONE	CUP	CONE
120.000	170.000	25.400	25.400	19.050	3.3	3.3	130 000	219 000	1 900	2 600	▲ JL 724348	▲ JL 724314	132	127	156	163	3.3	3.3	32.9	0.46	1.3	0.72	1.08	0.591
	174.625	35.720	36.512	27.783	3.5	1.5	212 000	385 000	1 900	2 600	* M 224748	M 224710	135	129	163	168	3.5	1.5	32.2	0.33	1.8	0.99	1.9	0.866
120.650	182.562	39.688	38.100	33.338	3.5	3.3	228 000	445 000	1 800	2 400	48282	48220	136	133	168	176	3.5	3.3	34.2	0.31	2.0	1.1	2.56	1.14
	206.375	47.625	47.625	34.925	3.3	3.3	320 000	530 000	1 600	2 200	795	792	139	134	186	198	3.3	3.3	45.7	0.46	1.3	0.72	4.44	1.9
123.825	182.562	39.688	38.100	33.338	3.5	3.3	228 000	445 000	1 800	2 400	48286	48220	139	133	168	176	3.5	3.3	34.2	0.31	2.0	1.1	2.37	1.14
	125.000	175.000	25.400	25.400	18.288	3.3	3.3	134 000	232 000	1 800	2 400	▲ JL 725346	▲ JL 725316	138	133	161	168	3.3	3.3	34.3	0.48	1.3	0.69	1.19
127.000	165.895	18.258	17.462	13.495	1.5	1.5	84 500	149 000	1 900	2 600	LL 225749	LL 225710	135	132	158	160	1.5	1.5	24.2	0.33	1.8	0.99	0.647	0.288
	182.562	39.688	38.100	33.338	3.5	3.3	228 000	445 000	1 800	2 400	48290	48220	141	135	168	176	3.5	3.3	34.2	0.31	2.0	1.1	2.19	1.14
	196.850	46.038	46.038	38.100	3.5	3.3	315 000	560 000	1 700	2 200	67388	67322	144	138	180	189	3.5	3.3	39.7	0.34	1.7	0.96	3.74	1.46
	215.900	47.625	47.625	34.925	3.5	3.3	287 000	495 000	1 500	2 000	74500	74850	148	141	196	208	3.5	3.3	48.4	0.49	1.2	0.68	4.92	1.99
	128.588	206.375	47.625	47.625	34.925	3.3	3.3	320 000	530 000	1 600	2 200	799	792	146	140	186	198	3.3	3.3	45.7	0.46	1.3	0.72	3.86
130.000	206.375	47.625	47.625	34.925	3.5	3.3	320 000	530 000	1 600	2 200	797	792	148	141	186	198	3.5	3.3	45.7	0.46	1.3	0.72	3.76	1.9
	130.175	203.200	46.038	46.038	38.100	3.5	3.3	315 000	560 000	1 700	2 200	67389	67320	146	141	183	191	3.5	3.3	39.7	0.34	1.7	0.96	3.51
133.350	177.008	25.400	26.195	20.638	1.5	1.5	124 000	258 000	1 800	2 400	L 327249	L 327210	143	141	167	171	1.5	1.5	29.5	0.35	1.7	0.95	1.18	0.55
	190.500	39.688	39.688	33.338	3.5	3.3	240 000	485 000	1 700	2 200	48385	48320	148	142	177	184	3.5	3.3	35.9	0.32	1.9	1.0	2.58	1.16
136.525	196.850	46.038	46.038	38.100	3.5	3.3	315 000	560 000	1 700	2 200	67390	67322	149	143	180	189	3.5	3.3	39.7	0.34	1.7	0.96	3.27	1.46
	215.900	47.625	47.625	34.925	3.5	3.3	287 000	495 000	1 500	2 000	74525	74850	152	146	196	208	3.5	3.3	48.4	0.49	1.2	0.68	4.44	1.99
	190.500	39.688	39.688	33.338	3.5	3.3	216 000	440 000	1 700	2 200	48393	48320	151	144	177	184	3.5	3.3	35.9	0.32	1.9	1.0	2.31	1.16
139.700	217.488	47.625	47.625	34.925	3.5	3.3	287 000	495 000	1 500	2 000	74537	74856	155	148	197	210	3.5	3.3	48.4	0.49	1.2	0.68	4.19	2.13
	187.325	28.575	29.370	23.020	1.5	1.5	153 000	305 000	1 700	2 200	LM 328448	LM 328410	149	147	176	182	1.5	1.5	31.7	0.36	1.7	0.93	1.59	0.67
142.875	215.900	47.625	47.625	34.925	3.5	3.3	287 000	495 000	1 500	2 000	74550	74850	158	151	196	208	3.5	3.3	48.4	0.49	1.2	0.68	3.93	1.99
	254.000	66.675	66.675	47.625	7.0	3.3	515 000	830 000	1 300	1 800	99550	99100	170	156	227	238	7	3.3	55.3	0.41	1.5	0.81	9.99	3.83
	146.050	193.675	28.575	28.575	23.020	1.5	1.5	170 000	355 000	1 600	2 200	48685	48620	158	151	185	193	3.5	3.3	37.6	0.34	1.8	0.98	2.63
149.225	236.538	57.150	56.642	44.450	3.5	3.3	455 000	720 000	1 400	1 900	36690	36620	155	154	182	188	1.5	1.5	33.5	0.37	1.6	0.90	1.64	0.725
	254.000	66.675	66.675	47.625	7.0	3.3	515 000	830 000	1 300	1 800	HM 231140	HM 231110	164	160	217	224	3.5	3.3	45.9	0.32	1.9	1.0	6.07	2.93
	152.400	254.000	66.675	66.675	47.625	7.0	3.3	515 000	830 000	1 300	1 800	99575	99100	175	162	227	238	7	3.3	55.3	0.41	1.5	0.81	9.24
158.750	254.000	66.675	66.675	47.625	7.0	3.3	515 000	830 000	1 300	1 800	99587	99100	178	165	227	238	7	3.3	55.3	0.41	1.5	0.81	8.86	3.83
	165.100	247.650	47.625	47.625	38.100	3.5	3.3	345 000	705 000	1 300	1 700	99600	99100	181	167	227	238	7	3.3	55.3	0.41	1.5	0.81	8.46
165.100	225.425	41.275	39.688	33.338	3.5	3.3	240 000	540 000	1 400	1 900	46780	46720	176	169	209	218	3.5	3.3	44.3	0.38	1.6	0.86	3.69	1.66
	247.650	47.625	47.625	38.100	3.5	3.3	345 000	705 000	1 300	1 700	67780	67720	185	179	229	240	3.5	3.3	52.4	0.44	1.4	0.75	5.83	2.33

Notes * The maximum bore diameter is listed and its tolerance is negative (See Table 7.4.1 on Page A136).
▲ The tolerances are listed in Tables 2, 3 and 4 on Pages C184 and C185.

■ SINGLE-ROW TAPERED ROLLER BEARINGS (INCH DESIGN)

Bore Diameter 170.000 – 206.375 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5F_r + Y_0F_a$$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

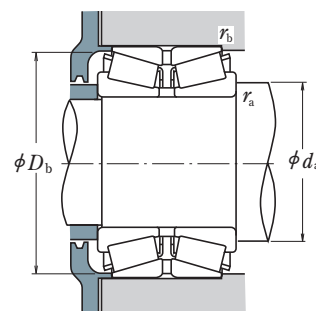
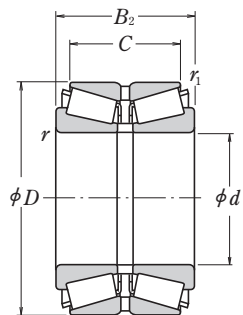
The values of e , Y_1 , and Y_0 are given in the table below.

d	Boundary Dimensions (mm)				Cone r min.	Cup max.	Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers		Abutment and Fillet Dimensions (mm)					Eff. Load Centers (mm) a	Constant e	Axial Load Factors		Mass (kg)		
	D	T	B	C			C _r	C _{0r}	Grease	Oil	CONE	CUP	d _a	d _b	D _a	D _b	Cone r max.			Cup max.	Y ₁	Y ₀	approx. CONE	CUP
170.000	230.000	39.000	38.000	31.000	3.0	2.5	278 000	520 000	1 300	1 800	▲ JHM 534149	▲ JHM 534110	184	178	217	224	3	2.5	43.2	0.38	1.6	0.86	3.1	1.3
	240.000	46.000	44.500	37.000	3.0	2.5	380 000	720 000	1 300	1 800	▲ JM 734449	▲ JM 734410	185	180	222	232	3	2.5	50.5	0.44	1.4	0.75	4.42	2.02
174.625	247.650	47.625	47.625	38.100	3.5	3.3	345 000	705 000	1 300	1 700	67787	67720	192	185	229	240	3.5	3.3	52.4	0.44	1.4	0.75	4.88	2.33
177.800	227.012	30.162	30.162	23.020	1.5	1.5	181 000	415 000	1 300	1 800	36990	36920	189	186	214	221	1.5	1.5	42.9	0.44	1.4	0.75	2.1	0.907
	247.650	47.625	47.625	38.100	3.5	3.3	345 000	705 000	1 300	1 700	67790	67720	194	188	229	240	3.5	3.3	52.4	0.44	1.4	0.75	4.56	2.33
	260.350	53.975	53.975	41.275	3.5	3.3	455 000	835 000	1 200	1 700	M 236849	M 236810	195	192	241	249	3.5	3.3	47.5	0.33	1.8	0.99	6.49	2.86
190.000	260.000	46.000	44.000	36.500	3.0	2.5	370 000	730 000	1 100	1 600	▲ JM 738249	▲ JM 738210	206	200	242	252	3	2.5	56.4	0.48	1.3	0.69	4.73	2.2
	266.700	47.625	46.833	38.100	3.5	3.3	345 000	720 000	1 100	1 500	67885	67820	209	203	246	259	3.5	3.3	57.9	0.48	1.3	0.69	5.4	2.64
190.500	266.700	47.625	46.833	38.100	3.5	3.3	345 000	720 000	1 100	1 500	67885	67820	209	203	246	259	3.5	3.3	57.9	0.48	1.3	0.69	5.4	2.64
200.000	300.000	65.000	62.000	51.000	3.5	2.5	615 000	1 130 000	1 000	1 400	▲ JHM 840449	▲ JHM 840410	223	215	273	289	3.5	2.5	73.1	0.52	1.2	0.63	10.3	5.19
	282.575	46.038	46.038	36.512	3.5	3.3	365 000	800 000	1 000	1 400	67983	67920	222	216	260	275	3.5	3.3	61.9	0.51	1.2	0.65	6.03	2.82
203.200	282.575	46.038	46.038	36.512	3.5	3.3	365 000	800 000	1 000	1 400	67983	67920	222	216	260	275	3.5	3.3	61.9	0.51	1.2	0.65	6.03	2.82
	282.575	46.038	46.038	36.512	3.5	3.3	365 000	800 000	1 000	1 400	67985	67920	224	219	260	275	3.5	3.3	61.9	0.51	1.2	0.65	5.66	2.82

Note ▲ The tolerances are listed in Tables 2, 3 and 4 on Pages C184 and C185.

DOUBLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 40 – 90 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

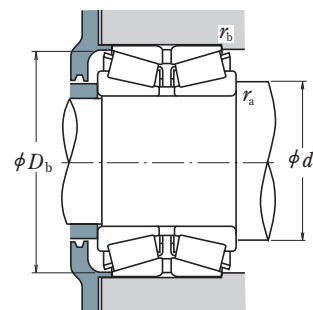
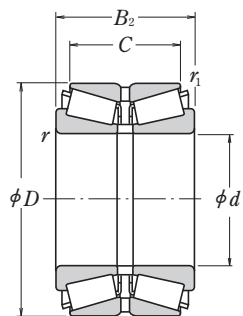
The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant e	Axial Load Factors			Mass (kg) approx.
d	D	B_2	C	$r_{min.}$	$r_{1 min.}$	C_r	C_{0r}	Grease	Oil		$d_a min.$	$D_b min.$	$r_a max.$	$r_b max.$		Y_2	Y_3	Y_0	
40	80	45	37.5	1.5	0.6	109 000	140 000	3 700	5 100		HR 40 KBE 42+L	51	75	1.5		0.6	0.37	2.7	
45	85	47	37.5	1.5	0.6	117 000	159 000	3 400	4 700	HR 45 KBE 42+L	56	81	1.5	0.6	0.40	2.5	1.7	1.6	1.08
	85	55	43.5	1.5	0.6	143 000	204 000	3 400	4 700	HR 45 KBE 52X+L	56	81	1.5	0.6	0.40	2.5	1.7	1.6	1.31
50	90	48	38.5	1.5	0.6	131 000	183 000	3 200	4 400	HR 50 KBE 042+L	61	87	1.5	0.6	0.42	2.4	1.6	1.6	1.20
	90	49	39.5	1.5	0.6	131 000	183 000	3 200	4 400	HR 50 KBE 42+L	61	87	1.5	0.6	0.42	2.4	1.6	1.6	1.22
	90	55	43.5	1.5	0.6	150 000	218 000	3 200	4 400	HR 50 KBE 52X+L	61	87	1.5	0.6	0.42	2.4	1.6	1.6	1.39
	110	64	51.5	2.5	0.6	224 000	297 000	2 700	3 700	HR 50 KBE 043+L	65	104	2	0.6	0.35	2.9	2.0	1.9	2.77
55	100	51	41.5	2	0.6	162 000	226 000	2 900	3 900	HR 55 KBE 042+L	67	96	2	0.6	0.40	2.5	1.7	1.6	1.59
	100	52	42.5	2	0.6	162 000	226 000	2 900	3 900	HR 55 KBE 1003+L	67	96	2	0.6	0.40	2.5	1.7	1.6	1.63
	100	60	48.5	2	0.6	188 000	274 000	2 900	3 900	HR 55 KBE 52X+L	67	97	2	0.6	0.40	2.5	1.7	1.6	1.88
	120	70	57	2.5	0.6	256 000	342 000	2 500	3 400	HR 55 KBE 43+L	70	113	2	0.6	0.35	2.9	2.0	1.9	3.52
60	110	53	43.5	2	0.6	178 000	246 000	2 700	3 600	HR 60 KBE 042+L	72	105	2	0.6	0.40	2.5	1.7	1.6	2.03
	110	66	54.5	2	0.6	225 000	335 000	2 700	3 600	HR 60 KBE 52X+L	72	106	2	0.6	0.40	2.5	1.7	1.6	2.52
	130	74	59	3	1	298 000	405 000	2 300	3 200	HR 60 KBE 43+L	78	122	2.5	1	0.35	2.9	2.0	1.9	4.40
65	120	56	46.5	2	0.6	210 000	300 000	2 400	3 200	HR 65 KBE 42+L	77	115	2	0.6	0.40	2.5	1.7	1.6	2.58
	120	57	47.5	2	0.6	210 000	300 000	2 400	3 200	HR 65 KBE 1202+L	77	115	2	0.6	0.40	2.5	1.7	1.6	2.61
	120	73	61.5	2	0.6	269 000	405 000	2 400	3 300	HR 65 KBE 52X+L	77	117	2	0.6	0.40	2.5	1.7	1.6	3.35
	140	79	63	3	1	340 000	465 000	2 100	2 900	HR 65 KBE 43+L	83	132	2.5	1	0.35	2.9	2.0	1.9	5.42
70	125	57	46.5	2	0.6	227 000	325 000	2 300	3 100	HR 70 KBE 042+L	82	120	2	0.6	0.42	2.4	1.6	1.6	2.79
	125	59	48.5	2	0.6	227 000	325 000	2 300	3 100	HR 70 KBE 42+L	82	120	2	0.6	0.42	2.4	1.6	1.6	2.85
	125	74	61.5	2	0.6	270 000	410 000	2 300	3 100	HR 70 KBE 52X+L	82	121	2	0.6	0.42	2.4	1.6	1.6	3.58
	150	83	67	3	1	390 000	535 000	2 000	2 700	HR 70 KBE 43+L	88	142	2.5	1	0.35	2.9	2.0	1.9	6.45
75	130	62	51.5	2	0.6	245 000	365 000	2 200	3 000	HR 75 KBE 42+L	87	126	2	0.6	0.44	2.3	1.6	1.5	3.15
	130	74	61.5	2	0.6	283 000	440 000	2 200	3 000	HR 75 KBE 52X+L	87	127	2	0.6	0.44	2.3	1.6	1.5	3.73
	160	87	69	3	1	435 000	600 000	1 900	2 500	HR 75 KBE 043+L	93	151	2.5	1	0.35	2.9	2.0	1.9	7.66
80	140	61	49	2.5	0.6	269 000	390 000	2 000	2 800	HR 80 KBE 042+L	95	134	2	0.6	0.42	2.4	1.6	1.6	3.70
	140	64	51.5	2.5	0.6	269 000	390 000	2 000	2 800	HR 80 KBE 42+L	95	134	2	0.6	0.42	2.4	1.6	1.6	3.70
	140	78	63.5	2.5	0.6	330 000	505 000	2 000	2 800	HR 80 KBE 52X+L	95	136	2	0.6	0.42	2.4	1.6	1.6	4.59
	170	92	73	3	1	475 000	655 000	1 700	2 400	HR 80 KBE 043+L	98	161	2.5	1	0.35	2.9	2.0	1.9	9.02
85	150	70	57	2.5	0.6	315 000	465 000	1 900	2 600	HR 85 KBE 42+L	100	143	2	0.6	0.42	2.4	1.6	1.6	4.69
	150	86	69	2.5	0.6	360 000	555 000	1 900	2 600	HR 85 KBE 52X+L	100	144	2	0.6	0.42	2.4	1.6	1.6	5.70
	180	98	77	4	1	530 000	745 000	1 600	2 200	HR 85 KBE 043+L	106	169	3	1	0.35	2.9	2.0	1.9	10.8
90	160	71	58	2.5	0.6	345 000	510 000	1 800	2 400	HR 90 KBE 042+L	105	152	2	0.6	0.42	2.4	1.6	1.6	5.53
	160	74	61	2.5	0.6	345 000	510 000	1 800	2 400	HR 90 KBE 42+L	105	152	2	0.6	0.42	2.4	1.6	1.6	5.71
	160	94	77	2.5	0.6	440 000	700 000	1 800	2 400	HR 90 KBE 52X+L	105	154	2	0.6	0.42	2.4	1.6	1.6	7.26

Remark For other double-row tapered roller bearings not listed above, please contact NSK.

DOUBLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 90 – 120 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

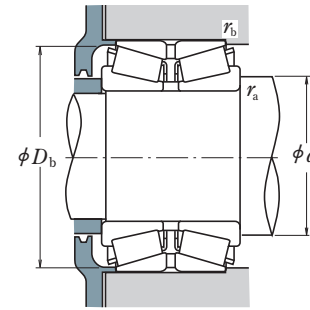
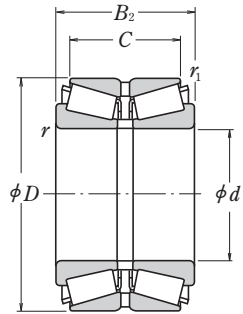
The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

<i>d</i>	Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant <i>e</i>	Axial Load Factors			Mass (kg) approx.			
	<i>D</i>	<i>B</i> ₂	<i>C</i>	<i>r</i> min.	<i>r</i> ₁ min.	<i>C</i> _r	<i>C</i> _{0r}	Grease	Oil		<i>d</i> _a min.	<i>D</i> _b min.	<i>r</i> _a max.	<i>r</i> _b max.		<i>Y</i> ₂	<i>Y</i> ₃	<i>Y</i> ₀				
90	190	102	81	4	1	595 000	845 000	1 600	2 100	HR 90 KBE 043+L HR 90 KBE 1901+L	111	178	3	1	0.35	2.9	2.0	1.9	12.7			
	190	144	115	4	1	770 000	1 180 000	1 600	2 200		111	179	3	1		0.35	2.9	2.0	1.9	17.9		
95	170	78	63	3	1	385 000	570 000	1 700	2 300	HR 95 KBE 42+L HR 95 KBE 52+L HR 95 KBE 43+L	113	161	2.5	1	0.42	2.4	1.6	1.6	6.75			
	170	100	83	3	1	495 000	800 000	1 700	2 300		113	163	2.5	1		0.42	2.4	1.6	1.6	8.60		
	200	108	85	4	1	640 000	910 000	1 500	2 000		116	187	3	1		0.35	2.9	2.0	1.9	14.7		
100	165	52	46	2.5	0.6	222 000	340 000	1 700	2 300	100 KBE 31+L HR100 KBE 1805+L HR100 KBE 042+L HR100 KBE 1801+L HR100 KBE 42+L HR100 KBE 1802+L HR100 KBE 52X+L HR100 KBE 1804+L HR100 KBE 043+L	115	156	2	0.6	0.33	3.0	2.0	2.0	4.04			
	180	81	64	3	1	435 000	665 000	1 600	2 200		118	170	2.5	1		0.42	2.4	1.6	1.6	8.16		
	180	81	65	3	1	435 000	665 000	1 600	2 200		118	170	2.5	1		0.42	2.4	1.6	1.6	8.13		
	180	82	66	3	1	435 000	665 000	1 600	2 200		118	170	2.5	1		0.42	2.4	1.6	1.6	8.22		
	180	83	67	3	1	435 000	665 000	1 600	2 200		118	170	2.5	1		0.42	2.4	1.6	1.6	8.7		
	180	105	85	3	1	555 000	905 000	1 600	2 200		118	173	2.5	1		0.42	2.4	1.6	1.6	10.6		
	180	107	87	3	1	555 000	905 000	1 600	2 200		118	173	2.5	1		0.42	2.4	1.6	1.6	10.7		
	180	110	90	3	1	555 000	905 000	1 600	2 200		118	173	2.5	1		0.42	2.4	1.6	1.6	11		
	215	112	87	4	1	725 000	1 050 000	1 400	1 900		121	200	3	1		0.35	2.9	2.0	1.9	18.1		
	105	190	88	70	3	1	480 000	735 000	1 500		2 000	HR105 KBE 42X+L HR105 KBE 1902+L HR105 KBE 52+L HR105 KBE 043+L	123	179		2.5	1	0.42	2.4	1.6	1.6	9.76
		190	117	96	3	1	620 000	1 020 000	1 500		2 000		123	182		2.5	1		0.42	2.4	1.6	1.6
190		115	95	3	1	620 000	1 020 000	1 500	2 000	123	182		2.5	1	0.42	2.4	1.6		1.6	13.1		
225		116	91	4	1	780 000	1 130 000	1 300	1 800	126	209		3	1	0.35	2.9	2.0		1.9	20.4		
190		110	90	3	1	555 000	905 000	1 600	2 200	118	173		2.5	1	0.42	2.4	1.6		1.6	10.7		
110	180	56	50	2.5	0.6	264 000	400 000	1 500	2 000	110 KBE 31+L 110 KBE 031+L 110 KBE 1802+L HR110 KBE 42+L HR110 KBE 42X+L HR110 KBE 2001+L HR110 KBE 52X+L HR110 KBE 043+L 120 KBE 30+L 120 KBE 030+L 120 KBE 31+L 120 KBE 031+L 120 KBE 2001+L HR120 KBE 42X+L HR120 KBE 52X+L HR120 KBE 43+L HR120 KBE 2601+L	125	172	2	0.6	0.39	2.6	1.7	1.7	5.11			
	180	70	56	2.5	0.6	340 000	555 000	1 500	2 000		125	172	2	0.6		0.39	2.6	1.7	1.7	6.33		
	180	125	100	2.5	0.6	550 000	1 060 000	1 500	2 100		125	172	2	0.6		0.26	3.8	2.6	2.5	11.4		
	200	90	72	3	1	540 000	840 000	1 400	1 900		128	190	2.5	1		0.42	2.4	1.6	1.6	11.2		
	200	92	74	3	1	540 000	840 000	1 400	1 900		128	190	2.5	1		0.42	2.4	1.6	1.6	11.5		
	200	120	100	3	1	685 000	1 130 000	1 400	1 900		128	193	2.5	1		0.42	2.4	1.6	1.6	15.4		
	200	121	101	3	1	685 000	1 130 000	1 400	1 900		128	193	2.5	1		0.42	2.4	1.6	1.6	15.2		
	240	118	93	4	1.5	830 000	1 190 000	1 200	1 700		131	223	3	1.5		0.35	2.9	2.0	1.9	23.6		
	120	180	46	41	2.5	0.6	184 000	296 000	1 500		2 000	135	172	2		0.6	0.40	2.5	1.7	1.6	3.75	
		180	58	46	2.5	0.6	260 000	450 000	1 500		2 000	135	172	2		0.6		0.39	2.6	1.7	1.7	4.64
		200	62	55	2.5	0.6	310 000	500 000	1 400		1 800	135	190	2		0.6		0.39	2.6	1.7	1.7	7.35
		200	78	62	2.5	0.6	415 000	690 000	1 400		1 900	135	190	2		0.6		0.39	2.6	1.7	1.7	8.97
200		100	84	2.5	0.6	515 000	885 000	1 400	1 800	135	193	2	0.6	0.37	2.7	1.8		1.8	11.3			
215		97	78	3	1	575 000	900 000	1 300	1 800	138	204	2.5	1	0.44	2.3	1.6		1.5	13.7			
215		132	109	3	1	750 000	1 270 000	1 300	1 800	138	207	2.5	1	0.44	2.3	1.6		1.5	18.8			
260		128	101	4	1	915 000	1 310 000	1 100	1 500	141	240	3	1	0.35	2.9	2.0		1.9	29.4			
260		188	145	4	1	1 320 000	2 110 000	1 100	1 500	141	242	3	1	0.35	2.9	2.0		1.9	44.6			

Remark For other double-row tapered roller bearings not listed above, please contact NSK.

DOUBLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 125 – 150 mm



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

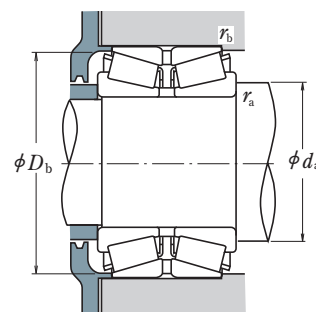
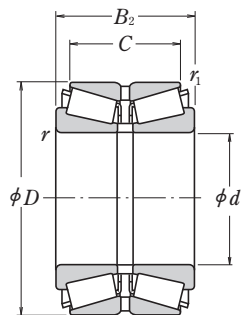
The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

<i>d</i>	Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant <i>e</i>	Axial Load Factors			Mass (kg)
	<i>D</i>	<i>B</i> ₂	<i>C</i>	<i>r</i> _{min.}	<i>r</i> _{1 min.}	<i>C</i> _r	<i>C</i> _{0r}	Grease	Oil		<i>d</i> _{a min.}	<i>D</i> _{b min.}	<i>r</i> _{a max.}	<i>r</i> _{b max.}		<i>Y</i> ₂	<i>Y</i> ₃	<i>Y</i> ₀	
125	210	110	88	4	1	560 000	1 030 000	1 300	1 800	125 KBE 2101+L	146	201	3	1	0.43	2.3	1.6	1.5	14.5
130	230	98	78.5	4	1	640 000	1 010 000	1 200	1 600	HR130 KBE 42+L	151	220	3	1	0.44	2.3	1.6	1.5	15.8
	230	100	80.5	4	1	640 000	1 010 000	1 200	1 600	HR130 KBE 2301+L	151	220	3	1	0.44	2.3	1.6	1.5	15.9
	280	137	107.5	5	1.5	940 000	1 350 000	1 000	1 400	130 KBE 43+L	157	258	4	1.5	0.36	2.8	1.9	1.8	35
130	230	145	115	4	1	905 000	1 580 000	1 200	1 700	HR130 KBE 2302+L	151	221	3	1	0.44	2.3	1.6	1.5	24.1
	230	145	117.5	4	1	905 000	1 580 000	1 200	1 700	HR130 KBE 52+L	151	222	3	1	0.44	2.3	1.6	1.5	23.8
	230	150	120	4	1	905 000	1 580 000	1 200	1 700	HR130 KBE 2303+L	151	221	3	1	0.44	2.3	1.6	1.5	24.2
140	210	53	47	2.5	0.6	282 000	495 000	1 200	1 700	140 KBE 30+L	155	202	2	0.6	0.39	2.6	1.7	1.7	6.02
	210	66	53	2.5	1	305 000	530 000	1 200	1 700	140 KBE 030+L	155	202	2	1	0.40	2.5	1.7	1.6	7.02
	210	106	94	2.5	0.6	555 000	1 200 000	1 300	1 700	140 KBE 2101+L	155	202	2	0.6	0.33	3.0	2.0	2.0	12.3
140	225	68	61	3	1	400 000	630 000	1 200	1 600	140 KBE 31+L	158	216	2.5	1	0.39	2.6	1.7	1.7	9.31
	225	84	68	3	1	490 000	850 000	1 200	1 600	140 KBE 031+L	158	215	2.5	1	0.39	2.6	1.7	1.7	11.6
	225	85	68	3	1	490 000	850 000	1 200	1 600	140 KBE 2201+L	158	215	2.5	1	0.39	2.6	1.7	1.7	11.7
140	230	120	94	3	1	685 000	1 270 000	1 200	1 600	140 KBE 2301+L	158	220	2.5	1	0.33	3.0	2.0	2.0	17.6
	230	140	110	3	1	820 000	1 550 000	1 200	1 600	140 KBE 2302+L	158	221	2.5	1	0.35	2.9	2.0	1.9	20.7
	240	132	106	4	1.5	685 000	1 360 000	1 100	1 500	140 KBE 2401+L	161	227	3	1.5	0.44	2.3	1.5	1.5	22.7
140	250	102	82.5	4	1	670 000	1 030 000	1 100	1 500	HR140 KBE 42+L	161	237	3	1	0.44	2.3	1.6	1.5	18.9
	250	153	125.5	4	1	1 040 000	1 830 000	1 100	1 500	HR140 KBE 52X+L	161	241	3	1	0.44	2.3	1.6	1.5	29.6
	300	145	115.5	5	1.5	1 030 000	1 480 000	1 000	1 300	140 KBE 43+L	167	275	4	1.5	0.36	2.8	1.9	1.8	42.6
150	225	56	50	3	1	300 000	545 000	1 200	1 600	150 KBE 30+L	168	213	2.5	1	0.35	2.9	2.0	1.9	7.41
	225	70	56	3	1	395 000	685 000	1 200	1 600	150 KBE 030+L	168	215	2.5	1	0.35	2.9	2.0	1.9	8.70
	250	80	71	3	1	510 000	810 000	1 100	1 400	150 KBE 31+L	168	240	2.5	1	0.40	2.5	1.7	1.6	14.2
150	250	100	80	3	1	630 000	1 090 000	1 100	1 400	150 KBE 031+L	168	238	2.5	1	0.39	2.6	1.7	1.7	17.8
	250	115	95	3	1	745 000	1 320 000	1 100	1 500	150 KBE 2502+L	168	238	2.5	1	0.37	2.7	1.8	1.8	20.9
	260	150	115	4	1	815 000	1 520 000	1 100	1 400	150 KBE 2601+L	171	242	3	1	0.43	2.3	1.6	1.5	30.0
150	270	109	87	4	1	830 000	1 330 000	1 000	1 400	HR150 KBE 42+L	171	253	3	1	0.44	2.3	1.6	1.5	24.3
	270	164	130	4	1	1 210 000	2 150 000	1 000	1 400	HR150 KBE 52X+L	171	257	3	1	0.44	2.3	1.6	1.5	37.3
	270	174	140	4	1	1 210 000	2 150 000	1 000	1 400	HR150 KBE 2701+L	171	257	3	1	0.44	2.3	1.6	1.5	39.7
320	154	120	5	1.5	1 420 000	2 130 000	900	1 200	HR150 KBE 43+L	177	295	4	1.5	0.35	2.9	2.0	1.9	53.4	

Remark For other double-row tapered roller bearings not listed above, please contact NSK.

DOUBLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 160 – 200 mm



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$

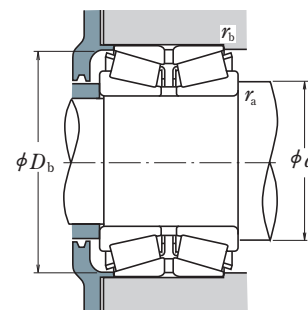
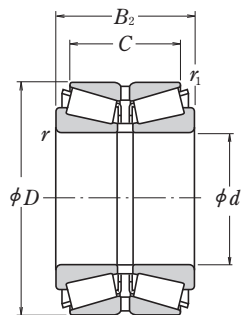
The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

d	Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant e	Axial Load Factors			Mass (kg) approx.
	D	B ₂	C	r	r ₁	C _r	C _{0r}	Grease	Oil		d _a	D _b	r _a	r _b		Y ₂	Y ₃	Y ₀	
	min.	min.	min.	min.	min.	min.	min.	min.	min.		min.	min.	min.	min.		min.	min.	min.	
160	240	60	53	3	1	355 000	580 000	1 100	1 500	160 KBE 30+L	178	231	2.5	1	0.37	2.7	1.8	1.8	8.56
	240	75	60	3	1	395 000	710 000	1 100	1 500	160 KBE 030+L	178	230	2.5	1	0.40	2.5	1.7	1.6	10.5
	240	110	90	3	1	650 000	1 290 000	1 100	1 500	160 KBE 2401+L	178	232	2.5	1	0.38	2.6	1.8	1.7	16.2
	270	86	76	3	1	540 000	885 000	1 000	1 300	160 KBE 31+L	178	255	2.5	1	0.40	2.5	1.7	1.6	18.6
	270	108	86	3	1	775 000	1 380 000	1 000	1 300	160 KBE 031+L	178	256	2.5	1	0.39	2.6	1.7	1.7	23.1
	270	140	120	3	1	990 000	1 880 000	1 000	1 300	160 KBE 2701+L	178	261	2.5	1	0.39	2.6	1.7	1.7	30.6
	280	150	125	4	1	1 100 000	2 020 000	1 000	1 300	160 KBE 2801+L	181	266	3	1	0.32	3.2	2.1	2.1	35.9
	290	115	91	4	1	800 000	1 220 000	900	1 300	160 KBE 42+L	181	275	3	1	0.43	2.3	1.6	1.5	28.2
	290	178	144	4	1	1 360 000	2 440 000	1 000	1 300	HR160 KBE 52X+L	181	277	3	1	0.44	2.3	1.6	1.5	47.3
	340	160	126	5	1.5	1 310 000	1 920 000	800	1 100	160 KBE 43+L	187	314	4	1.5	0.36	2.8	1.9	1.8	60.4
165	290	150	125	4	1	1 140 000	2 130 000	900	1 300	165 KBE 2901+L	186	272	3	1	0.33	3.1	2.1	2.0	39.5
170	250	85	65	3	1	435 000	845 000	1 000	1 400	170 KBE 2501+L	188	241	2.5	1	0.44	2.3	1.5	1.5	12.3
	260	67	60	3	1	400 000	700 000	1 000	1 300	170 KBE 30+L	188	248	2.5	1	0.40	2.5	1.7	1.6	11.8
	260	84	67	3	1	575 000	1 030 000	1 000	1 300	170 KBE 030+L	188	249	2.5	1	0.39	2.6	1.7	1.7	14.4
	280	88	78	3	1	630 000	1 040 000	900	1 300	170 KBE 31+L	188	266	2.5	1	0.39	2.6	1.7	1.7	19.7
	280	110	88	3	1	820 000	1 450 000	900	1 300	170 KBE 031+L	188	268	2.5	1	0.39	2.6	1.7	1.7	24.2
	280	150	130	3	1	1 110 000	2 160 000	1 000	1 300	170 KBE 2802+L	188	269	2.5	1	0.39	2.6	1.7	1.7	34.6
	310	192	152	5	1.5	1 590 000	2 910 000	900	1 200	HR170 KBE 52X+L	197	297	4	1.5	0.44	2.3	1.6	1.5	57.3
	280	74	66	3	1	455 000	810 000	900	1 300	180 KBE 30+L	198	265	2.5	1	0.40	2.5	1.7	1.6	15.4
	280	93	74	3	1	655 000	1 220 000	900	1 200	180 KBE 030+L	198	265	2.5	1	0.35	2.9	2.0	1.9	14.4
	300	96	85	4	1.5	725 000	1 210 000	900	1 200	180 KBE 31+L	201	284	3	1.5	0.39	2.6	1.7	1.7	24.8
300	120	96	4	1.5	940 000	1 690 000	900	1 200	180 KBE 031+L	201	287	3	1.5	0.39	2.6	1.7	1.7	31.1	
320	127	99	5	1.5	895 000	1 390 000	800	1 200	180 KBE 42+L	207	300	4	1.5	0.44	2.3	1.5	1.5	36.5	
320	192	152	5	1.5	1 640 000	3 050 000	900	1 200	HR180 KBE 52X+L	207	308	4	1.5	0.45	2.2	1.5	1.5	59.2	
340	180	140	5	1.5	1 410 000	2 510 000	800	1 100	180 KBE 3401+L	207	305	4	1.5	0.43	2.3	1.6	1.5	68.1	
190	290	75	67	3	1	490 000	845 000	900	1 200	190 KBE 30+L	208	279	2.5	1	0.39	2.6	1.7	1.7	16.2
	290	94	75	3	1	670 000	1 230 000	900	1 200	190 KBE 030+L	208	279	2.5	1	0.40	2.5	1.7	1.6	20.1
	320	104	92	4	1.5	800 000	1 380 000	800	1 100	190 KBE 31+L	211	301	3	1.5	0.40	2.5	1.7	1.6	30.9
	320	130	104	4	1.5	1 070 000	1 960 000	800	1 100	190 KBE 031+L	211	302	3	1.5	0.39	2.6	1.7	1.7	39.0
	340	133	105	5	1.5	990 000	1 580 000	800	1 100	190 KBE 42+L	217	320	4	1.5	0.40	2.5	1.7	1.6	43.9
	340	204	160	5	1.5	1 910 000	3 550 000	800	1 100	HR190 KBE 52X+L	217	327	4	1.5	0.44	2.3	1.6	1.5	70.8
200	310	152	123	3	1	1 300 000	2 740 000	800	1 100	HR200 KBE 3101+L	218	301	2.5	1	0.43	2.3	1.6	1.5	40.1
	320	146	110	5	1.5	990 000	2 120 000	800	1 100	200 KBE 3201+L	227	301	4	1.5	0.52	1.9	1.3	1.3	41.6
	330	180	140	5	1.5	1 390 000	2 730 000	800	1 100	200 KBE 3301+L	227	316	4	1.5	0.42	2.4	1.6	1.6	54.4
	340	112	100	4	1.5	940 000	1 670 000	800	1 000	200 KBE 31+L	221	321	3	1.5	0.40	2.5	1.7	1.6	38.8
	340	140	112	4	1.5	1 260 000	2 250 000	800	1 000	200 KBE 031+L	221	324	3	1.5	0.39	2.6	1.7	1.7	47.0
	360	142	110	5	1.5	1 100 000	1 780 000	700	1 000	200 KBE 42+L	227	338	4	1.5	0.40	2.5	1.7	1.6	52.6
	360	218	174	5	1.5	2 070 000	3 850 000	800	1 000	HR200 KBE 52+L	227	344	4	1.5	0.41	2.5	1.7	1.6	88.3

Remark For other double-row tapered roller bearings not listed above, please contact NSK.

DOUBLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 206 – 260 mm



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

d	Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant e	Axial Load Factors			Mass (kg)
	D	B ₂	C	r _{min.}	r _{1 min.}	C _r	C _{0r}	Grease	Oil		d _{a min.}	D _{b min.}	r _{a max.}	r _{b max.}		Y ₂	Y ₃	Y ₀	
	approx.																		
206	283	102	83	4	1.5	580 000	1 430 000	900	1 200	206 KBE 2801+L	227	275	3	1.5	0.51	2.0	1.3	1.3	18.1
210	355	116	103	4	1.5	905 000	1 520 000	700	1 000	210 KBE 31+L	231	338	3	1.5	0.46	2.2	1.5	1.4	41.7
220	300	110	88	3	1	730 000	1 710 000	800	1 100	220 KBE 3001+L	238	292	2.5	1	0.37	2.7	1.8	1.8	21.2
	340	90	80	4	1.5	695 000	1 280 000	700	1 000	220 KBE 30+L	241	324	3	1.5	0.40	2.5	1.7	1.6	27.9
	340	113	90	4	1.5	920 000	1 830 000	700	1 000	220 KBE 030+L	241	327	3	1.5	0.40	2.5	1.7	1.6	34.7
240	370	120	107	5	1.5	1 110 000	1 940 000	700	1 000	220 KBE 31+L	247	345	4	1.5	0.39	2.6	1.7	1.7	48.3
	370	150	120	5	1.5	1 460 000	2 760 000	700	1 000	220 KBE 031+L	247	349	4	1.5	0.39	2.6	1.7	1.7	60.2
	400	158	122	5	1.5	1 390 000	2 300 000	600	900	220 KBE 42+L	247	371	4	1.5	0.40	2.5	1.7	1.6	74.2
	360	92	82	4	1.5	780 000	1 490 000	700	900	240 KBE 30+L	261	344	3	1.5	0.39	2.6	1.7	1.7	30.1
250	360	115	92	4	1.5	1 020 000	2 040 000	700	900	240 KBE 030+L	261	344	3	1.5	0.35	2.9	2.0	1.9	37.3
	400	128	114	5	1.5	1 180 000	2 190 000	600	900	240 KBE 31+L	267	380	4	1.5	0.43	2.3	1.6	1.5	60.0
	400	160	128	5	1.5	1 620 000	3 050 000	600	900	240 KBE 031+L	267	378	4	1.5	0.39	2.6	1.7	1.7	73.6
	400	209	168	5	1.5	2 220 000	4 450 000	600	900	240 KBE 4003+L	267	384	4	1.5	0.33	3.0	2.0	2.0	96.4
260	380	98	87	4	1	795 000	1 460 000	600	900	250 KBE 3801+L	271	365	3	1	0.40	2.5	1.7	1.6	35.5
260	400	104	92	5	1.5	895 000	1 670 000	600	800	260 KBE 30+L	287	379	4	1.5	0.40	2.5	1.7	1.6	43.4
	400	130	104	5	1.5	1 210 000	2 460 000	600	800	260 KBE 030+L	287	382	4	1.5	0.40	2.5	1.7	1.6	54.1
	440	144	128	5	1.5	1 540 000	2 760 000	600	800	260 KBE 31+L	287	416	4	1.5	0.39	2.6	1.7	1.7	82.5
	440	172	145	5	1.5	1 870 000	3 500 000	600	800	260 KBE 4401+L	287	414	4	1.5	0.38	2.6	1.8	1.7	98.1
	440	180	144	5	1.5	2 110 000	4 150 000	600	800	260 KBE 031+L	287	416	4	1.5	0.39	2.6	1.7	1.7	104.0

Remark For other double-row tapered roller bearings not listed above, please contact NSK.

7. SPHERICAL ROLLER BEARINGS

INTRODUCTION C 258

TECHNICAL DATA

Free Space of Spherical Roller Bearings C 260

Measuring Bearing Clearance C 262

BEARING TABLES

**Spherical Roller Bearings
Cylindrical Bores, Tapered Bores**

Bore Diameter 20 – 1400 mm C 266



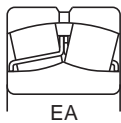
DESIGN, TYPES, AND FEATURES

Shown in the figures, types EA, C, CD, CA, which are designed for high load capacity, are available. Types EA, C and CD have pressed steel cages, and type CA has machined brass cages. The EA type bearings listed here are classified as NSKHPS™ bearings, which offer particularly high load-carrying capacity, high limiting speeds, and are highly functional under high-temperature operating conditions of up to 200°C.

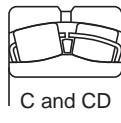
An oil groove and holes are provided in the outer ring to supply lubricant and the bearing numbers are suffixed with E4.

To use bearings with oil grooves and holes, it is recommended to provide an oil groove in the housing bore, since the depth of the groove in the bearing is limited. The number and dimensions of the oil groove and holes are shown in Tables 1 and 2.

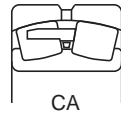
When bearings with a hole for a locking pin to prevent outer ring rotation are required, please inform NSK.



EA



C and CD



CA

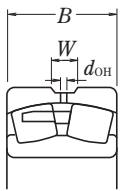


Table 1 Dimensions of Oil Grooves and Holes
Units : mm

Nominal Width <i>B</i>		Oil Groove Width <i>W</i>	Hole Diameter <i>d_{OH}</i>
over	incl.		
18	30	5	2.5
30	40	6	3
40	50	7	4
50	65	8	5
65	80	10	6
80	100	12	8
100	120	15	10
120	160	20	12
160	200	25	15
200	250	30	20
250	315	35	20
315	400	40	25
400	—	40	25

Table 2 Number of Oil Holes

Nominal Outer Ring Dia <i>D</i> (mm)		Number of Holes
over	incl.	
—	180	4
180	250	6
250	315	6
315	400	6
400	500	6
500	630	8
630	800	8
800	1000	8
1000	1250	8
1250	1600	8
1600	2000	8

TOLERANCES AND RUNNING ACCURACY Table 7.2 (Pages A128 to A131)

RECOMMENDED FITS Table 8.3 (Page A164)

Table 8.5 (Page A165)

INTERNAL CLEARANCE Table 8.16 (Page A172)

PERMISSIBLE MISALIGNMENT

The permissible misalignment of spherical roller bearings varies depending on the size and load, but it is approximately 0.018 to 0.045 radian (1° to 2.5°) with normal loads.

LIMITING SPEEDS (GREASE)

The limiting speeds (grease) listed in the bearing tables should be adjusted depending on the bearing load condition. Also, higher speeds are attainable by making changes in the lubrication method, cage design, etc. Refer to page A098 for detailed information.

PRECAUTIONS FOR USE OF SPHERICAL ROLLER BEARINGS

If the load on spherical roller bearings becomes too small during operation or if the ratio of axial and radial loads is larger than the value of 'e' (listed in the bearing tables), slippage occurs between the rollers and raceways, which may result in smearing. The higher this tendency becomes, especially for large spherical roller bearings.

If very small bearing loads are expected, please contact NSK for selection of an appropriate bearing.

SPHERICAL ROLLER BEARINGS

TECHNICAL DATA

Free Space of Spherical Roller Bearings

The spherical roller bearing has self-aligning ability and capacity to carry substantially large radial and bi-axial loads. For these reasons, this bearing is used widely in many applications. Application problems include a long span, which causes substantial deflection of the shaft, as well as installation errors and axial misalignment. These bearings may be exposed to a large radial or shock loads. By the way, this bearing is used in plumber blocks.

Grease lubrication is common for spherical roller bearings because it simplifies the seal construction around the housing and makes maintenance and inspection easier. In this case, it is important to select a grease appropriate to the operating conditions and to fill the bearing with the proper amount of grease considering the housing internal space.

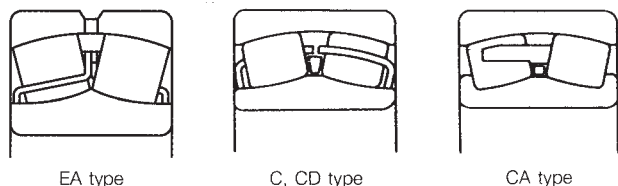
As a reference, the bearing free space for conventional types plus four other types (EA, C, CD, and CA) is shown in Table 1. Under general operating conditions, it is appropriate to pack a large quantity of grease into the bearing internal space and to pack grease into the housing internal space other than the bearing itself, to the extent of 1/3 to 2/3 that of the free space.

Table 1 Free Space of Spherical Roller Bearing (EA, C, CD, and CA)

Units: cm³

Bearing Bore No.	Bearing Free Space				
	Bearing Series				
	230	231	222	232	223
11	—	—	29	—	78
12	—	—	42	—	96
13	—	—	48	—	113
14	—	—	52	—	139
15	—	—	57	—	170
16	—	—	71	—	206
17	—	—	91	—	234
18	—	—	110	130	283
19	—	—	135	—	327
20	—	—	169	203	410
22	100	150	242	294	560
24	109	228	297	340	700
26	161	240	365	405	955
28	170	292	400	530	1 230
30	209	465	505	680	1 430
32	254	575	680	850	1 710
34	355	610	785	1 090	2 070
36	465	785	810	1 120	2 460
38	565	970	1 160	1 340	2 830
40	715	1 160	1 400	1 640	2 900
44	940	1 500	1 880	2 270	3 750
48	1 030	1 900	2 550	3 550	4 700
52	1 530	2 940	3 300	4 750	5 900
56	1 820	3 150	3 400	4 950	7 250
60	2 200	4 050	4 300	6 200	8 750

Remarks 22211 to 22226, 22311 to 22324 are EA Type Bearings.
 23122 to 23148, 23218 to 23244 are C Type Bearings.
 23022 to 23036, 22228 to 22236 are CD Type Bearings.
 23038 to 23060, 23152 to 23160, 22238 to 22260,
 23248 to 23260, and 22326 to 22360 are CA Type Bearing.



EA type

C, CD type

CA type

Measurement of Bearing Clearance

For the bearing mounting, the measurement of internal bearing clearance is a most important task. Before handling the bearing and measuring the internal bearing clearance, be sure to wear thin rubber gloves. (If a bearing is touched by a bare hand, the touched part may rust.)

When measuring the internal bearing clearance, pay careful attention so that the rollers are positioned correctly.

1. Measurement of Bearing Clearance

To measure only internal bearing clearance, set the bearing standing upright (vertically) on a flat surface, while holding its outer ring with one hand. While paying attention not to incline the inner and outer rings, stabilize the rollers by turning the inner ring to the right and left by about one half to one full rotation. Adjust rollers until one randomly chosen roller of the double rows is positioned to be exactly at the top. Now, the internal clearance is measured with a thickness gauge. The measurement position and measured point vary slightly depending on the size of the outer ring outside diameter.

1.1 Bearing Outside Diameter Is Smaller Than 200 mm

Insert the thickness gauge between rollers of 2 rows which have a roller positioned exactly at the top of the bearing and outer ring. Now, measure the internal clearance (Δ_r). (Fig. 1)

1.2 Bearing Outside Diameter Is Larger Than 200 mm

Insert the thickness gauge between the rollers of the 2 rows, which each have been positioned to be exactly at the top, and outer ring and between 2 rows of bearing at symmetrical position relative to the bearing center, then measure the respective

internal clearance of the bearing. (Fig. 2)

For the internal bearing clearance (Δ_r), take that value measured between 2 rows of just top of bearing and outer ring as respectively Δ_{rT1} and Δ_{rT2} and that value measured just at top of the bearing as Δ_{rT} .

$$\Delta_{rT} = 1/2 (\Delta_{rT1} + \Delta_{rT2})$$

Among internal clearances between 2 rows of rollers that are symmetrical relative to the bearing center and outer ring, take that measurement between 2 rows of rollers of left side respectively as Δ_{rL1} and Δ_{rL2} . The internal clearance on the left side of the bearing is Δ_{rL} :

$$\Delta_{rL} = 1/2 (\Delta_{rL1} + \Delta_{rL2})$$

Take that measurement between 2 rows of rollers of right side respectively as Δ_{rR1} and Δ_{rR2} . The internal clearance of the right side of the bearing is Δ_{rR} :

$$\Delta_{rR} = 1/2 (\Delta_{rR1} + \Delta_{rR2})$$

The internal bearing clearance (Δ_r) is given by the following equation:

$$\Delta_r = 1/2 (\Delta_{rT} + \Delta_{rL} + \Delta_{rR})$$

2. Measuring Bearing Clearance When Mounted on Shaft or Sleeve

Basically, the measurement of the clearance is taken when the outer ring of bearing hangs down from rollers. At first, while holding the bearing up-right, rotate the outer ring in the clockwise and counter-clockwise directions by one half to one full rotation until both rows have a randomly chosen roller positioned exactly at the bottom. The clearance is measured with a thickness gauge but

the measurement point varies slightly depending on the size of the outer ring outside diameter.

2.1 Bearing Outside Diameter Is Smaller Than 200 mm

Insert the thickness gauge between rollers of 2 rows of just at the bottom of the bearing and outer ring and measure the internal clearance (Δ_{rS}). (Fig. 3)

2.2 Bearing Outside Diameter Is Larger Than 200 mm

Insert the thickness gauge between rollers of 2 rows that are positioned just at the bottom of bearing and outer ring and between 2 rows of bearing rollers symmetrical relative to the bearing center, then, measure the respective internal clearance of the bearing. (Fig. 3) For the internal bearing clearance (Δ_r), take the measurement when the roller is positioned exactly at the bottom, since the bearing has 2 rows, two values must be measured. The bearing internal clearance is Δ_{rS1} and Δ_{rS2} while that value measured at the exact bottom of the bearing is Δ_{rS} .

$$\Delta_{rS} = 1/2 (\Delta_{rS1} + \Delta_{rS2})$$

Among internal clearances between 2 rows of rollers symmetrical relative to the bearing center and outer ring, take that value measured between 2 rows of rollers of left side respectively as Δ_{rL1} and Δ_{rL2} and the internal clearance of left side of bearing as Δ_{rL} .

$$\Delta_{rL} = 1/2 (\Delta_{rL1} + \Delta_{rL2})$$

The internal clearances measured between 2 rows of rollers on the right side respectively as Δ_{rR1} and Δ_{rR2} . The internal clearance of right side of bearing is Δ_{rR} .

$$\Delta_{rR} = 1/2 (\Delta_{rR1} + \Delta_{rR2})$$

The internal bearing clearance (Δ_r) is given by the following equation:

$$\Delta_r = 1/2 (\Delta_{rS} + \Delta_{rL} + \Delta_{rR})$$

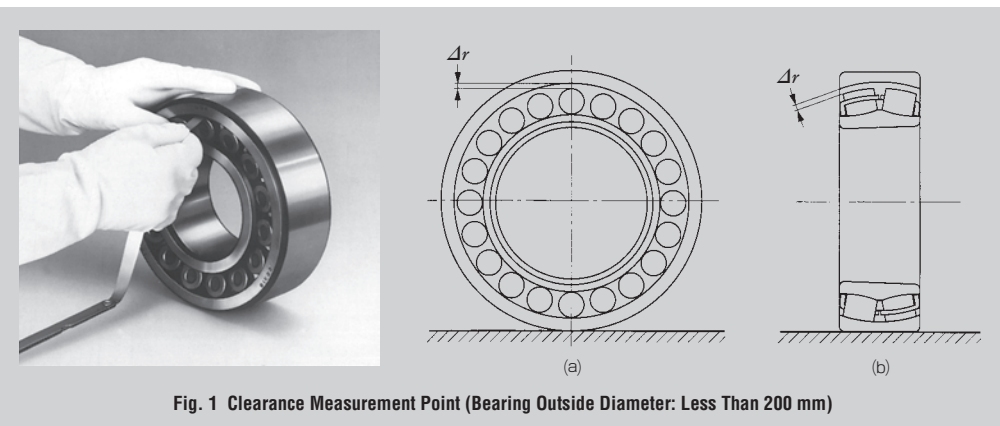


Fig. 1 Clearance Measurement Point (Bearing Outside Diameter: Less Than 200 mm)

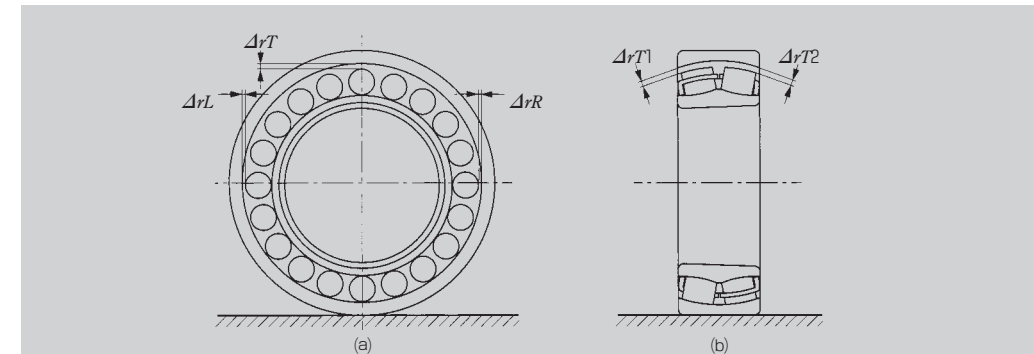


Fig. 2 Clearance Measurement Point (Bearing Outside Diameter: Larger Than 200 mm)

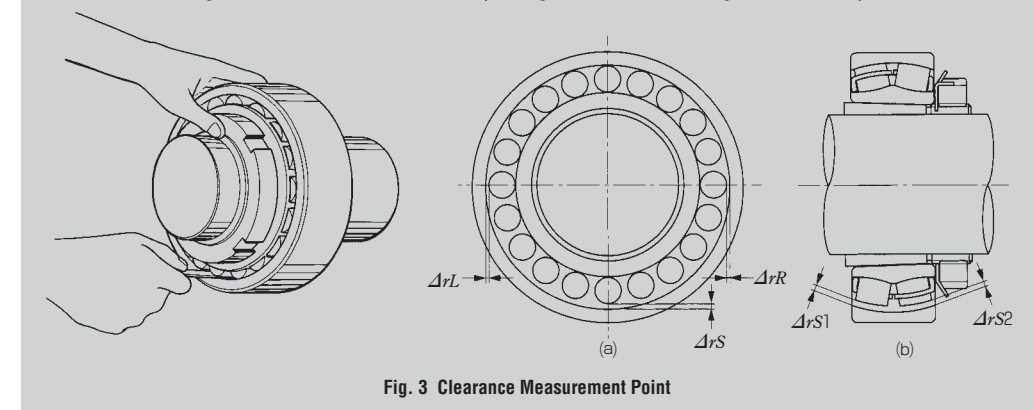


Fig. 3 Clearance Measurement Point

SPHERICAL ROLLER BEARINGS

3. Temperature Equilibrium When Taking Measurements

To ensure accurate bearing measurement of the internal clearance or dimensions, the temperature of the measurement instrument and that of the components to be measured must be brought to the same temperature. Especially, if the bearing is mounted by using an oil heating tank or induction heater, then measure the internal clearance only after a complete cool down. For example, if a bearing is brought from the warehouse to the measurement place, the temperature of the stored bearing may still be high, thus, if the clearance or dimension were measured without confirming the bearing temperature, the measured value may be wrong.

For a large bearing with an outer ring outside diameter that is larger than 400 mm, if a clearance or dimension measurement is necessary, it is recommended to leave the unpacked bearing for about 24 hours on the surface plate, before making a clearance or dimension measurement. Put the end face of the bearing on a surface plate prior to measurement to ensure a measurement with both objects at the same temperature.

4. Clearance Adjustment When Mounting Bearing on a Tapered Shaft or Sleeve

Mount the bearing with its inner ring having a tapered bore to the tapered shaft or sleeve (adapter, removable sleeve). When pushing in the bearing to the tapered shaft or sleeve, the inner ring of bearing is widened resulting in increase of "interference" and reduction of internal clearance. It is important to give proper interference and internal clearance when mounting the bearing. Next, we show the reduction amount of the clearance to achieve the proper mounting.

Mounting of spherical roller bearings having tapered bore Table 2

When mounting a bearing, each time the bearing is pushed further onto the tapered shaft or sleeve, measure the variation of internal clearance and repeat the above procedure until the clearance reduction amount to the specified value listed in the Table 2 is attained. This procedure is called "Clearance adjustment" and when the clearance reduction amount is attained, the clearance necessary for bearing running is secured. The confirmation of the clearance reduction amount by measurement with a thickness gauge is very important. Depending on the method of clearance adjustment, the measured value obtained with the thickness gauge may not be correct. Therefore, the following corrective procedure must be executed.

- In case to heat
When the temperatures of bearing and shaft are both at the same room temperature, measure again the clearance with the thickness gauge to

- confirm that the specified value is secured.
- In case that a lock-washer is used as a turning stopper of the lock nut.
Prior to bending the tooth of the lock-washer into cutout of lock nut, measure again the clearance with the thickness gauge to confirm that the specified value is secured.
- In case a hydraulic nut is used
After removal of the hydraulic nut, mount the lock nut and measure the clearance again to confirm that the specified value remains constant prior to stopping the turning.
- In case an oil injection pump is used
Drop to zero the pressure of high pressure oil fed from the oil injection pump so that there is no pressure on bearing or sleeve fitted part. Next, measure the clearance with the thickness gauge to confirm that the specified value remains secured.

Radial Internal Clearance and Clearance Reduction Amount of the Bearing to be Mounted

- When radial internal clearance is CN clearance (normal clearance)
Perform the clearance adjustment while aiming at a middle value between minimum and maximum clearance reduction amount.
- When radial internal clearance is C3 or C4 clearance
Perform the clearance adjustment aiming at the maximum clearance reduction amount.

Internal Clearance Adjustment of Tapered-Bore Bearings

Perform the adjustment by measuring the clearance reduction amount with the thickness gauge.

- For measurement position and measured point, refer to Section 2.(Page C262) of this manual.
- To mount a bearing on a tapered shaft, perform each time when the bearing is pushed in by the lock nut, end plate, end cap or hydraulic nut.
- When using an adapter sleeve, perform each time when the bearing is pushed in by the lock nut or hydraulic nut.
- When using a removable sleeve, perform each time when the removable sleeve is pushed in by the lock nut or hydraulic nut.

When measuring the clearance during those operations, as the outer ring of bearing is hanging down from of rollers, turn the outer ring to right and left by one half to one full rotation while keeping the bearing in its correct posture. Position one randomly chosen roller from each row of rollers to the exact bottom position. Then, insert the thickness gauge to an appropriate place depending on size of the outer ring outside diameter to measure the internal clearance. For the clearance adjustment, the measured value of each clearance measurement shall be recorded.

Table 2 Mounting of Spherical Roller Bearings with Tapered Bores

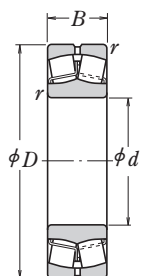
Units : mm

Bearing Bore Diameter <i>d</i> (mm)		Reduction in Radial Clearance		Axial Movement				Minimum Permissible Residual Clearance		
				Taper 1 : 12		Taper 1 : 30		CN	C3	C4
over	incl.	min.	max.	min.	max.	min.	max.			
30	40	0.025	0.030	0.40	0.45	—	—	0.010	0.025	0.035
40	50	0.030	0.035	0.45	0.55	—	—	0.015	0.030	0.045
50	65	0.030	0.035	0.45	0.55	—	—	0.025	0.035	0.060
65	80	0.040	0.045	0.60	0.70	—	—	0.030	0.040	0.075
80	100	0.045	0.055	0.70	0.85	1.75	2.15	0.035	0.050	0.085
100	120	0.050	0.060	0.75	0.90	1.9	2.25	0.045	0.065	0.110
120	140	0.060	0.070	0.90	1.1	2.25	2.75	0.055	0.080	0.130
140	160	0.065	0.080	1.0	1.3	2.5	3.25	0.060	0.100	0.150
160	180	0.070	0.090	1.1	1.4	2.75	3.5	0.070	0.110	0.170
180	200	0.080	0.100	1.3	1.6	3.25	4.0	0.070	0.110	0.190
200	225	0.090	0.110	1.4	1.7	3.5	4.25	0.080	0.130	0.210
225	250	0.100	0.120	1.6	1.9	4.0	4.75	0.090	0.140	0.230
250	280	0.110	0.140	1.7	2.2	4.25	5.5	0.100	0.150	0.250
280	315	0.120	0.150	1.9	2.4	4.75	6.0	0.110	0.160	0.280
315	355	0.140	0.170	2.2	2.7	5.5	6.75	0.120	0.180	0.300
355	400	0.150	0.190	2.4	3.0	6.0	7.5	0.130	0.200	0.330
400	450	0.170	0.210	2.7	3.3	6.75	8.25	0.140	0.220	0.360
450	500	0.190	0.240	3.0	3.7	7.5	9.25	0.160	0.240	0.390
500	560	0.210	0.270	3.4	4.3	8.5	11.0	0.170	0.270	0.410
560	630	0.230	0.300	3.7	4.8	9.25	12.0	0.200	0.310	0.460
630	710	0.260	0.330	4.2	5.3	10.5	13.0	0.220	0.330	0.520
710	800	0.280	0.370	4.5	5.9	11.5	15.0	0.240	0.390	0.590
800	900	0.310	0.410	5.0	6.6	12.5	16.5	0.280	0.430	0.660
900	1000	0.340	0.460	5.5	7.4	14.0	18.5	0.310	0.470	0.730
1000	1120	0.370	0.500	5.9	8.0	15.0	20.0	0.360	0.530	0.800

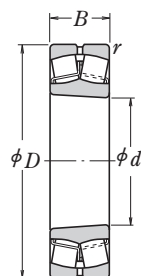
Remarks The values for reduction in radial internal clearance are for bearings with CN clearance.
For bearings with C3 or C4 Clearance, the maximum values listed should be used for the reduction in radial internal clearance.

SPHERICAL ROLLER BEARINGS

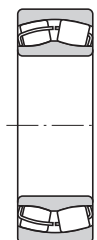
Bore Diameter 20 – 55 mm



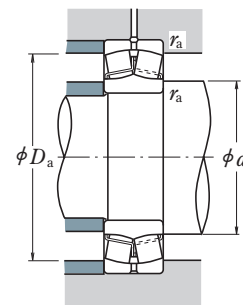
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

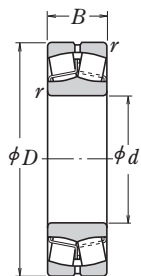
Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)					Constant e	Axial Load Factors			Mass (kg) approx.	
d	D	B	r min.	C_r	C_{0r}		Mechanical	Grease		Cylindrical Bore	Tapered Bore ⁽¹⁾	d_a		D_a		r_a	Y_2	Y_3		Y_0
												min.	max.	max.	min.	max.				
20	52	15	1.1	29 300	26 900	10 000	—	6 300	21304CDE4	21304CDKE4	27	28	45	42	1	0.31	3.2	2.1	2.1	0.17
25	52	18	1	37 500	37 000	10 000	—	7 100	22205CE4	22205CKE4	31	31	46	45	1	0.35	2.9	1.9	1.9	0.17
	62	17	1.1	43 000	40 500	9 000	—	5 300	21305CDE4	21305CDKE4	32	34	55	51	1	0.29	3.4	2.3	2.3	0.26
30	62	20	1	50 000	50 000	8 500	—	6 000	22206CE4	22206CKE4	36	37	56	54	1	0.33	3.1	2.1	2.0	0.27
	72	19	1.1	55 000	54 000	7 500	—	4 500	21306CDE4	21306CDKE4	37	40	65	59	1	0.28	3.6	2.4	2.3	0.39
35	72	23	1.1	69 000	71 000	7 500	—	5 300	22207CE4	22207CKE4	42	43	65	63	1	0.32	3.1	2.1	2.0	0.42
	80	21	1.5	71 500	76 000	7 100	—	4 000	21307CDE4	21307CDKE4	44	47	71	67	1.5	0.28	3.6	2.4	2.4	0.53
40	80	23	1.1	113 000	99 500	7 100	12 000	6 700	*22208EAE4	*22208EAKE4	47	49	73	70	1	0.28	3.6	2.4	2.4	0.50
	90	23	1.5	118 000	111 000	6 700	11 000	6 000	*21308EAE4	*21308EAKE4	49	54	81	75	1.5	0.25	3.9	2.7	2.6	0.73
	90	33	1.5	170 000	153 000	5 600	9 000	5 300	*22308EAE4	*22308EAKE4	49	52	81	77	1.5	0.35	2.8	1.9	1.9	0.98
45	85	23	1.1	118 000	111 000	6 300	11 000	6 000	*22209EAE4	*22209EAKE4	52	54	78	75	1	0.25	3.9	2.7	2.6	0.55
	100	25	1.5	149 000	144 000	6 000	9 000	5 000	*21309EAE4	*21309EAKE4	54	65	91	89	1.5	0.23	4.3	2.9	2.8	0.96
	100	36	1.5	207 000	195 000	5 000	8 000	4 500	*22309EAE4	*22309EAKE4	54	59	91	86	1.5	0.34	2.9	2.0	1.9	1.34
50	90	23	1.1	124 000	119 000	6 000	9 500	5 600	*22210EAE4	*22210EAKE4	57	60	83	81	1	0.24	4.3	2.9	2.8	0.61
	110	27	2	178 000	174 000	5 300	8 000	4 500	*21310EAE4	*21310EAKE4	60	72	100	98	2	0.23	4.4	3.0	2.9	1.21
	110	40	2	246 000	234 000	4 800	7 100	4 300	*22310EAE4	*22310EAKE4	60	64	100	93	2	0.35	2.8	1.9	1.9	1.78
55	100	25	1.5	149 000	144 000	5 300	9 000	5 300	*22211EAE4	*22211EAKE4	64	65	91	89	1.5	0.23	4.3	2.9	2.8	0.81
	120	29	2	178 000	174 000	5 300	8 000	4 500	*21311EAE4	*21311EAKE4	65	72	110	98	2	0.23	4.4	3.0	2.9	1.58
	120	43	2	292 000	292 000	4 300	6 000	3 800	*22311EAE4	*22311EAKE4	65	73	110	103	2	0.34	2.9	2.0	1.9	2.3

Note (1) The suffix K represents bearings with tapered bores (taper 1:12).

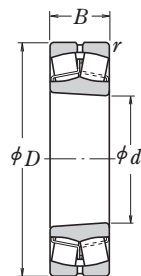
Remarks 1. The bearings denoted by an asterisk (*) are NSKHPS™ bearings and an oil groove and holes are standard for them.
 2. When making a selection of the recommended fit (Tolerance of shaft) on Page A164, in case of NSKHPS™ bearings, the conditions are different.
 The segmentations are: Light Loads(≤0.05C_r); Normal Loads(0.05 to 0.10C_r); and Heavy Loads(>0.10C_r).
 3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C348 – C349, and C356.

SPHERICAL ROLLER BEARINGS

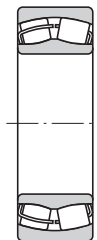
Bore Diameter 60 – 90 mm



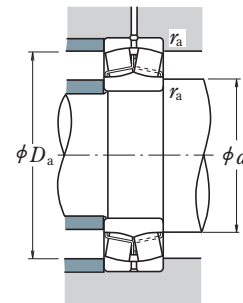
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

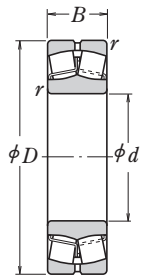
Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)					Constant e	Axial Load Factors			Mass (kg) approx.		
d	D	B	r min.	C_r	C_{0r}		Limiting Speeds			Cylindrical Bore	Tapered Bore ⁽¹⁾	d_a		D_a		r_a	Y_2	Y_3		Y_0	
							Mechanical	Grease				min.	max.	max.							min.
60	95	26	1.1	98 500	141 000	4 800	—	3 600	*23012CE4 *22212EAE4 *21312EAE4 *22312EAE4	*23012CKE4 *22212EAKE4 *21312EAKE4 *22312EAKE4	67	68	88	85	1	0.26	3.9	2.6	2.5	0.68	
	110	28	1.5	178 000	174 000	5 300	8 000	4 800			69	72	101	98	1.5	0.23	4.4	3.0	2.9	1.1	
	130	31	2.1	238 000	244 000	4 800	6 700	3 800			72	87	118	117	2	0.22	4.5	3.0	3.0	1.98	
	130	46	2.1	340 000	340 000	4 000	5 600	3 600			72	79	118	111	2	0.34	3.0	2.0	1.9	2.89	
65	120	31	1.5	221 000	230 000	4 800	7 500	4 300	*22213EAE4 *21313EAE4 *22313EAE4	*22213EAKE4 *21313EAKE4 *22313EAKE4	74	80	111	107	1.5	0.24	4.2	2.8	2.7	1.51	
	140	33	2.1	264 000	275 000	4 500	6 000	3 600			77	94	128	126	2	0.22	4.6	3.1	3.0	2.45	
	140	48	2.1	375 000	380 000	3 800	5 000	3 200			77	84	128	119	2	0.33	3.0	2.0	2.0	3.52	
70	125	31	1.5	225 000	232 000	4 500	7 100	4 000	*22214EAE4 *21314EAE4 *22314EAE4	*22214EAKE4 *21314EAKE4 *22314EAKE4	79	84	116	111	1.5	0.23	4.3	2.9	2.8	1.58	
	150	35	2.1	310 000	325 000	4 300	5 600	3 200			82	101	138	135	2	0.22	4.6	3.1	3.0	3.0	
	150	51	2.1	425 000	435 000	3 600	4 800	3 000			82	91	138	129	2	0.33	3.0	2.0	2.0	4.28	
75	130	31	1.5	238 000	244 000	4 300	6 700	4 000	*22215EAE4 *21315EAE4 *22315EAE4	*22215EAKE4 *21315EAKE4 *22315EAKE4	84	87	121	117	1.5	0.22	4.5	3.0	3.0	1.64	
	160	37	2.1	310 000	325 000	4 000	5 600	3 200			87	101	148	134	2	0.22	4.6	3.1	3.0	3.64	
	160	55	2.1	485 000	505 000	3 400	4 300	2 800			87	97	148	137	2	0.33	3.0	2.0	2.0	5.26	
80	140	33	2	264 000	275 000	4 000	6 000	3 600	*22216EAE4 *21316EAE4 *22316EAE4	*22216EAKE4 *21316EAKE4 *22316EAKE4	90	94	130	126	2	0.22	4.6	3.1	3.0	2.01	
	170	39	2.1	355 000	375 000	3 800	4 800	3 000			92	109	158	146	2	0.23	4.4	3.0	2.9	4.32	
	170	58	2.1	540 000	565 000	3 200	3 800	2 600			92	103	158	145	2	0.33	3.0	2.0	2.0	6.23	
85	150	36	2	310 000	325 000	4 000	5 600	3 400	*22217EAE4 *21317EAE4 *22317EAE4	*22217EAKE4 *21317EAKE4 *22317EAKE4	95	101	140	135	2	0.22	4.6	3.1	3.0	2.54	
	180	41	3	360 000	395 000	3 800	5 000	3 000			99	108	166	142	2.5	0.24	4.3	2.9	2.8	5.2	
	180	60	3	600 000	630 000	3 000	3 400	2 400			99	110	166	155	2.5	0.33	3.1	2.1	2.0	7.23	
90	160	40	2	360 000	395 000	3 800	5 000	3 200	*22218EAE4 *23218CE4 *21318EAE4 *22318EAE4	*22218EAKE4 *23218CKE4 *21318EAKE4 *22318EAKE4	100	108	150	142	2	0.24	4.3	2.9	2.8	3.3	
	160	52.4	2	340 000	490 000	2 800	—	1 800			100	105	150	138	2	0.32	3.2	2.1	2.1	4.51	
	190	43	3	415 000	450 000	3 600	4 500	2 800			104	115	176	152	2.5	0.24	4.3	2.9	2.8	6.1	
	190	64	3	665 000	705 000	2 800	3 000	2 400			104	115	176	163	2.5	0.33	3.1	2.1	2.0	8.56	

Note (1) The suffix K represents bearings with tapered bores (taper 1:12).

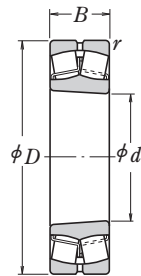
Remarks 1. The bearings denoted by an asterisk (*) are NSKHPS™ bearings and an oil groove and holes are standard for them.
 2. When making a selection of the recommended fit (Tolerance of shaft) on Page A164, in case of NSKHPS™ bearings, the conditions are different.
 The segmentations are: Light Loads(≤0.05C_r); Normal Loads(0.05 to 0.10C_r); and Heavy Loads(>0.10C_r).
 3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C349 – C351, and C356 – C357.

SPHERICAL ROLLER BEARINGS

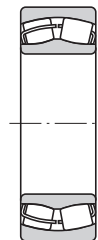
Bore Diameter 95 – 110 mm



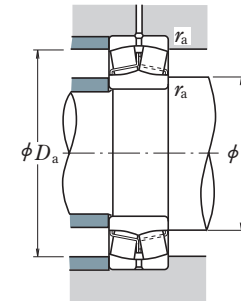
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$
The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

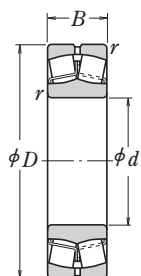
Boundary Dimensions (mm)	Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min^{-1})		Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant e	Axial Load Factors			Mass (kg)			
				Limiting Speeds Mechanical	Grease		d_a min.	d_a max.	D_a min.	D_a max.		r_a min.	r_a max.	Y_2		Y_3	Y_0	
95	170	43	2.1			415 000					450 000				3 800			*22219EAE4 23219CAME4 *21319CAME4
	170	55.6	2.1	370 000	525 000	2 600	107	—	158	146	2	0.32	3.1	2.1	2.0	5.33		
	200	45	3	430 000	435 000	3 600	109	127	186	172	2.5	0.22	4.6	3.1	3.0	6.92		
	200	45	3	345 000	435 000	3 600	21319CE4 *22319EAE4	21319CKE4 *22319EAKE4	109	127	186	172	2.5	0.22	4.6	3.1	3.0	6.92
	200	67	3	735 000	780 000	2 600			109	121	186	172	2.5	0.33	3.1	2.1	2.0	9.91
	100	150	37	1.5	212 000	335 000	3 200	23020CDE4 24020CE4 23120CE4	23020CDKE4 24020CK30E4 23120CKE4	109	112	141	136	1.5	0.22	4.6	3.1	3.0
150		50	1.5	276 000	470 000	2 800	109			110	141	132	1.5	0.30	3.4	2.3	2.2	3.08
165		52	2	345 000	530 000	2 800	110			113	155	144	2	0.30	3.4	2.3	2.2	4.38
165		65	2	345 000	535 000	2 400	24120CAME4 *22220EAE4 *23220CAME4	24120CAME4 *22220EAKE4 *23220CAMKE4	110	—	155	143	2	0.35	2.9	1.9	1.9	5.42
180		46	2.1	455 000	490 000	3 600			112	119	168	160	2	0.24	4.3	2.9	2.8	4.84
180		60.3	2.1	525 000	605 000	2 800			112	118	168	155	2	0.32	3.2	2.1	2.1	6.6
180	60.3	2.1	420 000	605 000	2 800	23220CE4 *21320CAME4 21320CE4 *22320CAME4 ⁽²⁾	23220CKE4 *21320CAMKE4 21320CKE4 *22320CAMKE4 ⁽²⁾	112	118	168	155	2	0.32	3.2	2.1	2.1	6.6	
215	47	3	495 000	485 000	3 400			114	133	201	184	2.5	0.21	4.7	3.2	3.1	8.46	
215	47	3	395 000	485 000	3 400			114	133	201	184	2.5	0.21	4.7	3.2	3.1	8.46	
215	73	3	750 000	785 000	2 600			114	130	201	184	2.5	0.33	3.0	2.0	2.0	12.7	
110	170	45	2	293 000	465 000	3 200	23022CDE4 24022CE4 *23122CAME4	23022CDKE4 24022CK30E4 *23122CAMKE4	120	124	160	153	2	0.24	4.2	2.8	2.8	3.76
	170	60	2	380 000	645 000	2 800			120	121	160	148	2	0.32	3.1	2.1	2.1	4.96
	180	56	2	480 000	630 000	3 200			120	127	170	158	2	0.28	3.5	2.4	2.3	5.7
	180	56	2	385 000	630 000	3 200	23122CE4 *24122CAME4 24122CE4	23122CKE4 *24122CAMK30E4 24122CK30E4	120	127	170	158	2	0.28	3.5	2.4	2.3	5.7
	180	69	2	575 000	750 000	2 200			120	123	170	154	2	0.36	2.8	1.9	1.8	6.84
	180	69	2	460 000	750 000	2 200			120	123	170	154	2	0.36	2.8	1.9	1.8	6.84
200	53	2.1	605 000	645 000	3 400	*22222EAE4 *23222CAME4 23222CE4	*22222EAKE4 *23222CAMKE4 23222CKE4	122	129	188	178	2	0.25	4.0	2.7	2.6	6.99	
200	69.8	2.1	645 000	760 000	2 600			122	130	188	170	2	0.34	3.0	2.0	1.9	9.54	
200	69.8	2.1	515 000	760 000	2 200			122	130	188	170	2	0.34	3.0	2.0	1.9	9.54	
240	50	3	565 000	545 000	3 000	*21322CAME4 *22322CAME4 ⁽²⁾	*21322CAMKE4 *22322CAMKE4 ⁽²⁾	124	—	226	206	2.5	0.22	4.6	3.1	3.0	11.2	
240	80	3	925 000	980 000	2 200			124	145	226	206	2.5	0.33	3.1	2.1	2.0	17.6	

Notes (1) The suffix K or K30 represents bearings with tapered bores (taper 1:12 or 1:30).
(2) EA is also available. Load rating of EA is around 10% higher than CAM's, please consult NSK.

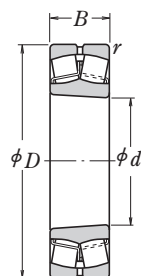
Remarks 1. The bearings denoted by an asterisk (*) are NSKHPS™ bearings and an oil groove and holes are standard for them.
2. When making a selection of the recommended fit (Tolerance of shaft) on Page A164, in case of NSKHPS™ bearings, the conditions are different.
The segmentations are: Light Loads($\leq 0.05C_r$); Normal Loads(0.05 to 0.10 C_r); and Heavy Loads(>0.10 C_r).
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C351, and C357.

SPHERICAL ROLLER BEARINGS

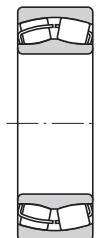
Bore Diameter 120 – 130 mm



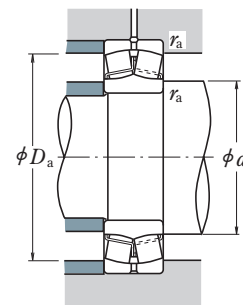
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

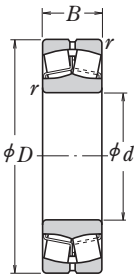
Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)					Constant e	Axial Load Factors			Mass (kg) approx.		
d	D	B	r min.	C_r	C_{0r}		Limiting Speeds			Cylindrical Bore	Tapered Bore ⁽¹⁾	d_a		D_a		r_a max.	Y_2	Y_3		Y_0	
							Mechanical	Grease				min.	max.	min.							max.
120	180	46	2	395 000	525 000	3 200	4 500	1 800	*23024CAME4	*23024CAMKE4	130	134	170	163	2	0.22	4.5	3.0	2.9	4.11	
	180	46	2	315 000	525 000	3 200	—	1 800	23024CDE4	23024CDKE4	130	134	170	163	2	0.22	4.5	3.0	2.9	4.11	
	180	60	2	480 000	680 000	2 600	3 600	1 500	*24024CAME4	*24024CAMK30E4	130	131	170	158	2	0.32	3.2	2.1	2.1	5.33	
	180	60	2	395 000	705 000	2 600	—	1 500	24024CE4	24024CK30E4	130	131	170	158	2	0.32	3.2	2.1	2.1	5.33	
	200	62	2	580 000	720 000	2 800	3 600	1 400	*23124CAME4	*23124CAMKE4	130	138	190	175	2	0.29	3.5	2.4	2.3	7.85	
	200	62	2	465 000	720 000	2 800	—	1 400	23124CE4	23124CKE4	130	138	190	175	2	0.29	3.5	2.4	2.3	7.85	
	200	80	2	695 000	905 000	2 000	3 000	1 400	*24124CAME4	*24124CAMK30E4	130	136	190	171	2	0.37	2.7	1.8	1.8	10	
	200	80	2	575 000	950 000	2 000	—	1 400	24124CE4	24124CK30E4	130	136	190	171	2	0.37	2.7	1.8	1.8	10	
	215	58	2.1	685 000	765 000	3 200	3 000	2 400	*22224EAE4	*22224EAKE4	132	142	203	190	2	0.25	3.9	2.7	2.6	8.8	
	215	76	2.1	790 000	970 000	2 200	3 000	1 300	*23224CAME4	*23224CAMKE4	132	140	203	182	2	0.34	2.9	2.0	1.9	12.1	
130	200	52	2	500 000	655 000	3 000	3 800	1 700	*23026CAME4	*23026CAMKE4	140	147	190	180	2	0.23	4.3	2.9	2.8	5.98	
	200	52	2	400 000	655 000	3 000	—	1 700	23026CDE4	23026CDKE4	140	147	190	180	2	0.23	4.3	2.9	2.8	5.98	
	200	69	2	620 000	865 000	2 200	3 200	1 400	*24026CAME4	*24026CAMK30E4	140	143	190	175	2	0.31	3.2	2.2	2.1	7.84	
	200	69	2	495 000	865 000	2 200	—	1 400	24026CE4	24026CK30E4	140	143	190	175	2	0.31	3.2	2.2	2.1	7.84	
	210	64	2	630 000	825 000	2 600	3 400	1 300	*23126CAME4	*23126CAMKE4	140	149	200	184	2	0.28	3.6	2.4	2.4	8.69	
	210	64	2	505 000	825 000	2 600	—	1 300	23126CE4	23126CKE4	140	149	200	184	2	0.28	3.6	2.4	2.4	8.69	
	210	80	2	735 000	1 010 000	1 800	2 800	1 300	*24126CAME4	*24126CAMK30E4	140	146	200	180	2	0.35	2.9	1.9	1.9	10.7	
	210	80	2	590 000	1 010 000	1 800	—	1 300	24126CE4	24126CK30E4	140	146	200	180	2	0.35	2.9	1.9	1.9	10.7	
	230	64	3	820 000	940 000	2 800	2 600	2 200	*22226EAE4	*22226EAKE4	144	152	216	204	2.5	0.26	3.8	2.6	2.5	11	
	230	80	3	875 000	1 080 000	2 000	2 800	1 200	*23226CAME4	*23226CAMKE4	144	150	216	196	2.5	0.34	2.9	2.0	1.9	14.3	
230	80	3	700 000	1 080 000	2 000	—	1 200	23226CE4	23226CKE4	144	150	216	196	2.5	0.34	2.9	2.0	1.9	14.3		
280	93	4	1 240 000	1 350 000	1 800	2 600	1 300	*22326CAME4	*22326CAMKE4	148	166	262	236	3	0.34	2.9	2.0	1.9	28.1		
280	93	4	995 000	1 350 000	1 800	—	1 300	22326CE4	22326CKE4	148	166	262	236	3	0.34	2.9	2.0	1.9	28.1		

Notes (1) The suffix K or K30 represents bearings with tapered bores (taper 1:12 or 1:30).
 (2) EA is also available. Load rating of EA is around 10% higher than CAM's, please consult NSK.

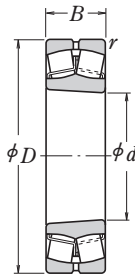
Remarks 1. The bearings denoted by an asterisk (*) are NSKHPS™ bearings and an oil groove and holes are standard for them.
 2. When making a selection of the recommended fit (Tolerance of shaft) on Page A164, in case of NSKHPS™ bearings, the conditions are different.
 The segmentations are: Light Loads(≤0.05C_r); Normal Loads(0.05 to 0.10C_r); and Heavy Loads(>0.10C_r).
 3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C351, and C357.

SPHERICAL ROLLER BEARINGS

Bore Diameter 140 – 150 mm



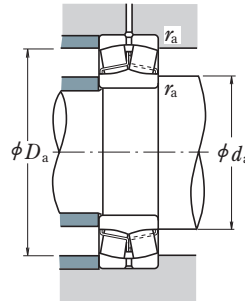
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)	Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)																
																	d	D	B	r min.	C_r	C_{0r}	Cylindrical Bore	Tapered Bore ⁽¹⁾	d_a	D_a	r_a	e	Y_2	Y_3	Y_0	approx.
																									min.	max.	min.	max.				
140	210	53	2	525 000	715 000	2 800	3 800	1 600	*23028CAME4	*23028CAMKE4	150	157	200	190	2	0.22	4.5	3.0	2.9	6.49												
	210	53	2	420 000	715 000	2 800	—	1 600	23028CDE4	23028CDKE4	150	157	200	190	2	0.22	4.5	3.0	2.9	6.49												
	210	69	2	635 000	905 000	2 200	3 000	1 300	*24028CAME4	*24028CAMK30E4	150	154	200	186	2	0.29	3.4	2.3	2.2	8.37												
	210	69	2	525 000	945 000	2 200	—	1 300	24028CE4	24028CK30E4	150	154	200	186	2	0.29	3.4	2.3	2.2	8.37												
	225	68	2.1	725 000	945 000	2 400	3 200	1 200	*23128CAME4	*23128CAMKE4	152	158	213	198	2	0.28	3.6	2.4	2.3	10.5												
	225	68	2.1	580 000	945 000	2 400	—	1 200	23128CE4	23128CKE4	152	158	213	198	2	0.28	3.6	2.4	2.3	10.5												
	225	85	2.1	835 000	1 160 000	1 600	2 600	1 200	*24128CAME4	*24128CAMK30E4	152	156	213	193	2	0.35	2.9	1.9	1.9	13												
	225	85	2.1	670 000	1 160 000	1 600	—	1 200	24128CE4	24128CK30E4	152	156	213	193	2	0.35	2.9	1.9	1.9	13												
	250	68	3	835 000	945 000	2 600	3 200	1 400	*22228CAME4	*22228CAMKE4	154	167	236	219	2.5	0.25	4.0	2.7	2.6	14.5												
	250	68	3	645 000	930 000	2 600	—	1 400	22228CDE4	22228CDKE4	154	167	236	219	2.5	0.25	4.0	2.7	2.6	14.5												
	250	88	3	1 040 000	1 300 000	1 800	2 600	1 100	*23228CAME4	*23228CAMKE4	154	163	236	213	2.5	0.35	2.9	1.9	1.9	18.8												
	250	88	3	835 000	1 300 000	1 800	—	1 100	23228CE4	23228CKE4	154	163	236	213	2.5	0.35	2.9	1.9	1.9	18.8												
	300	102	4	1 450 000	1 590 000	1 700	2 400	1 200	*22328CAME4	*22328CAMKE4	158	177	282	253	3	0.35	2.9	1.9	1.9	35.4												
	300	102	4	1 160 000	1 590 000	1 700	—	1 200	22328CE4	22328CKE4	158	177	282	253	3	0.35	2.9	1.9	1.9	35.4												
	150	225	56	2.1	590 000	815 000	2 600	3 600	1 400	*23030CAME4	*23030CAMKE4	162	168	213	203	2	0.22	4.6	3.1	3.0	7.9											
		225	56	2.1	470 000	815 000	2 600	—	1 400	23030CDE4	23030CDKE4	162	168	213	203	2	0.22	4.6	3.1	3.0	7.9											
225		75	2.1	740 000	1 090 000	1 900	3 000	1 200	*24030CAME4	*24030CAMK30E4	162	165	213	198	2	0.30	3.4	2.3	2.2	10.5												
225		75	2.1	590 000	1 090 000	1 900	—	1 200	24030CE4	24030CK30E4	162	165	213	198	2	0.30	3.4	2.3	2.2	10.5												
250		80	2.1	905 000	1 180 000	2 200	2 800	1 100	*23130CAME4	*23130CAMKE4	162	174	238	218	2	0.30	3.4	2.3	2.2	15.8												
250		80	2.1	725 000	1 180 000	2 200	—	1 100	23130CE4	23130CKE4	162	174	238	218	2	0.30	3.4	2.3	2.2	15.8												
250		100	2.1	1 070 000	1 450 000	1 400	2 400	1 100	*24130CAME4	*24130CAMK30E4	162	169	238	212	2	0.38	2.6	1.8	1.7	19.8												
250		100	2.1	890 000	1 530 000	1 400	—	1 100	24130CE4	24130CK30E4	162	169	238	212	2	0.38	2.6	1.8	1.7	19.8												
270		73	3	955 000	1 120 000	2 400	3 000	1 300	*22230CAME4	*22230CAMKE4	164	179	256	236	2.5	0.26	3.9	2.6	2.5	18.4												
270		73	3	765 000	1 120 000	2 400	—	1 300	22230CDE4	22230CDKE4	164	179	256	236	2.5	0.26	3.9	2.6	2.5	18.4												
270		96	3	1 220 000	1 560 000	1 700	2 400	1 100	*23230CAME4	*23230CAMKE4	164	176	256	230	2.5	0.35	2.9	1.9	1.9	24.2												
270		96	3	975 000	1 560 000	1 700	—	1 100	23230CE4	23230CKE4	164	176	256	230	2.5	0.35	2.9	1.9	1.9	24.2												
320		108	4	1 530 000	1 690 000	1 600	2 200	1 100	*22330CAME4	*22330CAMKE4	168	—	302	270	3	0.35	2.9	1.9	1.9	41.5												

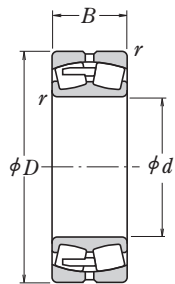
Note ⁽¹⁾ The suffix K or K30 represents bearings with tapered bores (taper 1:12 or 1:30).

Remarks

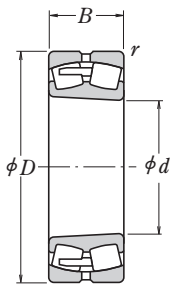
- The bearings denoted by an asterisk (*) are NSKHPS™ bearings and an oil groove and holes are standard for them.
- When making a selection of the recommended fit (Tolerance of shaft) on Page A164, in case of NSKHPS™ bearings, the conditions are different.
The segmentations are: Light Loads ($\leq 0.05C_r$); Normal Loads (0.05 to 0.10 C_r); and Heavy Loads (>0.10 C_r).
- For the dimensions of adapters and withdrawal sleeves, refer to Pages C352, and C357 – C358.

■ SPHERICAL ROLLER BEARINGS

Bore Diameter 160 – 170 mm



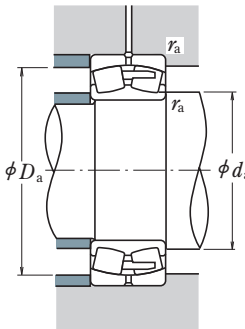
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

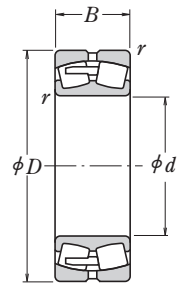
Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min^{-1})		Bearing Numbers	Abutment and Fillet Dimensions (mm)					Constant e	Axial Load Factors			Mass (kg) approx.	
d	D	B	r min.	C_r	C_{0r}		Limiting Speeds Mechanical Grease	Cylindrical Bore		Tapered Bore ⁽¹⁾	d_a		D_a			r_a max.	Y_2	Y_3		Y_0
		min.	max.	min.	max.	d_a min.			d_a max.		D_a min.	D_a max.								
160	220	45	2	450 000	675 000	3 000	3 200	1 400	*23932CAME4	*23932CAMKE4	170	—	210	203	2	0.18	5.6	3.8	3.7	4.97
	240	60	2.1	675 000	955 000	2 400	3 200	1 300	*23032CAME4	*23032CAMKE4	172	179	228	216	2	0.22	4.5	3.0	2.9	9.66
	240	60	2.1	540 000	955 000	2 400	—	1 300	23032CDE4	23032CDE4	172	179	228	216	2	0.22	4.5	3.0	2.9	9.66
	240	80	2.1	845 000	1 260 000	1 800	2 800	1 100	*24032CAME4	*24032CAMK30E4	172	177	228	212	2	0.30	3.4	2.3	2.2	12.7
	240	80	2.1	680 000	1 260 000	1 800	—	1 100	24032CE4	24032CK30E4	172	177	228	212	2	0.30	3.4	2.3	2.2	12.7
	270	86	2.1	1 070 000	1 400 000	2 000	2 600	1 000	*23132CAME4	*23132CAMKE4	172	185	258	234	2	0.30	3.4	2.3	2.2	20.3
	270	86	2.1	855 000	1 400 000	2 000	—	1 000	23132CE4	23132CKE4	172	185	258	234	2	0.30	3.4	2.3	2.2	20.3
	270	109	2.1	1 240 000	1 670 000	1 300	2 200	1 000	*24132CAME4	*24132CAMK30E4	172	179	258	229	2	0.39	2.6	1.7	1.7	25.4
	270	109	2.1	1 040 000	1 760 000	1 300	—	1 000	24132CE4	24132CK30E4	172	179	258	229	2	0.39	2.6	1.7	1.7	25.4
	290	80	3	1 140 000	1 320 000	2 200	2 800	1 200	*22232CAME4	*22232CAMKE4	174	190	276	255	2.5	0.26	3.8	2.6	2.5	23.1
	290	80	3	910 000	1 320 000	2 200	—	1 200	22232CDE4	22232CDE4	174	190	276	255	2.5	0.26	3.8	2.6	2.5	23.1
	290	104	3	1 370 000	1 770 000	1 500	2 200	1 000	*23232CAME4	*23232CAMKE4	174	189	276	245	2.5	0.34	2.9	2.0	1.9	30.5
	290	104	3	1 100 000	1 770 000	1 500	—	1 000	23232CE4	23232CKE4	174	189	276	245	2.5	0.34	2.9	2.0	1.9	30.5
	340	114	4	1 700 000	1 900 000	1 400	2 200	1 100	*22332CAME4	*22332CAMKE4	178	—	322	287	3	0.35	2.9	1.9	1.9	49.3
	22332CDE4																			
170	230	45	2	450 000	680 000	3 000	3 600	1 400	*23934CAME4	*23934CAMKE4	180	—	220	213	2	0.17	5.8	3.9	3.8	5.38
	260	67	2.1	795 000	1 090 000	2 200	3 000	1 200	*23034CAME4	*23034CAMKE4	182	191	248	233	2	0.23	4.3	2.9	2.8	13
	260	67	2.1	640 000	1 090 000	2 200	—	1 200	23034CDE4	23034CDE4	182	191	248	233	2	0.23	4.3	2.9	2.8	13
	260	90	2.1	1 030 000	1 520 000	1 600	2 400	1 000	*24034CAME4	*24034CAMK30E4	182	188	248	228	2	0.31	3.2	2.2	2.1	17.3
	260	90	2.1	825 000	1 520 000	1 600	—	1 000	24034CE4	24034CK30E4	182	188	248	228	2	0.31	3.2	2.2	2.1	17.3
	280	88	2.1	1 180 000	1 570 000	1 800	2 600	1 000	*23134CAME4	*23134CAMKE4	182	194	268	245	2	0.29	3.5	2.3	2.3	21.8
	280	88	2.1	940 000	1 570 000	1 800	—	1 000	23134CE4	23134CKE4	182	194	268	245	2	0.29	3.5	2.3	2.3	21.8
	280	109	2.1	1 280 000	1 770 000	1 200	2 200	1 000	*24134CAME4	*24134CAMK30E4	182	190	268	239	2	0.37	2.7	1.8	1.8	26.6
	280	109	2.1	1 080 000	1 860 000	1 200	—	1 000	24134CE4	24134CK30E4	182	190	268	239	2	0.37	2.7	1.8	1.8	26.6
	310	86	4	1 240 000	1 500 000	2 000	2 600	1 100	*22234CAME4	*22234CAMKE4	188	206	292	270	3	0.26	3.8	2.6	2.5	28.8
	310	86	4	990 000	1 500 000	2 000	—	1 100	22234CDE4	22234CDE4	188	206	292	270	3	0.26	3.8	2.6	2.5	28.8
	310	110	4	1 500 000	1 910 000	1 400	2 200	900	*23234CAME4	*23234CAMKE4	188	201	292	261	3	0.34	2.9	2.0	1.9	36.4
	310	110	4	1 200 000	1 910 000	1 400	—	900	23234CE4	23234CKE4	188	201	292	261	3	0.34	2.9	2.0	1.9	36.4
	360	120	4	1 970 000	2 110 000	1 300	2 000	1 000	*22334CAME4	*22334CAMKE4	188	—	342	304	3	0.35	2.9	1.9	1.9	57.9

Note ⁽¹⁾ The suffix K or K30 represents bearings with tapered bores (taper 1:12 or 1:30).

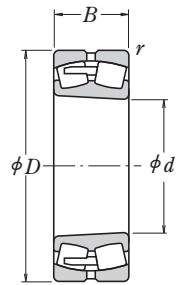
Remarks 1. The bearings denoted by an asterisk (*) are NSKHPS™ bearings and an oil groove and holes are standard for them.
2. When making a selection of the recommended fit (Tolerance of shaft) on Page A164, in case of NSKHPS™ bearings, the conditions are different.
The segmentations are: Light Loads($\leq 0.05C_r$); Normal Loads(0.05 to $0.10C_r$); and Heavy Loads($>0.10C_r$).
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C352, and C358.

■ SPHERICAL ROLLER BEARINGS

Bore Diameter 180 – 190 mm



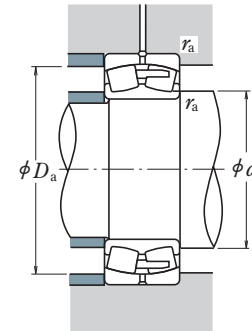
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

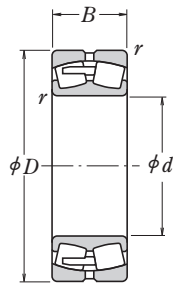
Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)					Constant e	Axial Load Factors			Mass (kg) approx.	
d	D	B	r min.	C_r	C_{0r}		Limiting Speeds			Cylindrical Bore			Tapered Bore(1)			Y_2	Y_3	Y_0		
							Mechanical	Grease		d_a min.	d_a max.	D_a min.	D_a max.	r_a min.						r_a max.
180	250	52	2	590 000	890 000	2 600	3 000	1 200	*23936CAME4	*23936CAMKE4	190	—	240	230	2	0.18	5.5	3.7	3.6	7.64
	280	74	2.1	935 000	1 270 000	2 000	2 800	1 200	*23036CAME4	*23036CAMKE4	192	202	268	249	2	0.24	4.2	2.8	2.8	17.1
	280	74	2.1	750 000	1 270 000	2 000	—	1 200	23036CDE4	23036CDKE4	192	202	268	249	2	0.24	4.2	2.8	2.8	17.1
	280	100	2.1	1 210 000	1 750 000	1 500	2 200	950	*24036CAME4	*24036CAMK30E4	192	200	268	245	2	0.32	3.1	2.1	2.0	22.7
	280	100	2.1	965 000	1 750 000	1 500	—	950	24036CE4	24036CK30E4	192	200	268	245	2	0.32	3.1	2.1	2.0	22.7
	300	96	3	1 320 000	1 760 000	1 700	2 200	900	*23136CAME4	*23136CAMKE4	194	206	286	260	2.5	0.30	3.4	2.3	2.2	27.5
	300	96	3	1 050 000	1 760 000	1 700	—	900	23136CE4	23136CKE4	194	206	286	260	2.5	0.30	3.4	2.3	2.2	27.5
	300	118	3	1 490 000	2 040 000	1 100	2 000	900	*24136CAME4	*24136CAMK30E4	194	202	286	255	2.5	0.37	2.7	1.8	1.8	33.1
	300	118	3	1 190 000	2 040 000	1 100	—	900	24136CE4	24136CK30E4	194	202	286	255	2.5	0.37	2.7	1.8	1.8	33.1
	320	86	4	1 280 000	1 540 000	2 000	2 600	1 100	*22236CAME4	*22236CAMKE4	198	212	302	278	3	0.26	3.9	2.6	2.6	30.2
	320	86	4	1 020 000	1 540 000	2 000	—	1 100	22236CDE4	22236CDKE4	198	212	302	278	3	0.26	3.9	2.6	2.6	30.2
	320	112	4	1 620 000	2 110 000	1 300	2 000	850	*23236CAME4	*23236CAMKE4	198	211	302	274	3	0.33	3.0	2.0	2.0	38.9
	320	112	4	1 300 000	2 110 000	1 300	—	850	23236CE4	23236CKE4	198	211	302	274	3	0.33	3.0	2.0	2.0	38.9
	380	126	4	2 170 000	2 340 000	1 200	2 000	950	*22336CAME4	*22336CAMKE4	198	—	362	322	3	0.34	2.9	2.0	1.9	67
190	260	52	2	575 000	875 000	2 600	3 000	1 200	*23938CAME4	*23938CAMKE4	200	—	250	240	2	0.18	5.7	3.8	3.7	8.03
	290	75	2.1	970 000	1 350 000	2 000	2 600	1 100	*23038CAME4	*23038CAMKE4	202	—	278	261	2	0.24	4.2	2.8	2.8	17.6
	290	100	2.1	1 220 000	1 840 000	1 400	2 200	900	*24038CAME4	*24038CAMK30E4	202	210	278	253	2	0.31	3.2	2.2	2.1	24
	290	100	2.1	975 000	1 840 000	1 400	—	900	24038CE4	24038CK30E4	202	210	278	253	2	0.31	3.2	2.2	2.1	24
	320	104	3	1 480 000	2 020 000	1 600	2 200	850	*23138CAME4	*23138CAMKE4	204	219	306	276	2.5	0.31	3.3	2.2	2.2	34.5
	320	104	3	1 190 000	2 020 000	1 600	—	850	23138CE4	23138CKE4	204	219	306	276	2.5	0.31	3.3	2.2	2.2	34.5
	320	128	3	1 710 000	2 330 000	1 000	1 900	850	*24138CAME4	*24138CAMK30E4	204	211	306	269	2.5	0.40	2.5	1.7	1.6	41.5
	320	128	3	1 370 000	2 330 000	1 000	—	850	24138CE4	24138CK30E4	204	211	306	269	2.5	0.40	2.5	1.7	1.6	41.5
	340	92	4	1 420 000	1 730 000	1 800	2 400	1 000	*22238CAME4	*22238CAMKE4	208	—	322	296	3	0.26	3.8	2.6	2.5	35.5
	340	120	4	1 800 000	2 350 000	1 200	1 900	800	*23238CAME4	*23238CAMKE4	208	222	322	288	3	0.35	2.9	1.9	1.9	47.6
	340	120	4	1 440 000	2 350 000	1 200	—	800	23238CE4	23238CKE4	208	222	322	288	3	0.35	2.9	1.9	1.9	47.6
	400	132	5	2 370 000	2 590 000	1 200	1 900	900	*22338CAME4	*22338CAMKE4	212	—	378	338	4	0.34	2.9	2.0	1.9	77.6

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1:12 or 1:30).

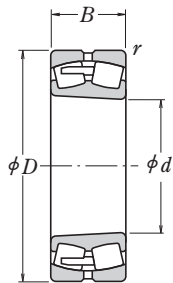
Remarks 1. The bearings denoted by an asterisk (*) are NSKHPS™ bearings and an oil groove and holes are standard for them.
 2. When making a selection of the recommended fit (Tolerance of shaft) on Page A164, in case of NSKHPS™ bearings, the conditions are different.
 The segmentations are: Light Loads(≤0.05C_r); Normal Loads(0.05 to 0.10C_r); and Heavy Loads(>0.10C_r).
 3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C353, and C358 – C359.

■ **SPHERICAL ROLLER BEARINGS**

Bore Diameter 200 – 220 mm



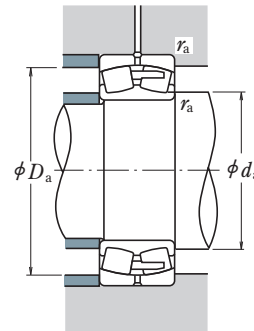
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

F _a /F _r ≤ e		F _a /F _r > e	
X	Y	X	Y
1	Y ₃	0.67	Y ₂

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e, Y₂, Y₃, and Y₀ are given in the table below.

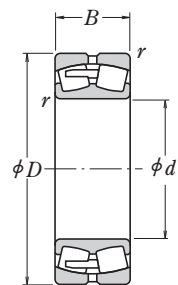
Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)					Constant e	Axial Load Factors			Mass (kg) approx.	
d	D	B	r min.	C _r	C _{0r}		Mechanical	Grease		Cylindrical Bore	Tapered Bore ⁽¹⁾		d _a min.	d _a max.		D _a min.	D _a max.	r _a min.		r _a max.
200	280	60	2.1	710 000	1 060 000	2 400			2 600	1 100	*23940CAME4	*23940CAMKE4	212	—	268	258	2	0.20	5.1	3.4
	310	82	2.1	1 180 000	1 700 000	1 800	2 400	1 000	*23040CAME4	*23040CAMKE4	212	—	298	279	2	0.25	4.0	2.7	2.6	22.6
	310	109	2.1	1 420 000	2 120 000	1 300	2 000	850	*24040CAME4	*24040CAMK30E4	212	223	298	271	2	0.32	3.1	2.1	2.0	30.4
	310	109	2.1	1 140 000	2 120 000	1 300	—	850	24040CE4	24040CK30E4	212	223	298	271	2	0.32	3.1	2.1	2.0	30.4
	340	112	3	1 700 000	2 330 000	1 500	2 000	800	*23140CAME4	*23140CAMKE4	214	232	326	293	2.5	0.31	3.2	2.2	2.1	42.7
	340	112	3	1 360 000	2 330 000	1 500	—	800	23140CE4	23140CKE4	214	232	326	293	2.5	0.31	3.2	2.2	2.1	42.7
	340	140	3	1 960 000	2 660 000	950	1 800	800	*24140CAME4	*24140CAMK30E4	214	226	326	290	2.5	0.39	2.6	1.8	1.7	51.3
	340	140	3	1 570 000	2 670 000	950	—	800	24140CE4	24140CK30E4	214	226	326	290	2.5	0.39	2.6	1.8	1.7	51.3
	360	98	4	1 620 000	2 010 000	1 700	2 200	950	*22240CAME4	*22240CAMKE4	218	—	342	315	3	0.26	3.8	2.6	2.5	42.6
	360	128	4	2 070 000	2 750 000	1 100	1 800	750	*23240CAME4	*23240CAMKE4	218	237	342	307	3	0.34	2.9	2.0	1.9	57.1
	360	128	4	1 660 000	2 750 000	1 100	—	750	23240CE4	23240CKE4	218	237	342	307	3	0.34	2.9	2.0	1.9	57.1
	420	138	5	2 500 000	2 990 000	1 000	1 700	850	*22340CAME4	*22340CAMKE4	222	—	398	352	4	0.34	2.9	2.0	1.9	92.6
220	300	60	2.1	785 000	1 240 000	2 200	2 600	1 000	*23944CAME4	*23944CAMKE4	232	—	288	278	2	0.18	5.7	3.8	3.7	12.2
	340	90	3	1 360 000	1 980 000	1 600	2 200	950	*23044CAME4	*23044CAMKE4	234	—	326	302	2.5	0.24	4.1	2.8	2.7	29.7
	340	118	3	1 640 000	2 490 000	1 200	1 900	750	*24044CAME4	*24044CAMK30E4	234	244	326	296	2.5	0.31	3.2	2.1	2.1	40.5
	340	118	3	1 360 000	2 600 000	1 200	—	750	24044CE4	24044CK30E4	234	244	326	296	2.5	0.31	3.2	2.1	2.1	40.5
	370	120	4	1 960 000	2 710 000	1 300	1 800	710	*23144CAME4	*23144CAMKE4	238	254	352	320	3	0.30	3.3	2.2	2.2	53
	370	120	4	1 570 000	2 710 000	1 300	—	710	23144CE4	23144CKE4	238	254	352	320	3	0.30	3.3	2.2	2.2	53
	370	150	4	2 250 000	3 200 000	850	1 600	710	*24144CAME4	*24144CAMK30E4	238	248	352	313	3	0.39	2.6	1.7	1.7	66.7
	370	150	4	1 800 000	3 200 000	850	—	710	24144CE4	24144CK30E4	238	248	352	313	3	0.39	2.6	1.7	1.7	66.7
	400	108	4	1 960 000	2 430 000	1 500	2 000	850	*22244CAME4	*22244CAMKE4	238	—	382	348	3	0.27	3.7	2.5	2.4	59
	400	144	4	2 520 000	3 400 000	1 000	1 600	670	*23244CAME4	*23244CAMKE4	238	260	382	337	3	0.35	2.9	1.9	1.9	80.4
	400	144	4	2 020 000	3 400 000	850	—	670	23244CE4	23244CKE4	238	260	382	337	3	0.35	2.9	1.9	1.9	80.4
	460	145	5	2 940 000	3 400 000	950	1 600	750	*22344CAME4	*22344CAMKE4	242	—	438	391	4	0.33	3.0	2.0	2.0	116

Note ⁽¹⁾ The suffix K or K30 represents bearings with tapered bores (taper 1:12 or 1:30).

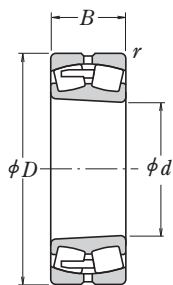
Remarks 1. The bearings denoted by an asterisk (*) are NSKHPS™ bearings and an oil groove and holes are standard for them.
2. When making a selection of the recommended fit (Tolerance of shaft) on Page A164, in case of NSKHPS™ bearings, the conditions are different.
The segmentations are: Light Loads(≤0.05C_r); Normal Loads(0.05 to 0.10C_r); and Heavy Loads(>0.10C_r).
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C353, and C359.

■ SPHERICAL ROLLER BEARINGS

Bore Diameter 240 – 280 mm



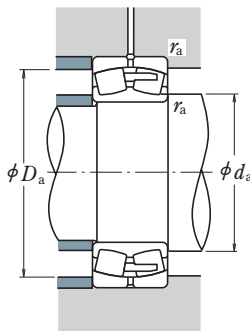
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y ₃	0.67	Y ₂

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of *e*, *Y*₂, *Y*₃, and *Y*₀ are given in the table below.

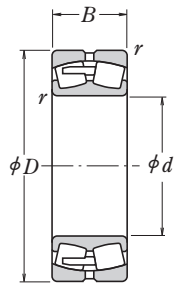
Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)					Constant <i>e</i>	Axial Load Factors			Mass (kg) approx.		
<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> _{min.}	<i>C</i> _r	<i>C</i> _{0r}		Limiting Speeds Mechanical Grease	Cylindrical Bore		Tapered Bore ⁽¹⁾	<i>d</i> _a		<i>D</i> _a			<i>r</i> _a max.	<i>Y</i> ₂	<i>Y</i> ₃		<i>Y</i> ₀	
min.		max.		min.					max.												
240	320	60	2.1	795 000	1 300 000	1 900	2 600	950	*23948CAME4 *23048CAME4 *24048CAME4	*23948CAMKE4 *23048CAMKE4 *24048CAMK30E4	252	—	308	298	2	0.17	6.0	4.0	3.9	13.3	
	360	92	3	1 450 000	2 140 000	1 500	2 200	850			254	—	346	324	2.5	0.24	4.2	2.8	2.7	32.6	
	360	118	3	1 730 000	2 730 000	1 100	1 800	710			254	265	346	317	2.5	0.29	3.4	2.3	2.2	43.4	
	360	118	3	1 390 000	2 730 000	1 100	—	710	24048CE4	24048CK30E4	254	265	346	317	2.5	0.29	3.4	2.3	2.2	43.4	
	400	128	4	2 230 000	3 100 000	1 200	1 700	670	*23148CAME4 23148CE4	*23148CAMKE4 23148CKE4	258	275	382	347	3	0.30	3.3	2.2	2.2	66.9	
	400	128	4	1 790 000	3 100 000	1 200	—	670	23148CE4	23148CKE4	258	275	382	347	3	0.30	3.3	2.2	2.2	66.9	
	400	160	4	2 660 000	3 800 000	750	1 500	670	*24148CAME4 24148CE4	*24148CAMK30E4 24148CK30E4	258	268	382	341	3	0.38	2.7	1.8	1.8	79.5	
	400	160	4	2 130 000	3 800 000	750	—	670	24148CE4	24148CK30E4	258	268	382	341	3	0.38	2.7	1.8	1.8	79.5	
	440	120	4	2 340 000	2 890 000	1 400	1 800	750	*22248CAME4	*22248CAMKE4	258	—	422	383	3	0.27	3.7	2.5	2.4	80.2	
	440	160	4	3 050 000	4 050 000	850	1 500	630	*23248CAME4	*23248CAMKE4	258	—	422	372	3	0.37	2.7	1.8	1.8	106	
500	155	5	3 250 000	3 800 000	850	1 500	670	*22348CAME4	*22348CAMKE4	262	—	478	423	4	0.32	3.2	2.1	2.1	147		
260	360	75	2.1	1 170 000	1 870 000	1 800	2 200	850	*23952CAME4 *23052CAME4 *24052CAME4	*23952CAMKE4 *23052CAMKE4 *24052CAMK30E4	272	—	348	333	2	0.19	5.4	3.6	3.5	23	
	400	104	4	1 780 000	2 580 000	1 300	1 900	800			278	—	382	356	3	0.25	4.1	2.7	2.7	46.6	
	400	140	4	2 270 000	3 500 000	950	1 600	630			278	—	382	348	3	0.32	3.1	2.1	2.1	62.6	
	440	144	4	2 700 000	3 750 000	1 100	1 500	600	*23152CAME4	*23152CAMKE4	278	—	422	380	3	0.32	3.2	2.1	2.1	88.2	
	440	180	4	3 200 000	4 700 000	630	1 300	600	*24152CAME4	*24152CAMK30E4	278	—	422	371	3	0.39	2.6	1.7	1.7	109	
	480	130	5	2 720 000	3 400 000	1 200	1 700	670	*22252CAME4	*22252CAMKE4	282	—	458	418	4	0.27	3.7	2.5	2.5	104	
	480	174	5	3 400 000	4 550 000	800	1 400	560	*23252CAME4	*23252CAMKE4	282	—	458	406	4	0.37	2.7	1.8	1.8	137	
	540	165	6	3 900 000	4 600 000	750	1 400	630	*22352CAME4	*22352CAMKE4	288	—	512	462	5	0.32	3.2	2.1	2.1	180	
	280	380	75	2.1	1 160 000	1 950 000	1 600	2 000	800	*23956CAME4 *23056CAME4 *24056CAME4	*23956CAMKE4 *23056CAMKE4 *24056CAMK30E4	292	—	368	351	2	0.18	5.7	3.9	3.8	24.5
		420	106	4	1 930 000	2 950 000	1 200	1 800	710			298	—	402	377	3	0.24	4.2	2.8	2.7	50.5
420		140	4	2 350 000	3 800 000	850	1 500	600	298			—	402	369	3	0.31	3.3	2.2	2.2	66.4	
460		146	5	2 790 000	4 000 000	1 000	1 500	560	*23156CAME4	*23156CAMKE4	302	—	438	400	4	0.30	3.3	2.2	2.2	94.3	
460		180	5	3 300 000	5 000 000	600	1 300	560	*24156CAME4	*24156CAMK30E4	302	—	438	392	4	0.37	2.7	1.8	1.8	115	
500		130	5	2 850 000	3 650 000	1 100	1 600	630	*22256CAME4	*22256CAMKE4	302	—	478	439	4	0.25	4.0	2.7	2.6	110	
500		176	5	3 600 000	4 900 000	750	1 300	530	*23256CAME4	*23256CAMKE4	302	—	478	425	4	0.35	2.9	1.9	1.9	147	
580		175	6	4 350 000	5 150 000	710	1 300	560	*22356CAME4	*22356CAMKE4	308	—	552	496	5	0.31	3.2	2.1	2.1	221	

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1:12 or 1:30).

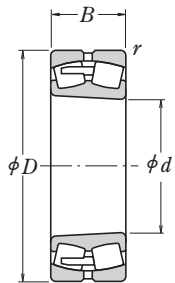
Remarks 1. The bearings denoted by an asterisk (*) are NSKHPS™ bearings and an oil groove and holes are standard for them.
2. When making a selection of the recommended fit (Tolerance of shaft) on Page A164, in case of NSKHPS™ bearings, the conditions are different.
The segmentations are: Light Loads(≤0.05C_r); Normal Loads(0.05 to 0.10C_r); and Heavy Loads(>0.10C_r).
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C353, and C359.

SPHERICAL ROLLER BEARINGS

Bore Diameter 300 – 380 mm



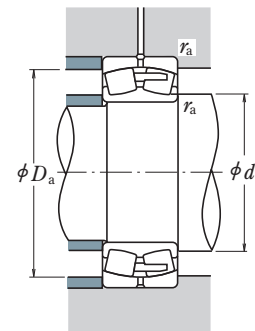
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

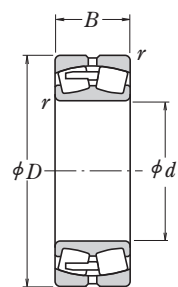
Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant e	Axial Load Factors			Mass (kg)				
d	D	B	r min.	C_r	C_{0r}		Limiting Speeds			Cylindrical Bore	Tapered Bore ⁽¹⁾	d_a min.	d_a max.		D_a max.	r_a max.	e		Y_2	Y_3	Y_0	approx.
							Mechanical	Grease														
300	420	90	3	1 540 000	2 490 000	1 500	1 800	710	*23960CAME4	*23960CAMKE4	314	406	386	2.5	0.19	5.2	3.5	3.4	38.2			
	460	118	4	2 400 000	3 700 000	1 100	1 600	670	*23060CAME4	*23060CAMKE4	318	442	413	3	0.24	4.2	2.8	2.7	70.5			
	460	160	4	2 890 000	4 600 000	800	1 400	530	*24060CAME4	*24060CAMK30E4	318	442	400	3	0.32	3.1	2.1	2.0	93.6			
	500	160	5	3 350 000	4 800 000	900	1 400	500	*23160CAME4	*23160CAMKE4	322	478	433	4	0.31	3.3	2.2	2.2	125			
	500	200	5	3 900 000	5 800 000	530	1 200	500	*24160CAME4	*24160CAMK30E4	322	478	423	4	0.38	2.6	1.8	1.7	152			
320	440	90	3	1 620 000	2 750 000	1 400	1 700	670	*23964CAME4	*23964CAMKE4	334	426	406	2.5	0.18	5.5	3.7	3.6	40.6			
	480	121	4	2 450 000	3 850 000	1 000	1 600	630	*23064CAME4	*23064CAMKE4	338	462	432	3	0.24	4.2	2.8	2.8	75.6			
	480	160	4	3 050 000	5 050 000	710	1 300	500	*24064CAME4	*24064CAMK30E4	338	462	422	3	0.31	3.3	2.2	2.2	99.7			
	540	176	5	3 850 000	5 500 000	800	1 300	480	*23164CAME4	*23164CAMKE4	342	518	466	4	0.31	3.2	2.1	2.1	162			
	540	218	5	4 400 000	6 650 000	500	1 100	480	*24164CAME4	*24164CAMK30E4	342	518	456	4	0.39	2.6	1.7	1.7	196			
340	540	150	5	3 750 000	4 850 000	950	1 400	530	*22264CAME4	*22264CAMKE4	342	558	508	4	0.26	3.9	2.6	2.6	174			
	580	208	5	4 850 000	6 900 000	600	1 100	450	*23264CAME4	*23264CAMKE4	342	558	488	4	0.36	2.8	1.9	1.8	239			
	460	90	3	1 670 000	2 840 000	1 300	1 700	630	*23968CAME4	*23968CAMKE4	354	446	427	2.5	0.18	5.7	3.8	3.7	42.4			
	520	133	5	2 850 000	4 400 000	950	1 500	560	*23068CAME4	*23068CAMKE4	362	498	465	4	0.24	4.2	2.8	2.8	101			
	520	180	5	3 650 000	6 050 000	670	1 200	480	*24068CAME4	*24068CAMK30E4	362	498	454	4	0.32	3.2	2.1	2.1	135			
360	580	190	5	4 500 000	6 600 000	710	1 200	430	*23168CAME4	*23168CAMKE4	362	558	499	4	0.31	3.2	2.1	2.1	206			
	580	243	5	5 300 000	7 900 000	450	1 000	430	*24168CAME4	*24168CAMK30E4	362	558	489	4	0.40	2.5	1.7	1.7	257			
	620	224	6	4 400 000	7 800 000	480	—	400	23268CAME4	23268CAMKE4	368	592	521	5	0.36	2.8	1.9	1.8	295			
	480	90	3	1 730 000	3 050 000	1 200	1 700	600	*23972CAME4	*23972CAMKE4	374	466	447	2.5	0.17	6.0	4.1	4.0	44.7			
	540	134	5	2 990 000	4 700 000	900	1 400	530	*23072CAME4	*23072CAMKE4	382	518	485	4	0.24	4.2	2.8	2.8	106			
380	540	180	5	3 650 000	6 100 000	630	1 200	450	*24072CAME4	*24072CAMK30E4	382	518	476	4	0.32	3.2	2.1	2.1	139			
	600	192	5	4 800 000	7 100 000	670	1 100	400	*23172CAME4	*23172CAMKE4	382	578	520	4	0.31	3.2	2.2	2.1	217			
	600	243	5	5 250 000	8 000 000	430	1 000	400	*24172CAME4	*24172CAMK30E4	382	578	507	4	0.40	2.5	1.7	1.7	264			
	650	232	6	4 800 000	8 550 000	450	—	380	23272CAME4	23272CAMKE4	388	622	549	5	0.36	2.8	1.9	1.8	342			
	520	106	4	2 340 000	4 100 000	1 100	1 500	530	*23976CAME4	*23976CAMKE4	398	502	482	3	0.18	5.5	3.7	3.6	65.4			
	560	135	5	3 150 000	5 100 000	850	1 400	530	*23076CAME4	*23076CAMKE4	402	538	506	4	0.22	4.5	3.0	3.0	113			
	560	180	5	3 850 000	6 600 000	600	1 200	430	*24076CAME4	*24076CAMK30E4	402	538	496	4	0.29	3.4	2.3	2.3	148			
	620	194	5	4 000 000	7 600 000	530	—	400	23176CAME4	23176CAMKE4	402	598	540	4	0.30	3.3	2.2	2.2	229			
	620	243	5	4 350 000	8 450 000	360	—	400	24176CAME4	24176CAMK30E4	402	598	529	4	0.38	2.6	1.8	1.7	275			
680	240	6	5 150 000	9 200 000	430	—	360	23276CAME4	23276CAMKE4	408	652	578	5	0.35	2.9	1.9	1.9	372				

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1:12 or 1:30).

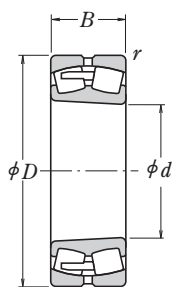
Remarks 1. The bearings denoted by an asterisk (*) are NSKHPS™ bearings and an oil groove and holes are standard for them.
2. When making a selection of the recommended fit (Tolerance of shaft) on Page A164, in case of NSKHPS™ bearings, the conditions are different.
The segmentations are: Light Loads(≤0.05C_r); Normal Loads(0.05 to 0.10C_r); and Heavy Loads(>0.10C_r).
3. For the dimensions od adapters and withdrawal sleeves, refer to Pages C354, and C360.

SPHERICAL ROLLER BEARINGS

Bore Diameter 400 – 460 mm



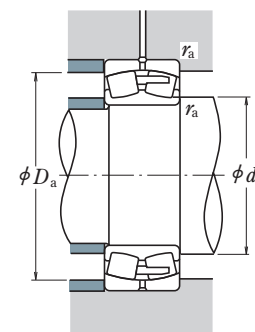
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

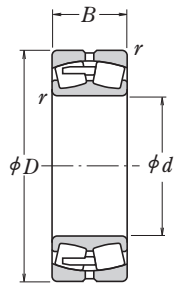
Boundary Dimensions (mm)	Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)			Constant e	Axial Load Factors			Mass (kg) approx.						
				C_r	C_{0r}		Limiting Speeds Mechanical	Grease	d_a min.		D_a max.	r_a max.	Y_2		Y_3	Y_0				
																	Cylindrical Bore	Tapered Bore ⁽¹⁾		
400	540	106	4	2 370 000	4 250 000	1 000	1 400	530	*23980CAME4	*23980CAMKE4	418	522	501	3	0.18	5.7	3.9	3.8	69.1	
	600	148	5	3 700 000	5 900 000	800	1 300	480	*23080CAME4	*23080CAMKE4	422	578	540	4	0.23	4.4	3.0	2.9	146	
	600	200	5	4 500 000	7 600 000	560	1 100	400	*24080CAME4	*24080CAMK30E4	422	578	527	4	0.31	3.3	2.2	2.2	193	
	650	200	6	4 150 000	7 900 000	500	—	380	23180CAME4	23180CAMKE4	428	622	569	5	0.29	3.4	2.3	2.3	257	
	650	250	6	4 950 000	10 100 000	320	—	380	24180CAME4	24180CAMK30E4	428	622	551	5	0.37	2.7	1.8	1.8	316	
	720	256	6	5 800 000	10 400 000	380	—	340	23280CAME4	23280CAMKE4	428	692	610	5	0.36	2.8	1.9	1.9	449	
	420	560	106	4	2 340 000	4 250 000	1 000	1 400	500	*23984CAME4	*23984CAMKE4	438	542	521	3	0.17	6.0	4.0	3.9	71.6
		620	150	5	2 910 000	5 850 000	670	—	450	23084CAME4	23084CAMKE4	442	598	562	4	0.23	4.3	2.9	2.8	151
		620	200	5	3 750 000	8 100 000	480	—	380	24084CAME4	24084CAMK30E4	442	598	549	4	0.31	3.2	2.2	2.1	199
		700	224	6	5 000 000	9 400 000	480	—	340	23184CAME4	23184CAMKE4	448	672	607	5	0.31	3.3	2.2	2.2	341
440	700	280	6	6 000 000	12 000 000	280	—	340	24184CAME4	24184CAMK30E4	448	672	598	5	0.38	2.6	1.8	1.7	421	
	760	272	7.5	6 450 000	11 700 000	360	—	320	23284CAME4	23284CAMKE4	456	724	644	6	0.35	2.9	1.9	1.9	534	
	600	118	4	2 190 000	4 800 000	630	—	450	23988CAME4	23988CAMKE4	458	582	555	3	0.18	5.7	3.9	3.8	96.3	
	650	157	6	3 150 000	6 350 000	630	—	430	23088CAME4	23088CAMKE4	468	622	587	5	0.23	4.3	2.9	2.8	173	
	650	212	6	4 150 000	9 100 000	450	—	360	24088CAME4	24088CAMK30E4	468	622	576	5	0.31	3.2	2.1	2.1	237	
	720	226	6	5 300 000	10 300 000	430	—	320	23188CAME4	23188CAMKE4	468	692	627	5	0.3	3.3	2.2	2.2	360	
	720	280	6	6 000 000	12 100 000	280	—	320	24188CAME4	24188CAMK30E4	468	692	617	5	0.37	2.7	1.8	1.8	433	
	790	280	7.5	6 900 000	12 800 000	340	—	300	23288CAME4	23288CAMKE4	476	754	669	6	0.35	2.9	1.9	1.9	594	
	460	620	118	4	2 220 000	4 950 000	600	—	430	23992CAME4	23992CAMKE4	478	602	575	3	0.17	5.9	4.0	3.9	100
		680	163	6	3 450 000	7 100 000	600	—	400	23092CAME4	23092CAMKE4	488	652	615	5	0.22	4.6	3.1	3.0	201
680		218	6	4 500 000	9 950 000	430	—	340	24092CAME4	24092CAMK30E4	488	652	604	5	0.29	3.4	2.3	2.3	266	
760		240	7.5	5 700 000	10 900 000	430	—	300	23192CAME4	23192CAMKE4	496	724	661	6	0.31	3.3	2.2	2.2	423	
760		300	7.5	6 300 000	12 400 000	280	—	300	24192CAME4	24192CAMK30E4	496	724	646	6	0.39	2.6	1.7	1.7	512	
830		296	7.5	7 350 000	13 700 000	320	—	280	23292CAME4	23292CAMKE4	496	794	702	6	0.36	2.8	1.9	1.8	691	

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1:12 or 1:30).

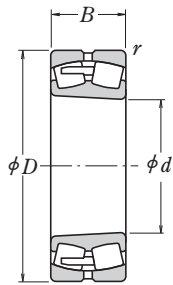
Remarks 1. The bearings denoted by an asterisk (*) are NSKHPS™ bearings and an oil groove and holes are standard for them.
 2. When making a selection of the recommended fit (Tolerance of shaft) on Page A164, in case of NSKHPS™ bearings, the conditions are different.
 The segmentations are: Light Loads (≤0.05C_r); Normal Loads (0.05 to 0.10C_r); and Heavy Loads (>0.10C_r).
 3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C354 – C355, and C360 – C361.

SPHERICAL ROLLER BEARINGS

Bore Diameter 480 – 560 mm



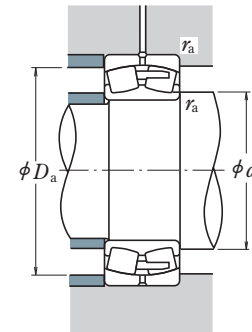
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

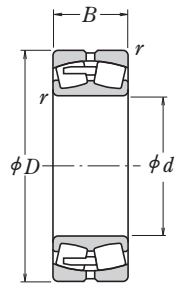
Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant e	Axial Load Factors			Mass (kg) approx.			
d	D	B	$r_{min.}$	C_r	C_{0r}		Mechanical	Grease		Cylindrical Bore	Tapered Bore ⁽¹⁾				d_a min.	D_a max.	r_a max.		Y_2	Y_3	Y_0
480	650	128	5	2 580 000	5 850 000	560			—	400	23996CAME4 23096CAME4 24096CAME4	23996CAMKE4 23096CAMKE4 24096CAMK30E4	502					628			
	700	165	6	3 800 000	7 950 000	560	—	400	508				672	633	5	0.22	4.6	3.1	3.0	211	
	700	218	6	4 600 000	10 200 000	400	—	320	508				672	625	5	0.30	3.4	2.3	2.2	270	
	790	248	7.5	6 050 000	11 700 000	400	—	300	23196CAME4 24196CAME4 23296CAME4	23196CAMKE4 24196CAMK30E4 23296CAMKE4	516		754	688	6	0.31	3.3	2.2	2.2	475	
	790	308	7.5	7 150 000	14 600 000	240	—	300			516		754	670	6	0.39	2.6	1.7	1.7	567	
	870	310	7.5	7 850 000	14 400 000	300	—	260			516		834	733	6	0.36	2.8	1.9	1.8	795	
	500	670	128	5	2 460 000	5 550 000	560	—	400	239/500CAME4 230/500CAME4 240/500CAME4	239/500CAMKE4 230/500CAMKE4 240/500CAMK30E4	522		648	622	4	0.17	6.0	4.0	3.9	124
		720	167	6	3 750 000	8 100 000	530	—	380			528		692	655	5	0.21	4.8	3.2	3.1	220
		720	218	6	4 450 000	9 900 000	400	—	300			528		692	643	5	0.30	3.4	2.3	2.2	276
	830	264	7.5	6 850 000	13 400 000	360	—	280	231/500CAME4 241/500CAME4 232/500CAME4	231/500CAMKE4 241/500CAMK30E4 232/500CAMKE4	536		794	720	6	0.31	3.2	2.2	2.1	567	
325		7.5	8 000 000	16 000 000	220	—	280	536				794	703	6	0.39	2.6	1.7	1.7	666		
336		7.5	9 000 000	16 600 000	280	—	260	536				884	773	6	0.38	2.7	1.8	1.8	969		
530	710	136	5	2 930 000	6 800 000	500	—	360	239/530CAME4 230/530CAME4 240/530CAME4	239/530CAMKE4 230/530CAMKE4 240/530CAMK30E4	552		688	659	4	0.17	6.0	4.0	3.9	149	
	780	185	6	4 400 000	9 200 000	500	—	340			558		752	706	5	0.22	4.6	3.1	3.0	298	
	780	250	6	5 400 000	11 800 000	360	—	280			558		752	690	5	0.31	3.3	2.2	2.2	390	
870	272	7.5	7 150 000	14 100 000	340	—	260	231/530CAME4 241/530CAME4 232/530CAME4	231/530CAMKE4 241/530CAMK30E4 232/530CAMKE4	566		834	758	6	0.30	3.3	2.2	2.2	628		
	335	7.5	8 500 000	17 500 000	200	—	260			566		834	740	6	0.38	2.6	1.8	1.7	773		
	355	9.5	10 100 000	18 800 000	260	—	240			574		936	824	8	0.38	2.7	1.8	1.7	1 170		
560	750	140	5	3 100 000	7 250 000	480	—	340	239/560CAME4 230/560CAME4 240/560CAME4	239/560CAMKE4 230/560CAMKE4 240/560CAMK30E4	582		728	697	4	0.16	6.1	4.1	4.0	172	
	820	195	6	5 000 000	10 700 000	450	—	320			588		792	742	5	0.22	4.5	3.0	2.9	344	
	820	258	6	5 950 000	13 300 000	340	—	260			588		792	729	5	0.30	3.3	2.2	2.2	440	
920	280	7.5	7 850 000	15 500 000	320	—	240	231/560CAME4 241/560CAME4 232/560CAME4	231/560CAMKE4 241/560CAMK30E4 232/560CAMKE4	596		884	804	6	0.30	3.4	2.3	2.2	727		
	355	7.5	9 400 000	19 600 000	190	—	240			596		884	782	6	0.39	2.6	1.8	1.7	886		
	365	9.5	10 900 000	20 500 000	240	—	220			604		986	870	8	0.36	2.8	1.9	1.8	1 320		

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1:12 or 1:30).

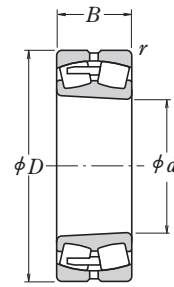
Remark For the dimensions of adapters and withdrawal sleeves, refer to Pages C355, and C361.

■ SPHERICAL ROLLER BEARINGS

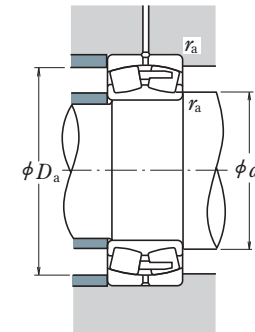
Bore Diameter 600 – 750 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

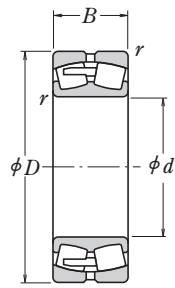
$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

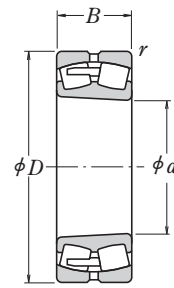
Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant e	Axial Load Factors			Mass (kg) approx.			
d	D	B	r min.	C_r	C_{0r}		Limiting Speeds Mechanical	Grease		Cylindrical Bore	Tapered Bore ⁽¹⁾	d_a min.	d_a max.		D_a min.	D_a max.	r_a min.		r_a max.	Y_2	Y_3
600	800	150	5	3 450 000	8 100 000	450			—	320	239/600CAME4 230/600CAME4 240/600CAME4	239/600CAMKE4 230/600CAMKE4 240/600CAMK30E4	622		778	745	4	0.17	5.9	3.9	3.9
	870	200	6	5 450 000	12 200 000	400	—	300	628				842	794	5	0.21	4.8	3.3	3.2	389	
	870	272	6	6 600 000	15 100 000	300	—	240	628				842	772	5	0.30	3.3	2.2	2.2	529	
		980	300	7.5	8 750 000	17 500 000	280	—	220	231/600CAME4	231/600CAMKE4	636		944	856	6	0.30	3.4	2.3	2.2	898
		980	375	7.5	10 400 000	21 900 000	170	—	220	241/600CAME4	241/600CAMK30E4	636		944	836	6	0.39	2.6	1.8	1.7	1 050
		1 090	388	9.5	12 700 000	24 900 000	200	—	200	232/600CAME4	232/600CAMKE4	644	1 046	923	8	0.36	2.8	1.9	1.8	1 590	
630	850	165	6	4 000 000	9 350 000	400	—	300	239/630CAME4 230/630CAME4 240/630CAME4	239/630CAMKE4 230/630CAMKE4 240/630CAMK30E4	658		822	786	5	0.18	5.6	3.8	3.7	259	
	920	212	7.5	5 900 000	12 700 000	400	—	280			666		884	835	6	0.22	4.7	3.1	3.1	468	
	920	290	7.5	7 550 000	17 700 000	280	—	220			666		884	815	6	0.30	3.3	2.2	2.2	637	
		1 030	315	7.5	9 600 000	19 400 000	260	—	200	231/630CAME4	231/630CAMKE4	666		994	900	6	0.30	3.4	2.3	2.2	1 040
		1 030	400	7.5	11 300 000	23 900 000	160	—	200	241/630CAME4	241/630CAMK30E4	666		994	876	6	0.38	2.7	1.8	1.7	1 250
		1 150	412	12	13 400 000	25 600 000	200	—	180	232/630CAME4	232/630CAMKE4	684	1 096	970	10	0.36	2.8	1.9	1.8	1 850	
670	900	170	6	4 350 000	10 300 000	380	—	260	239/670CAME4 230/670CAME4 240/670CAME4	239/670CAMKE4 230/670CAMKE4 240/670CAMK30E4	698		872	836	5	0.17	5.8	3.9	3.8	300	
	980	230	7.5	6 850 000	15 000 000	360	—	240			706		944	891	6	0.22	4.7	3.1	3.1	571	
	980	308	7.5	8 450 000	19 500 000	260	—	200			706		944	868	6	0.30	3.3	2.2	2.2	773	
		1 090	336	7.5	10 600 000	21 600 000	240	—	190	231/670CAME4	231/670CAMKE4	706		1 054	952	6	0.30	3.3	2.2	2.2	1 230
		1 090	412	7.5	12 400 000	26 500 000	150	—	190	241/670CAME4	241/670CAMK30E4	706		1 054	934	6	0.37	2.7	1.8	1.8	1 440
		1 220	438	12	14 900 000	28 700 000	180	—	170	232/670CAME4	232/670CAMKE4	724	1 166	1 024	10	0.37	2.7	1.8	1.8	2 210	
710	950	180	6	4 800 000	11 700 000	360	—	240	239/710CAME4 230/710CAME4 240/710CAME4	239/710CAMKE4 230/710CAMKE4 240/710CAMK30E4	738		922	883	5	0.17	5.8	3.9	3.8	352	
	1 030	236	7.5	7 100 000	15 800 000	340	—	240			746		994	936	6	0.22	4.6	3.1	3.0	647	
	1 030	315	7.5	8 850 000	20 700 000	240	—	190			746		994	916	6	0.29	3.4	2.3	2.2	861	
		1 150	438	9.5	13 900 000	30 500 000	130	—	170	241/710CAME4	241/710CAMK30E4	754		1 106	981	8	0.38	2.6	1.8	1.7	1 730
		1 280	450	12	15 700 000	30 500 000	170	—	160	232/710CAME4	232/710CAMKE4	764	1 226	1 080	10	0.36	2.8	1.9	1.8	2 470	
	750	1 000	185	6	5 250 000	12 800 000	320	—	220	239/750CAME4 230/750CAME4 240/750CAME4 232/750CAME4	239/750CAMKE4 230/750CAMKE4 240/750CAMK30E4 232/750CAMKE4	778		972	931	5	0.17	6.0	4.1	4.0	398
1 090		250	7.5	7 750 000	17 200 000	320	—	220	786				1 054	990	6	0.22	4.6	3.1	3.0	768	
1 090		335	7.5	10 100 000	24 000 000	220	—	180	786				1 054	969	6	0.29	3.4	2.3	2.2	1 030	
1 360		475	15	17 700 000	35 500 000	150	—	140	814				1 296	1 148	12	0.36	2.8	1.9	1.8	2 980	

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1:12 or 1:30).

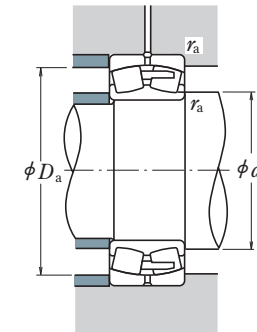
Bore Diameter 800 – 1400 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant e	Axial Load Factors			Mass (kg) approx.				
d	D	B	r min.	C_r	C_{0r}		Limiting Speeds			Cylindrical Bore		Tapered Bore ⁽¹⁾			d_a		D_a		r_a	Y_2	Y_3	Y_0
							—	Grease							min.	max.						
800	1 060	195	6	5 600 000	13 700 000	300	—	220	239/800CAME4 230/800CAME4 240/800CAME4	239/800CAMKE4 230/800CAMKE4 240/800CAMK30E4	828	1 032	987	5	0.17	6.0	4.0	3.9	462			
	1 150	258	7.5	8 350 000	19 100 000						300	—	200	836	1 114	1 045	6	0.21	4.7	3.2	3.1	870
	1 150	345	7.5	10 900 000	26 300 000						200	—	160	836	1 114	1 029	6	0.27	3.7	2.5	2.5	1 130
	1 280	375	9.5	13 800 000	29 200 000	190	—	150	231/800CAME4 232/800CAME4	231/800CAMKE4 232/800CAMKE4	844 864	1 236 1 356	1 127 1 208	8 12	0.28 0.35	3.6 2.8	2.4 1.9	2.3 1.9	1 870 3 250			
850	1 120	200	6	6 100 000	15 200 000	280	—	190	239/850CAME4 230/850CAME4 240/850CAME4 232/850CAME4	239/850CAMKE4 230/850CAMKE4 240/850CAMK30E4 232/850CAMKE4	878	1 092	1 046	5	0.16	6.2	4.2	4.1	523			
	1 220	272	7.5	9 300 000	21 400 000						280	—	180	886	1 184	1 109	6	0.21	4.8	3.2	3.1	1 020
	1 220	365	7.5	11 600 000	28 300 000						190	—	150	886	1 184	1 093	6	0.28	3.6	2.4	2.4	1 350
	1 500	515	15	22 300 000	45 500 000						120	—	120	914	1 436	1 274	12	0.35	2.8	1.9	1.9	3 890
900	1 180	206	6	6 600 000	16 700 000	260	—	180	239/900CAME4 230/900CAME4 240/900CAME4 232/900CAME4	239/900CAMKE4 230/900CAMKE4 240/900CAMK30E4 232/900CAMKE4	928	1 152	1 103	5	0.16	6.4	4.3	4.2	591			
	1 280	280	7.5	9 850 000	22 800 000						260	—	160	936	1 244	1 169	6	0.20	4.9	3.3	3.2	1 160
	1 280	375	7.5	12 800 000	31 500 000						170	—	140	936	1 244	1 147	6	0.28	3.6	2.4	2.4	1 520
	1 580	515	15	23 400 000	47 500 000						120	—	110	964	1 516	1 354	12	0.33	3.0	2.0	2.0	4 300
950	1 250	224	7.5	7 600 000	19 900 000	240	—	160	239/950CAME4 230/950CAME4 240/950CAME4 232/950CAME4	239/950CAMKE4 230/950CAMKE4 240/950CAMK30E4 232/950CAMKE4	986	1 214	1 169	6	0.16	6.3	4.2	4.1	732			
	1 360	300	7.5	11 300 000	26 500 000						240	—	150	986	1 324	1 241	6	0.21	4.8	3.2	3.2	1 400
	1 360	412	7.5	14 500 000	36 500 000						160	—	120	986	1 324	1 219	6	0.28	3.6	2.4	2.3	1 880
	1 660	530	15	24 700 000	50 500 000						110	—	100	1 014	1 596	1 428	12	0.32	3.1	2.1	2.1	4 800
1 000	1 320	236	7.5	8 200 000	21 700 000	220	—	150	239/1000CAME4 230/1000CAME4 240/1000CAME4	239/1000CAMKE4 230/1000CAMKE4 240/1000CAMK30E4	1 036	1 284	1 229	6	0.16	6.4	4.3	4.2	881			
	1 420	308	7.5	11 900 000	28 100 000						220	—	140	1 036	1 384	1 298	6	0.20	4.9	3.3	3.2	1 560
	1 420	412	7.5	15 300 000	38 500 000						150	—	110	1 036	1 384	1 275	6	0.27	3.7	2.5	2.4	2 010
1 060	1 400	250	7.5	9 300 000	24 400 000	200	—	130	239/1060CAME4 230/1060CAME4 240/1060CAME4	239/1060CAMKE4 230/1060CAMKE4 240/1060CAMK30E4	1 096	1 364	1 302	6	0.16	6.1	4.1	4.0	1 030			
	1 500	325	9.5	13 000 000	31 500 000						200	—	120	1 104	1 456	1 368	8	0.21	4.9	3.3	3.2	1 790
	1 500	438	9.5	16 800 000	43 000 000						140	—	100	1 104	1 456	1 346	8	0.28	3.6	2.4	2.4	2 410
1 120	1 580	345	9.5	15 400 000	38 000 000	180	—	110	230/1120CAME4 240/1120CAME4	230/1120CAMKE4 240/1120CAMK30E4	1 164	1 536	1 444	8	0.20	5.0	3.4	3.3	2 120			
	1 580	462	9.5	18 700 000	49 500 000						120	—	95	1 164	1 536	1 421	8	0.27	3.7	2.5	2.5	2 790
1 180	1 660	475	9.5	20 200 000	52 500 000	120	—	85	240/1180CAME4	240/1180CAMK30E4	1 224	1 616	1 494	8	0.27	3.7	2.5	2.4	3 180			
1 250	1 750	500	9.5	21 000 000	59 500 000	110	—	75	240/1250CAME4	240/1250CAMK30E4	1 294	1 706	1 579	8	0.25	4.0	2.7	2.6	3 700			
1 320	1 850	530	12	22 600 000	63 500 000	100	—	67	240/1320CAME4	240/1320CAMK30E4	1 374	1 796	1 656	10	0.26	3.9	2.6	2.6	4 400			
1 400	1 950	545	12	24 500 000	65 000 000	95	—	60	240/1400CAME4	240/1400CAMK30E4	1 454	1 896	1 767	10	0.25	4.0	2.7	2.6	4 900			

Note ⁽¹⁾ The suffix K or K30 represents bearings with tapered bores (taper 1:12 or 1:30).

8. THRUST BALL BEARINGS

INTRODUCTION C 296

BEARINGS TABLE

SINGLE-DIRECTION THRUST BALL BARINGS

With Flat Seat, Aligning Seat, or Aligning Seat Washer

Bore Diameter 10 – 360 mm C 298

DOUBLE-DIRECTION THRUST BALL BEARINGS

With Flat Seat, Aligning Seat, or Aligning Seat Washer

Bore Diameter 10 – 190 mm C 306



DESIGN, TYPES, AND FEATURES

THRUST BALL BEARINGS

Thrust ball bearings are classified into those with flat seats or aligning seats depending on the shape of the outer ring seat (housing washer). They can sustain axial loads but no radial loads.

The series of thrust ball bearings available are shown in Table 1. For Single-Direction Thrust Ball Bearings, pressed steel cages and machined brass cages are usually used as shown in Table 2. The cages in Double-Direction Thrust Ball Bearings are the same as those in Single-Direction Thrust Ball Bearings of the same diameter series.

The basic load ratings listed in the bearing tables are based on the standard cage type shown in Table 2. If the type of cage is different for bearings with the same number, the number of balls may vary, in such a case, the load rating will differ from the one listed in the bearing tables.

Table 1 Series of Thrust Ball Bearings

	W/Flat Seat	W/Aligning Seat	W/Aligning Seat Washer
Single-Direction	511	—	—
	512	532	532U
	513	533	533U
	514	534	534U
Double-Direction	522	542	542U
	523	543	543U
	524	544	544U

Table 2 Standard Cages for Thrust Ball Bearings

Pressed Steel	Machined Brass
51100 – 51152X	51156X – 51172X
51200 – 51236X	51238X – 51272X
51305 – 51336X	51338X – 51340X
51405 – 51418X	51420X – 51436X
53200 – 53236X	53238X – 53272X
53305 – 53336X	53338X – 53340X
53405 – 53418X	53420X – 53436X

MINIMUM AXIAL LOAD

It is necessary to apply some axial load to thrust bearings to prevent slippage between the rolling elements and raceways. For more details, please refer to Page A198.

TOLERANCES AND RUNNING ACCURACY

THRUST BALL BEARINGS Table 7.6 (Pages A140 to A142)

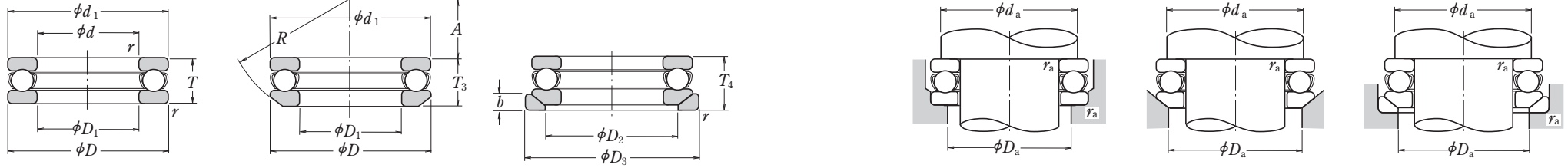
RECOMMENDED FITS

THRUST BALL BEARINGS Table 8.4 (Pages A164)
 Table 8.6 (Pages A165)



■ SINGLE-DIRECTION THRUST BALL BEARINGS

Bore Diameter 10 – 50 mm



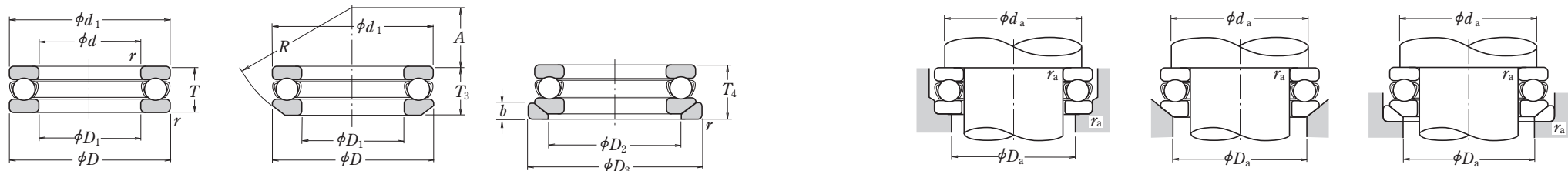
With Flat Seat With Aligning Seat With Aligning Seat Washer

d	Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		With Flat Seat	Bearing Numbers		Dimensions (mm)						Abutment and Fillet Dimensions (mm)			Mass(kg) approx.			
	D	T	T ₃	T ₄	r min.	C _a	C _{0a}	Grease	Oil		With Aligning Seat	With Aligning Seat Washer	d ₁	D ₁	D ₂	D ₃	b	A	R	d _a min.	D _a max.	r _a max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer
10	24	9	—	—	0.3	10 100	14 000	6 700	10 000	51100	—	24	11	—	—	—	—	—	18	16	0.3	0.019	—	—	
	26	11	11.6	13	0.6	12 800	17 100	6 000	9 000	51200	53200	53200 U	26	12	18	28	3.5	8.5	22	20	16	0.6	0.028	0.029	0.036
12	26	9	—	—	0.3	10 400	15 400	6 700	10 000	51101	—	26	13	—	—	—	—	—	20	18	0.3	0.021	—	—	
	28	11	11.4	13	0.6	13 300	19 000	5 600	8 500	51201	53201	53201 U	28	14	20	30	3.5	11.5	25	22	18	0.6	0.031	0.031	0.039
15	28	9	—	—	0.3	10 600	16 800	6 300	9 500	51102	—	28	16	—	—	—	—	—	23	20	0.3	0.023	—	—	
	32	12	13.3	15	0.6	16 700	24 800	5 000	7 500	51202	53202	53202 U	32	17	24	35	4	12	28	25	22	0.6	0.043	0.048	0.059
17	30	9	—	—	0.3	11 400	19 500	6 000	9 000	51103	—	30	18	—	—	—	—	—	25	22	0.3	0.025	—	—	
	35	12	13.2	15	0.6	17 300	27 300	4 800	7 500	51203	53203	53203 U	35	19	26	38	4	16	32	28	24	0.6	0.050	0.055	0.069
20	35	10	—	—	0.3	15 100	26 600	5 300	8 000	51104	—	35	21	—	—	—	—	—	29	26	0.3	0.037	—	—	
	40	14	14.7	17	0.6	22 500	37 500	4 300	6 300	51204	53204	53204 U	40	22	30	42	5	18	36	32	28	0.6	0.077	0.080	0.096
25	42	11	—	—	0.6	19 700	37 000	4 800	7 100	51105	—	42	26	—	—	—	—	—	35	32	0.6	0.056	—	—	
	47	15	16.7	19	0.6	28 000	50 500	3 800	5 600	51205	53205	53205 U	47	27	36	50	5.5	19	40	38	34	0.6	0.111	0.123	0.151
	52	18	19.8	22	1	36 000	61 500	3 200	5 000	51305	53305	53305 U	52	27	38	55	6	21	45	41	36	1	0.169	0.182	0.224
	60	24	26.4	29	1	56 000	89 500	2 600	4 000	51405	53405	53405 U	60	27	42	62	8	19	50	46	39	1	0.334	0.353	0.426
30	47	11	—	—	0.6	20 600	42 000	4 300	6 700	51106	—	47	32	—	—	—	—	—	40	37	0.6	0.064	—	—	
	52	16	17.8	20	0.6	29 500	58 000	3 400	5 300	51206	53206	53206 U	52	32	42	55	5.5	22	45	43	39	0.6	0.137	0.154	0.183
	60	21	22.6	25	1	43 000	78 500	2 800	4 300	51306	53306	53306 U	60	32	45	62	7	22	50	48	42	1	0.267	0.28	0.336
	70	28	30.1	33	1	73 000	126 000	2 200	3 400	51406	53406	53406 U	70	32	50	75	9	20	56	54	46	1	0.519	0.535	0.666
35	52	12	—	—	0.6	22 100	49 500	4 000	6 000	51107	—	52	37	—	—	—	—	—	45	42	0.6	0.081	—	—	
	62	18	19.9	22	1	39 500	78 000	3 000	4 500	51207	53207	53207 U	62	37	48	65	7	24	50	51	46	1	0.21	0.231	0.292
	68	24	25.6	28	1	56 000	105 000	2 400	3 800	51307	53307	53307 U	68	37	52	72	7.5	24	56	55	48	1	0.386	0.403	0.488
	80	32	34	37	1.1	87 500	155 000	2 000	3 000	51407	53407	53407 U	80	37	58	85	10	23	64	62	53	1	0.769	0.785	0.967
40	60	13	—	—	0.6	27 100	63 000	3 600	5 300	51108	—	60	42	—	—	—	—	—	52	48	0.6	0.12	—	—	
	68	19	20.3	23	1	47 500	98 500	2 800	4 300	51208	53208	53208 U	68	42	55	72	7	28.5	56	57	51	1	0.27	0.289	0.355
	78	26	28.5	31	1	70 000	135 000	2 200	3 400	51308	53308	53308 U	78	42	60	82	8.5	28	64	63	55	1	0.536	0.581	0.704
	90	36	38.2	42	1.1	103 000	188 000	1 700	2 600	51408	53408	53408 U	90	42	65	95	12	26	72	70	60	1	1.1	1.12	1.38
45	65	14	—	—	0.6	28 100	69 000	3 400	5 000	51109	—	65	47	—	—	—	—	—	57	53	0.6	0.143	—	—	
	73	20	21.3	24	1	48 000	105 000	2 600	4 000	51209	53209	53209 U	73	47	60	78	7.5	26	56	62	56	1	0.31	0.333	0.419
	85	28	30.1	33	1	80 500	163 000	2 000	3 000	51309	53309	53309 U	85	47	65	90	10	25	64	69	61	1	0.672	0.702	0.888
	100	39	42.4	46	1.1	128 000	246 000	1 600	2 400	51409	53409	53409 U	100	47	72	105	12.5	29	80	78	67	1	1.46	1.53	1.87
50	70	14	—	—	0.6	29 000	75 500	3 200	4 800	51110	—	70	52	—	—	—	—	—	62	58	0.6	0.153	—	—	
	78	22	23.5	26	1	49 000	111 000	2 400	3 600	51210	53210	53210 U	78	52	62	82	7.5	32.5	64	67	61	1	0.378	0.404	0.504
	95	31	34.3	37	1.1	97 500	202 000	1 800	2 800	51310	53310	53310 U	95	52	72	100	11	28	72	77	68	1	0.931	1.01	1.27
	110	43	45.6	50	1.5	147 000	288 000	1 400	2 200	51410	53410	53410 U	110	52	80	115	14	35	90	86	74	1.5	1.94	1.98	2.41



■ SINGLE-DIRECTION THRUST BALL BEARINGS

Bore Diameter 55 – 100 mm



With Flat Seat

With Aligning Seat

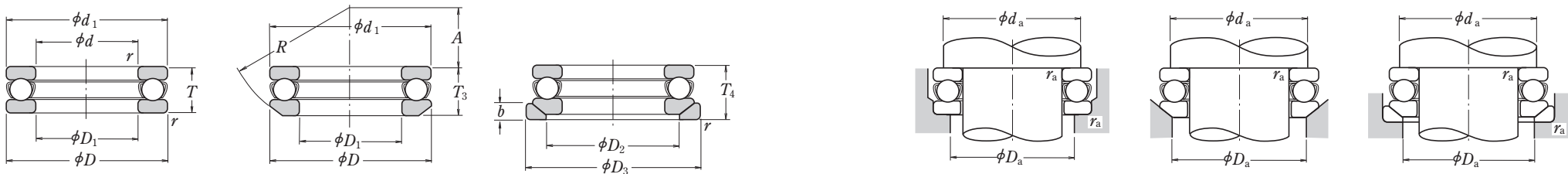
With Aligning Seat Washer

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers ⁽¹⁾	Dimensions (mm)						Abutment and Fillet Dimensions (mm)			Mass(kg) approx.					
d	D	T	T ₃	T ₄	r min.	C _a	C _{0a}	Grease	Oil		With Flat Seat	d ₁	D ₁	D ₂	D ₃	b	A	R	d _a min.	D _a max.	r _a max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer	
55	78	16	—	—	0.6	35 000	93 000	2 800	4 300	51111	—	—	—	—	—	—	—	69	64	0.6	0.227	—	—		
	90	25	27.3	30	1	70 000	159 000	2 200	3 200	51211	53211	53211U	90	57	72	95	9	35	72	76	69	1	0.599	0.656	0.819
	105	35	39.3	42	1.1	115 000	244 000	1 600	2 400	51311	53311	53311U	105	57	80	110	11.5	30	80	85	75	1	1.31	1.45	1.78
	120	48	50.5	55	1.5	181 000	350 000	1 300	1 900	51411	53411	53411U	120	57	88	125	15.5	28	90	94	81	1.5	2.58	2.59	3.16
60	85	17	—	—	1	41 500	113 000	2 600	4 000	51112	—	—	85	62	—	—	—	75	70	1	0.281	—	—		
	95	26	28	31	1	71 500	169 000	2 000	3 000	51212	53212	53212U	95	62	78	100	9	32.5	72	81	74	1	0.673	0.731	0.897
	110	35	38.3	42	1.1	119 000	263 000	1 600	2 400	51312	53312	53312U	110	62	85	115	11.5	41	90	90	80	1	1.4	1.51	1.83
	130	51	54	58	1.5	202 000	395 000	1 200	1 800	51412	53412	53412U	130	62	95	135	16	34	100	102	88	1.5	3.16	3.2	3.91
65	90	18	—	—	1	42 000	117 000	2 400	3 800	51113	—	—	90	67	—	—	—	80	75	1	0.324	—	—		
	100	27	28.7	32	1	75 500	189 000	1 900	2 800	51213	53213	53213U	100	67	82	105	9	40	80	86	79	1	0.756	0.812	0.989
	115	36	39.4	43	1.1	123 000	282 000	1 500	2 400	51313	53313	53313U	115	67	90	120	12.5	38.5	90	95	85	1	1.54	1.67	2.04
	140	56	60.2	65	2	234 000	495 000	1 100	1 700	51413	53413	53413U	140	68	100	145	17.5	40	112	110	95	2	4.1	4.22	5.13
70	95	18	—	—	1	43 500	127 000	2 400	3 600	51114	—	—	95	72	—	—	—	85	80	1	0.346	—	—		
	105	27	28.8	32	1	74 000	189 000	1 900	2 800	51214	53214	53214U	105	72	88	110	9	38	80	91	84	1	0.793	0.866	1.05
	125	40	44.2	48	1.1	137 000	315 000	1 400	2 000	51314	53314	53314U	125	72	98	130	13	43	100	103	92	1	2.0	2.2	2.64
	150	60	63.6	69	2	252 000	555 000	1 000	1 500	51414	53414	53414U	150	73	110	155	19.5	34	112	118	102	2	5.05	5.12	6.21
75	100	19	—	—	1	43 500	131 000	2 200	3 400	51115	—	—	100	77	—	—	—	90	85	1	0.389	—	—		
	110	27	28.3	32	1	78 000	209 000	1 800	2 800	51215	53215	53215U	110	77	92	115	9.5	49	90	96	89	1	0.845	1.27	1.11
	135	44	48.1	52	1.5	159 000	365 000	1 300	1 900	51315	53315	53315U	135	77	105	140	15	37	100	111	99	1.5	2.6	2.8	3.42
	160	65	69	75	2	254 000	560 000	950	1 400	51415	53415	53415U	160	78	115	165	21	42	125	125	110	2	6.15	6.23	7.58
80	105	19	—	—	1	45 000	141 000	2 200	3 400	51116	—	—	105	82	—	—	—	95	90	1	0.417	—	—		
	115	28	29.5	33	1	79 000	218 000	1 800	2 600	51216	53216	53216U	115	82	98	120	10	46	90	101	94	1	0.931	1.01	1.23
	140	44	47.6	52	1.5	164 000	395 000	1 300	1 900	51316	53316	53316U	140	82	110	145	15	50	112	116	104	1.5	2.74	2.94	3.55
	170	68	72.2	78	2.1	272 000	620 000	900	1 300	51416	53416	53416U	170	83	125	175	22	36	125	133	117	2	7.21	7.33	8.9
85	110	19	—	—	1	46 500	150 000	2 200	3 200	51117	—	—	110	87	—	—	—	100	95	1	0.44	—	—		
	125	31	33.1	37	1	96 000	264 000	1 600	2 400	51217	53217	53217U	125	88	105	130	11	52	100	109	101	1	1.22	1.35	1.63
	150	49	53.1	58	1.5	207 000	490 000	1 100	1 700	51317	53317	53317U	150	88	115	155	17.5	43	112	124	111	1.5	3.57	3.78	4.67
	180	72	77	83	2.1	310 000	755 000	850	1 300	51417 X	53417 X	53417 XU	177	88	130	185	23	47	140	141	124	2	8.51	8.72	10.4
90	120	22	—	—	1	60 000	190 000	1 900	3 000	51118	—	—	120	92	—	—	—	108	102	1	0.646	—	—		
	135	35	38.5	42	1.1	114 000	310 000	1 400	2 200	51218	53218	53218U	135	93	110	140	13.5	45	100	117	108	1	1.69	1.89	2.38
	155	50	54.6	59	1.5	214 000	525 000	1 100	1 700	51318	53318	53318U	155	93	120	160	18	40	112	129	116	1.5	3.83	4.11	5.09
	190	77	81.2	88	2.1	330 000	825 000	800	1 200	51418 X	53418 X	53418 XU	187	93	140	195	25.5	40	140	149	131	2	10.2	10.3	12.4
100	135	25	—	—	1	86 000	268 000	1 700	2 600	51120	—	—	135	102	—	—	—	121	114	1	0.96	—	—		
	150	38	40.9	45	1.1	135 000	375 000	1 300	2 000	51220	53220	53220U	150	103	125	155	14	52	112	130	120	1	2.25	2.49	3.03
	170	55	59.2	64	1.5	239 000	595 000	1 000	1 500	51320	53320	53320U	170	103	135	175	18	46	125	142	128	1.5	4.98	5.31	6.37
	210	85	90	98	3	370 000	985 000	710	1 100	51420 X	53420 X	53420 XU	205	103	155	220	27	50	160	165	145	2.5	14.8	15	18.1

Note ⁽¹⁾ The outside diameter d₁ of the shaft washers of all bearing numbers marked X is smaller than the outside diameter D of the housing washers.

■ SINGLE-DIRECTION THRUST BALL BEARINGS

Bore Diameter 110 – 190 mm



With Flat Seat

With Aligning Seat

With Aligning Seat Washer

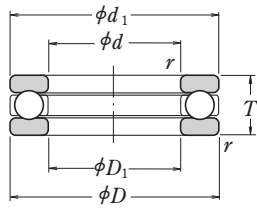
d	Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers ⁽¹⁾	Dimensions (mm)						Abutment and Fillet Dimensions (mm)			Mass(kg) approx.					
	D	T	T ₃	T ₄	r min.	C _a	C _{0a}	Grease	Oil		With Flat Seat	d ₁	D ₁	D ₂	D ₃	b	A	R	d _a min.	D _a max.	r _a max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer	
110	145	25	—	—	1	88 000	288 000	1 700	2 400	51122	—	—	—	—	—	—	—	131	124	1	1.04	—	—		
	160	38	40.2	45	1.1	136 000	395 000	1 300	1 900	51222	53222	53222 U	160	113	135	165	14	65	125	140	130	1	2.42	2.65	3.2
	190	63	67.2	72	2	282 000	755 000	900	1 300	51322 X	53322 X	53322 XU	187	113	150	195	20.5	51	140	158	142	2	7.19	7.55	9.1
	230	95	99.7	109	3	415 000	1 150 000	630	950	51422 X	53422 X	53422 XU	225	113	170	240	29	59	180	181	159	2.5	20	20.5	24.3
120	155	25	—	—	1	90 000	310 000	1 600	2 400	51124	—	—	155	122	—	—	—	141	134	1	1.12	—	—		
	170	39	40.8	46	1.1	141 000	430 000	1 200	1 800	51224	53224	53224 U	170	123	145	175	15	61	125	150	140	1	2.7	2.94	3.58
	210	70	74.1	80	2.1	330 000	930 000	800	1 200	51324 X	53324 X	53324 XU	205	123	165	220	22	63	160	173	157	2	9.7	10.1	12.4
	250	102	107.3	118	4	480 000	1 400 000	600	900	51424 X	53424 X	53424 XU	245	123	185	260	32	70	200	196	174	3	26.2	26.5	31.3
130	170	30	—	—	1	105 000	350 000	1 400	2 000	51126	—	—	170	132	—	—	—	154	146	1	1.68	—	—		
	190	45	47.9	53	1.5	183 000	550 000	1 100	1 600	51226 X	53226 X	53226 XU	187	133	160	195	17	67	140	166	154	1.5	3.95	4.35	5.33
	225	75	80.3	86	2.1	350 000	1 030 000	750	1 100	51326 X	53326 X	53326 XU	220	134	177	235	26	53	160	186	169	2	12.1	12.7	15.8
	270	110	115.2	128	4	525 000	1 590 000	530	800	51426 X	53426 X	53426 XU	265	134	200	280	38	58	200	212	188	3	32.3	32.4	38.8
140	180	31	—	—	1	107 000	375 000	1 300	2 000	51128 X	—	—	178	142	—	—	—	164	156	1	1.83	—	—		
	200	46	48.6	55	1.5	186 000	575 000	1 000	1 500	51228 X	53228 X	53228 XU	197	143	170	210	17	87	160	176	164	1.5	4.3	4.74	5.89
	240	80	84.9	92	2.1	370 000	1 130 000	670	1 000	51328 X	53328 X	53328 XU	235	144	190	250	26	68	180	199	181	2	14.2	16.3	19.5
	280	112	117	131	4	550 000	1 750 000	530	800	51428 X	53428 X	53428 XU	275	144	206	290	38	83	225	222	198	3	34.7	34.8	41.4
150	190	31	—	—	1	110 000	400 000	1 300	1 900	51130 X	—	—	188	152	—	—	—	174	166	1	1.95	—	—		
	215	50	53.3	60	1.5	238 000	735 000	950	1 400	51230 X	53230 X	53230 XU	212	153	180	225	20.5	79	160	189	176	1.5	5.52	6.09	7.82
	250	80	83.7	92	2.1	380 000	1 200 000	670	1 000	51330 X	53330 X	53330 XU	245	154	200	260	26	89.5	200	209	191	2	15	17.3	20.5
	300	120	125.9	140	4	620 000	2 010 000	480	710	51430 X	53430 X	53430 XU	295	154	225	310	41	69	225	238	212	3	43.5	43.8	51.9
160	200	31	—	—	1	113 000	425 000	1 200	1 900	51132 X	—	—	198	162	—	—	—	184	176	1	2.07	—	—		
	225	51	54.7	61	1.5	249 000	805 000	900	1 400	51232 X	53232 X	53232 XU	222	163	190	235	21	74	160	199	186	1.5	6.04	6.78	8.7
	270	87	91.7	100	3	475 000	1 570 000	600	900	51332 X	53332 X	53332 XU	265	164	215	280	29	77	200	225	205	2.5	19.6	22.3	26.7
	320	130	135.3	150	5	650 000	2 210 000	450	670	51432 X	53432 X	53432 XU	315	164	240	330	41.5	84	250	254	226	4	52.7	52.9	62
170	215	34	—	—	1.1	135 000	510 000	1 100	1 700	51134 X	—	—	213	172	—	—	—	197	188	1	2.72	—	—		
	240	55	58.7	65	1.5	280 000	915 000	850	1 300	51234 X	53234 X	53234 XU	237	173	200	250	21.5	91	180	212	198	1.5	7.41	8.21	10.5
	280	87	91.3	100	3	465 000	1 570 000	600	900	51334 X	53334 X	53334 XU	275	174	220	290	29	105	225	235	215	2.5	20.3	23.2	28
	340	135	141	156	5	715 000	2 480 000	430	630	51434 X	53434 X	53434 XU	335	174	255	350	46	74	250	269	241	4	61.2	61.3	73
180	225	34	—	—	1.1	136 000	530 000	1 100	1 700	51136 X	—	—	222	183	—	—	—	207	198	1	2.79	—	—		
	250	56	58.2	66	1.5	284 000	955 000	800	1 200	51236 X	53236 X	53236 XU	247	183	210	260	21.5	112	200	222	208	1.5	7.94	8.57	10.8
	300	95	99.3	109	3	480 000	1 680 000	560	850	51336 X	53336 X	53336 XU	295	184	240	310	32	91	225	251	229	2.5	25.9	29.2	34.9
	360	140	148.3	164	5	750 000	2 730 000	400	600	51436 X	53436 X	53436 XU	355	184	270	370	46.5	97	280	285	255	4	70.5	72.1	84.9
190	240	37	—	—	1.1	172 000	655 000	1 000	1 600	51138 X	—	—	237	193	—	—	—	220	210	1	3.6	—	—		
	270	62	65.7	73	2	320 000	1 110 000	750	1 100	51238 X	53238 X	53238 XU	267	194	230	280	23	98	200	238	222	2	11.8	12.9	15.7
	320	105	111	121	4	550 000	1 960 000	500	750	51338 X	53338 X	53338 XU	315	195	255	330	33	104	250	266	244	3	36.5	38.1	44.7

Note ⁽¹⁾ The outside diameter d₁ of the shaft washers of all bearing numbers marked X is smaller than the outside diameter D of the housing washers.

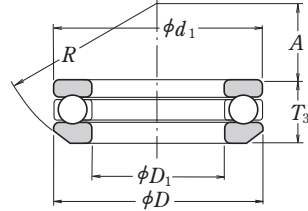


■ SINGLE-DIRECTION THRUST BALL BEARINGS

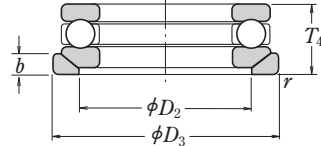
Bore Diameter 200 – 360 mm



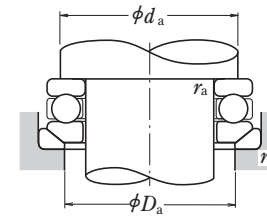
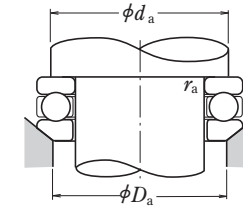
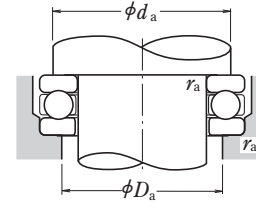
With Flat Seat



With Aligning Seat



With Aligning Seat Washer

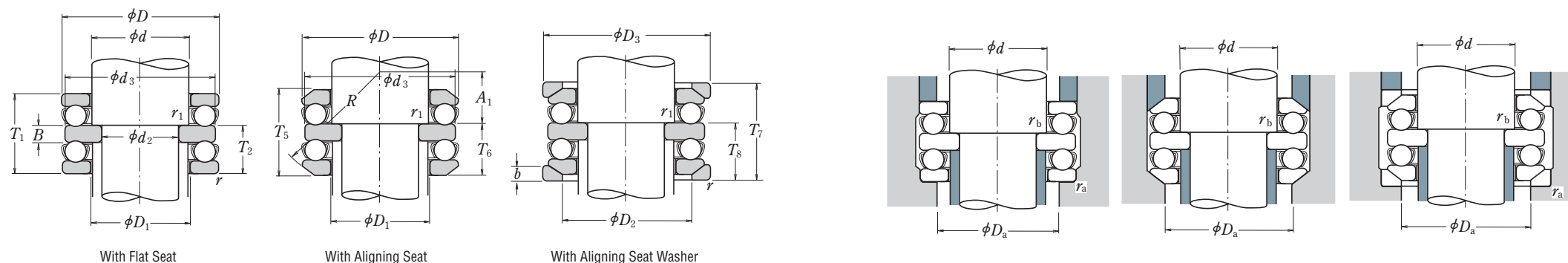


d	Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		With Flat Seat	Bearing Numbers ⁽¹⁾		Dimensions (mm)						Abutment and Fillet Dimensions (mm)			Mass(kg) approx.				
	D	T	T ₃	T ₄	r min.	C _a	C _{0a}	Grease	Oil		With Aligning Seat	With Aligning Seat Washer	d ₁	D ₁	D ₂	D ₃	b	A	R	d _a min.	D _a max.	r _a max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer	
200	250	37	—	—	1.1	173 000	675 000	1 000	1 500	51140 X	—	247	203	—	—	—	—	—	230	220	1	3.75	—	—		
	280	62	65.3	74	2	315 000	1 110 000	710	1 100			51240 X	53240 X	277	204	240	290	23	125	225	248	232	2	12.3	13.4	16.1
	340	110	118.4	130	4	600 000	2 220 000	480	710			51340 X	53340 X	335	205	270	350	38	92	250	282	258	3	43.6	46.2	54.8
220	270	37	—	—	1.1	179 000	740 000	950	1 500	51144 X	—	267	223	—	—	—	—	—	250	240	1	4.09	—	—		
	300	63	65.6	75	2	325 000	1 210 000	670	1 000			51244 X	53244 X	297	224	260	310	25	118	225	268	252	2	13.6	14.9	18
240	300	45	—	—	1.5	229 000	935 000	850	1 200	51148 X	—	297	243	—	—	—	—	—	276	264	1.5	6.55	—	—		
	340	78	81.6	92	2.1	420 000	1 650 000	560	850			51248 X	53248 X	335	244	290	350	30	122	250	299	281	2	23.7	25.6	30.7
260	320	45	—	—	1.5	233 000	990 000	800	1 200	51152 X	—	317	263	—	—	—	—	—	296	284	1.5	7.01	—	—		
	360	79	82.8	93	2.1	435 000	1 800 000	560	850			51252 X	53252 X	355	264	305	370	30	152	280	319	301	2	25.1	27.3	33.2
280	350	53	—	—	1.5	315 000	1 310 000	710	1 000	51156 X	—	347	283	—	—	—	—	—	322	308	1.5	12	—	—		
	380	80	85	94	2.1	450 000	1 950 000	530	800			51256 X	53256 X	375	284	325	390	31	143	280	339	321	2	27.1	30.3	37
300	380	62	—	—	2	360 000	1 560 000	600	900	51160 X	—	376	304	—	—	—	—	—	348	332	2	17.2	—	—		
	420	95	100.5	112	3	540 000	2 410 000	450	670			51260 X	53260 X	415	304	360	430	34	164	320	371	349	2.5	43.5	47.7	56.1
320	400	63	—	—	2	365 000	1 660 000	600	900	51164 X	—	396	324	—	—	—	—	—	368	352	2	18.6	—	—		
	440	95	100.5	112	3	585 000	2 680 000	450	670			51264 X	53264 X	435	325	380	450	36	157	320	391	369	2.5	45	49.9	59.4
340	420	64	—	—	2	375 000	1 760 000	560	850	51168 X	—	416	344	—	—	—	—	—	388	372	2	19.9	—	—		
	460	96	100.3	113	3	595 000	2 800 000	430	630			51268 X	53268 X	455	345	400	470	36	199	360	411	389	2.5	47.9	52.7	62
360	440	65	—	—	2	385 000	1 860 000	560	800	51172 X	—	436	364	—	—	—	—	—	408	392	2	21.5	—	—		
	500	110	116.7	130	4	705 000	3 500 000	380	560			51272 X	53272 X	495	365	430	510	43	172	360	442	418	3	68.8	76.3	90.9

Note ⁽¹⁾ The outside diameter d_1 of the shaft washers of all bearing numbers marked X is smaller than the outside diameter D of the housing washers.

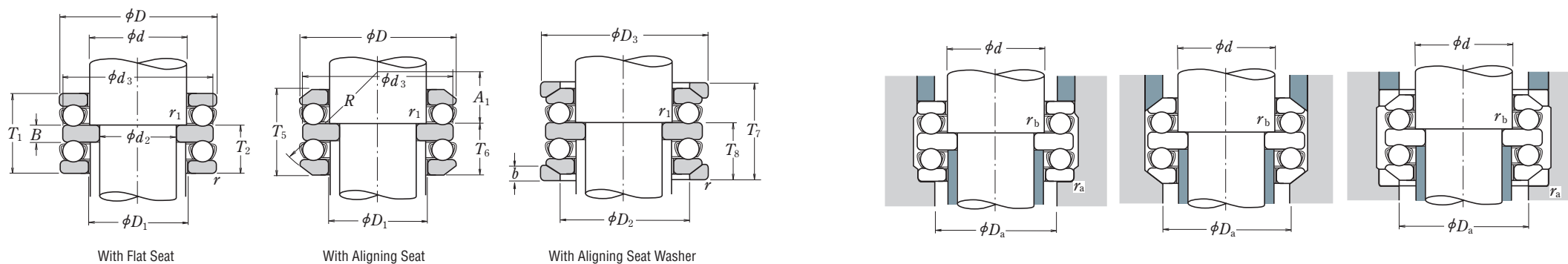
DOUBLE-DIRECTION THRUST BALL BEARINGS

Bore Diameter 10 – 55 mm



Boundary Dimensions (mm)								Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers			Dimensions (mm)										Abutment and Fillet Dimensions (mm)			Mass (kg) approx.			
d ₂	d	D	T ₁	T ₅	T ₇	r _{min.}	r ₁ _{min.}	C _a	C _{0a}	Grease	Oil	With Flat Seat	With Aligning Seat	With Aligning Seat Washer	d ₃	D ₁	D ₂	D ₃	T ₂	T ₆	T ₈	B	b	A ₁	R	D _a _{max.}	r _a _{max.}	r _b _{max.}	With Flat Seat	With Aligning Seat	With Aligning Seat Washer
10	15	32	22	24.6	28	0.6	0.3	16 700	24 800	4 800	7 100	52202	54202	54202 U	32	17	24	35	13.5	14.8	16.5	5	4	10.5	28	24	0.6	0.3	0.081	0.090	0.113
15	20	40	26	27.4	32	0.6	0.3	22 500	37 500	4 000	6 000	52204	54204	54204 U	40	22	30	42	16	16.7	19	6	5	16	36	30	0.6	0.3	0.148	0.151	0.185
	25	60	45	49.8	55	1	0.6	56 000	89 500	2 400	3 600	52405	54405	54405 U	60	27	42	62	28	30.4	33	11	8	15	50	42	1	0.6	0.641	0.68	0.825
20	25	47	28	31.4	36	0.6	0.3	28 000	50 500	3 400	5 300	52205	54205	54205 U	47	27	36	50	17.5	19.2	21.5	7	5.5	16.5	40	36	0.6	0.3	0.213	0.236	0.293
	25	52	34	37.6	42	1	0.3	36 000	61 500	3 000	4 500	52305	54305	54305 U	52	27	38	55	21	22.8	25	8	6	18	45	38	1	0.3	0.324	0.35	0.434
	30	70	52	56.2	62	1	0.6	73 000	126 000	2 200	3 200	52406	54406	54406 U	70	32	50	75	32	34.1	37	12	9	16	56	50	1	0.6	0.978	1.01	1.27
25	30	52	29	32.6	37	0.6	0.3	29 500	58 000	3 200	5 000	52206	54206	54206 U	52	32	42	55	18	19.8	22	7	5.5	20	45	42	0.6	0.3	0.254	0.288	0.345
	30	60	38	41.2	46	1	0.3	43 000	78 500	2 600	4 000	52306	54306	54306 U	60	32	45	62	23.5	25.1	27.5	9	7	19.5	50	45	1	0.3	0.483	0.511	0.621
	35	80	59	63	69	1.1	0.6	87 500	155 000	1 800	2 800	52407	54407	54407 U	80	37	58	85	36.5	38.5	41.5	14	10	18.5	64	58	1	0.6	1.43	1.47	1.83
30	35	62	34	37.8	42	1	0.3	39 500	78 000	2 800	4 300	52207	54207	54207 U	62	37	48	65	21	22.9	25	8	7	21	50	48	1	0.3	0.406	0.447	0.57
	35	68	44	47.2	52	1	0.3	56 000	105 000	2 400	3 600	52307	54307	54307 U	68	37	52	72	27	28.6	31	10	7.5	21	56	52	1	0.3	0.71	0.744	0.915
	40	68	36	38.6	44	1	0.6	47 500	98 500	2 600	3 800	52208	54208	54208 U	68	42	55	72	22.5	23.8	26.5	9	7	25	56	55	1	0.6	0.543	0.581	0.713
	40	78	49	54	59	1	0.6	70 000	135 000	2 000	3 000	52308	54308	54308 U	78	42	60	82	30.5	33	35.5	12	8.5	23.5	64	60	1	0.6	1.04	1.13	1.38
40	40	90	65	69.4	77	1.1	0.6	103 000	188 000	1 700	2 400	52408	54408	54408 U	90	42	65	95	40	42.2	46	15	12	22	72	65	1	0.6	1.98	2.02	2.54
	45	73	37	39.6	45	1	0.6	48 000	105 000	2 400	3 600	52209	54209	54209 U	73	47	60	78	23	24.3	27	9	7.5	23	56	60	1	0.6	0.606	0.652	0.823
45	45	85	52	56.2	62	1	0.6	80 500	163 000	1 900	2 800	52309	54309	54309 U	85	47	65	90	32	34.1	37	12	10	21	64	65	1	0.6	1.28	1.34	1.71
	45	100	72	78.8	86	1.1	0.6	128 000	246 000	1 500	2 200	52409	54409	54409 U	100	47	72	105	44.5	47.9	51.5	17	12.5	23.5	80	72	1	0.6	2.71	2.85	3.53
40	50	78	39	42	47	1	0.6	49 000	111 000	2 400	3 400	52210	54210	54210 U	78	52	62	82	24	25.5	28	9	7.5	30.5	64	62	1	0.6	0.697	0.75	0.949
	50	95	58	64.6	70	1.1	0.6	97 500	202 000	1 700	2 600	52310	54310	54310 U	95	52	72	100	36	39.3	42	14	11	23	72	72	1	0.6	1.78	1.94	2.46
	50	110	78	83.2	92	1.5	0.6	147 000	288 000	1 400	2 000	52410	54410	54410 U	110	52	80	115	48	50.6	55	18	14	30	90	80	1.5	0.6	3.51	3.59	4.45
45	55	90	45	49.6	55	1	0.6	70 000	159 000	2 000	3 000	52211	54211	54211 U	90	57	72	95	27.5	29.8	32.5	10	9	32.5	72	72	1	0.6	1.11	1.22	1.55
	55	105	64	72.6	78	1.1	0.6	115 000	244 000	1 500	2 400	52311	54311	54311 U	105	57	80	110	39.5	43.8	46.5	15	11.5	25.5	80	80	1	0.6	2.43	2.7	3.35
	55	120	87	92	101	1.5	0.6	181 000	350 000	1 200	1 800	52411	54411	54411 U	120	57	88	125	53.5	56	60.5	20	15.5	22.5	90	88	1.5	0.6	4.66	4.68	5.82
50	60	95	46	50	56	1	0.6	71 500	169 000	1 900	3 000	52212	54212	54212 U	95	62	78	100	28	30	33	10	9	30.5	72	78	1	0.6	1.22	1.33	1.66
	60	110	64	70.6	78	1.1	0.6	119 000	263 000	1 500	2 200	52312	54312	54312 U	110	62	85	115	39.5	42.8	46.5	15	11.5	36.5	90	85	1	0.6	2.59	2.82	3.45
	60	130	93	99	107	1.5	0.6	202 000	395 000	1 100	1 700	52412	54412	54412 U	130	62	95	135	57	60	64	21	16	28	100	95	1.5	0.6	5.74	5.82	7.24
	65	140	101	109.4	119	2	1	234 000	495 000	1 000	1 600	52413	54413	54413 U	140	68	100	145	62	66.2	71	23	17.5	34	112	100	2	1	7.41	7.66	9.47
55	65	100	47	50.4	57	1	0.6	75 500	189 000	1 900	2 800	52213	54213	54213 U	100	67	82	105	28.5	30.2	33.5	10	9	38.5	80	82	1	0.6	1.34	1.45	1.81
	65	115	65	71.8	79	1.1	0.6	123 000	282 000	1 500	2 200	52313	54313	54313 U	115	67	90	120	40	43.4	47	15	12.5	34.5	90	90	1	0.6	2.8	3.06	3.8
	70	105	47	50.6	57	1	1	74 000	189 000	1 800	2 800	52214	54214	54214 U	105	72	88	110	28.5	30.3	33.5	10	9	36.5	80	88	1	1	1.44	1.59	1.95
	70	125	72	80.4	88	1.1	1	137 000	315 000	1 300	2 000	52314	54314	54314 U	125	72	98	130	44	48.2	52	16	13	39	100	98	1	1	3.67	4.07	4.95
70	150	107	114.2	125	2	1	252 000	555 000	1 000	1 500	52414	54414	54414 U	150	73	110	155	65.5	69.1	74.5	24	19.5	28.5	112	110	2	1	8.99	9.12	11.3	

Bore Diameter 60 – 130 mm

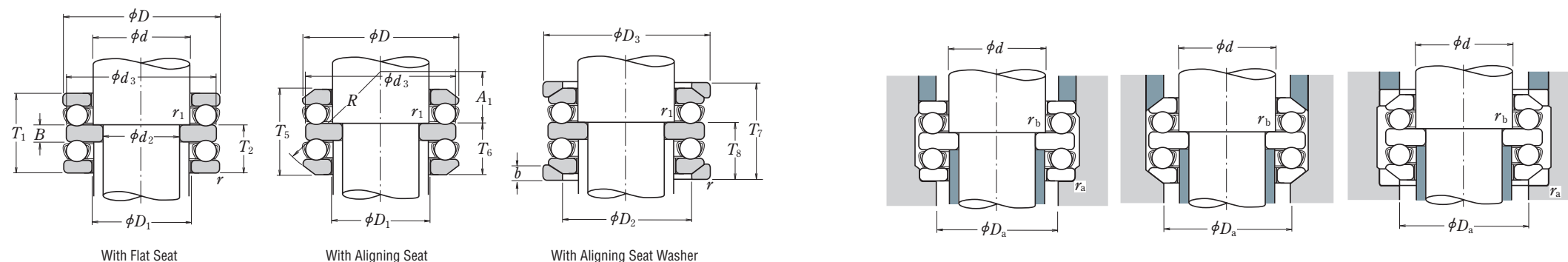


d ₂	Boundary Dimensions (mm)					r min.	r ₁ min.	Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers ⁽¹⁾		With Aligning Seat Washer	Dimensions (mm)									Abutment and Fillet Dimensions (mm)			Mass(kg) approx.				
	d	D	T ₁	T ₅	T ₇			C _a	C _{0a}	Grease	Oil	With Flat Seat	With Aligning Seat		d ₃	D ₁	D ₂	D ₃	T ₂	T ₆	T ₈	B	b	A ₁	R	D _a max.	r _a max.	r _b max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer
60	75	110	47	49.6	57	1	1	78 000	209 000	1 800	2 600	52215	54215	54215 U	110	77	92	115	28.5	29.8	33.5	10	9.5	47.5	90	92	1	1	1.54	1.66	2.06
	75	135	79	87.2	95	1.5	1	159 000	365 000	1 200	1 800	52315	54315	54315 U	135	77	105	140	48.5	52.6	56.5	18	15	32.5	100	105	1.5	1	4.74	5.14	6.38
	75	160	115	123	135	2	1	254 000	560 000	900	1 400	52415	54415	54415 U	160	78	115	165	70.5	74.5	80.5	26	21	36.5	125	115	2	1	10.8	11	13.7
65	80	115	48	51	58	1	1	79 000	218 000	1 700	2 600	52216	54216	54216 U	115	82	98	120	29	30.5	34	10	10	45	90	98	1	1	1.66	1.78	2.21
	80	140	79	86.2	95	1.5	1	164 000	395 000	1 200	1 800	52316	54316	54316 U	140	82	110	145	48.5	52.1	56.5	18	15	45.5	112	110	1.5	1	4.99	5.39	6.61
	80	170	120	128.4	140	2.1	1	272 000	620 000	850	1 300	52416	54416	54416 U	170	83	125	175	73.5	77.7	83.5	27	22	30.5	125	125	2	1	12.6	12.8	16
	85	180	128	138	150	2.1	1.1	310 000	755 000	800	1 200	52417 X	54417 X	54417 XU	179.5	88	130	185	78.5	83.5	89.5	29	23	40.5	140	130	2	1	15.4	15.8	19.5
70	85	125	55	59.2	67	1	1	96 000	264 000	1 500	2 200	52217	54217	54217 U	125	88	105	130	33.5	35.6	39.5	12	11	49.5	100	105	1	1	2.26	2.45	3.02
	85	150	87	95.2	105	1.5	1	207 000	490 000	1 100	1 600	52317	54317	54317 U	150	88	115	155	53	57.1	62	19	17.5	39	112	115	1.5	1	6.38	6.8	10.5
	90	190	135	143.4	157	2.1	1.1	330 000	825 000	750	1 100	52418 X	54418 X	54418 XU	189.5	93	140	195	82.5	86.7	93.5	30	25.5	34.5	140	140	2	1	17.5	18.1	22.5
75	90	135	62	69	76	1.1	1	114 000	310 000	1 400	2 000	52218	54218	54218 U	135	93	110	140	38	41.5	45	14	13.5	42	100	110	1	1	3.09	3.42	4.39
	90	155	88	97.2	106	1.5	1	214 000	525 000	1 100	1 600	52318	54318	54318 U	155	93	120	160	53.5	58.1	62.5	19	18	36.5	112	120	1.5	1	6.79	7.33	9.29
80	100	210	150	160	176	3	1.1	370 000	985 000	670	1 000	52420 X	54420 X	54420 XU	209.5	103	155	220	91.5	96.5	104.5	33	27	43.5	160	155	2.5	1	26.8	27.2	33.4
	100	150	67	72.8	81	1.1	1	135 000	375 000	1 300	1 900	52220	54220	54220 U	150	103	125	155	41	43.9	48	15	14	49	112	125	1	1	4.08	4.54	5.64
90	100	170	97	105.4	115	1.5	1	239 000	595 000	950	1 500	52320	54320	54320 U	170	103	135	175	59	63.2	68	21	18	42	125	135	1.5	1	8.82	9.47	11.6
	110	230	166	—	—	3	1.1	415 000	1 150 000	600	900	52422 X	—	—	229	113	—	—	101.5	—	—	37	—	—	159	2.5	1	35.6	—	—	
95	110	160	67	71.4	81	1.1	1	136 000	395 000	1 200	1 800	52222	54222	54222 U	160	113	135	165	41	43.2	48	15	14	62	125	135	1	1	4.39	4.83	5.94
	110	190	110	118.4	128	2	1	282 000	755 000	850	1 300	52322 X	54322 X	54322 XU	189.5	113	150	195	67	71.2	76	24	20.5	47	140	150	2	1	12.7	13.5	16.6
	120	250	177	—	—	4	1.5	515 000	1 540 000	560	850	52424 X	—	—	249	123	—	—	108.5	—	—	40	—	—	174	3	1.5	47.6	—	—	
100	120	170	68	71.6	82	1.1	1.1	141 000	430 000	1 200	1 800	52224	54224	54224 U	170	123	145	175	41.5	43.3	48.5	15	15	58.5	125	145	1	1	4.92	5.4	6.68
	120	210	123	131.2	143	2.1	1.1	330 000	930 000	750	1 100	52324 X	54324 X	54324 XU	209.5	123	165	220	75	79.1	85	27	22	58	160	165	2	1	17.6	16.4	22.9
	130	270	192	—	—	4	1.5	525 000	1 590 000	530	800	52426 X	—	—	269	134	—	—	117	—	—	42	—	—	188	3	1.5	57.8	—	—	
110	130	190	80	85.8	96	1.5	1.1	183 000	550 000	1 000	1 500	52226 X	54226 X	54226 XU	189.5	133	160	195	49	51.9	57	18	17	63	140	160	1.5	1	7.43	8.24	10.2
	130	225	130	—	—	2.1	1.1	350 000	1 030 000	710	1 100	52326 X	—	—	224	134	—	—	80	—	—	30	—	—	169	2	1	21.5	—	—	
	140	280	196	—	—	4	1.5	550 000	1 750 000	500	750	52428 X	—	—	279	144	—	—	120	—	—	44	—	—	198	3	1.5	62.4	—	—	
120	140	200	81	86.2	99	1.5	1.1	186 000	575 000	1 000	1 500	52228 X	54228 X	54228 XU	199.5	143	170	210	49.5	52.1	58.5	18	17	83.5	160	170	1.5	1	8.01	8.87	11.2
	140	240	140	—	—	2.1	1.1	370 000	1 130 000	670	1 000	52328 X	—	—	239	144	—	—	85.5	—	—	31	—	—	181	2	1	24.8	—	—	
	150	300	209	—	—	4	2	620 000	2 010 000	480	710	52430 X	—	—	299	153	—	—	127.5	—	—	46	—	—	212	3	2	77.8	—	—	
130	150	215	89	95.6	109	1.5	1.1	238 000	735 000	900	1 300	52230 X	54230 X	54230 XU	214.5	153	180	225	54.5	57.8	64.5	20	20.5	74.5	160	180	1.5	1	10.4	11.5	15
	150	250	140	—	—	2.1	1.1	380 000	1 200 000	630	950	52330 X	—	—	249	154	—	—	85.5	—	—	31	—	—	191	2	1	30.3	—	—	
	160	320	226	—	—	5	2	650 000	2 210 000	430	630	52432 X	—	—	319	164	—	—	138	—	—	50	—	—	226	4	2	93.6	—	—	

Note (1) The outside diameter d₃ of the central washers of all bearing numbers marked X is smaller than the outside diameter D of the housing washers.

DOUBLE-DIRECTION THRUST BALL BEARINGS

Bore Diameter 135 – 190 mm



d_2	Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers ⁽¹⁾			Dimensions (mm)										Abutment and Fillet Dimensions (mm)			Mass (kg) approx.				
	d	D	T_1	T_5	T_7	$r_{\text{min.}}$	$r_{1\text{ min.}}$	C_a	C_{0a}	Grease	Oil	With Flat Seat	With Aligning Seat	With Aligning Seat Washer	d_3	D_1	D_2	D_3	T_2	T_6	T_8	B	b	A_1	R	D_a max.	r_a max.	r_b max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer
135	170	340	236	—	—	5	2.1	715 000	2 480 000	400	600	52434 X	—	—	339	174	—	—	143	—	—	50	—	—	—	240	4	2	110	—	—
140	160	225	90	97.4	110	1.5	1.1	249 000	805 000	850	1 300	52232 X	54232 X	54232 XU	224.5	163	190	235	55	58.7	65	20	21	70	160	190	1.5	1	11.2	12.7	16.5
	160	270	153	—	—	3	1.1	475 000	1 570 000	600	900	52332 X	—	—	269	164	—	—	93	—	—	33	—	—	205	2.5	1	35.1	—	—	
	180	360	245	—	—	5	3	750 000	2 730 000	380	560	52436 X	—	—	359	184	—	—	148.5	—	—	52	—	—	254	4	2.5	126	—	—	
150	170	240	97	104.4	117	1.5	1.1	280 000	915 000	800	1 200	52234 X	54234 X	54234 XU	239.5	173	200	250	59	62.7	69	21	21.5	87	180	200	1.5	1	13.6	15.2	19.8
	170	280	153	—	—	3	1.1	465 000	1 570 000	560	850	52334 X	—	—	279	174	—	—	93	—	—	33	—	—	215	2.5	1	40.8	—	—	
	180	250	98	102.4	118	1.5	2	284 000	955 000	800	1 200	52236 X	54236 X	54236 XU	249	183	210	260	59.5	61.7	69.5	21	21.5	108.5	200	210	1.5	2	14.8	16.1	20.6
	180	300	165	—	—	3	2	480 000	1 680 000	530	800	52336 X	—	—	299	184	—	—	101	—	—	37	—	—	229	2.5	2.5	46.3	—	—	
160	190	270	109	116.4	131	2	2	320 000	1 110 000	710	1 100	52238 X	54238 X	54238 XU	269	194	230	280	66.5	70.2	77.5	24	23	93.5	200	230	2	2	22.1	22.2	29.8
	190	320	183	—	—	4	2	550 000	1 960 000	480	710	52338 X	—	—	319	195	—	—	111.5	—	—	40	—	—	244	3	2	113	—	—	
170	200	280	109	115.6	133	2	2	315 000	1 110 000	710	1 000	52240 X	54240 X	54240 XU	279	204	240	290	66.5	69.8	78.5	24	23	120.5	225	240	2	2	23.1	23.2	30.6
	200	340	192	—	—	4	2	600 000	2 220 000	450	670	52340 X	—	—	339	205	—	—	117	—	—	42	—	—	258	3	2	78.4	—	—	
190	220	300	110	115.2	134	2	2	325 000	1 210 000	670	1 000	52244 X	54244 X	54244 XU	299	224	260	310	67	69.6	79	24	25	114	225	260	2	2	25.2	27.8	34.1

Note ⁽¹⁾ The outside diameter d_3 of the central washers of all bearing numbers marked X is smaller than the outside diameter D of the housing washers.

9. THRUST CYLINDRICAL ROLLER BEARINGS

INTRODUCTION C 314

BEARINGS TABLE

THRUST CYLINDRICAL ROLLER BEARINGS

Bore Diameter 35mm – 320mm C 316



THRUST CYLINDRICAL ROLLER BEARINGS**DESIGN, TYPES, AND FEATURES****THRUST CYLINDRICAL ROLLER BEARINGS**

These are thrust bearings containing cylindrical rollers. They can sustain only axial loads, but they are suitable for heavy loads and have high axial rigidity.

The cages are machined brass.

TOLERANCES AND RUNNING ACCURACY**THRUST CYLINDRICAL ROLLER BEARINGS**

..... According to Table 7.6 (Pages A140 to A142)

RECOMMENDED FITS

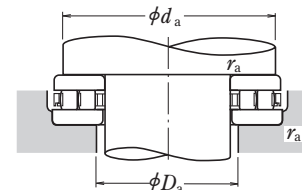
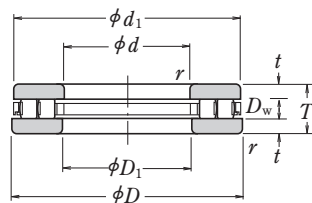
THRUST CYLINDRICAL ROLLER BEARINGS..... Table 8.4 (Pages A164)
Table 8.6 (Pages A165)

MINIMUM AXIAL LOAD

It is necessary to apply some axial load to thrust bearings to prevent slippage between the rolling elements and raceways. For more details, please refer to Page A198.

THRUST CYLINDRICAL ROLLER BEARINGS

Bore Diameter 35 – 130 mm

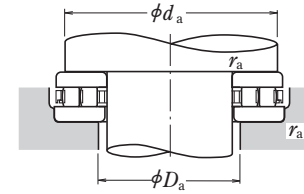
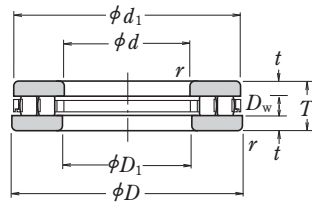


Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	Dimensions (mm)				Abutment and Fillet Dimensions (mm)			Mass (kg) approx.
<i>d</i>	<i>D</i>	<i>T</i>	<i>r</i> _{min.}	<i>C</i> _a	<i>C</i> _{0a}	Grease	Oil		<i>d</i> ₁	<i>D</i> ₁	<i>D</i> _w	<i>t</i>	<i>d</i> _a _{min.}	<i>D</i> _a _{max.}	<i>r</i> _a _{max.}	
35	80	32	1.1	95 500	247 000	1 000	3 000	35 TMP 14	80	37	12	10	71	46	1	0.97
40	78	22	1	63 000	194 000	1 200	3 600	40 TMP 93	78	42	8	7	71	48	1	0.525
45	65	14	0.6	33 000	100 000	1 700	5 000	45 TMP 11	65	47	6	4	60	49	0.6	0.144
	85	24	1	71 000	233 000	1 100	3 400	45 TMP 93	85	47	8	8	78	53	1	0.665
50	110	27	1.1	139 000	470 000	900	2 800	50 TMP 74	109	52	11	8	100	61	1	1.52
	95	27	1.1	113 000	350 000	1 000	3 000	50 TMP 93	93	52	11	8	89	57	1	0.94
55	105	30	1.1	134 000	450 000	900	2 600	55 TMP 93	105	55.2	11	9.5	98	63	1	1.28
60	95	26	1	99 000	325 000	1 000	3 000	60 TMP 12	95	62	10	8	88	67	1	0.735
	110	30	1.1	139 000	480 000	850	2 600	60 TMP 93	110	62	11	9.5	103	68	1	1.36
65	100	27	1	110 000	325 000	950	2 800	65 TMP 12	100	67	12.5	7.25	93	71	1	0.805
	115	30	1.1	145 000	515 000	850	2 600	65 TMP 93	115	65.2	11	9.5	108	73	1	1.44
70	150	36	2	259 000	935 000	670	2 000	70 TMP 74	149	72	15	10.5	137	84	2	3.8
	125	34	1.1	191 000	635 000	750	2 200	70 TMP 93	125	72	14	10	117	78	1	1.95
75	100	19	1	63 500	221 000	1 100	3 400	75 TMP 11	100	77	8	5.5	96	79	1	0.41
	135	36	1.5	209 000	735 000	710	2 200	75 TMP 93	135	77	14	11	125	84	1.5	2.42
80	115	28	1	120 000	420 000	900	2 600	80 TMP 12	115	82	11	8.5	109	86	1	1.02
	140	36	1.5	208 000	740 000	710	2 000	80 TMP 93	138	82	14	11	130	91	1.5	2.54
85	110	19	1	75 000	298 000	1 100	3 200	85 TMP 11	110	87	7.5	5.75	105	89	1	0.46
	125	31	1	151 000	485 000	800	2 400	85 TMP 12	125	88	14	8.5	118	92	1	1.36
	150	39	1.5	257 000	995 000	630	1 900	85 TMP 93	148	87	14	12.5	140	95	1.5	3.2
90	120	22	1	96 000	370 000	950	3 000	90 TMP 11	119	91.5	9	6.5	114	95	1	0.725
	155	39	1.5	250 000	885 000	630	1 900	90 TMP 93	155	90.2	16	11.5	144	101	1.5	3.3
100	170	42	1.5	292 000	1 110 000	560	1 700	100 TMP 93	170	103	16	13	159	110	1.5	4.25
110	160	38	1.1	228 000	855 000	630	1 900	110 TMP 12	160	113	15	11.5	150	119	1	2.66
	190	48	2	390 000	1 490 000	500	1 500	110 TMP 93	190	113	19	14.5	179	120	2	6.15
120	170	39	1.1	233 000	895 000	600	1 800	120 TMP 12	170	123	15	12	160	129	1	2.93
	210	54	2.1	505 000	1 930 000	450	1 400	120 TMP 93	210	123	22	16	199	129	2	8.55
130	190	45	1.5	300 000	1 090 000	530	1 600	130 TMP 12	187	133	19	13	177	142	1.5	4.5
	225	58	2.1	585 000	2 370 000	430	1 300	130 TMP 93	225	133	22	18	214	140	2	10.4
	270	85	4	895 000	3 300 000	320	950	130 TMP 94	270	133	32	26.5	254	150	3	26.2

Remark For cylindrical roller thrust bearings not listed above, please contact NSK.

THRUST CYLINDRICAL ROLLER BEARINGS

Bore Diameter 140 – 320 mm



<i>d</i>	Boundary Dimensions (mm)			Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	Dimensions (mm)				Abutment and Fillet Dimensions (mm)			Mass (kg) approx.
	<i>D</i>	<i>T</i>	<i>r</i> _{min.}	<i>C</i> _a	<i>C</i> _{0a}	Grease	Oil		<i>d</i> ₁	<i>D</i> ₁	<i>D</i> _w	<i>t</i>	<i>d</i> _a min.	<i>D</i> _a max.	<i>r</i> _a max.	
140	200	46	2	285 000	1 120 000	500	1 500	140 TMP 12 140 TMP 93 140 TMP 94	197	143	17	14.5	188	153	2	4.85
	240	60	2.1	610 000	2 360 000	400	1 200		240	143	25	17.5	226	154	2	12.2
	280	85	4	990 000	3 800 000	300	900		280	143	32	26.5	262	158	3	27.5
150	215	50	2	375 000	1 500 000	480	1 400	150 TMP 12 150 TMP 93	215	153	19	15.5	202	163	2	6.15
	250	60	2.1	635 000	2 510 000	400	1 200		250	153	25	17.5	236	165	2	12.8
160	200	31	1	173 000	815 000	630	1 900	160 TMP 11 160 TMP 93	200	162	11	10	191	168	1	2.21
	270	67	3	745 000	3 150 000	360	1 100		265	164	25	21	255	173	2.5	16.9
170	240	55	1.5	485 000	1 960 000	430	1 300	170 TMP 12 170 TMP 93	237	173	22	16.5	227	182	1.5	8.2
	280	67	3	800 000	3 500 000	340	1 000		280	173	25	21	265	183	2.5	17.7
180	300	73	3	1 000 000	4 000 000	320	950	180 TMP 93 180 TMP 94	300	185	32	20.5	284	194	2.5	22.5
	360	109	5	1 640 000	6 200 000	240	710		354	189	45	32	335	205	4	58.2
190	270	62	3	705 000	2 630 000	360	1 100	190 TMP 12 190 TMP 93	266	195	30	16	255	200	2.5	11.8
	320	78	4	1 080 000	4 500 000	300	900		320	195	32	23	303	205	3	27.6
200	250	37	1.1	365 000	1 690 000	500	1 500	200 TMP 11 200 TMP 93	247	203	17	10	242	207	1	4.1
	340	85	4	1 180 000	5 150 000	280	800		340	205	32	26.5	322	218	3	34.5
220	270	37	1.1	385 000	1 860 000	480	1 500	220 TMP 11 220 TMP 12	267	223	17	10	262	227	1	4.5
	300	63	2	770 000	3 100 000	340	1 000		297	224	30	16.5	287	232	2	13.5
240	300	45	1.5	435 000	2 160 000	400	1 200	240 TMP 11 240 TMP 12	297	243	18	13.5	288	251	1.5	7.2
	340	78	2.1	965 000	4 100 000	280	850		335	244	32	23	322	258	2	23.3
260	320	45	1.5	460 000	2 350 000	400	1 200	260 TMP 11 260 TMP 12	317	263	18	13.5	308	272	1.5	7.75
	360	79	2.1	995 000	4 350 000	280	850		355	264	32	23.5	342	276	2	25.2
280	350	53	1.5	545 000	2 800 000	340	1 000	280 TMP 11 280 TMP 12	347	283	20	16.5	335	294	1.5	11.6
	380	80	2.1	1 050 000	4 750 000	260	800		375	284	32	24	362	296	2	27.2
300	380	62	2	795 000	4 000 000	300	900	300 TMP 11 300 TMP 12	376	304	25	18.5	365	315	2	16.7
	420	95	3	1 390 000	6 250 000	220	670		415	304	38	28.5	398	322	2.5	42
320	400	63	2	820 000	4 250 000	300	900	320 TMP 11 320 TMP 12	396	324	25	19	385	335	2	18
	440	95	3	1 420 000	6 550 000	220	670		435	325	38	28.5	418	340	2.5	44.5

Remark For cylindrical roller thrust bearings not listed above, please contact NSK.

10. THRUST TAPERED ROLLER BEARINGS

INTRODUCTION C 322

BEARINGS TABLE

THRUST TAPERED ROLLER BEARINGS

Bore Diameter 101.600mm – 600mm C 324



DESIGN, TYPES, AND FEATURES

THRUST TAPERED ROLLER BEARINGS

These are thrust bearings containing tapered rollers. TT-type bearings, which have a rib on the housing washer, can accurately guide the shaft in the radial direction. TTF-type bearings, which have no rib on the housing washer, can tolerate some eccentricity during operation.



Fig 1 TT, TTF Base Structure

TOLERANCES AND RUNNING ACCURACY

THRUST TAPERED ROLLER BEARINGS Table 7.7 (Page A144)

RECOMMENDED FITS

THRUST TAPERED ROLLER BEARINGS Table 8.4 (Page A164)
 Table 8.6 (Page A165)

For inch design tapered roller thrust bearings, please contact NSK.

MINIMUM AXIAL LOAD

It is necessary to apply some axial load to thrust bearings to prevent slippage between the rolling elements and raceways. For more details, please contact NSK.

USAGE EXAMPLE

Typical structure of Heavy Duty Extruder is shown in Figure 2.

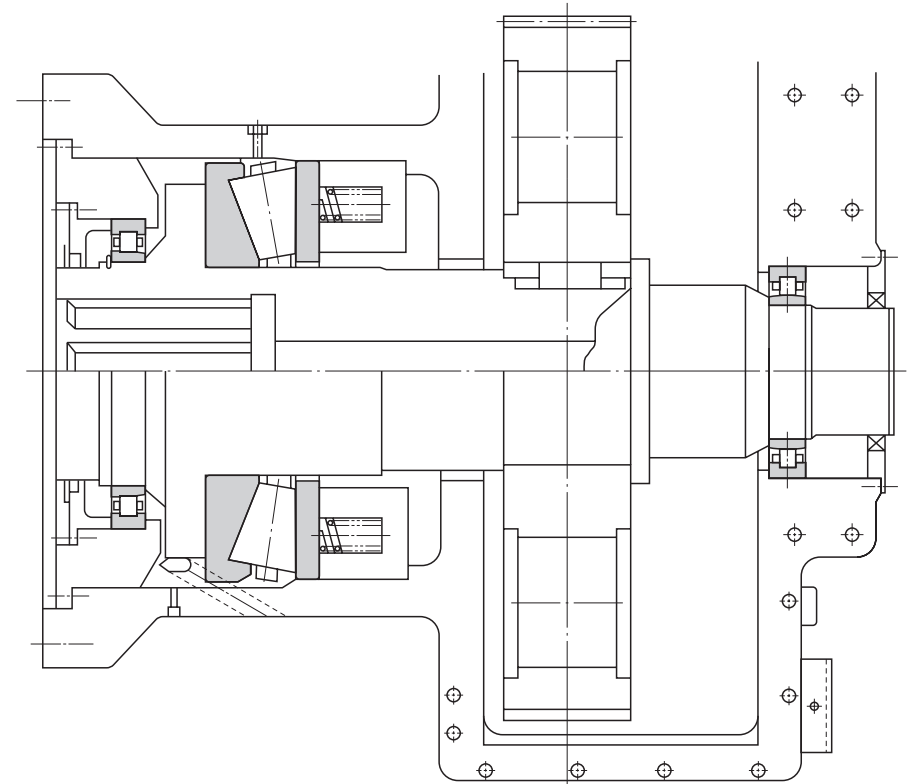
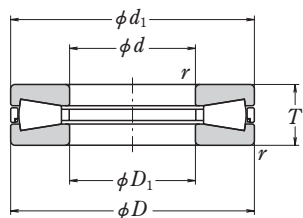


Figure 2 Thrust Tapered Roller Bearing in Heavy Duty Extruder

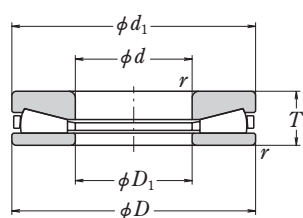
THRUST TAPERED ROLLER BEARINGS

TT, TTF Types

Bore Diameter 101.600 – 168.275 mm



TT



TTF

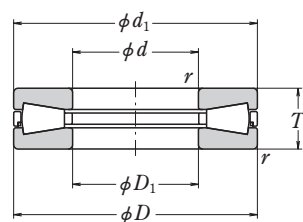
<i>d</i>	Boundary Dimensions (mm/inch)			Basic Load Ratings (kN)		Bearing Numbers	Dimensions (mm)		Corner Radius of Shaft or Housing <i>r_a</i> max.	Mass (kg) approx.
	<i>D</i>	<i>T</i>	<i>r</i> min.	<i>C_a</i>	<i>C_{0a}</i>		<i>D₁</i>	<i>d₁</i>		
101.600 4.000	215.900 8.5000	46.038 1.8125	3.3	710	2 900	*101TT2151	103.200	214.300	3.3	8.9
111.760 4.400	223.520 8.8000	55.880 2.2000	3.3	790	2 920	*111TT2251	113.300	221.900	3.3	11.2
114.300 4.500	250.825 9.8750	53.975 2.1250	4.0	970	4 100	*114TT2551	114.500	250.825	4.0	14.4
127.000 5.000	266.700 10.5000	58.738 2.3125	4.8	1 040	4 350	*127TT2551	128.600	265.100	4.8	17.3
	266.700 10.5000	58.738 2.3125	4.8	1 030	4 500	*127TTF2651	128.600	265.100	4.8	17.3
128.575 5.0620	265.100 10.4370	63.500 2.5000	6.4	1 040	4 350	*128TT2651	128.900	265.100	6.4	18.2
130	250	70	2.1	1 100	4 100	130TTF2501	130.3	250	2	17
135	245	65	2.1	855	3 100	135TT2401	135.3	245	2	14.5
150	300	90	5	1 470	6 300	150TTF3001	152	306	4	34.2
152.400 6.000	317.500 12.5000	69.850 2.7500	6.4	1 470	6 300	*152TTF3151	152.700	315.900	6.4	28.9
	317.500 12.5000	69.850 2.7500	6.4	1 550	6 700	*152TT3152	152.400	317.500	6.4	28.9
165.100 6.500	311.150 12.2500	88.900 3.5000	6.4	1 560	5 250	*165TT3151	165.400	311.150	6.4	33
168.275 6.6250	304.800 12.0000	69.850 2.7500	6.4	1 230	5 000	*168TTF3051	169.000	302.500	6.4	24.1

Note * Bearings marked * are inch design.

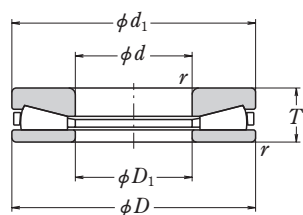
THRUST TAPERED ROLLER BEARINGS

TT, TTF Types

Bore Diameter 170 – 241.300 mm



TT



TTF

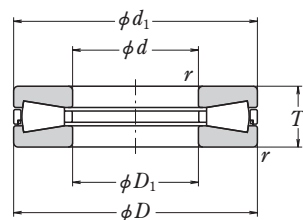
d	Boundary Dimensions (mm/inch)			Basic Load Ratings (kN)		Bearing Numbers	Dimensions (mm)		Corner Radius of Shaft or Housing r_a max.	Mass (kg) approx.
	D	T	r min.	C_a	C_{0a}		D_1	d_1		
170	320	100	5	1 650	5 550	170TT3201	170.5	320	4	39.3
174.625 6.8750	358.775 14.1250	82.550 3.2500	6.4	1 740	7 400	*174TT3551	174.625	358.775	6.4	43.3
	358.775 14.1250	82.550 3.2500	6.4	1 740	7 400	*174TTF3551	174.625	358.775	6.4	43.3
177.800 7.0000	368.300 14.5000	82.550 3.2500	8.0	1 900	8 250	*177TT3651	180.400	365.800	8.0	45.9
203.200 8.0000	419.100 16.5000	92.075 3.6250	9.7	2 530	11 300	*203TT4151	205.600	416.700	9.7	66.1
	419.100 16.5000	92.075 3.6250	9.7	2 530	11 300	*203TTF4153A	203.200	419.100	9.7	66.1
	419.100 16.5000	120.650 4.7500	9.7	2 530	11 300	*203TT4152	205.600	416.700	9.7	86.6
	419.100 16.5000	120.650 4.7500	9.7	2 530	11 300	*203TTF4152	205.600	416.700	9.7	86.6
206.375 8.1250	419.100 16.5000	120.370 4.7390	C10	2 590	11 700	*206TT4151	206.375	419.100	6	85.5
228.600 9.0000	482.600 19.0000	104.775 4.1250	11.2	3 350	16 400	*228TT4851	228.900	482.600	11.2	101
	482.600 19.0000	104.775 4.1250	11.2	3 350	16 400	*228TTF4851	230.600	480.600	11.2	101
234.950 9.2500	546.100 21.5000	127.000 5.0000	15.9	4 600	21 400	*234TT5451	237.000	544.000	15.9	165
241	404	110	4	2 200	8 650	241TTF4002	241	404	3	61.8
241.300 9.5000	496.888 19.5625	129.000 5.0787	C8	3 450	16 700	*241TT4952	241.300	496.888	5	130

Note * Bearings marked * are inch design.

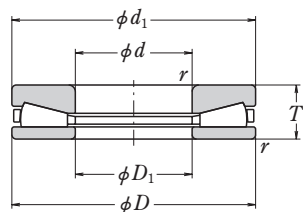
THRUST TAPERED ROLLER BEARINGS

TT, TTF Types

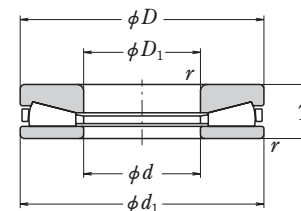
Bore Diameter 254.000 – 600 mm



TT



TTF



TTF-1

d	Boundary Dimensions (mm/inch)			Basic Load Ratings (kN)		Bearing Numbers	Dimensions (mm)		Corner Radius of Shaft or Housing r _a max.	Mass (kg) approx.
	D	T	r min.	C _a	C _{0a}		D ₁	d ₁		
254.000 10.0000	539.750 21.2500	117.475 4.6250	11.2	3 950	18 600	*254TTF5351	254.000	539.750	11.2	142
260	360	75	2.1	1 110	4 650	260TTF3601	260.3	360	2	24.8
273.050 10.7500	552.450 21.7500	133.350 5.2500	C8	4 400	20 700	*273TT5551	273.050	552.450	5	164
279.400 11.0000	603.250 23.7500	136.525 5.3750	11.2	5 400	25 200	*279TT6051	279.700	603.250	11.2	208
330	440	85	3	1 300	6 300	330TTF4401	331	440	2.5	38.5
340	460	96	3	1 690	7 750	340TTF4603	340	460	2.5	49.2
350	460	85	2	1 370	6 600	350TTF4602A⁽¹⁾	351	450	2	40.4
360	470	85	4	1 440	6 950	360TTF4701	360.4	470	3	41.4
	600	120	4	3 700	20 100	360TTF6201	366	620	3	148
380	550	110	4	2 760	12 100	380TTF5501	381	550	3	92.9
406.400 16.0000	711.200 28.0000	146.050 5.7500	9.7	5 900	28 600	*406TT7151	406.800	711.200	9.7	266
	838.200 33.0000	177.800 7.0000	12.7	8 950	46 500	*406TT8351	406.800	837.800	12.7	510
431.800 17.0000	863.600 34.0000	228.600 9.0000	10.4	15 100	69 500	*431TTF8651	435.000	862.000	10.4	683
440	600	105	4	2 720	13 900	440TTF6001	440	600	3	93.3
450	570	100	3	2 170	10 500	450TTF5701	455	569	2.5	65.4
460	580	90	3	1 890	9 550	460TTF5801	465	579	2.5	60
500	630	82	3	2 020	11 600	500TTF6301	505	628	2.5	64.3
508	730.25	120.65	6	4 900	26 100	508TT7301	509	730.25	5	177
508.000 20.0000	990.600 39.0000	196.850 7.7500	12.7	12 000	65 000	*508TT9951	508.000	990.600	12.7	760
558	780	120	9.5	4 800	25 500	558TT7801	558	780	8	190
558.800 22.0000	1 066.800 42.0000	285.750 11.2500	10.4	21 100	94 500	*558TTF1051	561.980	1 065.219	10.4	1 260
560	670	85	3	1 950	10 700	560TTF6701	565	668	2.5	61.4
600	710	86	3	1 900	10 700	600TTF7101	604	710	2.5	66.2

Note * Bearings marked * are inch design.

⁽¹⁾ For this bearing, the dimensional symbols are defined by Figure TTF-1.

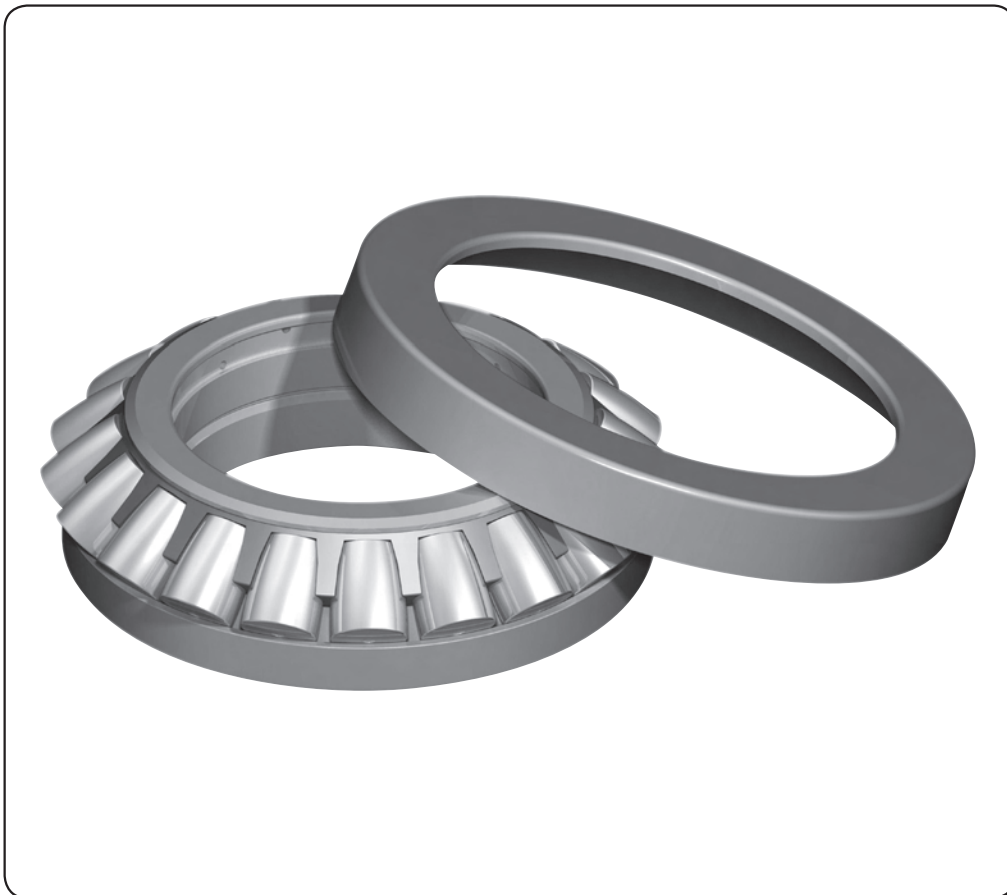
11. THRUST SPHERICAL ROLLER BEARINGS

INTRODUCTION C 332

BEARINGS TABLE

THRUST SPHERICAL ROLLER BEARINGS

Bore Diameter 60mm – 500mm C 334



DESIGN, TYPES, AND FEATURES**THRUST SPHERICAL ROLLER BEARINGS**

These are thrust bearings containing convex rollers. They have a self-aligning capability and are free of any influence of mounting error or shaft deflection. Besides the original type, the E type with pressed cages for high load capacity is also available. Their bearing numbers are suffixed by E.

For horizontal shaft or high speed application, machined brass cages are recommended. For details, contact NSK.

Since there are several places where lubrication is difficult, such as the area between the roller heads and inner ring rib, the sliding surfaces between cage and guide sleeve, etc., oil lubrication should be used even at low speed.

The cages in the original type are machined brass.

TOLERANCES AND RUNNING ACCURACY

THRUST SPHERICAL ROLLER BEARINGSTable 7.8 (Pages A145)

RECOMMENDED FITS

THRUST SPHERICAL ROLLER BEARINGSTable 8.4 (Pages A164)
Table 8.6 (Pages A165)

DIMENSIONS RELATED TO MOUNTING

The dimensions related to mounting of thrust spherical roller bearings are listed in the Bearing Table.

If the bearing load is heavy, it is necessary to design the shaft shoulder with ample strength in order to provide sufficient support for the shaft washer.

PERMISSIBLE MISALIGNMENT

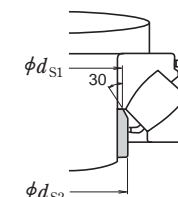
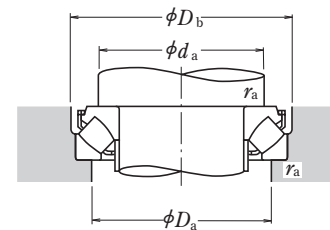
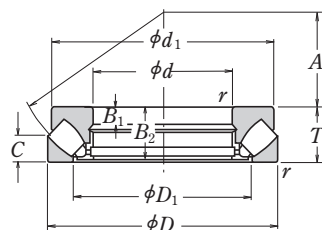
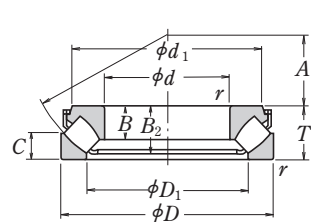
The permissible misalignment of thrust spherical roller bearings varies depending on the size, but it is approximately 0.018 to 0.036 radian (1° to 2°) with average loads.

MINIMUM AXIAL LOAD

It is necessary to apply some axial load to thrust bearings to prevent slippage between the rolling elements and raceways. For more details, please refer to Page A198.

THRUST SPHERICAL ROLLER BEARINGS

Bore Diameter 60 – 200 mm



Dynamic Equivalent Load

$$P = 1.2F_r + F_a$$

Static Equivalent Load

$$P_0 = 2.8F_r + F_a$$

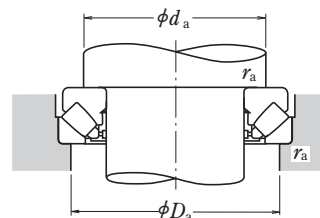
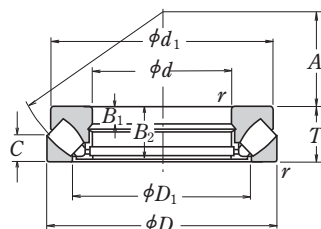
However, $F_r/F_a \leq 0.55$ must be satisfied.

d	Boundary Dimensions (mm)			Basic Load Ratings (N)		Limiting Speeds (min ⁻¹) Oil	Bearing Numbers	Dimensions (mm)					Spacer Sleeve Dimensions (mm)		Abutment and Fillet Dimensions (mm)				Mass (kg) approx.	
	D	T	r min.	C _a	C _{0a}			d ₁	D ₁	B, B ₁	B ₂	C	A	d _{s1} max.	d _{s2} max.	d _a ⁽¹⁾ min.	D _a max.	D _b min.		r _a max.
60	130	42	1.5	330 000	885 000	2 600	29412 E	114.5	89	27	38	20	38	67	67	90	108	133	1.5	2.55
65	140	45	2	405 000	1 100 000	2 400	29413 E	121.5	93	29.5	40.5	22	42	72	72	100	115	143	2	3.2
70	150	48	2	450 000	1 240 000	2 400	29414 E	131.5	102	31	43	24	44	78	78	105	125	153	2	3.9
75	160	51	2	515 000	1 430 000	2 200	29415 E	138	107	33.5	46	25	47	83	83	115	132	163	2	4.65
80	170	54	2.1	575 000	1 600 000	2 000	29416 E	148	114.5	35	48.5	27	50	89	89	120	140	173	2	5.55
85	150	39	1.5	330 000	1 040 000	2 400	29317 E	134.5	112	24.5	35.5	19	50	91	91	115	135	153	1.5	2.7
	180	58	2.1	630 000	1 760 000	1 900	29417 E	156.5	124	37	51.5	28	54	95	95	130	150	183	2	6.55
90	155	39	1.5	350 000	1 080 000	2 200	29318 E	139.5	118	24.5	35	19	52	97	97	120	140	158	1.5	2.83
	190	60	2.1	695 000	1 950 000	1 800	29418 E	165.5	129.5	39	54.5	29	56	100	100	135	157	193	2	7.55
100	170	42	1.5	410 000	1 280 000	2 000	29320 E	152	128	26.2	38	20.8	58	107	107	130	150	173	1.5	3.6
	210	67	3	840 000	2 400 000	1 600	29420 E	185	144	43	59.5	33	62	111	111	150	175	214	2.5	10.3
110	190	48	2	530 000	1 710 000	1 800	29322 E	169.5	142.5	30.3	43.5	24	64	117	117	145	165	193	2	5.25
	230	73	3	1 010 000	2 930 000	1 500	29422 E	200	157	47	64.5	36	69	121	129	165	190	234	2.5	13.3
120	210	54	2.1	645 000	2 100 000	1 600	29324 E	187.5	156.5	34	48.5	27	70	130	130	160	180	214	2	7.3
	250	78	4	1 160 000	3 400 000	1 400	29424 E	215	171	50.5	69.5	38	74	132	142	180	205	254	3	16.6
130	225	58	2.1	740 000	2 450 000	1 500	29326 E	203.5	168.5	37	53.5	28	76	141	143	170	195	229	2	8.95
	270	85	4	1 330 000	3 900 000	1 200	29426 E	235	185	54	74.5	42	81	143	153	195	225	275	3	21.1
140	240	60	2.1	840 000	2 810 000	1 400	29328 E	216.5	179	38.5	54	30	82	148	154	185	205	244	2	10.4
	280	85	4	1 370 000	4 200 000	1 200	29428 E	244.5	195.5	54	74.5	42	86	153	162	205	235	285	3	22.2
150	250	60	2.1	870 000	2 900 000	1 400	29330 E	224	190	38	54.5	29	87	158	163	195	215	254	2	10.8
	300	90	4	1 580 000	4 900 000	1 100	29430 E	266	209	58	81	44	92	164	175	220	250	306	3	27.3
160	270	67	3	1 010 000	3 400 000	1 300	29332 E	243	203	42	60	33	92	169	176	210	235	275	2.5	14.3
	320	95	5	1 740 000	5 400 000	1 100	29432 E	278	224.5	60.5	84.5	46	99	175	189	230	265	326	4	32.1
170	280	67	3	1 050 000	3 500 000	1 200	29334 E	252	214.5	42.2	60.5	32	96	178	188	220	245	285	2.5	14.8
	340	103	5	1 680 000	5 800 000	1 000	29434 E	310	243	37	99	50	104	—	—	245	285	—	4	43.5
180	300	73	3	1 230 000	4 200 000	1 100	29336 E	270	227	46	65.5	36	103	189	195	235	260	306	2.5	19
	360	109	5	1 870 000	6 500 000	900	29436 E	330	255	39	105	52	110	—	—	260	300	—	4	52
190	320	78	4	1 370 000	4 700 000	1 100	29338 E	288.5	244	49	69	38	110	200	211	250	275	326	3	23
	380	115	5	2 100 000	7 450 000	850	29438 E	345	271	41	111	55	117	—	—	275	320	—	4	60
200	280	48	2	540 000	2 310 000	1 500	29240	266	236	15	46	24	108	—	—	235	255	—	2	8.55
	340	85	4	1 570 000	5 450 000	1 000	29340 E	306.5	257	53.5	75	41	116	211	224	265	295	346	3	28.5
	400	122	5	2 290 000	8 150 000	800	29440	365	280	43	117	59	122	—	—	290	335	—	4	69

Note (1) For heavy load applications, a d_a value should be chosen which is large enough to support the shaft washer rib.

THRUST SPHERICAL ROLLER BEARINGS

Bore Diameter 220 – 420 mm



Dynamic Equivalent Load

$$P = 1.2F_r + F_a$$

Static Equivalent Load

$$P_0 = 2.8F_r + F_a$$

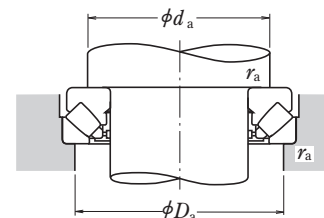
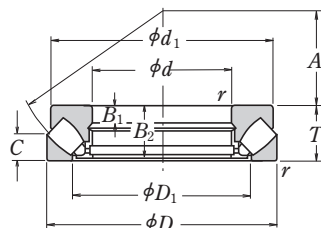
However, $F_r/F_a \leq 0.55$ must be satisfied.

Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹) Oil	Bearing Numbers	Dimensions (mm)					Abutment and Fillet Dimensions (mm)			Mass (kg) approx.	
d	D	T	r min.	C _a	C _{0a}			d ₁	D ₁	B ₁	B ₂	C	A	d _a ⁽¹⁾ min.	D _a max.		r _a max.
220	300	48	2	560 000	2 500 000	1 400	29244 29344 29444	285	254	15	46	24	117	260	275	2	9.2
	360	85	4	1 340 000	5 200 000	950		335	280	29	81	41	125	285	315	3	33
	420	122	6	2 350 000	8 650 000	800		385	308	43	117	58	132	310	355	5	74
240	340	60	2.1	800 000	3 450 000	1 200	29248 29348 29448	325	283	19	57	30	130	285	305	2	16.5
	380	85	4	1 360 000	5 400 000	950		355	300	29	81	41	135	300	330	3	35.5
	440	122	6	2 420 000	9 100 000	750		405	326	43	117	59	142	330	375	5	79
260	360	60	2.1	855 000	3 850 000	1 200	29252 29352 29452	345	302	19	57	30	139	305	325	2	18
	420	95	5	1 700 000	6 800 000	800		390	329	32	91	45	148	330	365	4	48.5
	480	132	6	2 820 000	10 700 000	710		445	357	48	127	64	154	360	405	5	105
280	380	60	2.1	885 000	4 100 000	1 100	29256 29356 29456 29456 EM	365	323	19	57	30	150	325	345	2	19
	440	95	5	1 830 000	7 650 000	800		410	348	32	91	46	158	350	390	4	52.5
	520	145	6	3 400 000	13 100 000	630		480	384	52	140	68	166	390	440	5	132
	520	145	6	3 950 000	14 900 000	630		480	380	52	140	70	166	410	445	5	134
300	420	73	3	1 160 000	5 150 000	950	29260 29360 29460	400	353	21	69	38	162	355	380	2.5	30
	480	109	5	2 190 000	9 100 000	710		450	379	37	105	50	168	380	420	4	74
	540	145	6	3 500 000	13 700 000	630		500	402	52	140	70	175	410	460	5	140
320	440	73	3	1 190 000	5 450 000	950	29264 29364 29464	420	372	21	69	38	172	375	400	2.5	32.5
	500	109	5	2 230 000	9 400 000	670		470	399	37	105	53	180	400	440	4	77
	580	155	7.5	3 650 000	14 600 000	560		555	436	55	149	75	191	435	495	6	175
340	460	73	3	1 230 000	5 750 000	900	29268 29368 29468	440	395	21	69	37	183	395	420	2.5	33.5
	540	122	5	2 640 000	11 200 000	630		510	428	41	117	59	192	430	470	4	103
	620	170	7.5	4 400 000	17 400 000	530		590	462	61	164	82	201	465	530	6	218
360	500	85	4	1 550 000	7 300 000	800	29272 29372 29472 29472 EM	480	423	25	81	44	194	420	455	3	51
	560	122	5	2 670 000	11 500 000	600		525	448	41	117	59	202	450	495	4	107
	640	170	7.5	4 200 000	17 200 000	500		610	480	61	164	82	210	485	550	6	228
	640	170	7.5	5 450 000	20 400 000	500		580	474	61	164	83	210	495	550	6	220
380	520	85	4	1 620 000	7 800 000	800	29276 29376 29476	496	441	27	81	42	202	440	475	3	52
	600	132	6	3 300 000	14 500 000	560		568	477	44	127	63	216	480	525	5	140
	670	175	7.5	4 800 000	19 500 000	480		640	504	63	168	85	230	510	575	6	254
400	540	85	4	1 640 000	8 000 000	750	29280 29380 29480	517	460	27	81	42	212	460	490	3	55
	620	132	6	3 250 000	14 500 000	530		590	494	44	127	64	225	500	550	5	150
	710	185	7.5	5 400 000	22 100 000	450		680	536	67	178	89	236	540	610	6	306
420	580	95	5	2 010 000	9 800 000	670	29284 29384 29484	553	489	30	91	46	225	490	525	4	72
	650	140	6	3 500 000	15 700 000	500		620	520	48	135	68	235	525	575	5	170
	730	185	7.5	5 650 000	23 500 000	450		700	556	67	178	89	244	560	630	6	323

Note (1) For heavy load applications, a d_a value should be chosen which is large enough to support the shaft washer rib.

THRUST SPHERICAL ROLLER BEARINGS

Bore Diameter 440 – 500 mm



Dynamic Equivalent Load

$$P = 1.2F_r + F_a$$

Static Equivalent Load

$$P_0 = 2.8F_r + F_a$$

However, $F_r/F_a \leq 0.55$ must be satisfied.

d	Boundary Dimensions (mm)			Basic Load Ratings (N)		Limiting Speeds (min ⁻¹) Oil	Bearing Numbers	Dimensions (mm)					Abutment and Fillet Dimensions (mm)			Mass (kg) approx.	
	D	T	r min.	C _a	C _{0a}			d ₁	D ₁	B ₁	B ₂	C	A	d _a ⁽¹⁾ min.	D _a max.		r _a max.
440	600	95	5	2 030 000	10 100 000	670	29288	575	508	30	91	49	235	510	545	4	77
	680	145	6	3 750 000	16 700 000	480	29388	645	548	49	140	70	245	550	600	5	190
	780	206	9.5	6 550 000	27 200 000	400	29488	745	588	74	199	100	260	595	670	8	407
	780	206	9.5	8 000 000	31 500 000	400	29488 EM	710	577	74	199	101	257	605	675	8	402
460	620	95	5	2 060 000	10 300 000	670	29292	592	530	30	91	46	245	530	570	4	80
	710	150	6	4 100 000	18 400 000	450	29392	666	567	51	144	72	257	575	630	5	210
	800	206	9.5	6 750 000	28 600 000	380	29492	765	608	74	199	100	272	615	690	8	420
480	650	103	5	2 370 000	12 100 000	600	29296	624	556	33	99	55	259	555	595	4	97
	730	150	6	4 150 000	19 000 000	450	29396	690	590	51	144	72	270	595	650	5	215
	850	224	9.5	7 200 000	31 000 000	360	29496	810	638	81	216	108	280	645	730	8	545
500	670	103	5	2 390 000	12 400 000	600	292/500	645	574	33	99	55	268	575	615	4	100
	750	150	6	4 350 000	20 400 000	450	293/500	715	611	51	144	74	280	615	670	5	220
	870	224	9.5	7 850 000	33 000 000	340	294/500	830	661	81	216	107	290	670	750	8	560

Note (1) For heavy load applications, a d_a value should be chosen which is large enough to support the shaft washer rib.

12. NEEDLE ROLLER BEARINGS

DESIGN AND TYPES

For needle roller bearings, there are many designs and types bearings. Catalog

Specified catalog, NSK Needle Roller Bearings CAT.No.E1419 lists bearings shown in Table 1. For details, please refer individual specified catalog.

For bearing selection, please contact NSK.



Table 1 Types of Needle Roller Bearings

Cage & Needle Roller Assemblies	FWJ FWF WJ		FBN, FBNP WJC FWJC	
Drawn Cup Needle Roller Bearings	FJ, FJH J, JH F, FH B, BH FJT, FJTT MFJT FJLT, FJLTT MFJLT		MFJ, MFJH MJ, MJH MF, MFH M, MH FJP JP	MFJL Y YH FIR IR
Solid Needle Roller Bearings	RNA 48 RNA 49 RNA 59 RNA 69 HJ		RLM	
Thrust Needle Roller Bearings Thrust raceway washers	FNTA NTA		FB FTRA TRA	
Needle Rollers	A Type (Please refer to B350 page)		F Type C Type	
Cam Followers Roller Followers	FCR FCJ CR		FCRS FCJS CRS	
Needle Roller Bearings For Universal Joints	ZY		NSA	
Drawn Cup Roller Clutches	RC		FC	
			RCB	
			FCB	

13. BALL BEARING UNITS

DESIGN, TYPES

For ball bearing units, there are many designs and types.
Please refer to specified Catalog below, for more detailed information.

Specified Catalog

Ball Bearing Units CAT.No. E1154

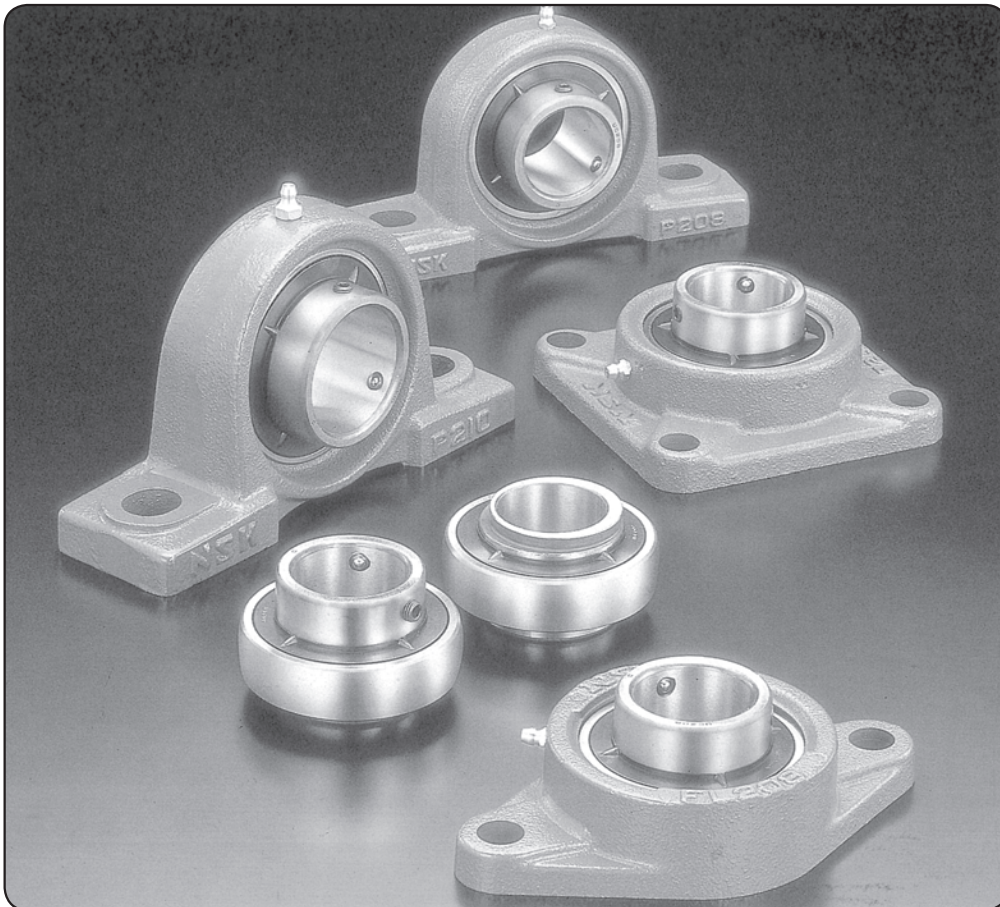
Ball Bearing Units Steel Series CAT.No. E1232

Ball Bearing Units with Ductile Cast Iron Housing CAT.No. E1233

Triple-Sealed Bearings for Ball Bearing Units CAT.No. E1234

Ball Bearings Units Stainless Series CAT.No. E1235

Ball Bearing Units Hand book CAT.No. E1155

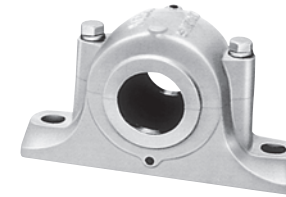


14. PLUMMER BLOCKS

DESIGN, TYPES AND FEATURES

There are numerous types and sizes of plummer blocks.

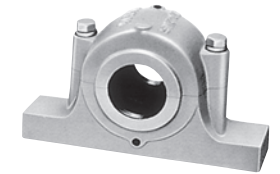
SN 5
SN 6
SN 30
SN 31
SN 2
SN 3
SN 2C
SN 3C



These are the most common type. Models SN30 and SN31 are for medium loads.

For types SN2C and SN3C, the bore diameters on the two sides are different.

SN 5B
SN 6B
SN 30B
SN 31B
SN 2B
SN 3B
SN 2BC
SN 3BC



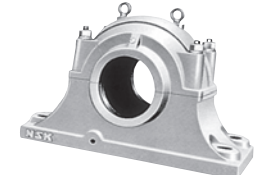
These have the same dimensions as those of types SN5 and SN6. To increase the bearing box strength, no material is removed from the top or bottom of the base, so mounting holes can be drilled anywhere.

SG 5



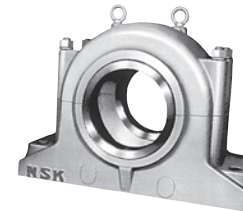
Dustproof plummer blocks have a combination of oil seals, labyrinth seals, and oil groove seals, therefore, they are suitable for environments with much dust and other foreign matter.

SD 30S
SD 31S
SD 5
SD 6
SD 2
SD 3
SD 2C
SD 3C



These are large and made for heavy loads. The standard ones have double seals and four mounting bolt holes. For types SD2C and SD3C, the bore diameters on the two sides are different.

SD31TS
SD32TS



These are provided with labyrinth seals, so they are suitable for high speed applications.

V · C



Single-piece plummer blocks (integrated type roller bearing unit) have higher rigidity and precision than split type plummer blocks.



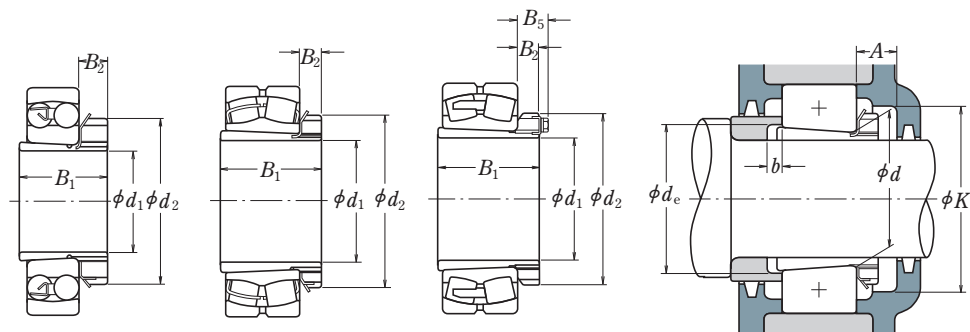
15. ACCESSORIES FOR ROLLING BEARINGS

ADAPTERS FOR ROLLING BEARINGS	Shaft Diameter 17 – 470mm.....	C 348
WITHDRAWAL SLEEVES FOR ROLLING BEARINGS	Shaft Diameter 35 – 480mm.....	C 356
NUTS FOR ROLLING BEARINGS	C 362
STOPPERS FOR ROLLING BEARINGS	C 367
LOCK-WASHERS FOR ROLLING BEARINGS	C 368



ADAPTERS FOR ROLLING BEARINGS

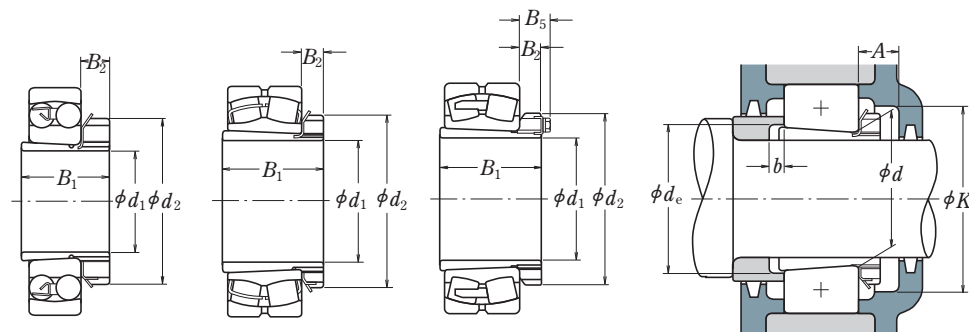
Shaft Diameter 17 – 40 mm



Shaft Diameter (mm) d_1	Nominal Bearing Bore Dia. (mm) d	Nominal Numbers Applicable Bearings		Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg) approx.
				B_1	d_2	B_2	B_5		A min.	K min.	d_e min.	b min.	
17	20	1204K	+ H 204X	24	32	7	—	A 204X	14	39	23	5	0.045
	20	2204K	+ H 304X	28	32	7	—	A 304X	14	39	24	5	0.045
	20	1304K	+ H 304X	28	32	7	—	A 304X	14	39	24	8	0.045
	20	2304K	+ H2304X	31	32	7	—	A2304X	14	39	24	5	0.050
20	25	1205K	+ H 205X	26	38	8	—	A 205X	15	45	28	5	0.065
	25	2205K	+ H 305X	29	38	8	—	A 305X	15	45	29	5	0.075
	25	1305K	+ H 305X	29	38	8	—	A 305X	15	45	29	6	0.075
	25	21305C DKE4	+ H 305X	29	38	8	—	A 305X	15	45	29	6	0.075
	25	2305K	+ H2305X	35	38	8	—	A2305X	15	45	29	5	0.090
25	30	1206K	+ H 206X	27	45	8	—	A 206X	15	50	33	5	0.10
	30	2206K	+ H 306X	31	45	8	—	A 306X	15	50	34	5	0.11
	30	1306K	+ H 306X	31	45	8	—	A 306X	15	50	34	6	0.11
	30	21306C DKE4	+ H 306X	31	45	8	—	A 306X	15	50	34	6	0.11
	30	2306K	+ H2306X	38	45	8	—	A2306X	15	50	35	5	0.125
30	35	1207K	+ H 207X	29	52	9	—	A 207X	17	58	38	5	0.125
	35	2207K	+ H 307X	35	52	9	—	A 307X	17	58	39	5	0.145
	35	1307K	+ H 307X	35	52	9	—	A 307X	17	58	39	7	0.145
	35	21307C DKE4	+ H 307X	35	52	9	—	A 307X	17	58	39	7	0.145
	35	2307K	+ H2307X	43	52	9	—	A2307X	17	58	40	5	0.16
35	40	1208K	+ H 208X	31	58	10	—	A 208X	17	65	44	5	0.175
	40	2208K	+ H 308X	36	58	10	—	A 308X	17	65	44	5	0.19
	40	1308K	+ H 308X	36	58	10	—	A 308X	17	65	44	5	0.19
	40	21308E AKE4	+ H 308X	36	58	10	—	A 308X	17	65	44	5	0.19
	40	2308K	+ H2308X	46	58	10	—	A2308X	17	65	45	5	0.225
	40	22308E AKE4	+ H2308X	46	58	10	—	A2308X	17	65	45	5	0.225
40	45	1209K	+ H 209X	33	65	11	—	A 209X	17	72	49	5	0.225
	45	2209K	+ H 309X	39	65	11	—	A 309X	17	72	49	8	0.26
	45	1309K	+ H 309X	39	65	11	—	A 309X	17	72	49	5	0.26
	45	21309E AKE4	+ H 309X	39	65	11	—	A 309X	17	72	49	5	0.26
	45	2309K	+ H2309X	50	65	11	—	A2309X	17	72	50	5	0.30
	45	22309E AKE4	+ H2309X	50	65	11	—	A2309X	17	72	50	5	0.30

Remark The suffix X represents adapter sleeves having narrow slits, for which washers with straight tabs should be used.

Shaft Diameter 45 – 60 mm

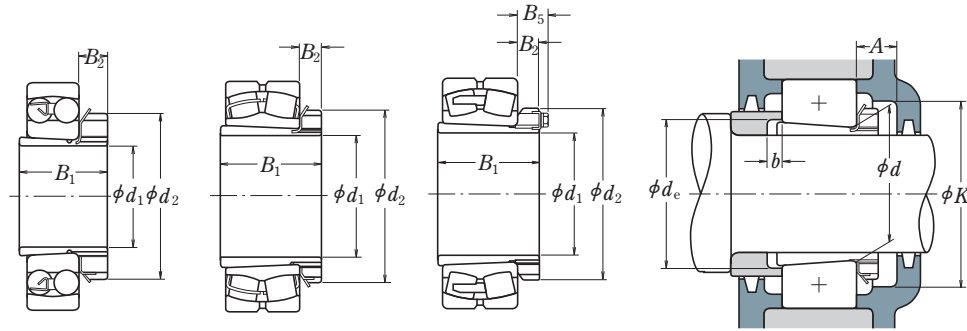


Shaft Diameter (mm) d_1	Nominal Bearing Bore Dia. (mm) d	Nominal Numbers Applicable Bearings		Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg) approx.
				B_1	d_2	B_2	B_5		A min.	K min.	d_e min.	b min.	
45	50	1210K	+ H 210X	35	70	12	—	A 210X	19	76	53	5	0.275
	50	2210K	+ H 310X	42	70	12	—	A 310X	19	76	54	10	0.30
	50	1310K	+ H 310X	42	70	12	—	A 310X	19	76	54	5	0.30
	50	21310E AKE4	+ H 310X	42	70	12	—	A 310X	19	76	54	5	0.30
	50	2310K	+ H2310X	55	70	12	—	A2310X	19	76	56	5	0.35
	50	22310E AKE4	+ H2310X	55	70	12	—	A2310X	19	76	56	5	0.35
50	55	1211K	+ H 211X	37	75	12	—	A 211X	19	85	60	6	0.305
	55	2211K	+ H 311X	45	75	12	—	A 311X	19	85	60	11	0.35
	55	22211E AKE4	+ H 311X	45	75	12	—	A 311X	19	85	60	11	0.35
	55	1311K	+ H 311X	45	75	12	—	A 311X	19	85	60	6	0.35
	55	21311E AKE4	+ H 311X	45	75	12	—	A 311X	19	85	60	6	0.35
	55	2311K	+ H2311X	59	75	12	—	A2311X	19	85	61	6	0.40
	55	22311E AKE4	+ H2311X	59	75	12	—	A2311X	19	85	61	6	0.40
55	60	1212K	+ H 212X	38	80	13	—	A 212X	20	90	64	5	0.365
	60	2212K	+ H 312X	47	80	13	—	A 312X	20	90	65	9	0.40
	60	22212E AKE4	+ H 312X	47	80	13	—	A 312X	20	90	65	9	0.40
	60	1312K	+ H 312X	47	80	13	—	A 312X	20	90	65	5	0.40
	60	21312E AKE4	+ H 312X	47	80	13	—	A 312X	20	90	65	5	0.40
	60	2312K	+ H2312X	62	80	13	—	A2312X	20	90	66	5	0.45
	60	22312E AKE4	+ H2312X	62	80	13	—	A2312X	20	90	66	5	0.45
60	65	1213K	+ H 213X	40	85	14	—	A 213X	21	96	70	5	0.40
	65	2213K	+ H 313X	50	85	14	—	A 313X	21	96	70	8	0.45
	65	22213E AKE4	+ H 313X	50	85	14	—	A 313X	21	96	70	8	0.45
	65	1313K	+ H 313X	50	85	14	—	A 313X	21	96	70	5	0.45
	65	21313E AKE4	+ H 313X	50	85	14	—	A 313X	21	96	70	5	0.45
	65	2313K	+ H2313X	65	85	14	—	A2313X	21	96	72	5	0.55
	65	22313E AKE4	+ H2313X	65	85	14	—	A2313X	21	96	72	5	0.55
	70	22214E AKE4	+ H 314X	52	92	14	—	A 314X	21	96	70	8	0.65
	70	21314E AKE4	+ H 314X	52	92	14	—	A 314X	21	96	70	5	0.65
	70	22314E AKE4	+ H2314X	68	92	14	—	A2314X	21	96	72	5	0.80

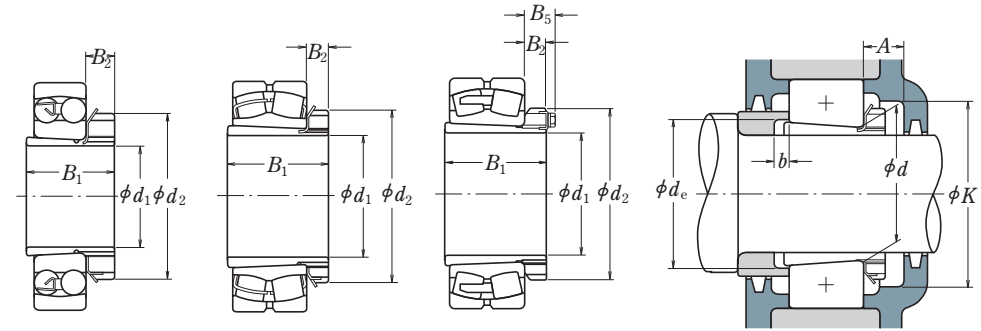
Remark The suffix X represents adapter sleeves having narrow slits, for which washers with straight tabs should be used.

ADAPTERS FOR ROLLING BEARINGS

Shaft Diameter 65 – 80 mm



Shaft Diameter 85 – 115 mm



Shaft Diameter (mm) d_1	Nominal Bearing Bore Dia. (mm) d	Nominal Numbers Applicable Bearings	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg) approx.	
			B_1	d_2	B_2	B_5		A min.	K min.	d_e min.	b min.		
65	75	1215K + H 215X	43	98	15	—	A 215X	23	110	80	5	0.70	
	75	2215K + H 315X	55	98	15	—	A 315X	23	110	80	12	0.85	
	75	22215E AKE4 + H 315X	55	98	15	—	A 315X	23	110	80	12	0.85	
	75	1315K + H 315X	55	98	15	—	A 315X	23	110	80	5	0.85	
	75	21315E AKE4 + H 315X	55	98	15	—	A 315X	23	110	80	5	0.85	
	75	2315K + H2315X	73	98	15	—	A2315X	23	110	82	5	1.05	
	75	22315E AKE4 + H2315X	73	98	15	—	A2315X	23	110	82	5	1.05	
	70	80	1216K + H 216X	46	105	17	—	A 216X	25	120	85	5	0.85
		80	2216K + H 316X	59	105	17	—	A 316X	25	120	86	12	1.05
		80	22216E AKE4 + H 316X	59	105	17	—	A 316X	25	120	86	12	1.05
80		1316K + H 316X	59	105	17	—	A 316X	25	120	86	5	1.05	
80		21316E AKE4 + H 316X	59	105	17	—	A 316X	25	120	86	5	1.05	
80		2316K + H2316X	78	105	17	—	A2316X	25	120	87	5	1.3	
80		22316E AKE4 + H2316X	78	105	17	—	A2316X	25	120	87	5	1.3	
75		85	1217K + H 217X	50	110	18	—	A 217X	27	128	90	6	1.0
		85	2217K + H 317X	63	110	18	—	A 317X	27	128	91	12	1.2
		85	22217E AKE4 + H 317X	63	110	18	—	A 317X	27	128	91	12	1.2
	85	1317K + H 317X	63	110	18	—	A 317X	27	128	91	6	1.2	
	85	21317E AKE4 + H 317X	63	110	18	—	A 317X	27	128	91	6	1.2	
	85	2317K + H2317X	82	110	18	—	A2317X	27	128	94	6	1.45	
	85	22317E AKE4 + H2317X	82	110	18	—	A2317X	27	128	94	6	1.45	
	80	90	1218K + H 218X	52	120	18	—	A 218X	28	139	95	6	1.15
		90	2218K + H 318X	65	120	18	—	A 318X	28	139	96	10	1.4
		90	22218E AKE4 + H 318X	65	120	18	—	A 318X	28	139	96	10	1.4
90		1318K + H 318X	65	120	18	—	A 318X	28	139	96	6	1.4	
90		21318E AKE4 + H 318X	65	120	18	—	A 318X	28	139	96	6	1.4	
90		2318K + H2318X	86	120	18	—	A2318X	28	139	99	6	1.7	
90		23218C KE4 + H2318X	86	120	18	—	A2318X	28	139	99	6	1.7	
90		22318E AKE4 + H2318X	86	120	18	—	A2318X	28	139	99	6	1.7	

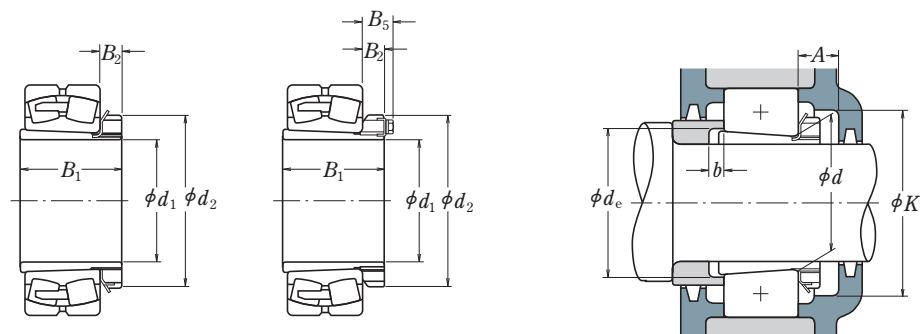
Remark The suffix X represents adapter sleeves having narrow slits, for which washers with straight tabs should be used.

Shaft Diameter (mm) d_1	Nominal Bearing Bore Dia. (mm) d	Nominal Numbers Applicable Bearings	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg) approx.	
			B_1	d_2	B_2	B_5		A min.	K min.	d_e min.	b min.		
85	95	1219K + H 219X	55	125	19	—	A 219X	29	145	101	7	1.35	
	95	2219K + H 319X	68	125	19	—	A 319X	29	145	102	9	1.55	
	95	22219E AKE4 + H 319X	68	125	19	—	A 319X	29	145	102	9	1.55	
	95	1319K + H 319X	68	125	19	—	A 319X	29	145	102	7	1.55	
	95	21319C KE4 + H 319X	68	125	19	—	A 319X	29	145	102	7	1.55	
	95	2319K + H2319X	90	125	19	—	A2319X	29	145	105	7	1.9	
	95	22319E AKE4 + H2319X	90	125	19	—	A2319X	29	145	105	7	1.9	
	90	100	1220K + H 220X	58	130	20	—	A 220X	30	150	106	7	1.45
		100	2220K + H 320X	71	130	20	—	A 320X	30	150	107	8	1.7
		100	22220E AKE4 + H 320X	71	130	20	—	A 320X	30	150	107	8	1.7
100		1320K + H 320X	71	130	20	—	A 320X	30	150	107	7	1.7	
100		21320C KE4 + H 320X	71	130	20	—	A 320X	30	150	107	7	1.7	
100		2320K + H2320X	97	130	20	—	A2320X	30	150	110	7	2.15	
100		23220C KE4 + H2320X	97	130	20	—	A2320X	30	150	110	7	2.15	
100		22320E AKE4 + H2320X	97	130	20	—	A2320X	30	150	110	7	2.15	
100		110	23122C KE4 + H3122X	81	145	21	—	A3122X	32	170	117	7	2.25
		110	1222K + H 222X	63	145	21	—	A 222X	32	170	116	7	1.95
	110	2222K + H 322X	77	145	21	—	A 322X	32	170	117	6	2.3	
	110	22222E AKE4 + H 322X	77	145	21	—	A 322X	32	170	117	6	2.3	
	110	1322K + H 322X	77	145	21	—	A 322X	32	170	117	9	2.3	
	110	2322K + H2322X	105	145	21	—	A2322X	32	170	121	7	2.75	
	110	23222C KE4 + H2322X	105	145	21	—	A2322X	32	170	121	17	2.75	
	110	22322E AKE4 + H2322X	105	145	21	—	A2322X	32	170	121	7	2.75	
	110	120	23024C DKE4 + H3024	72	145	22	—	A 3024	33	180	127	7	1.95
		120	23124C KE4 + H3124	88	155	22	—	A 3124	33	180	128	7	2.65
120		22224E AKE4 + H3124	88	155	22	—	A 3124	33	180	128	11	2.65	
120		23224C KE4 + H2324	112	155	22	—	A 2324	33	180	131	17	3.2	
120		22324E AKE4 + H2324	112	155	22	—	A 2324	33	180	131	7	3.2	
115		130	23026C DKE4 + H3026	80	155	23	—	A 3026	34	190	137	8	2.85
		130	23126C KE4 + H3126	92	165	23	—	A 3126	34	190	138	8	3.65
		130	22226E AKE4 + H3126	92	165	23	—	A 3126	34	190	138	8	3.65
		130	23226C KE4 + H2326	121	165	23	—	A 2326	34	190	142	21	4.6
		130	22326C KE4 + H2326	121	165	23	—	A 2326	34	190	142	8	4.6

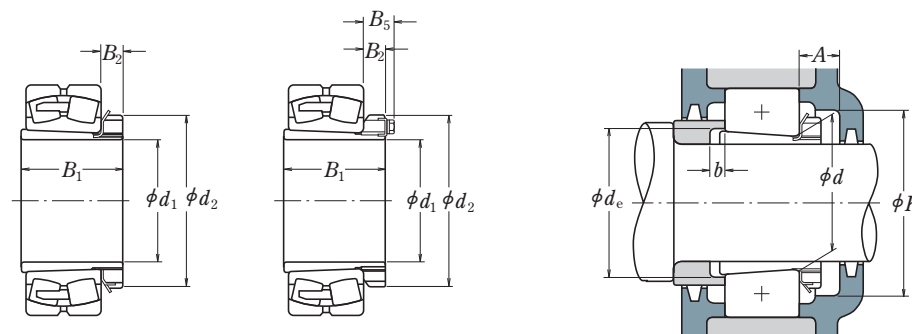
Remark The suffix X represents adapter sleeves having narrow slits, for which washers with straight tabs should be used.

ADAPTERS FOR ROLLING BEARINGS

Shaft Diameter 125 – 170 mm



Shaft Diameter 180 – 260 mm

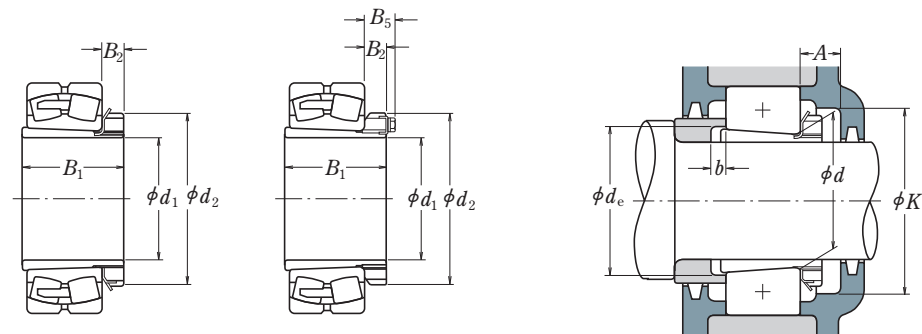


Shaft Diameter (mm) d ₁	Nominal Bearing Bore Dia. (mm) d	Nominal Numbers Applicable Bearings	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg) approx.
			B ₁	d ₂	B ₂	B ₅		A min.	K min.	d _e min.	b min.	
125	140	23028C DKE4 + H3028	82	165	24	—	A 3028	36	205	147	8	3.15
	140	23128C KE4 + H3128	97	180	24	—	A 3128	36	205	149	8	4.35
	140	22228C DKE4 + H3128	97	180	24	—	A 3128	36	205	149	8	4.35
140	140	23228C KE4 + H2328	131	180	24	—	A 2328	36	205	152	22	5.55
	140	22328C KE4 + H2328	131	180	24	—	A 2328	36	205	152	8	5.55
135	150	23030C DKE4 + H3030	87	180	26	—	A 3030	37	220	158	8	3.9
	150	23130C KE4 + H3130	111	195	26	—	A 3130	37	220	160	8	5.5
	150	22230C DKE4 + H3130	111	195	26	—	A 3130	37	220	160	15	5.5
150	150	23230C KE4 + H2330	139	195	26	—	A 2330	37	220	163	20	6.6
	150	22330C AKE4 + H2330	139	195	26	—	A 2330	37	220	163	8	6.6
140	160	23932C AKE4 + H3932	78	190	28	—	A 3932	39	205	168	8	4.64
	160	23032C DKE4 + H3032	93	190	28	—	A 3032	39	230	168	8	5.2
	160	23132C KE4 + H3132	119	210	28	—	A 3132	39	230	170	8	7.65
160	160	22232C DKE4 + H3132	119	210	28	—	A 3132	39	230	170	14	7.65
	160	23232C KE4 + H2332	147	210	28	—	A 2332	39	230	174	18	9.15
	160	22332C AKE4 + H2332	147	210	28	—	A 2332	39	230	174	8	9.15
150	170	23934B CAKE4 + H3934	79	200	29	—	A 3934	40	215	179	8	5.07
	170	23034C DKE4 + H3034	101	200	29	—	A 3034	40	250	179	8	6.0
	170	23134C KE4 + H3134	122	220	29	—	A 3134	40	250	180	8	8.4
170	170	22234C DKE4 + H3134	122	220	29	—	A 3134	40	250	180	10	8.4
	170	23234C KE4 + H2334	154	220	29	—	A 2334	40	250	185	18	10
	170	22334C AKE4 + H2334	154	220	29	—	A 2334	40	250	185	8	10
160	180	23936C AKE4 + H3936	87	210	30	—	A 3936	41	230	189	8	5.87
	180	23036C DKE4 + H3036	109	210	30	—	A 3036	41	260	189	8	6.85
	180	23136C KE4 + H3136	131	230	30	—	A 3136	41	260	191	8	9.5
180	180	22236C DKE4 + H3136	131	230	30	—	A 3136	41	260	191	18	9.5
	180	23236C KE4 + H2336	161	230	30	—	A 2336	41	260	195	22	11.5
	180	22336C AKE4 + H2336	161	230	30	—	A 2336	41	260	195	8	11.5
170	190	23938C AKE4 + H3938	89	220	31	—	A 3938	43	240	199	9	6.35
	190	23038C AKE4 + H3038	112	220	31	—	A 3038	43	270	199	9	7.45
	190	23138C KE4 + H3138	141	240	31	—	A 3138	43	270	202	9	11
190	190	22238C AKE4 + H3138	141	240	31	—	A 3138	43	270	202	21	11
	190	23238C KE4 + H2338	169	240	31	—	A 2338	43	270	206	21	12.5
	190	22338C AKE4 + H2338	169	240	31	—	A 2338	43	270	206	9	12.5

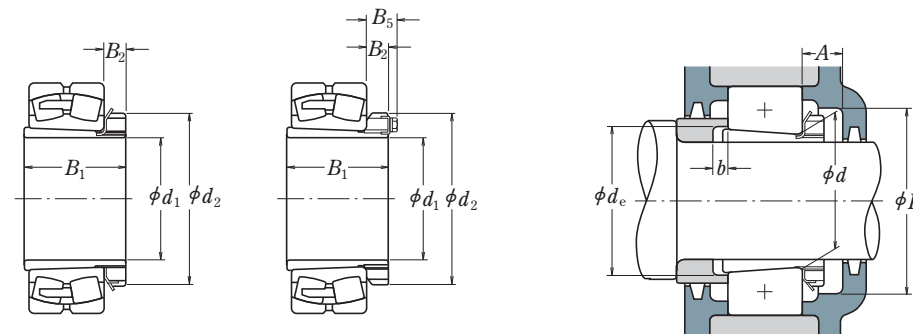
Shaft Diameter (mm) d ₁	Nominal Bearing Bore Dia. (mm) d	Nominal Numbers Applicable Bearings	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg) approx.
			B ₁	d ₂	B ₂	B ₅		A min.	K min.	d _e min.	b min.	
180	200	23940C AKE4 + H3940	98	240	32	—	A 3940	46	260	210	10	8.0
	200	23040C AKE4 + H3040	120	240	32	—	A 3040	46	280	210	10	9.2
	200	23140C KE4 + H3140	150	250	32	—	A 3140	46	280	212	10	12
200	200	22240C AKE4 + H3140	150	250	32	—	A 3140	46	280	212	24	12
	200	23240C KE4 + H2340	176	250	32	—	A 2340	46	280	216	20	14
	200	22340C AKE4 + H2340	176	250	32	—	A 2340	46	280	216	10	14
200	220	23944C AKE4 + H3944	96	260	30	41	A 3944	55	280	231	10	8.32
	220	23044C AKE4 + H3044	128	260	30	41	A 3044	55	320	231	12	10.5
	220	23144C KE4 + H3144	158	280	32	44	A 3144	55	320	233	10	14.5
200	220	22244C AKE4 + H3144	158	280	32	44	A 3144	55	320	233	22	14.5
	220	23244C KE4 + H2344	183	280	32	44	A 2344	55	320	236	11	16.5
	220	22344C AKE4 + H2344	183	280	32	44	A 2344	55	320	236	10	16.5
220	240	23948C AKE4 + H3948	101	290	34	46	A 3948	60	300	251	11	11.2
	240	23048C AKE4 + H3048	133	290	34	46	A 3048	60	340	251	11	13
	240	23148C KE4 + H3148	169	300	34	46	A 3148	60	340	254	11	17.5
220	240	22248C AKE4 + H3148	169	300	34	46	A 3148	60	340	254	19	17.5
	240	23248C AKE4 + H2348	196	300	34	46	A 2348	60	340	257	6	19.5
	240	22348C AKE4 + H2348	196	300	34	46	A 2348	60	340	257	11	19.5
240	260	23952C AKE4 + H3952	116	310	34	46	A 3952	60	330	272	11	13.4
	260	23052C AKE4 + H3052	147	310	34	46	A 3052	60	370	272	13	15.5
	260	23152C AKE4 + H3152	187	330	36	49	A 3152	60	370	276	11	22
240	260	22252C AKE4 + H3152	187	330	36	49	A 3152	60	370	276	25	22
	260	23252C AKE4 + H2352	208	330	36	49	A 2352	60	370	278	2	24
	260	22352C AKE4 + H2352	208	330	36	49	A 2352	60	370	278	11	24
260	280	23956C AKE4 + H3956	121	330	38	50	A 3956	65	350	292	12	15.5
	280	23056C AKE4 + H3056	152	330	38	50	A 3056	65	390	292	12	17.5
	280	23156C AKE4 + H3156	192	350	38	51	A 3156	65	390	296	12	24.5
260	280	22256C AKE4 + H3156	192	350	38	51	A 3156	65	390	296	28	24.5
	280	23256C AKE4 + H2356	221	350	38	51	A 2356	65	390	299	11	28
	280	22356C AKE4 + H2356	221	350	38	51	A 2356	65	390	299	12	28

ADAPTERS FOR ROLLING BEARINGS

Shaft Diameter 280 – 410 mm



Shaft Diameter 430 – 470 mm

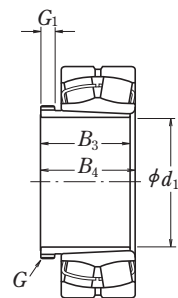


Shaft Diameter (mm) <i>d</i> ₁	Nominal Bearing Bore Dia. (mm) <i>d</i>	Nominal Numbers Applicable Bearings	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg) approx.
			<i>B</i> ₁	<i>d</i> ₂	<i>B</i> ₂	<i>B</i> ₅		<i>A</i> min.	<i>K</i> min.	<i>d</i> _e min.	<i>b</i> min.	
280	300	23960CAKE4 + H3960	140	360	42	54	A3960	69	380	313	12	20.7
	300	23060CAKE4 + H3060	168	360	42	54	A3060	69	430	313	12	23
	300	23160CAKE4 + H3160	208	380	40	53	A3160	69	430	317	12	30
	300	22260CAKE4 + H3160	208	380	40	53	A3160	69	430	317	32	30
	300	23260CAKE4 + H3260	240	380	40	53	A3260	69	430	321	12	34
	300	320	23964CAKE4 + H3964	140	380	42	55	A3964	72	400	334	13
320		23064CAKE4 + H3064	171	380	42	55	A3064	72	450	334	13	24.5
320		23164CAKE4 + H3164	226	400	42	56	A3164	72	450	339	13	35
320		22264CAKE4 + H3164	226	400	42	56	A3164	72	450	339	39	35
320		23264CAKE4 + H3264	258	400	42	56	A3264	72	450	343	13	39.5
320		340	23968CAKE4 + H3968	144	400	45	58	A3968	75	430	354	14
	340	23068CAKE4 + H3068	187	400	45	58	A3068	75	490	355	14	28.5
	340	23168CAKE4 + H3168	254	440	55	72	A3168	75	490	360	14	49.5
	340	23268CAKE4 + H3268	288	440	55	72	A3268	75	490	364	14	54.5
340	360	23972CAKE4 + H3972	144	420	45	58	A3972	75	450	374	14	25.7
	360	23072CAKE4 + H3072	188	420	45	58	A3072	75	510	375	14	30.5
	360	23172CAKE4 + H3172	259	460	58	75	A3172	75	510	380	14	54
	360	23272CAKE4 + H3272	299	460	58	75	A3272	75	510	385	14	60.5
360	380	23976CAKE4 + H3976	164	450	48	62	A3976	82	480	396	15	31.9
	380	23076CAKE4 + H3076	193	450	48	62	A3076	82	540	396	15	36
	380	23176CAKE4 + H3176	264	490	60	77	A3176	82	540	401	15	61.5
	380	23276CAKE4 + H3276	310	490	60	77	A3276	82	540	405	15	69.5
380	400	23980CAKE4 + H3980	168	470	52	66	A3980	86	500	417	15	35.2
	400	23080CAKE4 + H3080	210	470	52	66	A3080	86	580	417	15	41.5
	400	23180CAKE4 + H3180	272	520	62	82	A3180	86	580	421	15	70.5
	400	23280CAKE4 + H3280	328	520	62	82	A3280	86	580	427	15	81
400	420	23984CAKE4 + H3984	168	490	52	66	A3984	86	520	437	16	36.6
	420	23084CAKE4 + H3084	212	490	52	66	A3084	86	600	437	16	43.5
	420	23184CAKE4 + H3184	304	540	70	90	A3184	86	600	443	16	84
	420	23284CAKE4 + H3284	352	540	70	90	A3284	86	600	448	16	94
410	440	23988CAKE4 + H3988	189	520	60	77	A3988	99	550	458	17	58.6
	440	23088CAKE4 + H3088	228	520	60	77	A3088	99	620	458	17	65
	440	23188CAKE4 + H3188	307	560	70	90	A3188	99	620	464	17	104
	440	23288CAKE4 + H3288	361	560	70	90	A3288	99	620	469	17	118

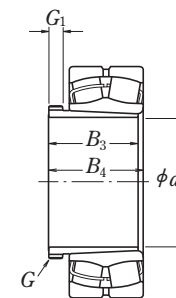
Shaft Diameter (mm) <i>d</i> ₁	Nominal Bearing Bore Dia. (mm) <i>d</i>	Nominal Numbers Applicable Bearings	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg) approx.
			<i>B</i> ₁	<i>d</i> ₂	<i>B</i> ₂	<i>B</i> ₅		<i>A</i> min.	<i>K</i> min.	<i>d</i> _e min.	<i>b</i> min.	
430	460	23992CAKE4 + H3992	189	540	60	77	A3992	99	570	478	17	62
	460	23092CAKE4 + H3092	234	540	60	77	A3092	99	650	478	17	69.5
	460	23192CAKE4 + H3192	326	580	75	95	A3192	99	650	485	17	116
	460	23292CAKE4 + H3292	382	580	75	95	A3292	99	650	491	17	132
450	480	23996CAKE4 + H3996	200	560	60	77	A3996	99	600	499	18	67.5
	480	23096CAKE4 + H3096	237	560	60	77	A3096	99	690	499	18	73.5
	480	23196CAKE4 + H3196	335	620	75	95	A3196	99	690	505	18	133
	480	23296CAKE4 + H3296	397	620	75	95	A3296	99	690	512	18	152
470	500	239500CAKE4 + H39/500	208	580	68	85	A39/500	109	620	519	18	74.6
	500	230500CAKE4 + H30/500	247	580	68	85	A30/500	109	700	519	18	82
	500	231500CAKE4 + H31/500	356	630	80	100	A31/500	109	700	527	18	143
	500	232500CAKE4 + H32/500	428	630	80	100	A32/500	109	700	534	18	166

WITHDRAWAL SLEEVES FOR ROLLING BEARINGS

Shaft Diameter 35 – 85 mm



Shaft Diameter 90 – 135 mm

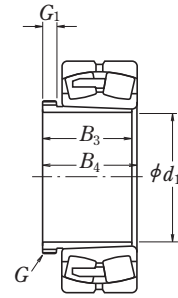


Shaft Diameter (mm) d_1	Nominal Bearing Bore Dia. (mm) d	Nominal Numbers Applicable Bearings	Screw Thread G	Dimensions (mm)			Mass (kg) approx.	
				B_3	G_1	B_4		
35	40	21308EAKE4 + AH 308	M 45 × 1.5	29	6	32	0.09	
	40	22308EAKE4 + AH 2308	M 45 × 1.5	40	7	43	0.13	
	40	45	21309EAKE4 + AH 309	M 50 × 1.5	31	6	34	0.11
		45	22309EAKE4 + AH 2309	M 50 × 1.5	44	7	47	0.165
45	50	21310EAKE4 + AHX 310	M 55 × 2	35	7	38	0.16	
	50	22310EAKE4 + AHX 2310	M 55 × 2	50	9	53	0.235	
50	55	22211EAKE4 + AHX 311	M 60 × 2	37	7	40	0.19	
	55	21311EAKE4 + AHX 311	M 60 × 2	37	7	40	0.19	
	55	22311EAKE4 + AHX 2311	M 60 × 2	54	10	57	0.285	
55	60	22212EAKE4 + AHX 312	M 65 × 2	40	8	43	0.215	
	60	21312EAKE4 + AHX 312	M 65 × 2	40	8	43	0.215	
	60	22312EAKE4 + AHX 2312	M 65 × 2	58	11	61	0.34	
60	65	22213EAKE4 + AH 313	M 75 × 2	42	8	45	0.255	
	65	21313EAKE4 + AH 313	M 75 × 2	42	8	45	0.255	
	65	22313EAKE4 + AH 2313	M 75 × 2	61	12	64	0.395	
65	70	22214EAKE4 + AH 314	M 80 × 2	43	8	47	0.28	
	70	21314EAKE4 + AH 314	M 80 × 2	43	8	47	0.28	
	70	22314EAKE4 + AHX 2314	M 80 × 2	64	12	68	0.53	
70	75	22215EAKE4 + AH 315	M 85 × 2	45	8	49	0.315	
	75	21315EAKE4 + AH 315	M 85 × 2	45	8	49	0.315	
	75	22315EAKE4 + AHX 2315	M 85 × 2	68	12	72	0.605	
75	80	22216EAKE4 + AH 316	M 90 × 2	48	8	52	0.365	
	80	21316EAKE4 + AH 316	M 90 × 2	48	8	52	0.365	
	80	22316EAKE4 + AHX 2316	M 90 × 2	71	12	75	0.665	
80	85	22217EAKE4 + AHX 317	M 95 × 2	52	9	56	0.48	
	85	21317EAKE4 + AHX 317	M 95 × 2	52	9	56	0.48	
	85	22317EAKE4 + AHX 2317	M 95 × 2	74	13	78	0.745	
85	90	22218EAKE4 + AHX 318	M 100 × 2	53	9	57	0.52	
	90	21318EAKE4 + AHX 318	M 100 × 2	53	9	57	0.52	
	90	23218CKE4 + AHX 3218	M 100 × 2	63	10	67	0.58	
	90	22318EAKE4 + AHX 2318	M 100 × 2	79	14	83	0.845	

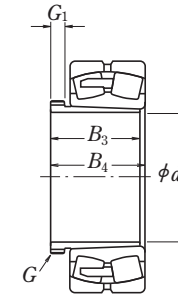
Shaft Diameter (mm) d_1	Nominal Bearing Bore Dia. (mm) d	Nominal Numbers Applicable Bearings	Screw Thread G	Dimensions (mm)			Mass (kg) approx.
				B_3	G_1	B_4	
90	95	22219EAKE4 + AHX 319	M 105 × 2	57	10	61	0.595
	95	21319CKE4 + AHX 319	M 105 × 2	57	10	61	0.595
	95	22319EAKE4 + AHX 2319	M 105 × 2	85	16	89	0.89
95	100	21320CKE4 + AHX 3120	M 110 × 2	64	11	68	0.70
	100	22220EAKE4 + AHX 320	M 110 × 2	59	10	63	0.66
	100	21320CKE4 + AHX 320	M 110 × 2	59	10	63	0.66
	100	23220CKE4 + AHX 3220	M 110 × 2	73	11	77	0.77
	100	22320EAKE4 + AHX 2320	M 110 × 2	90	16	94	1.0
105	110	23122CKE4 + AHX 3122	M 120 × 2	68	11	72	0.76
	110	22222EAKE4 + AHX 3122	M 120 × 2	68	11	72	0.76
	110	24122CK30E4 + AH 24122	M 115 × 2	82	13	91	0.73
115	110	23222CKE4 + AHX 3222	M 125 × 2	82	11	86	1.04
	110	22322EAKE4 + AHX 2322	M 125 × 2	98	16	102	1.35
	120	23024CDKE4 + AHX 3024	M 130 × 2	60	13	64	0.75
125	120	24024CK30E4 + AH 24024	M 125 × 2	73	13	82	0.70
	120	23124CKE4 + AHX 3124	M 130 × 2	75	12	79	0.95
	120	22224EAKE4 + AHX 3124	M 130 × 2	75	12	79	0.95
135	120	24124CK30E4 + AH 24124	M 130 × 2	93	13	102	1.02
	120	23224CKE4 + AHX 3224	M 135 × 2	90	13	94	1.3
	120	22324EAKE4 + AHX 2324	M 135 × 2	105	17	109	1.6
135	130	23026CDKE4 + AHX 3026	M 140 × 2	67	14	71	0.95
	130	24026CK30E4 + AH 24026	M 135 × 2	83	14	93	0.89
	130	23126CKE4 + AHX 3126	M 140 × 2	78	12	82	1.08
135	130	22226EAKE4 + AHX 3126	M 140 × 2	78	12	82	1.08
	130	24126CK30E4 + AH 24126	M 140 × 2	94	14	104	1.14
	130	23226CKE4 + AHX 3226	M 145 × 2	98	15	102	1.58
	130	22326CKE4 + AHX 2326	M 145 × 2	115	19	119	1.97
	140	23028CDKE4 + AHX 3028	M 150 × 2	68	14	73	1.01
	140	24028CK30E4 + AH 24028	M 145 × 2	83	14	93	0.96
140	140	23128CKE4 + AHX 3128	M 150 × 2	83	14	88	1.28
	140	22228CDKE4 + AHX 3128	M 150 × 2	83	14	88	1.28
	140	24128CK30E4 + AH 24128	M 150 × 2	99	14	109	1.3
	140	23228CKE4 + AHX 3228	M 155 × 3	104	15	109	1.84
	140	22328CKE4 + AHX 2328	M 155 × 3	125	20	130	2.33

WITHDRAWAL SLEEVES FOR ROLLING BEARINGS

Shaft Diameter 145 – 180 mm



Shaft Diameter 190 – 260 mm

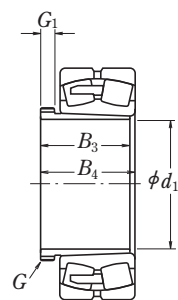


Shaft Diameter (mm) d_1	Nominal Bearing Bore Dia. (mm) d	Nominal Numbers Applicable Bearings	Screw Thread G	Dimensions (mm)			Mass (kg) approx.
				B_3	G_1	B_4	
145	150	23030CDKE4 + AHX 3030	M 160 × 3	72	15	77	1.15
	150	24030CK30E4 + AH 24030	M 155 × 3	90	15	101	1.11
	150	23130CKE4 + AHX 3130	M 165 × 3	96	15	101	1.79
	150	22230CDKE4 + AHX 3130	M 165 × 3	96	15	101	1.79
	150	24130CK30E4 + AH 24130	M 160 × 3	115	15	126	1.63
	150	23230CKE4 + AHX 3230	M 165 × 3	114	17	119	2.22
	150	22330CAKE4 + AHX 2330	M 165 × 3	135	24	140	2.82
150	160	23032CDKE4 + AH 3032	M 170 × 3	77	16	82	2.05
	160	24032CK30E4 + AH 24032	M 170 × 3	95	15	106	2.28
	160	23132CKE4 + AH 3132	M 180 × 3	103	16	108	3.2
	160	22232CDKE4 + AH 3132	M 180 × 3	103	16	108	3.2
	160	24132CK30E4 + AH 24132	M 170 × 3	124	15	135	3.03
	160	23232CKE4 + AH 3232	M 180 × 3	124	20	130	4.1
	160	22332CAKE4 + AH 2332	M 180 × 3	140	24	146	4.7
160	170	23034CDKE4 + AH 3034	M 180 × 3	85	17	90	2.45
	170	24034CK30E4 + AH 24034	M 180 × 3	106	16	117	2.74
	170	23134CKE4 + AH 3134	M 190 × 3	104	16	109	3.4
	170	22234CDKE4 + AH 3134	M 190 × 3	104	16	109	3.4
	170	24134CK30E4 + AH 24134	M 180 × 3	125	16	136	3.26
	170	23234CKE4 + AH 3234	M 190 × 3	134	24	140	4.8
	170	22334CAKE4 + AH 2334	M 190 × 3	146	24	152	5.25
170	180	23036CDKE4 + AH 3036	M 190 × 3	92	17	98	2.8
	180	24036CK30E4 + AH 24036	M 190 × 3	116	16	127	3.19
	180	23136CKE4 + AH 3136	M 200 × 3	116	19	122	4.2
	180	24136CK30E4 + AH 24136	M 190 × 3	134	16	145	3.74
	180	22236CDKE4 + AH 2236	M 200 × 3	105	17	110	3.75
	180	23236CKE4 + AH 3236	M 200 × 3	140	24	146	5.3
	180	22336CAKE4 + AH 2336	M 200 × 3	154	26	160	5.85
180	190	23038CAKE4 + AH 3038	Tr 205 × 4	96	18	102	3.35
	190	24038CK30E4 + AH 24038	M 200 × 3	118	18	131	3.47
	190	23138CKE4 + AH 3138	Tr 210 × 4	125	20	131	4.9
	190	24138CK30E4 + AH 24138	M 200 × 3	146	18	159	4.38
	190	22238CAKE4 + AH 2238	Tr 210 × 4	112	18	117	4.25
	190	23238CKE4 + AH 3238	Tr 210 × 4	145	25	152	5.9
	190	22338CAKE4 + AH 2338	Tr 210 × 4	160	26	167	6.65

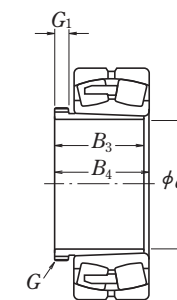
Shaft Diameter (mm) d_1	Nominal Bearing Bore Dia. (mm) d	Nominal Numbers Applicable Bearings	Screw Thread G	Dimensions (mm)			Mass (kg) approx.
				B_3	G_1	B_4	
190	200	23040CAKE4 + AH 3040	Tr 215 × 4	102	19	108	3.8
	200	24040CK30E4 + AH 24040	Tr 210 × 4	127	18	140	3.92
	200	23140CKE4 + AH 3140	Tr 220 × 4	134	21	140	5.5
	200	24140CK30E4 + AH 24140	Tr 210 × 4	158	18	171	5.0
	200	22240CAKE4 + AH 2240	Tr 220 × 4	118	19	123	4.7
	200	23240CKE4 + AH 3240	Tr 220 × 4	153	25	160	6.7
	200	22340CAKE4 + AH 2340	Tr 220 × 4	170	30	177	7.55
200	220	23044CAKE4 + AH 3044	Tr 235 × 4	111	20	117	7.4
	220	24044CK30E4 + AH 24044	Tr 230 × 4	138	20	152	8.23
	220	23144CKE4 + AH 3144	Tr 240 × 4	145	23	151	10.5
	220	24144CK30E4 + AH 24144	Tr 230 × 4	170	20	184	10.3
	220	22244CAKE4 + AH 2244	Tr 240 × 4	130	20	136	9.1
	220	23244CKE4 + AH 3244	Tr 240 × 4	181	30	189	13.5
	220	22344CAKE4 + AH 2344	Tr 240 × 4	181	30	189	13.5
220	240	23048CAKE4 + AH 3048	Tr 260 × 4	116	21	123	8.75
	240	24048CK30E4 + AH 24048	Tr 250 × 4	138	20	153	9.0
	240	23148CKE4 + AH 3148	Tr 260 × 4	154	25	161	12
	240	24148CK30E4 + AH 24148	Tr 260 × 4	180	20	195	12.6
	240	22248CAKE4 + AH 2248	Tr 260 × 4	144	21	150	11
	240	23248CKE4 + AH 3248	Tr 260 × 4	189	30	197	15.5
	240	22348CAKE4 + AH 2348	Tr 260 × 4	189	30	197	15.5
240	260	23052CAKE4 + AH 3052	Tr 280 × 4	128	23	135	10.5
	260	24052CAK30E4 + AH 24052	Tr 270 × 4	162	22	178	11.7
	260	23152CAKE4 + AH 3152	Tr 290 × 4	172	26	179	16
	260	24152CAK30E4 + AH 24152	Tr 280 × 4	202	22	218	15.5
	260	22252CAKE4 + AH 2252	Tr 290 × 4	155	23	161	14
	260	23252CAKE4 + AH 3252	Tr 290 × 4	205	30	213	19.5
	260	22352CAKE4 + AH 2352	Tr 290 × 4	205	30	213	19.5
260	280	23056CAKE4 + AH 3056	Tr 300 × 4	131	24	139	12
	280	24056CAK30E4 + AH 24056	Tr 290 × 4	162	22	179	12.6
	280	23156CAKE4 + AH 3156	Tr 310 × 5	175	28	183	17.5
	280	24156CAK30E4 + AH 24156	Tr 300 × 4	202	22	219	16.8
	280	22256CAKE4 + AH 2256	Tr 310 × 5	155	24	163	15
	280	23256CAKE4 + AH 3256	Tr 310 × 5	212	30	220	21.5
	280	22356CAKE4 + AH 2356	Tr 310 × 5	212	30	220	21.5

WITHDRAWAL SLEEVES FOR ROLLING BEARINGS

Shaft Diameter 280 – 380 mm



Shaft Diameter 400 – 480 mm

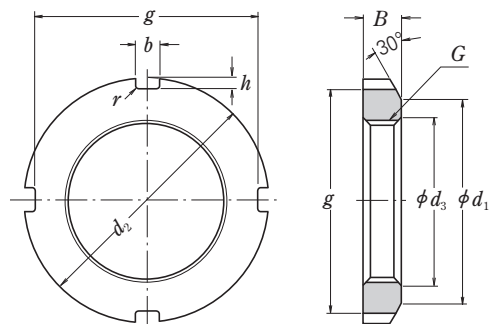


Shaft Diameter (mm) d_1	Nominal Bearing Bore Dia. (mm) d	Nominal Numbers Applicable Bearings	Screw Thread G	Dimensions (mm)			Mass (kg) approx.
				B_3	G_1	B_4	
280	300	23060CAKE4 + AH 3060	Tr 320 x 5	145	26	153	14.5
	300	24060CAK30E4 + AH 24060	Tr 310 x 5	184	24	202	15.5
	300	23160CAKE4 + AH 3160	Tr 330 x 5	192	30	200	21
	300	24160CAK30E4 + AH 24160	Tr 320 x 5	224	24	242	20.3
	300	22260CAKE4 + AH 2260	Tr 330 x 5	170	26	178	18
	300	23260CAKE4 + AH 3260	Tr 330 x 5	228	34	236	20
300	320	23064CAKE4 + AH 3064	Tr 345 x 5	149	27	157	16
	320	24064CAK30E4 + AH 24064	Tr 330 x 5	184	24	202	16.4
	320	23164CAKE4 + AH 3164	Tr 350 x 5	209	31	217	24.5
	320	24164CAK30E4 + AH 24164	Tr 340 x 5	242	24	260	23.5
	320	23264CAKE4 + AH 3264	Tr 350 x 5	246	36	254	25
	320	23068CAKE4 + AH 3068	Tr 365 x 5	162	28	171	19.5
320	340	24068CAK30E4 + AH 24068	Tr 360 x 5	206	26	225	21.2
	340	23168CAKE4 + AH 3168	Tr 370 x 5	225	33	234	29
	340	24168CAK30E4 + AH 24168	Tr 360 x 5	269	26	288	28.3
	340	23268CAKE4 + AH 3268	Tr 370 x 5	264	38	273	35.5
	340	23072CAKE4 + AH 3072	Tr 385 x 5	167	30	176	21
	340	24072CAK30E4 + AH 24072	Tr 380 x 5	206	26	226	22.5
340	360	23172CAKE4 + AH 3172	Tr 400 x 5	229	35	238	33
	360	24172CAK30E4 + AH 24172	Tr 380 x 5	269	26	289	30
	360	23272CAKE4 + AH 3272	Tr 400 x 5	274	40	283	41.5
	360	23076CAKE4 + AH 3076	Tr 410 x 5	170	31	180	23.5
	360	24076CAK30E4 + AH 24076	Tr 400 x 5	208	28	228	24.1
	360	23176CAKE4 + AH 3176	Tr 420 x 5	232	36	242	35.5
360	380	24176CAK30E4 + AH 24176	Tr 400 x 5	271	28	291	32.1
	380	23276CAKE4 + AH 3276	Tr 420 x 5	284	42	294	45.5
	380	23080CAKE4 + AH 3080	Tr 430 x 5	183	33	193	27.5
	380	24080CAK30E4 + AH 24080	Tr 420 x 5	228	28	248	28
	380	23180CAKE4 + AH 3180	Tr 440 x 5	240	38	250	39.5
	380	24180CAK30E4 + AH 24180	Tr 420 x 5	278	28	298	34.8
380	400	23280CAKE4 + AH 3280	Tr 440 x 5	302	44	312	51.5

Shaft Diameter (mm) d_1	Nominal Bearing Bore Dia. (mm) d	Nominal Numbers Applicable Bearings	Screw Thread G	Dimensions (mm)			Mass (kg) approx.
				B_3	G_1	B_4	
400	420	23084CAKE4 + AH 3084	Tr 450 x 5	186	34	196	29
	420	24084CAK30E4 + AH 24084	Tr 440 x 5	230	30	252	29.8
	420	23184CAKE4 + AH 3184	Tr 460 x 5	266	40	276	46.5
	420	24184CAK30E4 + AH 24184	Tr 440 x 5	310	30	332	41.4
	420	23284CAKE4 + AH 3284	Tr 460 x 5	321	46	331	59
	420	23088CAKE4 + AHX 3088	Tr 470 x 5	194	35	205	42
420	440	24088CAK30E4 + AH 24088	Tr 460 x 5	242	30	264	33
	440	23188CAKE4 + AHX 3188	Tr 480 x 5	270	42	281	50
	440	24188CAK30E4 + AH 24188	Tr 460 x 5	310	30	332	43.5
	440	23288CAKE4 + AHX 3288	Tr 480 x 5	330	48	341	64
	440	23092CAKE4 + AHX 3092	Tr 490 x 5	202	37	213	46
	440	24092CAK30E4 + AH 24092	Tr 480 x 5	250	32	273	35.9
440	460	23192CAKE4 + AHX 3192	Tr 510 x 6	285	43	296	58
	460	24192CAK30E4 + AH 24192	Tr 480 x 5	332	32	355	49.7
	460	23292CAKE4 + AHX 3292	Tr 510 x 6	349	50	360	74.5
	460	23096CAKE4 + AHX 3096	Tr 520 x 6	205	38	217	51
	460	24096CAK30E4 + AH 24096	Tr 500 x 5	250	32	273	37.5
	460	23196CAKE4 + AHX 3196	Tr 530 x 6	295	45	307	63
460	480	24196CAK30E4 + AH 24196	Tr 500 x 5	340	32	363	53
	480	23296CAKE4 + AHX 3296	Tr 530 x 6	364	52	376	82
	480	230/500CAKE4 + AHX 30/500	Tr 540 x 6	209	40	221	54.5
	480	240/500CAK30E4 + AH 240/500	Tr 530 x 6	253	35	276	41.9
	480	231/500CAKE4 + AHX 31/500	Tr 550 x 6	313	47	325	71
	480	241/500CAK30E4 + AH 241/500	Tr 530 x 6	360	35	383	61.2
480	500	232/500CAKE4 + AHX 32/500	Tr 550 x 6	393	54	405	94.5

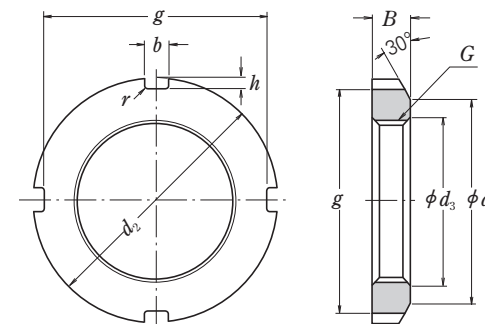
■ NUTS FOR ROLLING BEARINGS

(For Adapters and Shafts)



Nut with Washer

Units : mm



Nut with Washer

Units : mm

Nominal Numbers	Nut Series AN									Reference			
	Screw Threads G	d ₂	d ₁	g	b	h	d ₃	B	r max.	Mass (kg) approx.	Adapter ⁽¹⁾ Sleeve Bore Dia. Numbers	Washer Numbers	Shaft Dia.
AN 02	M 15×1	25	21	21	4	2	15.5	5	0.4	0.010	—	AW 02 X	15
AN 03	M 17×1	28	24	24	4	2	17.5	5	0.4	0.013	—	AW 03 X	17
AN 04	M 20×1	32	26	28	4	2	20.5	6	0.4	0.019	04	AW 04 X	20
AN 05	M 25×1.5	38	32	34	5	2	25.8	7	0.4	0.025	05	AW 05 X	25
AN 06	M 30×1.5	45	38	41	5	2	30.8	7	0.4	0.043	06	AW 06 X	30
AN 07	M 35×1.5	52	44	48	5	2	35.8	8	0.4	0.053	07	AW 07 X	35
AN 08	M 40×1.5	58	50	53	6	2.5	40.8	9	0.5	0.085	08	AW 08 X	40
AN 09	M 45×1.5	65	56	60	6	2.5	45.8	10	0.5	0.119	09	AW 09 X	45
AN 10	M 50×1.5	70	61	65	6	2.5	50.8	11	0.5	0.148	10	AW 10 X	50
AN 11	M 55×2	75	67	69	7	3	56	11	0.5	0.158	11	AW 11 X	55
AN 12	M 60×2	80	73	74	7	3	61	11	0.5	0.174	12	AW 12 X	60
AN 13	M 65×2	85	79	79	7	3	66	12	0.5	0.203	13	AW 13 X	65
AN 14	M 70×2	92	85	85	8	3.5	71	12	0.5	0.242	14	AW 14 X	70
AN 15	M 75×2	98	90	91	8	3.5	76	13	0.5	0.287	15	AW 15 X	75
AN 16	M 80×2	105	95	98	8	3.5	81	15	0.6	0.395	16	AW 16 X	80
AN 17	M 85×2	110	102	103	8	3.5	86	16	0.6	0.45	17	AW 17 X	85
AN 18	M 90×2	120	108	112	10	4	91	16	0.6	0.555	18	AW 18 X	90
AN 19	M 95×2	125	113	117	10	4	96	17	0.6	0.66	19	AW 19 X	95
AN 20	M 100×2	130	120	122	10	4	101	18	0.6	0.70	20	AW 20 X	100
AN 21	M 105×2	140	126	130	12	5	106	18	0.7	0.845	21	AW 21 X	105
AN 22	M 110×2	145	133	135	12	5	111	19	0.7	0.965	22	AW 22 X	110
AN 23	M 115×2	150	137	140	12	5	116	19	0.7	1.01	—	AW 23	115
AN 24	M 120×2	155	138	145	12	5	121	20	0.7	1.08	24	AW 24	120
AN 25	M 125×2	160	148	150	12	5	126	21	0.7	1.19	—	AW 25	125

Note ⁽¹⁾ Applicable to adapter sleeve Series A31, A2, A3, and A23.

Remark The basic design and dimensions of screw threads are in accordance with JIS B 0205.

Nominal Numbers	Nut Series AN									Reference			
	Screw Threads G	d ₂	d ₁	g	b	h	d ₃	B	r max.	Mass (kg) approx.	Adapter ⁽¹⁾ Sleeve Bore Dia. Numbers	Washer Numbers	Shaft Dia.
AN 26	M 130×2	165	149	155	12	5	131	21	0.7	1.25	26	AW 26	130
AN 27	M 135×2	175	160	163	14	6	136	22	0.7	1.55	—	AW 27	135
AN 28	M 140×2	180	160	168	14	6	141	22	0.7	1.56	28	AW 28	140
AN 29	M 145×2	190	172	178	14	6	146	24	0.7	2.0	—	AW 29	145
AN 30	M 150×2	195	171	183	14	6	151	24	0.7	2.03	30	AW 30	150
AN 31	M 155×3	200	182	186	16	7	156.5	25	0.7	2.21	—	—	—
AN 32	M 160×3	210	182	196	16	7	161.5	25	0.7	2.59	32	AW 32	160
AN 33	M 165×3	210	193	196	16	7	166.5	26	0.7	2.43	—	—	—
AN 34	M 170×3	220	193	206	16	7	171.5	26	0.7	2.8	34	AW 34	170
AN 36	M 180×3	230	203	214	18	8	181.5	27	0.7	3.05	36	AW 36	180
AN 38	M 190×3	240	214	224	18	8	191.5	28	0.7	3.4	38	AW 38	190
AN 40	M 200×3	250	226	234	18	8	201.5	29	0.7	3.7	40	AW 40	200

Nut Series ANL

ANL 24	M 120×2	145	133	135	12	5	121	20	0.7	0.78	24	AWL 24	120
ANL 26	M 130×2	155	143	145	12	5	131	21	0.7	0.88	26	AWL 26	130
ANL 28	M 140×2	165	151	153	14	6	141	22	0.7	0.99	28	AWL 28	140
ANL 30	M 150×2	180	164	168	14	6	151	24	0.7	1.38	30	AWL 30	150
ANL 32	M 160×3	190	174	176	16	7	161.5	25	0.7	1.56	32	AWL 32	160
ANL 34	M 170×3	200	184	186	16	7	171.5	26	0.7	1.72	34	AWL 34	170
ANL 36	M 180×3	210	192	194	18	8	181.5	27	0.7	1.95	36	AWL 36	180
ANL 38	M 190×3	220	202	204	18	8	191.5	28	0.7	2.08	38	AWL 38	190
ANL 40	M 200×3	240	218	224	18	8	201.5	29	0.7	2.98	40	AWL 40	200

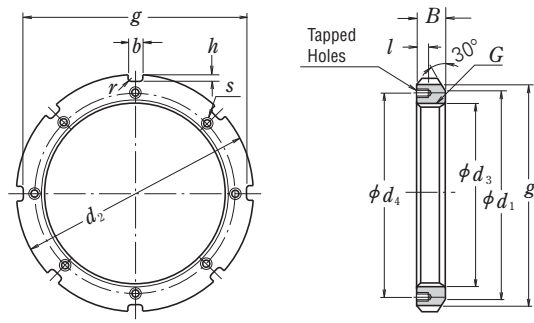
Note ⁽¹⁾ Series AN is applicable to adapter sleeve Series A31 and A23.

Series ANL is applicable to adapter sleeve Series A30.

Remark The basic design and dimensions of screw threads are in accordance with JIS B 0205.

■ NUTS FOR ROLLING BEARINGS

(For Adapters and Shafts)



Nut with Stopper

Units : mm

Nominal Numbers	Nut Series AN											Reference			
	Screw Threads <i>G</i>	<i>d</i> ₂	<i>d</i> ₁	<i>g</i>	<i>b</i>	<i>h</i>	<i>d</i> ₃	<i>B</i>	<i>r</i> max.	Tapped Holes Screw Threads (S)	<i>d</i> ₄	Mass (kg) approx.	Adapter (1) Sleeve Bore Dia. Numbers	Stopper Numbers	Shaft Dia.
AN 44	Tr 220x4	280	250	260	20	10	222	32	0.8	15 M 8x1.25	238	5.2	44	AL 44	220
AN 48	Tr 240x4	300	270	280	20	10	242	34	0.8	15 M 8x1.25	258	5.95	48	AL 44	240
AN 52	Tr 260x4	330	300	306	24	12	262	36	0.8	18 M 10x1.5	281	8.05	52	AL 52	260
AN 56	Tr 280x4	350	320	326	24	12	282	38	0.8	18 M 10x1.5	301	9.05	56	AL 52	280
AN 60	Tr 300x4	380	340	356	24	12	302	40	0.8	18 M 10x1.5	326	11.8	60	AL 60	300
AN 64	Tr 320x5	400	360	376	24	12	322.5	42	0.8	18 M 10x1.5	345	13.1	64	AL 64	320
AN 68	Tr 340x5	440	400	410	28	15	342.5	55	1	21 M 12x1.75	372	23.1	68	AL 68	340
AN 72	Tr 360x5	460	420	430	28	15	362.5	58	1	21 M 12x1.75	392	25.1	72	AL 68	360
AN 76	Tr 380x5	490	450	454	32	18	382.5	60	1	21 M 12x1.75	414	31	76	AL 76	380
AN 80	Tr 400x5	520	470	484	32	18	402.5	62	1	27 M 16x2	439	37	80	AL 80	400
AN 84	Tr 420x5	540	490	504	32	18	422.5	70	1	27 M 16x2	459	43.5	84	AL 80	420
AN 88	Tr 440x5	560	510	520	36	20	442.5	70	1	27 M 16x2	477	45	88	AL 88	440
AN 92	Tr 460x5	580	540	540	36	20	462.5	75	1	27 M 16x2	497	50.5	92	AL 88	460
AN 96	Tr 480x5	620	560	580	36	20	482.5	75	1	27 M 16x2	527	62	96	AL 96	480
AN 100	Tr 500x5	630	580	584	40	23	502.5	80	1	27 M 16x2	539	63.5	/500	AL 100	500

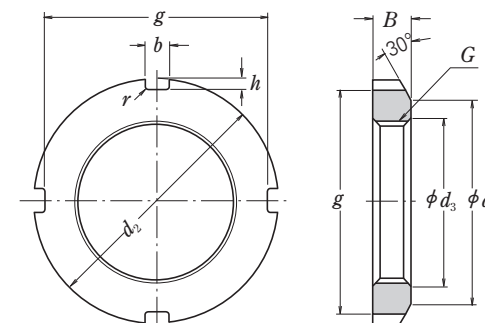
Nut Series ANL

Nominal Numbers	Screw Threads <i>G</i>	<i>d</i> ₂	<i>d</i> ₁	<i>g</i>	<i>b</i>	<i>h</i>	<i>d</i> ₃	<i>B</i>	<i>r</i> max.	Tapped Holes Screw Threads (S)	<i>d</i> ₄	Mass (kg) approx.	Adapter (1) Sleeve Bore Dia. Numbers	Stopper Numbers	Shaft Dia.
ANL 44	Tr 220x4	260	242	242	20	9	222	30	0.8	12 M 6x1	229	3.1	44	ALL 44	220
ANL 48	Tr 240x4	290	270	270	20	10	242	34	0.8	15 M 8x1.25	253	5.15	48	ALL 48	240
ANL 52	Tr 260x4	310	290	290	20	10	262	34	0.8	15 M 8x1.25	273	5.65	52	ALL 48	260
ANL 56	Tr 280x4	330	310	310	24	10	282	38	0.8	15 M 8x1.25	293	6.8	56	ALL 56	280
ANL 60	Tr 300x4	360	336	336	24	12	302	42	0.8	15 M 8x1.25	316	9.6	60	ALL 60	300
ANL 64	Tr 320x5	380	356	356	24	12	322.5	42	0.8	15 M 8x1.25	335	9.95	64	ALL 64	320
ANL 68	Tr 340x5	400	376	376	24	12	342.5	45	1	15 M 8x1.25	355	11.7	68	ALL 64	340
ANL 72	Tr 360x5	420	394	394	28	13	362.5	45	1	15 M 8x1.25	374	12	72	ALL 72	360
ANL 76	Tr 380x5	450	422	422	28	14	382.5	48	1	18 M 10x1.5	398	14.9	76	ALL 76	380
ANL 80	Tr 400x5	470	442	442	28	14	402.5	52	1	18 M 10x1.5	418	16.9	80	ALL 76	400
ANL 84	Tr 420x5	490	462	462	32	14	422.5	52	1	18 M 10x1.5	438	17.4	84	ALL 84	420
ANL 88	Tr 440x5	520	490	490	32	15	442.5	60	1	21 M 12x1.75	462	26.2	88	ALL 88	440
ANL 92	Tr 460x5	540	510	510	32	15	462.5	60	1	21 M 12x1.75	482	28	92	ALL 88	460
ANL 96	Tr 480x5	560	530	530	36	15	482.5	60	1	21 M 12x1.75	502	29.5	96	ALL 96	480
ANL 100	Tr 500x5	580	550	550	36	15	502.5	68	1	21 M 12x1.75	522	33.5	/500	ALL 96	500

Note (1) Series AN is applicable to adapter sleeve Series A31, A32 and A23. Series ANL is applicable to adapter sleeve Series A30.

- Remarks**
- The basic design and dimensions of screw threads are in accordance with JIS B 0216.
 - The basic design and dimensions of threads in tapped holes are in accordance with JIS B 0205.

(For Withdrawal Sleeves)



Units : mm

Nominal Numbers	Nut Series HN											Reference			
	Screw Threads <i>G</i>	<i>d</i> ₂	<i>d</i> ₁	<i>g</i>	<i>b</i>	<i>h</i>	<i>d</i> ₃	<i>B</i>	<i>r</i> max.	Mass (kg) approx.	Withdrawal Sleeve Numbers	AH 31	AH 22	AH 32	AH 23
HN 42	Tr 210x4	270	238	250	20	10	212	30	0.8	4.75	AH 3138	AH 2238	AH 3238	AH 2338	
HN 44	Tr 220x4	280	250	260	20	10	222	32	0.8	5.35	AH 3140	AH 2240	AH 3240	AH 2340	
HN 48	Tr 240x4	300	270	280	20	10	242	34	0.8	6.2	AH 3144	AH 2244	—	AH 2344	
HN 52	Tr 260x4	330	300	306	24	12	262	36	0.8	8.55	AH 3148	AH 2248	—	AH 2348	
HN 58	Tr 290x4	370	330	346	24	12	292	40	0.8	11.8	AH 3152	AH 2252	—	AH 2352	
HN 62	Tr 310x5	390	350	366	24	12	312.5	42	0.8	13.4	AH 3156	AH 2256	—	AH 2356	
HN 66	Tr 330x5	420	380	390	28	15	332.5	52	1	20.4	AH 3160	AH 2260	AH 3260	—	
HN 70	Tr 350x5	450	410	420	28	15	352.5	55	1	25.2	AH 3164	AH 2264	AH 3264	—	
HN 74	Tr 370x5	470	430	440	28	15	372.5	58	1	28.2	AH 3168	—	AH 3268	—	
HN 80	Tr 400x5	520	470	484	32	18	402.5	62	1	40	AH 3172	—	AH 3272	—	
HN 84	Tr 420x5	540	490	504	32	18	422.5	70	1	46.9	AH 3176	—	AH 3276	—	
HN 88	Tr 440x5	560	510	520	36	20	442.5	70	1	48.5	AH 3180	—	AH 3280	—	
HN 92	Tr 460x5	580	540	540	36	20	462.5	75	1	55	AH 3184	—	AH 3284	—	
HN 96	Tr 480x5	620	560	580	36	20	482.5	75	1	67	AHX 3188	—	AHX 3288	—	
HN 102	Tr 510x6	650	590	604	40	23	513	80	1	75	AHX 3192	—	AHX 3292	—	
HN 106	Tr 530x6	670	610	624	40	23	533	80	1	78	AHX 3196	—	AHX 3296	—	
HN 110	Tr 550x6	700	640	654	40	23	553	80	1	92.5	AHX 31/500	—	AHX 32/500	—	

Nut Series HNL

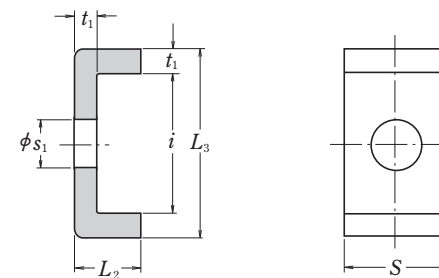
Nominal Numbers	Screw Threads <i>G</i>	<i>d</i> ₂	<i>d</i> ₁	<i>g</i>	<i>b</i>	<i>h</i>	<i>d</i> ₃	<i>B</i>	<i>r</i> max.	Mass (kg) approx.	Reference	AH 30	AH 2
HNL41	Tr 205x4	250	232	234	18	8	207	30	0.8	3.45	AH 3038	AH 238	—
HNL43	Tr 215x4	260	242	242	20	9	217	30	0.8	3.7	AH 3040	AH 240	—
HNL47	Tr 235x4	280	262	262	20	9	237	34	0.8	4.6	AH 3044	AH 244	—
HNL52	Tr 260x4	310	290	290	20	10	262	34	0.8	5.8	AH 3048	AH 248	—
HNL56	Tr 280x4	330	310	310	24	10	282	38	0.8	6.7	AH 3052	AH 252	—
HNL60	Tr 300x4	360	336	336	24	12	302	42	0.8	9.6	AH 3056	AH 256	—
HNL64	Tr 320x5	380	356	356	24	12	322.5	42	1	10.3	AH 3060	—	—
HNL69	Tr 345x5	410	384	384	28	13	347.5	45	1	11.5	AH 3064	—	—
HNL73	Tr 365x5	430	404	404	28	13	367.5	48	1	14.2	AH 3068	—	—
HNL77	Tr 385x5	450	422	422	28	14	387.5	48	1	15	AH 3072	—	—
HNL82	Tr 410x5	480	452	452	32	14	412.5	52	1	19	AH 3076	—	—
HNL86	Tr 430x5	500	472	472	32	14	432.5	52	1	19.8	AH 3080	—	—
HNL90	Tr 450x5	520	490	490	32	15	452.5	60	1	23.8	AH 3084	—	—
HNL94	Tr 470x5	540	510	510	32	15	472.5	60	1	25	AHX 3088	—	—
HNL98	Tr 490x5	580	550	550	36	15	492.5	60	1	34	AHX 3092	—	—
HNL 104	Tr 520x6	600	570	570	36	15	523	68	1	37	AHX 3096	—	—
HNL 108	Tr 540x6	630	590	590	40	20	543	68	1	43.5	AHX 30/500	—	—

- Remarks**
- The basic design and dimensions of screw threads are in accordance with JIS B 0216.
 - The number of notches in the nut may be bigger than that shown in the above figure.

■ NUTS FOR ROLLING BEARINGS

(Combination of Withdrawal Sleeves and Nuts)

■ STOPPERS FOR ROLLING BEARINGS

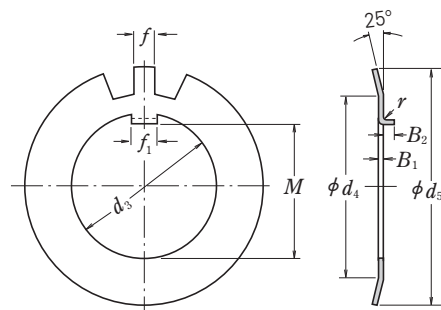


Units : mm

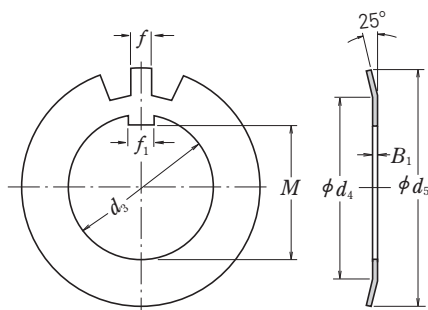
Nominal Numbers	Reference						
	Withdrawal Sleeve Numbers						
	AH 30	AH 31	AH 2	AH 22	AH 32	AH 3	AH 23
AN 09	—	—	AH 208	—	—	AH 308	AH 2308
AN 10	—	—	AH 209	—	—	AH 309	AH 2309
AN 11	—	—	AH 210	—	—	AHX 310	AHX 2310
AN 12	—	—	AH 211	—	—	AHX 311	AHX 2311
AN 13	—	—	AH 212	—	—	AHX 312	AHX 2312
AN 14	—	—	—	—	—	—	—
AN 15	—	—	AH 213	—	—	AH 313	AH 2313
AN 16	—	—	AH 214	—	—	AH 314	AHX 2314
AN 17	—	—	AH 215	—	—	AH 315	AHX 2315
AN 18	—	—	AH 216	—	—	AH 316	AHX 2316
AN 19	—	—	AH 217	—	—	AHX 317	AHX 2317
AN 20	—	—	AH 218	—	AHX 3218	AHX 318	AHX 2318
AN 21	—	—	AH 219	—	—	AHX 319	AHX 2319
AN 22	—	—	AH 220	—	AHX 3220	AHX 320	AHX 2320
AN 23	—	—	AH 221	—	—	AHX 321	—
AN 24	—	AHX 3122	AH 222	—	—	AHX 322	—
AN 25	—	—	—	—	AHX 3222	—	AHX 2322
AN 26	AHX 3024	AHX 3124	AH 224	—	—	AHX 324	—
AN 27	—	—	—	—	AHX 3224	—	AHX 2324
AN 28	AHX 3026	AHX 3126	AH 226	—	—	AHX 326	—
AN 29	—	—	—	—	AHX 3226	—	AHX 2326
AN 30	AHX 3028	AHX 3128	AH 228	—	—	AHX 328	—
AN 31	—	—	—	—	AHX 3228	—	AHX 2328
AN 32	AHX 3030	—	AH 230	—	—	—	—
AN 33	—	AHX 3130	—	—	AHX 3230	AHX 330	AHX 2330
AN 34	AH 3032	—	AH 232	—	—	—	—
AN 36	AH 3034	AH 3132	AH 234	—	AH 3232	AH 332	AH 2332
AN 38	AH 3036	AH 3134	AH 236	—	AH 3234	AH 334	AH 2334
AN 40	—	AH 3136	—	AH 2236	AH 3236	—	AH 2336

Nominal Numbers	Stopper Series AL						Reference	
	Basic Dimensions							Mass (kg) per 100 pcs approx.
	t_1	S	L_2	s_1	i	L_3		
AL 44	4	20	12	9	22.5	30.5	2.6	AN 44, AN 48 AN 52, AN 56 AN 60
AL 52	4	24	12	12	25.5	33.5	3.4	
AL 60	4	24	12	12	30.5	38.5	3.8	
AL 64	5	24	15	12	31	41	5.35	AN 64 AN 68, AN 72 AN 76
AL 68	5	28	15	14	38	48	6.65	
AL 76	5	32	15	14	40	50	7.95	
AL 80	5	32	15	18	45	55	8.2	AN 80, AN 84 AN 88, AN 92 AN 96 AN 100
AL 88	5	36	15	18	43	53	9.0	
AL 96	5	36	15	18	53	63	10.4	
AL 100	5	40	15	18	45	55	10.5	

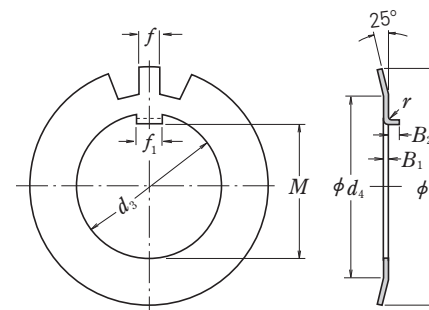
Nominal Numbers	Stopper Series ALL						Reference	
	Basic Dimensions							Mass (kg) per 100 pcs approx.
	t_1	S	L_2	s_1	i	L_3		
ALL 44	4	20	12	7	13.5	21.5	2.12	ANL 44 ANL 48, ANL 52 ANL 56
ALL 48	4	20	12	9	17.5	25.5	2.29	
ALL 56	4	24	12	9	17.5	25.5	2.92	
ALL 60	4	24	12	9	20.5	28.5	3.15	ANL 60 ANL 64, ANL 68 ANL 72
ALL 64	5	24	15	9	21	31	4.55	
ALL 72	5	28	15	9	20	30	5.05	
ALL 76	5	28	15	12	24	34	5.3	ANL 76, ANL 80 ANL 84 ANL 88, ANL 92 ANL 96, ANL 100
ALL 84	5	32	15	12	24	34	6.1	
ALL 88	5	32	15	14	28	38	6.45	
ALL 96	5	36	15	14	28	38	7.3	



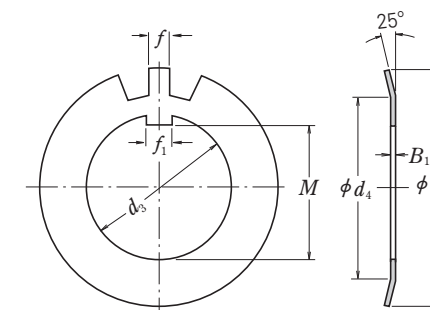
Bent-Tab



Straight-Tab



Bent-Tab



Straight-Tab

Units : mm

Units : mm

Nominal Numbers		Lock-washer Series AW										Reference			
Bent-Tab	Straight-Tab	Basic Dimensions									No. of Teeth	Mass (kg) per 100 pcs approx.	Adapter (1) Sleeve Bore Dia. Numbers	Nut Numbers	Shaft Dia.
		d_3	M	f_1	B_1	f	d_4	d_5	Bent-Tab r	Straight-Tab B_2					
AW 02	AW 02 X	15	13.5	4	1	4	21	28	1	2.5	13	0.253	—	AN 02	15
AW 03	AW 03 X	17	15.5	4	1	4	24	32	1	2.5	13	0.315	—	AN 03	17
AW 04	AW 04 X	20	18.5	4	1	4	26	36	1	2.5	13	0.35	04	AN 04	20
AW 05	AW 05 X	25	23	5	1.2	5	32	42	1	2.5	13	0.64	05	AN 05	25
AW 06	AW 06 X	30	27.5	5	1.2	5	38	49	1	2.5	13	0.78	06	AN 06	30
AW 07	AW 07 X	35	32.5	6	1.2	5	44	57	1	2.5	15	1.04	07	AN 07	35
AW 08	AW 08 X	40	37.5	6	1.2	6	50	62	1	2.5	15	1.23	08	AN 08	40
AW 09	AW 09 X	45	42.5	6	1.2	6	56	69	1	2.5	17	1.52	09	AN 09	45
AW 10	AW 10 X	50	47.5	6	1.2	6	61	74	1	2.5	17	1.6	10	AN 10	50
AW 11	AW 11 X	55	52.5	8	1.2	7	67	81	1	4	17	1.96	11	AN 11	55
AW 12	AW 12 X	60	57.5	8	1.5	7	73	86	1.2	4	17	2.53	12	AN 12	60
AW 13	AW 13 X	65	62.5	8	1.5	7	79	92	1.2	4	19	2.9	13	AN 13	65
AW 14	AW 14 X	70	66.5	8	1.5	8	85	98	1.2	4	19	3.35	14	AN 14	70
AW 15	AW 15 X	75	71.5	8	1.5	8	90	104	1.2	4	19	3.55	15	AN 15	75
AW 16	AW 16 X	80	76.5	10	1.8	8	95	112	1.2	4	19	4.65	16	AN 16	80
AW 17	AW 17 X	85	81.5	10	1.8	8	102	119	1.2	4	19	5.25	17	AN 17	85
AW 18	AW 18 X	90	86.5	10	1.8	10	108	126	1.2	4	19	6.25	18	AN 18	90
AW 19	AW 19 X	95	91.5	10	1.8	10	113	133	1.2	4	19	6.7	19	AN 19	95
AW 20	AW 20 X	100	96.5	12	1.8	10	120	142	1.2	6	19	7.65	20	AN 20	100
AW 21	AW 21 X	105	100.5	12	1.8	12	126	145	1.2	6	19	8.25	21	AN 21	105
AW 22	AW 22 X	110	105.5	12	1.8	12	133	154	1.2	6	19	9.4	22	AN 22	110
AW 23	AW 23 X	115	110.5	12	2	12	137	159	1.5	6	19	10.8	—	AN 23	115
AW 24	AW 24 X	120	115	14	2	12	138	164	1.5	6	19	10.5	24	AN 24	120
AW 25	AW 25 X	125	120	14	2	12	148	170	1.5	6	19	11.8	—	AN 25	125

Note (1) Applicable to adapter sleeve Series A31, A2, A3, and A23.

Remark Lock-washers with straight tabs shall be used with adapter sleeves having narrow slits, and for those having wide slits, either type of lock-washer may be used.

Nominal Numbers		Lock-washer Series AW										Reference			
Bent-Tab	Straight-Tab	Basic Dimensions									No. of Teeth	Mass (kg) per 100 pcs approx.	Adapter (1) Sleeve Bore Dia. Numbers	Nut Numbers	Shaft Dia.
		d_3	M	f_1	B_1	f	d_4	d_5	Bent-Tab r	Straight-Tab B_2					
AW 26	AW 26 X	130	125	14	2	12	149	175	1.5	6	19	11.3	26	AN 26	130
AW 27	AW 27 X	135	130	14	2	14	160	185	1.5	6	19	14.4	—	AN 27	135
AW 28	AW 28 X	140	135	16	2	14	160	192	1.5	8	19	14.2	28	AN 28	140
AW 29	AW 29 X	145	140	16	2	14	172	202	1.5	8	19	16.8	—	AN 29	145
AW 30	AW 30 X	150	145	16	2	14	171	205	1.5	8	19	15.9	30	AN 30	150
AW 31	AW 31 X	155	147.5	16	2.5	16	182	212	1.5	8	19	20.9	—	AN 31	155
AW 32	AW 32 X	160	154	18	2.5	16	182	217	1.5	8	19	22.2	32	AN 32	160
AW 33	AW 33 X	165	157.5	18	2.5	16	193	222	1.5	8	19	24.1	—	AN 33	165
AW 34	AW 34 X	170	164	18	2.5	16	193	232	1.5	8	19	24.7	34	AN 34	170
AW 36	AW 36 X	180	174	20	2.5	18	203	242	1.5	8	19	26.8	36	AN 36	180
AW 38	AW 38 X	190	184	20	2.5	18	214	252	1.5	8	19	27.8	38	AN 38	190
AW 40	AW 40 X	200	194	20	2.5	18	226	262	1.5	8	19	29.3	40	AN 40	200

Washer Series AWL

AWL 24	AWL 24 X	120	115	14	2	12	133	155	1.5	6	19	7.7	24	ANL 24	120
AWL 26	AWL 26 X	130	125	14	2	12	143	165	1.5	6	19	8.7	26	ANL 26	130
AWL 28	AWL 28 X	140	135	16	2	14	151	175	1.5	8	19	10.9	28	ANL 28	140
AWL 30	AWL 30 X	150	145	16	2	14	164	190	1.5	8	19	11.3	30	ANL 30	150
AWL 32	AWL 32 X	160	154	18	2.5	16	174	200	1.5	8	19	16.2	32	ANL 32	160
AWL 34	AWL 34 X	170	164	18	2.5	16	184	210	1.5	8	19	19	34	ANL 34	170
AWL 36	AWL 36 X	180	174	20	2.5	18	192	220	1.5	8	19	18	36	ANL 36	180
AWL 38	AWL 38 X	190	184	20	2.5	18	202	230	1.5	8	19	20.5	38	ANL 38	190
AWL 40	AWL 40 X	200	194	20	2.5	18	218	250	1.5	8	19	21.4	40	ANL 40	200

Note (1) Series AW is applicable to adapter sleeve Series A31 and A23. Series AWL is applicable to adapter sleeve Series A30.

Remark Lock-washers with straight tabs shall be used with adapter sleeves having narrow slits, and for those having wide slits, either type of lock-washer may be used.