BEARING TABLES



Part C

BEARING TABLES

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1. DEEP GROOVE BALL BEARINGS

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BEARING TABLES

Single-Row Deep Groove Ball Bearings

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DESIGN, TYPES, AND FEATURES

SINGLE-ROW DEEP GROOVE BALL BEARINGS

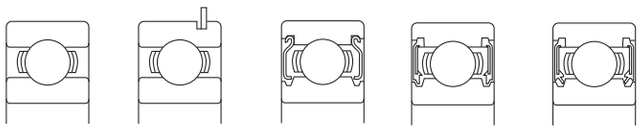
Single-row deep groove ball bearings are classified into the types shown below.

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

	Shielded (ZZ Type)	Rubber Non-Contact Seal (VV Type)	Rubber Contact Seal (DDU Type)
Torque	Low	Low	Higher than ZZ and VV types due to contact seal
Speed capability	Good	Good	Limited by contact seals
Grease-sealing effectiveness	Good	Better than ZZ type	Slightly better than VV type
Dust resistance	Good	Better than ZZ type (usable in moderately dusty environments)	Best (usable even in very dusty environments)
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 or changing the type of rubber, the operating temperature range can be extended. Please contact NSK for such applications.



Open | **With Snap Ring** | **Shielded (ZZ Type)** | **Rubber Non-Contact Sealed (VV Type)** | **Rubber Contact Sealed (DDU Type)**

Pressed cages are usually used for deep groove ball bearings. For large bearings, machined brass cages are used (refer to Table 2).

Machined cages are also used for high-speed applications.

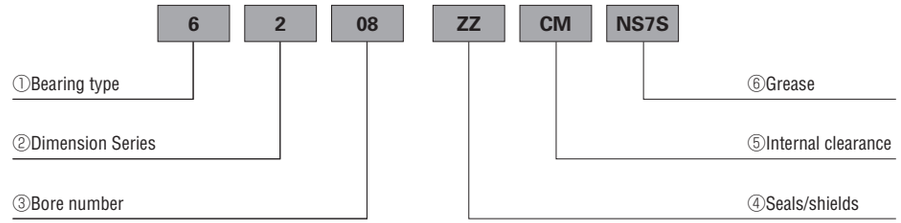
Table 2 Standard Cages for Deep Groove Ball Bearings

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 Designations

Single-row deep groove ball bearings

Example:



①Bearing type	6: Single-row deep groove ball bearings
②Dimension Series	2: 02 Series, 3: 03 Series, 9: 19 Series, 0: 10 Series
③Bore number	Bore diameter for 03 and under—00: 10 mm, 01: 12 mm, 02: 15 mm, 03: 17 mm 04 and over—Bore diameter = Bore number × 5 (mm)
④Seals/shields	ZZ: Shield on both sides, DDU: Rubber contact seal on both sides, VV: Rubber non-contact seal on both sides, Z: Shield on one side, DU: Rubber contact seal on one side, V: Rubber non-contact seal on one side
⑤Internal clearance	Omitted: CN clearance*1, C3: Clearance greater than CN, C4: Clearance greater than C3, CM: For electric motors*1
⑥Grease designation*2	NS7: NS HI-LUBE

*1 CM clearance may be used instead of CN clearance (the reverse is not possible).

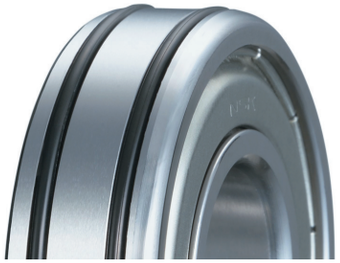
*2 The grease designation is required when seals/shields are used on both sides.

Creep-Free Bearings™

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

No special machining is required; therefore 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 improvements in creep prevention due to the tension of the O-ring mounted in the outer ring.



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

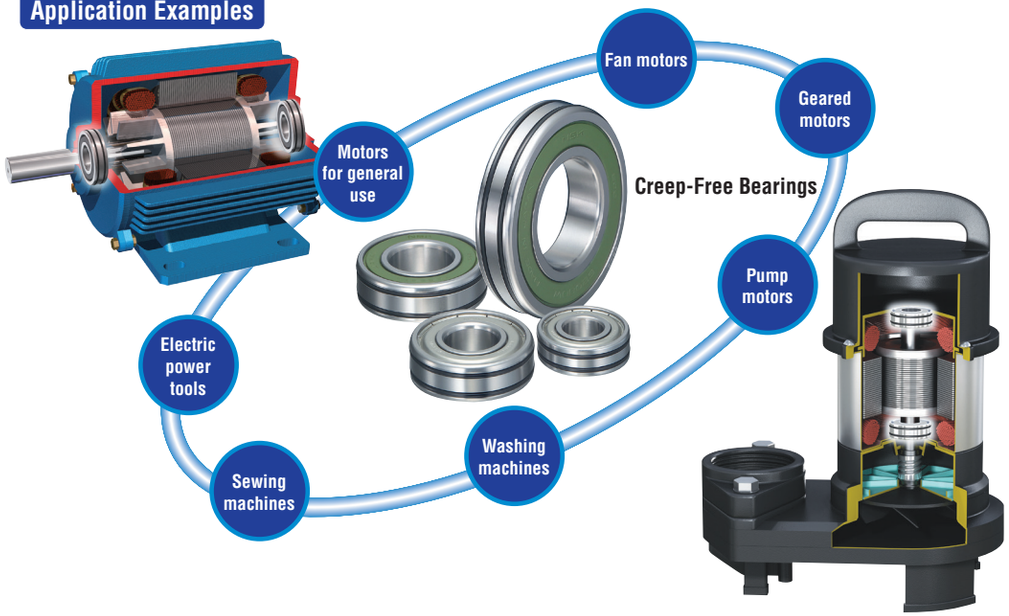
Very little abrasion occurs on the bore surface of the housing, making reuse possible.

■No special machining of the housing required

Bearings can be easily replaced since boundary dimensions are identical to standard bearings.

No reworking of the housing is required.

Application Examples



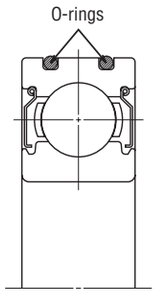


Fig. 1 Structure of Creep-Free Bearings

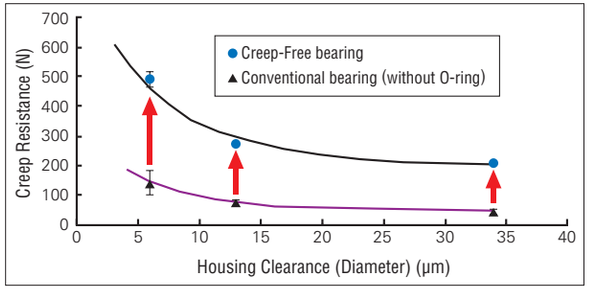


Fig. 2 Creep Limit Load Test (Example Bearing 6204)

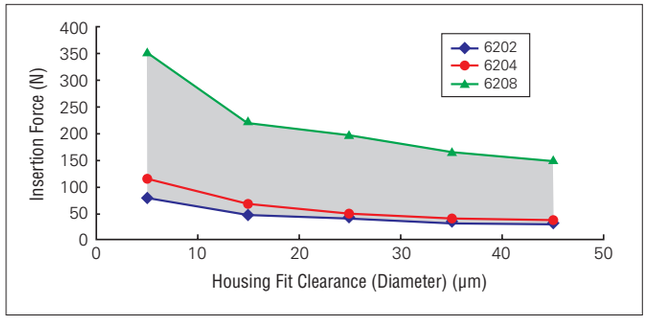


Fig. 3 Fit and Insertion Force

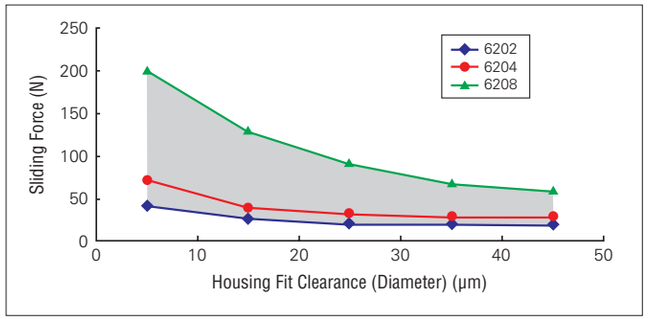


Fig. 4 Fit and Sliding Force

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.).
- Nitrile rubber is used as the standard specification O-ring material (operating temperature range: –30 to 120 °C). Please contact NSK for use under special environments such as high temperatures.

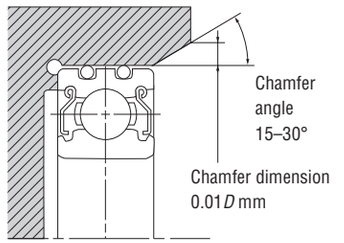
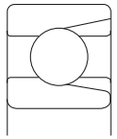


Fig. 5 Housing Shape and Dimension

Note that "free" in the product name "Creep-Free" bearings should not be understood as meaning that creep is nonexistent.



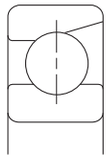
MAXIMUM BALL BEARINGS

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

BL2 and BL3 have boundary dimensions equal to those of Series 62 and 63 deep groove ball bearings 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.

Maximum ball bearings use cages made of pressed steel.



MAGNETO BEARINGS

The groove in the inner ring is slightly shallower than that of deep groove ball bearings and one side of the outer ring is relieved. Consequently, the outer ring is separable, which is 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

If the bearing load is too small during operation, slippage may occur between the balls and raceways, which may result in smearing. The higher the weight of the balls and cage, the more likely this will occur, 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 BEARINGS ..... Table 7.2 (Pages A128 to A131)
MAXIMUM BALL BEARINGS ..... Table 7.2 (Pages A128 to A131)
MAGNETO BEARINGS ..... Table 7.5 (Pages A138 and A139)

RECOMMENDED FITS

SINGLE-ROW DEEP GROOVE BALL BEARINGS ..... Table 8.3 (Page A164)
Table 8.5 (Page A165)
MAXIMUM BALL BEARINGS ..... Table 8.3 (Page A164)
Table 8.5 (Page A165)
MAGNETO BEARINGS ..... Table 8.3 (Page A164)
Table 8.5 (Page A165)

INTERNAL CLEARANCES

SINGLE-ROW DEEP GROOVE BALL BEARINGS ..... Table 8.10 (Page A169)
MAXIMUM BALL BEARINGS ..... Table 8.10 (Page A169)
MAGNETO BEARINGS ..... Table 8.12 (Page A169)

LIMITING SPEEDS (GREASE/OIL)

The limiting speeds for grease and oil lubrication listed in the bearing tables should be adjusted depending on bearing load. Furthermore, higher speeds are attainable by changing 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 is 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 bearing radius is called the radial clearance, and the amount along the axis is called the axial clearance.

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

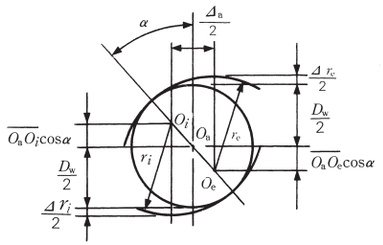


Fig. 1 Relationship Between Δ_r and Δ_a

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 $\Delta_r=\Delta r_e+\Delta r_i$.

Various equations for clearance, contact angle, etc. can be derived from geometric relationships:

$$\Delta_r=2\,(1-\cos\alpha)\,(r_e+r_i-D_w) \quad \cdots\cdots (1)$$

$$\Delta_a=2\sin\alpha\,(r_e+r_i-D_w) \quad \cdots\cdots (2)$$

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

$$\Delta_a\fallingdotseq 2\,(r_e+r_i-D_w)^{1/2}\Delta_r^{1/2} \quad \cdots\cdots (4)$$

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

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

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

As previously mentioned, the clearances for deep groove ball bearings are given as radial clearances, but there are specific applications where an axial clearance is desirable 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,

$$\Delta_a\fallingdotseq K\,\Delta_r^{1/2} \quad \cdots\cdots (7)$$

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 bearing 6312 has a radial clearance of 0.017 mm. From Table 1, K=2.09. Therefore, the axial clearance Δ_a is:
$\Delta=2.09\times\sqrt{0.017}=2.09\times0.13=0.27$ (mm)

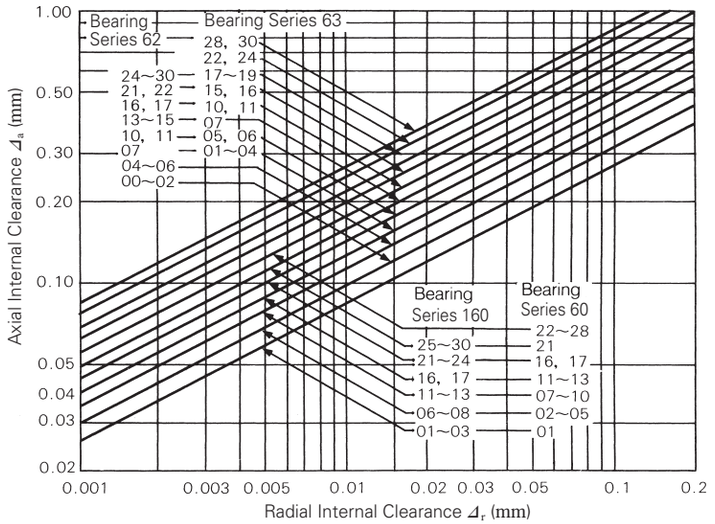


Fig. 2 Radial Clearance Δ_r and Axial Clearance Δ_a of Deep Groove Ball Bearings

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, the contact angle should be as large as possible.

The contact angle for ball bearings is determined by the geometric relationship between the radial clearance and 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 bearings in Series 62 and 63 bearings. The initial contact angle, α_0, refers to the initial contact angle when 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°, check whether or not the contact area of the ball and raceway touch the edge of the raceway shoulder (refer to Section 8.1.2).

For applications where 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 Designation	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°

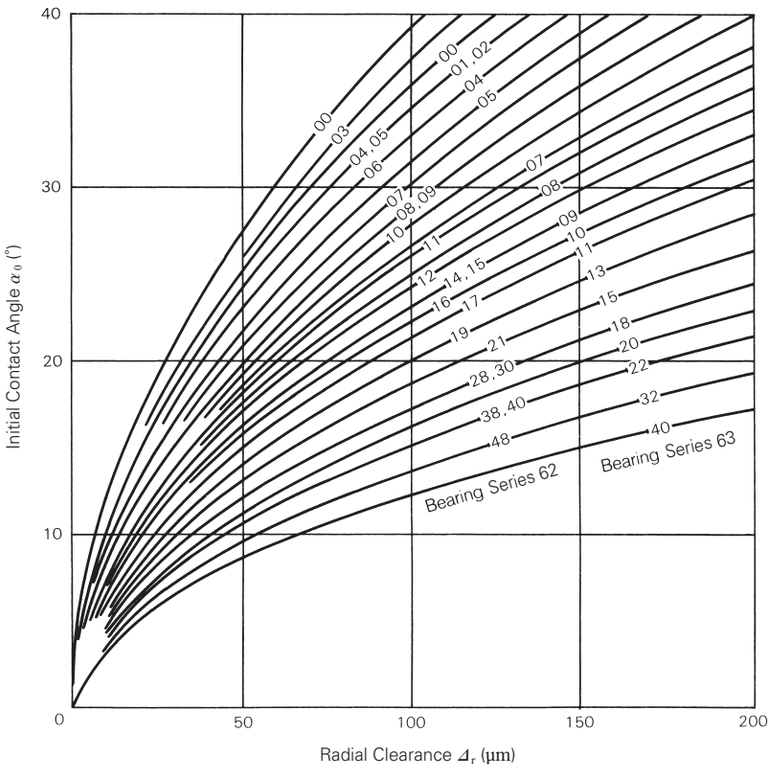


Fig. 3 Radial Clearance and Contact Angle

Features and Operating Temperature Range of Ball Bearing Seal Material

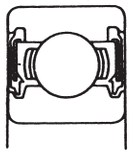
Sealed ball bearings are shown in Figs. 1 and 2. There are two seal types: non-contact seals and contact seals. Nitrile rubber is used for general-purpose applications, while polyacrylic, silicon, and fluoric rubbers are used based on operating temperature requirements. All rubbers have their own unique characteristics and must be selected while considering the application environment and operating 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 temperature and time. Rubber may be used in a much wider range of operating temperatures depending on the operating time and frequency.

Heat generation due to friction on the lip can be ignored in non-contact seals. Thermal factors, which cause aging of the rubber, refer to 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 seal performance. A rubber non-contact seal can thus be used in a greater range of operating temperatures than contact seals.

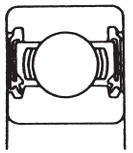
However, there are some disadvantages. Problems with friction-generated wear at the seal lip, thermal plastic deformation, and hardening may occur, causing the contact pressure between the lip and slide surface to decrease and result in a clearance. This clearance is low and does not degrade sealing performance (it does not cause dust entry or grease leakage). In most cases, this minor plastic deformation or increased hardness presents no practical problems.

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



Rubber non-contact seal (VV)

Fig. 1



Rubber contact 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		○Most popular seal material ○Superior mechanical properties and resistance to oil and wear ○Readily ages under direct sunlight ○Less expensive than other rubbers	○Superior heat and oil resistances ○Large compression causes permanent deformation ○Inferior cold resistance ○One of the less expensive high-temperature materials ○Swells in contact with ester oil based grease	○High heat and cold resistances ○Inferior mechanical properties besides resistance to permanent deformation by compression. Note the tear strength ○Swells in contact with low-anilinepoint mineral oil, silicone grease, and silicone oil	○High heat resistance ○Superior oil and chemical resistances ○Cold resistance similar to nitrile rubber ○Deteriorates in contact with 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 refers to the temperature of rubber seal materials.

Free Space and Grease Filling Amount for Deep Groove Ball Bearings

Grease lubrication can simplify the bearing's peripheral construction. Thanks to enhanced grease quality, grease lubrication is now employed in place of oil lubrication in many fields. Be sure to select a grease appropriate for operating conditions. Take care with 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.

As a general guideline, the bearing is first filled with an appropriate amount of grease. Apply grease onto the cage guide surface, then, fill the free space, whic excludes the spindle and bearing inside the housing, with the following amount of grease:

When bearing speed is 50% or less of the specified limiting speed, fill 1/2 to 2/3 of the free space.
When bearing speed is 50% or more of the specified limiting speed, fill 1/3 to 1/2 of the free space.

In general, 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 prevent heat generation. When bearing speed is extremely low on the other hand, grease may be packed almost full to prevent dust and water entry. Accordingly, one must know the extent of the housing's free space for the specific bearing to determine the correct filling amount. The volume of free space is shown in Table 1 for an open deep groove ball bearing for reference.

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.

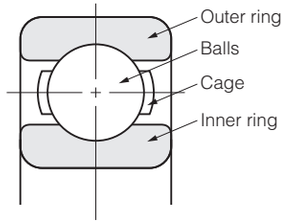


Table 1 Free Space of Open Deep Groove Ball Bearings

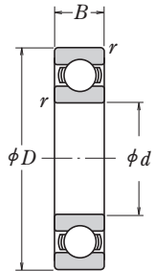
Units : cm^3

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

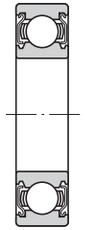
Remark The table above shows the free space of bearings using pressed-steel cages. The free space of a bearing using a high-tension machined-brass cage is about 50 to 60% of the value in this table.

■SINGLE-ROW DEEP GROOVE BALL BEARINGS

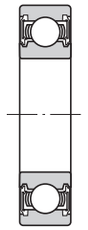
Bore Diameter 10 – 17 mm



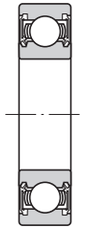
Open



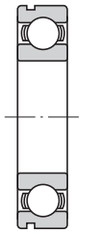
Shielded
ZZ



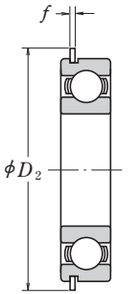
Non-Contact
Sealed
VV



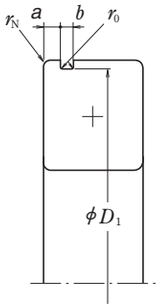
Contact
Sealed
DD · DDU

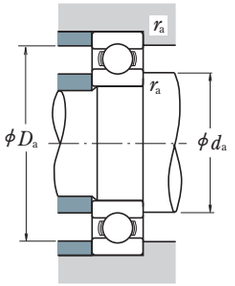


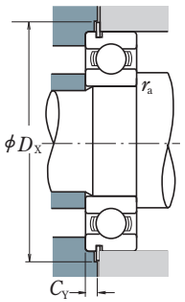
With Snap
Ring Groove
N



With
Snap Ring
NR







Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		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

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

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

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Designations			With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
							Grease		Oil																			
d	D	B	r min.	C_r	C_{0r}	f_0	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed			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.	D_a(2) max.	r_a max.	D_x min.	C_Y max.	approx.
10	19	5	0.3	1 890	840	14.8	34 000	24 000	40 000	**6800**	**ZZ**	**VV**	**DD**	—	—	—	—	—	—	—	—	—	12	12	17	0.3	—	—	0.005
	22	6	0.3	2 970	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	24.8	0.7	12	12.5	20	0.3	25.5	1.5	0.009
	26	8	0.3	5 050	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	28.7	0.84	12	13	24	0.3	29.4	1.9	0.018
	30	9	0.6	5 600	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	34.7	1.12	14	16	26	0.6	35.5	2.9	0.032
	35	11	0.6	8 900	3 450	11.2	26 000	17 000	30 000	**6300**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.06	1.35	33.17	0.4	0.5	39.7	1.12	14	16.5	31	0.6	40.5	2.9	0.052
12	21	5	0.3	2 110	1 040	15.3	32 000	20 000	38 000	**6801**	**ZZ**	**VV**	**DD**	—	—	—	—	—	—	—	—	—	14	14	19	0.3	—	—	0.006
	24	6	0.3	3 200	1 460	14.5	30 000	20 000	36 000	**6901**	**ZZ**	**VV**	**DD**	**N**(3)	**NR**(3)	1.05	0.8	22.8	0.2	0.2	26.8	0.7	14	14.5	22	0.3	27.5	1.5	0.010
	28	7	0.3	5 600	2 370	13.0	28 000	—	32 000	**16001**	—	—	—	—	—	—	—	—	—	—	—	—	14	—	26	0.3	—	—	0.019
	28	8	0.3	5 600	2 370	13.0	32 000	18 000	38 000	**6001**	**ZZ**	**VV**	**DDU**	**N**(4)	**NR**(4)	1.35	0.87	26.5	0.2	0.3	30.7	0.84	14	15.5	26	0.3	31.4	1.9	0.022
	32	10	0.6	7 500	3 050	12.3	26 000	17 000	32 000	**6201**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.06	1.35	30.15	0.4	0.5	36.7	1.12	16	17	28	0.6	37.5	2.9	0.037
	37	12	1	10 700	4 200	11.1	24 000	16 000	28 000	**6301**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.06	1.35	34.77	0.4	0.5	41.3	1.12	17	18	32	1	42	2.9	0.060
15	24	5	0.3	2 280	1 260	15.8	28 000	17 000	34 000	**6802**	**ZZ**	**VV**	**DD**	—	—	—	—	—	—	—	—	—	17	17	22	0.3	—	—	0.007
	28	7	0.3	4 750	2 260	14.3	26 000	17 000	30 000	**6902**	**ZZ**	**VV**	**DD**	**N**(3)	**NR**(3)	1.30	0.95	26.7	0.25	0.3	30.8	0.85	17	17	26	0.3	31.5	1.8	0.015
	32	8	0.3	6 150	2 840	13.9	24 000	—	28 000	**16002**	—	—	—	—	—	—	—	—	—	—	—	—	17	—	30	0.3	—	—	0.027
	32	9	0.3	6 150	2 840	13.9	26 000	15 000	32 000	**6002**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.06	1.35	30.15	0.4	0.3	36.7	1.12	17	19	30	0.3	37.5	2.9	0.031
	35	11	0.6	8 400	3 750	13.2	22 000	14 000	28 000	**6202**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.06	1.35	33.17	0.4	0.5	39.7	1.12	19	20.5	31	0.6	40.5	2.9	0.045
	42	13	1	12 600	5 450	12.3	19 000	13 000	24 000	**6302**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.06	1.35	39.75	0.4	0.5	46.3	1.12	20	22.5	37	1	47	2.9	0.083
17	26	5	0.3	2 890	1 570	15.7	26 000	15 000	30 000	**6803**	**ZZ**	**VV**	**DD**	—	—	—	—	—	—	—	—	—	19	19	24	0.3	—	—	0.007
	30	7	0.3	5 050	2 550	14.7	24 000	15 000	28 000	**6903**	**ZZ**	**VV**	**DDU**	**N**(3)	**NR**(3)	1.30	0.95	28.7	0.25	0.3	32.8	0.85	19	19.5	28	0.3	33.5	1.8	0.017
	35	8	0.3	6 600	3 250	14.4	22 000	—	26 000	**16003**	—	—	—	—	—	—	—	—	—	—	—	—	19	—	33	0.3	—	—	0.033
	35	10	0.3	6 600	3 250	14.4	24 000	13 000	28 000	**6003**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.06	1.35	33.17	0.4	0.3	39.7	1.12	19	21.5	33	0.3	40.5	2.9	0.041
	40	12	0.6	10 500	4 800	13.2	20 000	12 000	24 000	**6203**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.06	1.35	38.1	0.4	0.5	44.6	1.12	21	23.5	36	0.6	45.5	2.9	0.067
	47	14	1	15 000	6 650	12.4	17 000	11 000	20 000	**6303**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.46	1.35	44.6	0.4	0.5	52.7	1.12	22	25.5	42	1	53.5	3.3	0.113

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

(2) When heavy axial loads are applied, d_a and D_a can be adjusted up to the shoulder diameter of the races. Please consult NSK for details.

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

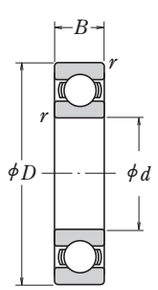
(4) Snap ring groove dimensions and snap ring dimensions do not conform to ISO464.

Remarks 1. Diameter Series 7 (extra-thin wall) bearings are also available; please contact NSK for details.

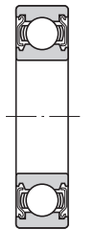
2. When using bearings with rotating outer rings, contact NSK if they are sealed, shielded, or have snap rings.

■SINGLE-ROW DEEP GROOVE BALL BEARINGS

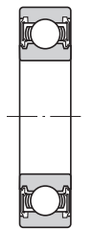
Bore Diameter 20 – 30 mm



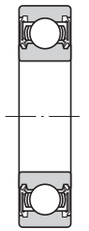
Open



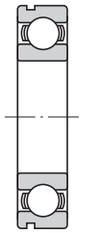
Shielded
ZZ



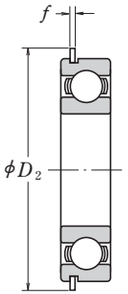
Non-Contact
Sealed
VV



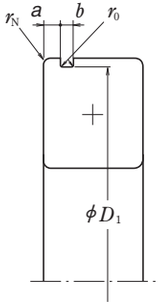
Contact
Sealed
DD · DDU

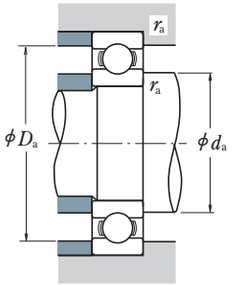


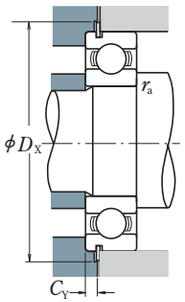
With Snap
Ring Groove
N



With
Snap Ring
NR







Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		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

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

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

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Designations				With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
							Grease		Oil																				
d	D	B	r min.	C_r	C_{0r}	f_0	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed				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.	D_a(2) max.	r_a max.	D_x min.	C_Y max.	approx.
20	32	7	0.3	4 400	2 470	15.5	22 000	13 000	26 000	**6804**	**ZZ**	**VV**	**DD**	**N**	**NR**	1.30	0.95	30.7	0.25	0.3	34.8	0.85	22	22	30	0.3	35.5	1.8	0.017
	37	9	0.3	7 000	3 700	14.7	19 000	12 000	22 000	**6904**	**ZZ**	**VV**	**DDU**	**N**	**NR**	1.70	0.95	35.7	0.25	0.3	39.8	0.85	22	24	35	0.3	40.5	2.3	0.037
	42	8	0.3	8 700	4 450	14.5	18 000	—	20 000	**16004**	—	—	—	—	—	—	—	—	—	—	—	—	22	—	40	0.3	—	—	0.048
	42	12	0.6	10 300	5 000	13.8	20 000	11 000	24 000	**6004**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.06	1.35	39.75	0.4	0.5	46.3	1.12	24	25.5	38	0.6	47	2.9	0.068
	47	14	1	14 100	6 600	13.1	17 000	11 000	20 000	**6204**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.46	1.35	44.6	0.4	0.5	52.7	1.12	25	26.5	42	1	53.5	3.3	0.107
	52	15	1.1	17 500	7 900	12.4	16 000	10 000	19 000	**6304**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.46	1.35	49.73	0.4	0.5	57.9	1.12	26.5	28	45.5	1	58.5	3.3	0.145
22	44	12	0.6	10 300	5 050	14.0	17 000	11 000	20 000	**60/22**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.06	1.35	41.75	0.4	0.5	48.3	1.12	26	26.5	40	0.6	49	2.9	0.074
	50	14	1	14 200	6 800	13.5	14 000	9 500	16 000	**62/22**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.46	1.35	47.6	0.4	0.5	55.7	1.12	27	29.5	45	1	56.5	3.3	0.119
	56	16	1.1	20 200	9 250	12.4	13 000	9 500	16 000	**63/22**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.46	1.35	53.6	0.4	0.5	61.7	1.12	28.5	30.5	49.5	1	62.5	3.3	0.179
25	37	7	0.3	4 950	3 150	16.1	18 000	10 000	22 000	**6805**	**ZZ**	**VV**	**DD**	**N**	**NR**	1.30	0.95	35.7	0.25	0.3	39.8	0.85	27	27	35	0.3	40.5	1.8	0.021
	42	9	0.3	7 750	4 550	15.4	16 000	10 000	19 000	**6905**	**ZZ**	**VV**	**DDU**	**N**(3)	**NR**(3)	1.70	0.95	40.7	0.25	0.3	44.8	0.85	27	28.5	40	0.3	45.5	2.3	0.042
	47	8	0.3	9 750	5 600	15.1	15 000	—	18 000	**16005**	—	—	—	—	—	—	—	—	—	—	—	—	27	—	45	0.3	—	—	0.059
	47	12	0.6	11 100	5 850	14.5	18 000	9 500	22 000	**6005**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.06	1.35	44.6	0.4	0.5	52.7	1.12	29	30	43	0.6	53.5	2.9	0.079
	52	15	1	15 400	7 850	13.9	15 000	9 000	18 000	**6205**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.46	1.35	49.73	0.4	0.5	57.9	1.12	30	32	47	1	58.5	3.3	0.129
	62	17	1.1	22 600	11 200	13.2	13 000	8 000	16 000	**6305**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.28	1.9	59.61	0.6	0.5	67.7	1.7	31.5	36	55.5	1	68.5	4.6	0.235
28	52	12	0.6	13 700	7 400	14.5	14 000	8 500	16 000	**60/28**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.06	1.35	49.73	0.4	0.5	57.9	1.12	32	34	48	0.6	58.5	2.9	0.096
	58	16	1	18 300	9 500	13.9	12 000	8 000	14 000	**62/28**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.46	1.35	55.6	0.4	0.5	63.7	1.12	33	35.5	53	1	64.5	3.3	0.175
	68	18	1.1	29 400	14 000	12.4	10 000	7 500	13 000	**63/28**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.28	1.9	64.82	0.6	0.5	74.6	1.7	34.5	38	61.5	1	76	4.6	0.287
30	42	7	0.3	5 200	3 650	16.4	15 000	9 000	18 000	**6806**	**ZZ**	**VV**	**DD**	**N**	**NR**	1.30	0.95	40.7	0.25	0.3	44.8	0.85	32	32	40	0.3	45.5	1.8	0.024
	47	9	0.3	7 950	5 000	15.8	14 000	8 500	17 000	**6906**	**ZZ**	**VV**	**DDU**	**N**	**NR**	1.70	0.95	45.7	0.25	0.3	49.8	0.85	32	34	45	0.3	50.5	2.3	0.052
	55	9	0.3	12 400	7 350	15.2	13 000	—	15 000	**16006**	—	—	—	—	—	—	—	—	—	—	—	—	32	—	53	0.3	—	—	0.087
	55	13	1	14 600	8 300	14.7	15 000	8 000	18 000	**6006**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.08	1.35	52.6	0.4	0.5	60.7	1.12	35	36.5	50	1	61.5	2.9	0.116
	62	16	1	21 400	11 300	13.8	12 000	7 500	15 000	**6206**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.28	1.9	59.61	0.6	0.5	67.7	1.7	35	38.5	57	1	68.5	4.6	0.199
	72	19	1.1	29 300	15 000	13.3	11 000	6 700	13 000	**6306**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.28	1.9	68.81	0.6	0.5	78.6	1.7	36.5	42.5	65.5	1	80	4.6	0.345

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

(2) When heavy axial loads are applied, d_a and D_a can be adjusted up to the shoulder diameter of the races. Please consult NSK for details.

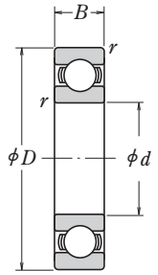
(3) Ring types N and NR are applicable only to open bearings. Please consult NSK about the snap ring groove dimensions of sealed or shielded bearings.

Remarks 1. Diameter Series 7 (extra-thin wall) bearings are also available; please contact NSK for details.

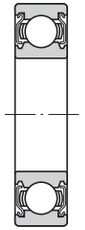
2. When using bearings with rotating outer rings, contact NSK if they are sealed, shielded, or have snap rings.

■SINGLE-ROW DEEP GROOVE BALL BEARINGS

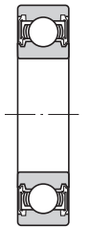
Bore Diameter 32 – 45 mm



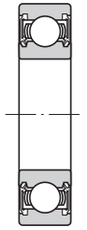
Open



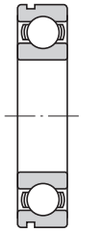
Shielded
ZZ



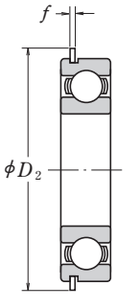
Non-Contact
Sealed
VV



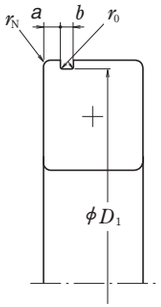
Contact
Sealed
DD · DDU

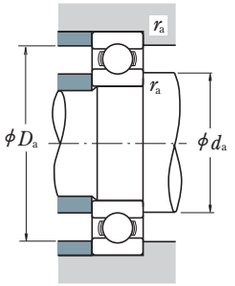


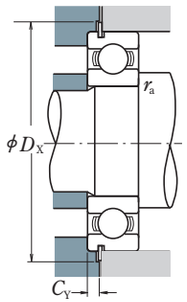
With Snap
Ring Groove
N



With
Snap Ring
NR







Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		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

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

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

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Designations				With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
							Grease		Oil																				
d	D	B	r min.	C_r	C_{0r}	f_0	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed				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.	D_a(2) max.	r_a max.	D_x min.	C_Y max.	approx.
32	58	13	1	16 600	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	22 800	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	33 000	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	5 400	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	11 600	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	12 800	8 200	15.6	11 000	—	13 000	**16007**	—	—	—	—	—	—	—	—	—	—	—	—	37	—	60	0.3	—	—	0.107
	62	14	1	17 600	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
	72	17	1.1	28 200	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
	80	21	1.5	36 500	19 200	13.2	10 000	6 000	12 000	**6307**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.28	1.9	76.81	0.6	0.5	86.6	1.7	43	47	72	1.5	88	4.6	0.464
40	52	7	0.3	7 000	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	15 000	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	13 900	9 650	16.0	10 000	—	12 000	**16008**	—	—	—	—	—	—	—	—	—	—	—	—	42	—	66	0.3	—	—	0.13
	68	15	1	18 400	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
	80	18	1.1	32 000	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
	90	23	1.5	45 000	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
45	58	7	0.3	7 250	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	15 500	10 900	15.9	9 500	5 600	12 000	**6909**	**ZZ**	**VV**	**DDU**	**N**	**NR**	1.70	0.95	66.7	0.25	0.3(3)	70.8	0.85	49	50	64	0.6	72	2.3	0.126
	75	10	0.6	16 400	11 400	15.9	9 000	—	11 000	**16009**	—	—	—	—	—	—	—	—	—	—	—	—	49	—	71	0.6	—	—	0.167
	75	16	1	23 000	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
	85	19	1.1	34 500	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
	100	25	1.5	58 500	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

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

(2) When heavy axial loads are applied, d_a and D_a can be adjusted up to the shoulder diameter of the races. Please consult NSK for details.

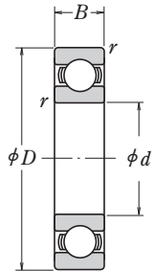
(3) Does not conform to ISO464.

Remarks 1. Diameter Series 7 (extra-thin wall) bearings are also available; please contact NSK for details.

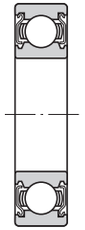
2. When using bearings with rotating outer rings, contact NSK if they are sealed, shielded, or have snap rings.

SINGLE-ROW DEEP GROOVE BALL BEARINGS

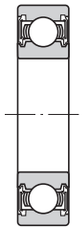
Bore Diameter 50 – 60 mm



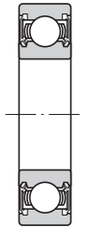
Open



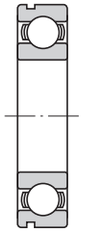
Shielded
ZZ



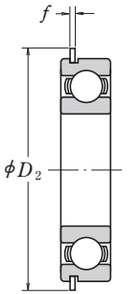
Non-Contact
Sealed
VV



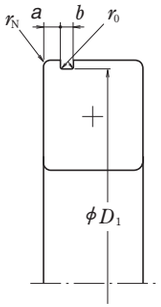
Contact
Sealed
DD · DDU

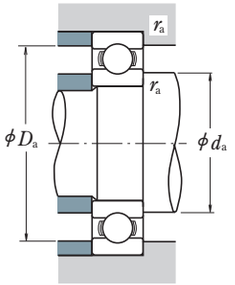


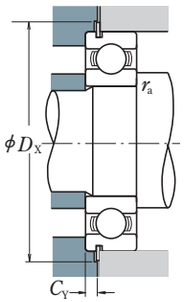
With Snap
Ring Groove
N



With
Snap Ring
NR







Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		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

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

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

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Designations				With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
							Grease		Oil																				
d	D	B	r min.	C_r	C_{0r}	f_0	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed				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.	D_a(2) max.	r_a max.	D_x min.	C_Y max.	approx.
50	65	7	0.3	7 050	6 200	17.2	9 500	5 300	11 000	**6810**	**ZZ**	**VV**	**DDU**	**N**	**NR**	1.30	0.95	63.7	0.25	0.3	67.8	0.85	52	52.5	63	0.3	68.5	1.8	0.050
	72	12	0.6	16 000	11 700	16.1	9 000	5 300	11 000	**6910**	**ZZ**	**VV**	**DDU**	**N**	**NR**	1.70	0.95	70.7	0.25	0.5	74.8	0.85	54	55	68	0.6	76	2.3	0.135
	80	10	0.6	17 000	12 400	16.1	8 500	—	10 000	**16010**	—	—	—	—	—	—	—	—	—	—	—	—	54	—	76	0.6	—	—	0.175
	80	16	1	24 000	16 600	15.6	9 500	4 800	11 000	**6010**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.49	1.9	76.81	0.6	0.5	86.6	1.7	55	58.5	75	1	88	3.8	0.261
	90	20	1.1	38 500	23 200	14.4	8 000	4 800	10 000	**6210**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.28	2.7	86.79	0.6	0.5	96.5	2.46	56.5	60	83.5	1	98	5.4	0.459
	110	27	2	68 000	38 500	13.2	7 100	4 300	8 500	**6310**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.28	2.7	106.81	0.6	0.5	116.6	2.46	59	68	101	2	118	5.4	1.06
55	72	9	0.3	9 700	8 500	17.0	8 500	4 800	10 000	**6811**	**ZZ**	**VV**	**DDU**	**N**	**NR**	1.70	0.95	70.7	0.25	0.3	74.8	0.85	57	59	70	0.3	76	2.3	0.081
	80	13	1	17 600	13 300	16.2	8 000	4 500	9 500	**6911**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.10	1.3	77.9	0.4	0.5	84.4	1.12	60	61.5	75	1	86	2.9	0.189
	90	11	0.6	21 400	16 300	16.2	7 500	—	9 000	**16011**	—	—	—	—	—	—	—	—	—	—	—	—	59	—	86	0.6	—	—	0.257
	90	18	1.1	31 000	21 200	15.3	8 500	4 500	10 000	**6011**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.87	2.7	86.79	0.6	0.5	96.5	2.46	61.5	64	83.5	1	98	5	0.381
	100	21	1.5	47 500	29 300	14.3	7 500	4 300	9 000	**6211**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.28	2.7	96.8	0.6	0.5	106.5	2.46	63	66.5	92	1.5	108	5.4	0.619
	120	29	2	78 500	44 500	13.1	6 700	4 000	8 000	**6311**	**ZZ**	**VV**	**DDU**	**N**	**NR**	4.06	3.1	115.21	0.6	0.5	129.7	2.82	64	72.5	111	2	131.5	6.5	1.37
60	78	10	0.3	12 600	10 900	16.9	8 000	4 500	9 500	**6812**	**ZZ**	**VV**	**DD**	**N**	**NR**	1.70	1.3	76.2	0.4	0.3	82.7	1.12	62	64	76	0.3	84	2.5	0.103
	85	13	1	21 400	16 300	16.2	7 500	4 300	9 000	**6912**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.10	1.3	82.9	0.4	0.5	89.4	1.12	65	66	80	1	91	2.9	0.192
	95	11	0.6	22 000	17 500	16.3	7 100	—	8 500	**16012**	—	—	—	—	—	—	—	—	—	—	—	—	64	—	91	0.6	—	—	0.281
	95	18	1.1	32 500	23 200	15.6	8 000	4 000	9 500	**6012**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.87	2.7	91.82	0.6	0.5	101.6	2.46	66.5	69	88.5	1	103	5	0.412
	110	22	1.5	57 500	36 000	14.3	6 700	3 800	8 000	**6212**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.28	2.7	106.81	0.6	0.5	116.6	2.46	68	74.5	102	1.5	118	5.4	0.783
	130	31	2.1	90 000	52 000	13.1	6 000	3 600	7 100	**6312**	**ZZ**	**VV**	**DDU**	**N**	**NR**	4.06	3.1	125.22	0.6	0.5	139.7	2.82	71	79	119	2	141.5	6.5	1.72

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

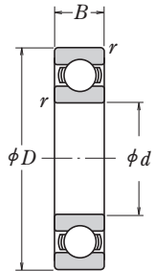
(2) When heavy axial loads are applied, d_a and D_a can be adjusted up to the shoulder diameter of the races. Please consult NSK for details.

Remarks

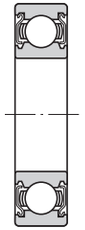
1. Diameter Series 7 (extra-thin wall) bearings are also available; please contact NSK for details.
2. When using bearings with rotating outer rings, contact NSK if they are sealed, shielded, or have snap rings.
3. Please consult NSK about the snap ring groove dimensions of Dimension Series 18 and 19 sealed and shielded bearings when the diameter is 50 mm or more.

SINGLE-ROW DEEP GROOVE BALL BEARINGS

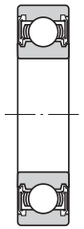
Bore Diameter 65 – 75 mm



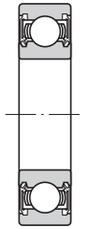
Open



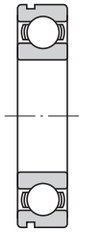
Shielded
ZZ



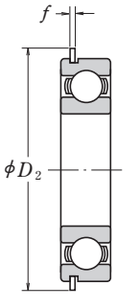
Non-Contact
Sealed
VV



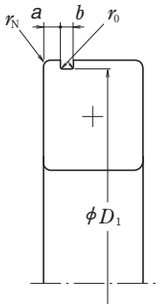
Contact
Sealed
DD · DDU

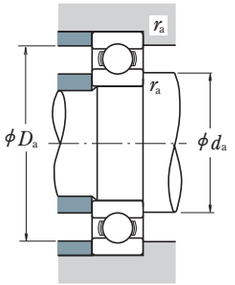


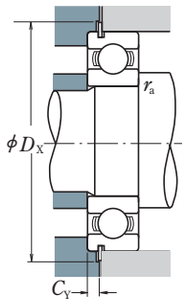
With Snap
Ring Groove
N



With
Snap Ring
NR







Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		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

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

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

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Designations				With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
							Grease		Oil																				
d	D	B	r min.	C_r	C_{0r}	f_0	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed				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.	D_a(2) max.	r_a max.	D_X min.	C_Y max.	approx.
65	85	10	0.6	13 100	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	19 100	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	22 500	18 700	16.5	6 700	—	8 000	**16013**	—	—	—	—	—	—	—	—	—	—	—	—	69	—	96	0.6	—	—	0.30
	100	18	1.1	33 500	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
	120	23	1.5	63 000	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
	140	33	2.1	102 000	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
70	90	10	0.6	13 300	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	26 100	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	29 500	23 600	16.3	6 000	—	7 100	**16014**	—	—	—	—	—	—	—	—	—	—	—	—	74	—	106	0.6	—	—	0.441
	110	20	1.1	42 000	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
	125	24	1.5	68 500	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
	150	35	2.1	115 000	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
75	95	10	0.6	13 800	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	26 800	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	30 500	25 300	16.4	5 600	—	6 700	**16015**	—	—	—	—	—	—	—	—	—	—	—	—	79	—	111	0.6	—	—	0.463
	115	20	1.1	43 500	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
	130	25	1.5	73 000	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
	160	37	2.1	125 000	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

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

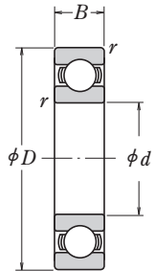
(2) When heavy axial loads are applied, d_a and D_a can be adjusted up to the shoulder diameter of the races. Please consult NSK for details.

Remarks

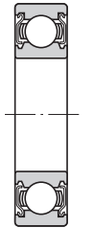
1. Diameter Series 7 (extra-thin wall) bearings are also available; please contact NSK for details.
2. When using bearings with rotating outer rings, contact NSK if they are sealed, shielded, or have snap rings.
3. Please consult NSK about the snap ring groove dimensions of Dimension Series 18 and 19 sealed and shielded bearings when the diameter is 50 mm or more.

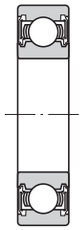
SINGLE-ROW DEEP GROOVE BALL BEARINGS

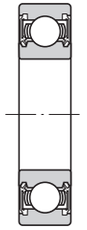
Bore Diameter 80 – 90 mm

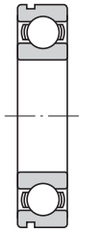


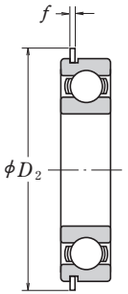
Open


Shielded ZZ

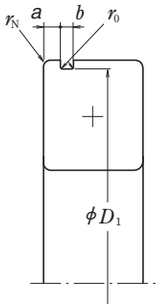

Non-Contact Sealed VV

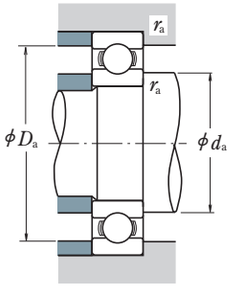

Contact Sealed DD · DDU

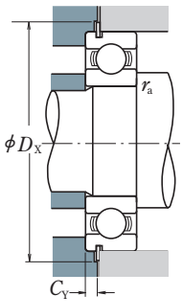

With Snap Ring Groove N



With Snap Ring NR







Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		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

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

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

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Designations				With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
							Grease		Oil																				
d	D	B	r min.	C_r	C_{0r}	f_0	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed				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.	D_a(2) max.	r_a max.	D_x min.	C_Y max.	approx.
80	100	10	0.6	13 900	14 500	17.4	6 000	3 400	7 100	**6816**	**ZZ**	**VV**	**DDU**	**N**	**NR**	1.7	1.3	97.9	0.4	0.5	104.4	1.12	84	84.5	96	0.6	106	2.5	0.151
	110	16	1	27 400	24 000	16.6	5 600	3 200	6 700	**6916**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.5	1.3	107.6	0.4	0.5	115.7	1.12	85	87.5	105	1	117	3.3	0.391
	125	14	0.6	35 000	29 600	16.4	5 300	—	6 300	**16016**	—	—	—	—	—	—	—	—	—	—	—	—	84	—	121	0.6	—	—	0.621
	125	22	1.1	52 500	40 000	15.6	6 300	3 200	7 100	**6016**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.87	3.1	120.22	0.6	0.5	134.7	2.82	86.5	91	118.5	1	136.5	5.3	0.872
	140	26	2	80 000	53 000	14.6	5 300	3 000	6 300	**6216**	**ZZ**	**VV**	**DDU**	**N**	**NR**	4.90	3.1	135.23	0.6	0.5	149.7	2.82	89	95.5	131	2	152	7.3	1.42
	170	39	2.1	135 000	86 500	13.3	4 500	2 800	5 600	**6316**	**ZZ**	**VV**	**DDU**	**N**	**NR**	5.69	3.5	163.65	0.6	0.5	182.9	3.1	91	104.5	159	2	185	8.4	3.67
85	110	13	1	20 600	20 000	17.1	5 600	3 200	6 700	**6817**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.10	1.3	107.6	0.4	0.5	115.7	1.12	90	90.5	105	1	117	2.9	0.263
	120	18	1.1	35 000	29 600	16.4	5 300	3 000	6 300	**6917**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.30	1.3	117.6	0.4	0.5	125.7	1.12	91.5	94.5	113.5	1	127	4.1	0.55
	130	14	0.6	36 000	31 500	16.5	5 000	—	6 000	**16017**	—	—	—	—	—	—	—	—	—	—	—	—	89	—	126	0.6	—	—	0.652
	130	22	1.1	54 500	43 000	15.8	6 000	3 000	7 100	**6017**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.87	3.1	125.22	0.6	0.5	139.7	2.82	91.5	96	123.5	1	141.5	5.3	0.918
	150	28	2	92 500	62 000	14.5	4 800	2 800	6 000	**6217**	**ZZ**	**VV**	**DDU**	**N**	**NR**	4.90	3.1	145.24	0.6	0.5	159.7	2.82	94	102	141	2	162	7.3	1.76
	180	41	3	146 000	97 000	13.3	4 300	2 600	5 000	**6317**	**ZZ**	**VV**	**DDU**	**N**	**NR**	5.69	3.5	173.66	0.6	0.5	192.9	3.1	98	110.5	167	2.5	195	8.4	4.28
90	115	13	1	20 900	21 000	17.2	5 300	3 000	6 300	**6818**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.10	1.3	112.6	0.4	0.5	120.7	1.12	95	95.5	110	1	122	2.9	0.276
	125	18	1.1	36 000	31 500	16.5	5 000	2 800	6 000	**6918**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.30	1.3	122.6	0.4	0.5	130.7	1.12	96.5	98.5	118.5	1	132	4.1	0.585
	140	16	1	45 500	39 500	16.3	4 800	—	5 600	**16018**	—	—	—	—	—	—	—	—	—	—	—	—	95	—	135	1	—	—	0.873
	140	24	1.5	64 000	50 000	15.6	5 600	2 800	6 300	**6018**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.71	3.1	135.23	0.6	0.5	149.7	2.82	98	103	132	1.5	152	6.1	1.19
	160	30	2	106 000	71 500	14.5	4 500	2 600	5 600	**6218**	**ZZ**	**VV**	**DDU**	**N**	**NR**	4.90	3.1	155.22	0.6	0.5	169.7	2.82	99	107.5	151	2	172	7.3	2.18
	190	43	3	157 000	107 000	13.3	4 000	2 400	4 800	**6318**	**ZZ**	**VV**	**DDU**	**N**	**NR**	5.69	3.5	183.64	0.6	0.5	202.9	3.1	103	117	177	2.5	205	8.4	4.98

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

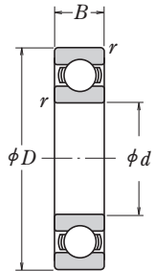
(2) When heavy axial loads are applied, d_a and D_a can be adjusted up to the shoulder diameter of the races. Please consult NSK for details.

Remarks

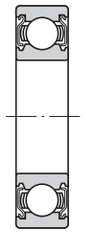
1. Diameter Series 7 (extra-thin wall) bearings are also available; please contact NSK for details.
2. When using bearings with rotating outer rings, contact NSK if they are sealed, shielded, or have snap rings.
3. Please consult NSK about the snap ring groove dimensions of Dimension Series 18 and 19 sealed and shielded bearings when the diameter is 50 mm or more.

■SINGLE-ROW DEEP GROOVE BALL BEARINGS

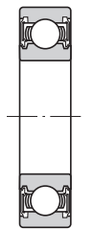
Bore Diameter 95 – 105 mm



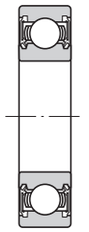
Open



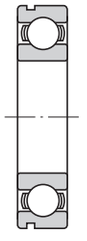
Shielded
ZZ



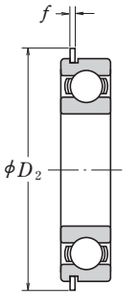
Non-Contact
Sealed
VV



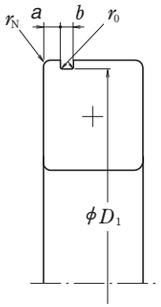
Contact
Sealed
DD · DDU

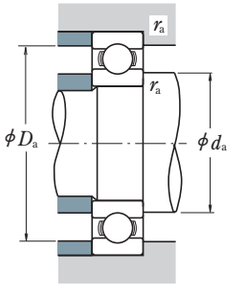


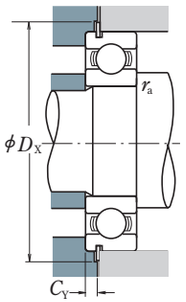
With Snap
Ring Groove
N



With
Snap Ring
NR







Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		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

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

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

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Designations				With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
							Grease		Oil																				
d	D	B	r min.	C_r	C_{0r}	f_0	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed				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.	D_a(2) max.	r_a max.	D_x min.	C_Y max.	approx.
95	120	13	1	21 200	22 000	17.2	5 000	2 800	6 000	**6819**	**ZZ**	**VV**	**DD**	**N**	**NR**	2.10	1.3	117.6	0.4	0.5	125.7	1.12	100	101.5	115	1	127	2.9	0.297
	130	18	1.1	37 000	33 500	16.6	4 800	2 800	5 600	**6919**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.30	1.3	127.6	0.4	0.5	135.7	1.12	101.5	103.5	123.5	1	137	4.1	0.601
	145	16	1	47 000	42 000	16.4	4 500	—	5 300	**16019**	—	—	—	—	—	—	—	—	—	—	—	—	100	—	140	1	—	—	0.904
	145	24	1.5	66 500	54 000	15.8	5 300	2 600	6 000	**6019**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.71	3.1	140.23	0.6	0.5	154.7	2.82	103	108.5	137	1.5	157	6.1	1.23
	170	32	2.1	120 000	82 000	14.4	4 300	2 600	5 000	**6219**	**ZZ**	**VV**	**DDU**	**N**	**NR**	5.69	3.5	163.65	0.6	0.5	182.9	3.1	106	114	159	2	185	8.4	2.64
	200	45	3	168 000	119 000	13.3	3 400	2 400	4 300	**6319**	**ZZ**	**VV**	**DDU**	**N**	**NR**	5.69	3.5	193.65	0.6	0.5	212.9	3.1	108	123.5	187	2.5	215	8.4	5.76
100	125	13	1	21 500	23 000	17.3	4 800	2 800	5 600	**6820**	**ZZ**	**VV**	**DD**	**N**	**NR**	2.10	1.3	122.6	0.4	0.5	130.7	1.12	105	105.5	120	1	132	2.9	0.31
	140	20	1.1	47 000	42 000	16.4	4 500	2 600	5 300	**6920**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.30	1.9	137.6	0.6	0.5	145.7	1.7	106.5	111	133.5	1	147	4.7	0.828
	150	16	1	46 500	42 000	16.5	4 300	—	5 300	**16020**	—	—	—	—	—	—	—	—	—	—	—	—	105	—	145	1	—	—	0.945
	150	24	1.5	66 000	54 000	15.9	5 000	2 600	6 000	**6020**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.71	3.1	145.24	0.6	0.5	159.7	2.82	108	112.5	142	1.5	162	6.1	1.29
	180	34	2.1	134 000	93 000	14.4	4 000	2 400	4 800	**6220**	**ZZ**	**VV**	**DDU**	**N**	**NR**	5.69	3.5	173.66	0.6	0.5	192.9	3.1	111	121.5	169	2	195	8.4	3.17
	215	47	3	191 000	141 000	13.2	2 800	2 200	3 400	**6320**	**ZZ**	**VV**	**DDU**	—	—	—	—	—	—	—	—	—	113	133	202	2.5	—	—	7.04
105	130	13	1	21 800	23 900	17.4	4 800	2 600	5 600	**6821**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.10	1.3	127.6	0.4	0.5	135.7	1.12	110	110.5	125	1	137	2.9	0.324
	145	20	1.1	46 500	42 000	16.5	4 300	—	5 300	**6921**	**ZZ**	**VV**	—	**N**	**NR**	3.30	1.9	142.6	0.6	0.5	150.7	1.7	111.5	116	138.5	1	152	4.7	0.856
	160	18	1	57 000	50 500	16.3	4 000	—	4 800	**16021**	—	—	—	—	—	—	—	—	—	—	—	—	110	—	155	1	—	—	1.24
	160	26	2	79 500	66 000	15.8	4 500	2 400	5 600	**6021**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.71	3.1	155.22	0.6	0.5	169.7	2.82	114	120	151	2	172	6.1	1.58
	190	36	2.1	146 000	105 000	14.4	3 800	2 200	4 500	**6221**	**ZZ**	**VV**	**DDU**	**N**	**NR**	5.69	3.5	183.64	0.6	0.5	202.9	3.1	116	127.5	179	2	205	8.4	3.79
	225	49	3	202 000	154 000	13.2	2 600	2 000	3 200	**6321**	**ZZ**	—	**DDU**	—	—	—	—	—	—	—	—	—	118	138	212	2.5	—	—	8.09

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

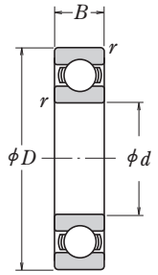
(2) When heavy axial loads are applied, d_a and D_a can be adjusted up to the shoulder diameter of the races. Please consult NSK for details.

Remarks

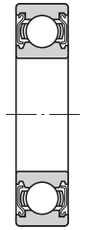
1. Diameter Series 7 (extra-thin wall) bearings are also available; please contact NSK for details.
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3. Please consult NSK about the snap ring groove dimensions of Dimension Series 18 and 19 sealed and shielded bearings when the diameter is 50 mm or more.

■SINGLE-ROW DEEP GROOVE BALL BEARINGS

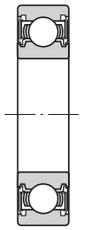
Bore Diameter 110 – 150 mm



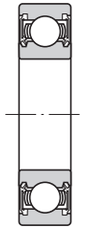
Open



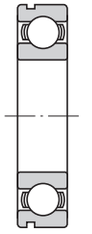
Shielded
ZZ · ZZS



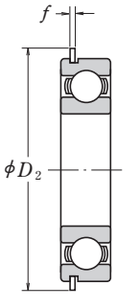
Non-Contact
Sealed
VV



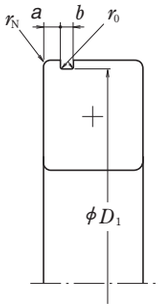
Contact
Sealed
DD · DDU

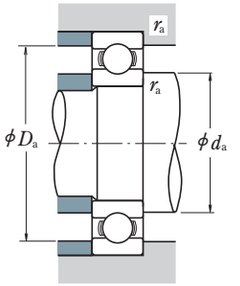


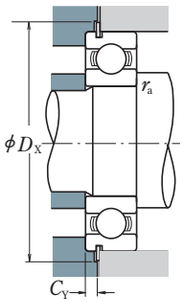
With Snap
Ring Groove
N



With
Snap Ring
NR







Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		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

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

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

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹) Grease		Oil	Bearing Designations				With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
d	D	B	r min.	C_r	C_{0r}	f_0	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed				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.	D_a(2) max.	r_a max.	D_X min.	C_Y max.	approx.
110	140	16	1	31 000	32 500	17.1	4 300	2 400	5 300	**6822**	**ZZ**	**VV**	**DDU**	**N**	**NR**	2.50	1.9	137.6	0.6	0.5	145.7	1.7	115	117	135	1	147	3.9	0.497
	150	20	1.1	48 000	44 500	16.6	4 300	2 400	5 000	**6922**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.30	1.9	147.6	0.6	0.5	155.7	1.7	116.5	121	143.5	1	157	4.7	0.893
	170	19	1	63 000	56 500	16.3	3 800	—	4 500	**16022**	—	—	—	—	—	—	—	—	—	—	—	—	115	—	165	1	—	—	1.51
	170	28	2	93 000	73 000	15.5	4 500	2 200	5 300	**6022**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.71	3.5	163.65	0.6	0.5	182.9	3.1	119	124.5	161	2	185	6.4	1.94
	200	38	2.1	159 000	117 000	14.3	2 800	2 200	3 400	**6222**	**ZZ**	**VV**	**DDU**	**N**	**NR**	5.69	3.5	193.65	0.6	0.5	212.9	3.1	121	134	189	2	215	8.4	4.45
	240	50	3	226 000	179 000	13.2	2 400	—	3 000	**6322**	**ZZ**	—	—	—	—	—	—	—	—	—	—	—	123	147	227	2.5	—	—	9.51
120	150	16	1	32 000	35 500	17.3	4 000	2 200	4 800	**6824**	**ZZ**	**VV**	**DD**	**N**	**NR**	2.50	1.9	147.6	0.6	0.5	155.7	1.7	125	127	145	1	157	3.9	0.537
	165	22	1.1	58 500	54 000	16.5	3 800	—	4 500	**6924**	**ZZ**	—	—	**N**	**NR**	3.70	1.9	161.8	0.6	0.5	171.5	1.7	126.5	132	158.5	1	173	5.1	1.21
	180	19	1	62 500	57 500	16.5	3 600	—	4 300	**16024**	—	—	—	—	—	—	—	—	—	—	—	—	125	—	175	1	—	—	1.6
	180	28	2	97 000	80 000	15.7	4 000	2 200	4 800	**6024**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.71	3.5	173.66	0.6	0.5	192.9	3.1	129	134.5	171	2	195	6.4	2.08
	215	40	2.1	171 000	131 000	14.4	2 600	2 000	3 200	**6224**	**ZZ**	**VV**	**DDU**	—	—	—	—	—	—	—	—	—	131	146	204	2	—	—	5.29
	260	55	3	227 000	185 000	13.5	2 200	1 800	2 800	**6324**	**ZZS**	—	**DDU**	—	—	—	—	—	—	—	—	—	133	161	247	2.5	—	—	12.5
130	165	18	1.1	40 500	44 000	17.1	3 600	2 000	4 300	**6826**	**ZZS**	**VV**	**DD**	**N**	**NR**	3.30	1.9	161.8	0.6	0.5	171.5	1.7	136.5	138	158.5	1	173	4.7	0.758
	180	24	1.5	71 500	67 500	16.5	3 400	—	4 000	**6926**	**ZZ**	—	—	**N**	**NR**	3.70	1.9	176.8	0.6	0.5	186.5	1.7	138	144	172	1.5	188	5.1	1.57
	200	22	1.1	83 500	77 500	16.4	3 000	—	3 600	**16026**	—	—	—	—	—	—	—	—	—	—	—	—	136.5	—	193.5	1	—	—	2.4
	200	33	2	117 000	101 000	15.8	3 000	1 900	3 600	**6026**	**ZZ**	—	**DDU**	**N**	**NR**	5.69	3.5	193.65	0.6	0.5	212.9	3.1	139	148.5	191	2	215	8.4	3.26
	230	40	3	184 000	146 000	14.5	2 400	—	3 000	**6226**	**ZZ**	—	—	—	—	—	—	—	—	—	—	—	143	157	217	2.5	—	—	5.96
	280	58	4	252 000	214 000	13.6	2 200	—	2 600	**6326**	**ZZS**	—	—	—	—	—	—	—	—	—	—	—	146	175	264	3	—	—	15.2
140	175	18	1.1	42 000	48 000	17.3	3 400	1 900	4 000	**6828**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.30	1.9	171.8	0.6	0.5	181.5	1.7	146.5	148.5	168.5	1	183	4.7	0.832
	190	24	1.5	73 500	72 000	16.6	3 200	—	3 800	**6928**	**ZZS**	**VV**	—	**N**	**NR**	3.70	1.9	186.8	0.6	0.5	196.5	1.7	148	153.5	182	1.5	198	5.1	1.67
	210	22	1.1	85 500	82 500	16.5	2 800	—	3 400	**16028**	—	—	—	—	—	—	—	—	—	—	—	—	146.5	—	203.5	1	—	—	2.84
	210	33	2	121 000	109 000	16.0	2 800	1 800	3 400	**6028**	**ZZ**	—	**DDU**	—	—	—	—	—	—	—	—	—	149	158.5	201	2	—	—	3.48
	250	42	3	183 000	150 000	14.9	2 200	1 700	2 800	**6228**	**ZZS**	—	**DDU**	—	—	—	—	—	—	—	—	—	153	171.5	237	2.5	—	—	7.68
	300	62	4	278 000	246 000	13.6	2 000	—	2 400	**6328**	**ZZS**	—	—	—	—	—	—	—	—	—	—	—	156	187	284	3	—	—	18.5
150	190	20	1.1	52 500	58 500	17.1	3 200	1 800	3 800	**6830**	**ZZ**	**VV**	**DDU**	**N**	**NR**	3.30	1.9	186.8	0.6	0.5	196.5	1.7	156.5	160	183.5	1	198	4.7	1.15
	210	28	2	93 500	90 500	16.5	2 600	1 700	3 200	**6930**	**ZZS**	—	**DDU**	—	—	—	—	—	—	—	—	—	159	166	201	2	—	—	3.01
	225	24	1.1	92 500	91 000	16.6	2 600	—	3 000	**16030**	—	—	—	—	—	—	—	—	—	—	—	—	156.5	—	218.5	1	—	—	3.62
	225	35	2.1	138 000	126 000	15.9	2 600	1 700	3 000	**6030**	**ZZ**	**VV**	**DDU**	—	—	—	—	—	—	—	—	—	161	170	214	2	—	—	4.24
	270	45	3	194 000	168 000	15.1	2 000	—	2 600	**6230**	**ZZS**	—	—	—	—	—	—	—	—	—	—	—	163	186	257	2.5	—	—	10
	320	65	4	300 000	284 000	13.9	1 800	—	2 200	**6330**	**ZZS**	—	—	—	—	—	—	—	—	—	—	—	166	203	304	3	—	—	22.7

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

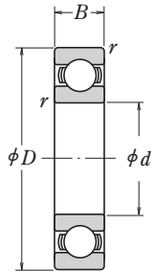
(2) When heavy axial loads are applied, d_a and D_a can be adjusted up to the shoulder diameter of the races. Please consult NSK for details.

Remarks

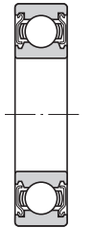
1. When using bearings with rotating outer rings, contact NSK if they are sealed, shielded, or have snap rings.
2. Please consult NSK about the snap ring groove dimensions of Dimension Series 18 and 19 sealed and shielded bearings when the diameter is 50 mm or more.

■SINGLE-ROW DEEP GROOVE BALL BEARINGS

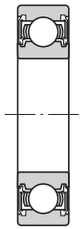
Bore Diameter 160 mm



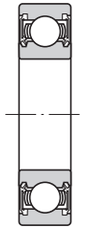
Open



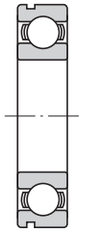
Shielded
ZZ · ZZS



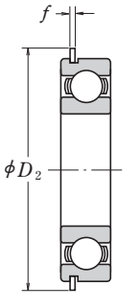
Non-Contact
Sealed
VV



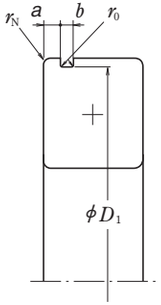
Contact
Sealed
DD · DDU

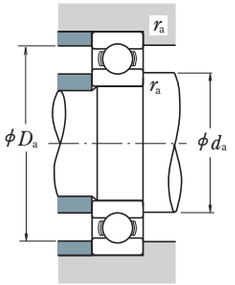


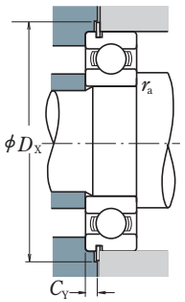
With Snap
Ring Groove
N



With
Snap Ring
NR







Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		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

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

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

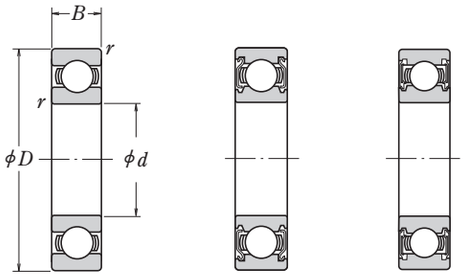
Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Designations				With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
							Grease		Oil																				
d	D	B	r min.	C_r	C_{0r}	f_0	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed				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.	D_a(2) max.	r_a max.	D_x min.	C_Y max.	approx.
160	200	20	1.1	53 000	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	95 500	96 000	16.6	2 600	1 600	3 000	**6932**	**ZZS**	—	**DDU**	—	—	—	—	—	—	—	—	—	169	176	211	2	—	—	2.71
	240	25	1.5	109 000	108 000	16.5	2 400	—	2 800	**16032**	—	—	—	—	—	—	—	—	—	—	—	—	168	—	232	1.5	—	—	4.2
	240	38	2.1	150 000	135 000	15.9	2 400	1 600	2 800	**6032**	**ZZ**	—	**DDU**	—	—	—	—	—	—	—	—	—	171	181.5	229	2	—	—	5.15
	290	48	3	204 000	186 000	15.4	1 900	—	2 400	**6232**	**ZZS**	—	—	—	—	—	—	—	—	—	—	—	173	202	277	2.5	—	—	12.8
	340	68	4	305 000	287 000	13.9	1 700	—	2 000	**6332**	**ZZS**	—	—	—	—	—	—	—	—	—	—	—	176	215.5	324	3	—	—	26.2

Notes (1) For tolerances of snap ring grooves and snap ring dimensions, refer to Pages A116 to A119.
(2) When heavy axial loads are applied, d_a and D_a can be adjusted up to the shoulder diameter of the races. Please consult NSK for details.

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 Dimension Series 18 and 19 sealed and shielded bearings when the diameter is 50 mm or more.

SINGLE-ROW DEEP GROOVE BALL BEARINGS

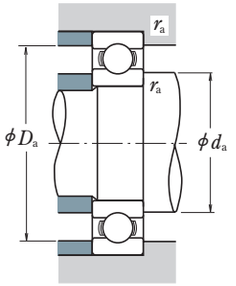
Bore Diameter 170 – 240 mm



Open

Shielded
ZZS

Non-Contact
Sealed
VV



Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Designations				Abutment and Fillet Dimensions (mm)				Mass (kg)
							Grease		Oil									
d	D	B	r min.	C_r	C_{0r}	f_0	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed		d_a(1) min.	d_a(1) max.	D_a(1) max.	r_a max.	approx.
170	215	22	1.1	66 000	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	94 500	97 000	16.7	2 400	—	2 800	**6934**	**ZZS**	—	—	179	186	221	2	3.34
	260	28	1.5	126 000	126 000	16.5	2 200	—	2 600	**16034**	—	—	—	178	—	252	1.5	5.71
	260	42	2.1	177 000	161 000	15.8	2 200	—	2 600	**6034**	**ZZS**	**VV**	—	181	194.5	249	2	6.89
	310	52	4	234 000	224 000	15.3	1 800	—	2 200	**6234**	**ZZS**	—	—	186	215	294	3	15.8
	360	72	4	360 000	355 000	13.6	1 600	—	2 000	**6334**	—	—	—	186	—	344	3	36.6
180	225	22	1.1	66 500	78 500	17.2	2 400	—	2 800	**6836**	—	**VV**	—	186.5	192	218.5	1	1.98
	250	33	2	131 000	128 000	16.4	2 200	—	2 600	**6936**	**ZZS**	—	—	189	198.5	241	2	4.16
	280	31	2	159 000	157 000	16.3	2 000	—	2 400	**16036**	—	—	—	189	—	271	2	7.5
	280	46	2.1	198 000	185 000	15.6	2 000	—	2 400	**6036**	**ZZS**	**VV**	—	191	208	269	2	8.88
	320	52	4	250 000	241 000	15.1	1 700	—	2 000	**6236**	**ZZS**	—	—	196	223	304	3	15.9
	380	75	4	390 000	405 000	13.9	1 500	—	1 800	**6336**	—	—	—	196	—	364	3	43.1
190	240	24	1.5	80 500	93 500	17.1	2 200	—	2 600	**6838**	—	**VV**	—	198	202.5	232	1.5	2.53
	260	33	2	124 000	127 000	16.6	2 200	—	2 600	**6938**	—	—	—	199	—	251	2	5.18
	290	31	2	164 000	168 000	16.4	2 000	—	2 400	**16038**	—	—	—	199	—	281	2	7.78
	290	46	2.1	207 000	201 000	15.8	2 000	—	2 400	**6038**	**ZZS**	—	—	201	218	279	2	9.39
	340	55	4	280 000	282 000	15.0	1 600	—	2 000	**6238**	**ZZS**	—	—	206	236	324	3	22.3
	400	78	5	390 000	415 000	14.1	1 400	—	1 700	**6338**	—	—	—	210	—	380	4	49.7
200	250	24	1.5	81 500	98 000	17.2	2 200	—	2 600	**6840**	—	—	—	208	—	242	1.5	2.67
	280	38	2.1	158 000	158 000	16.4	2 000	—	2 400	**6940**	**ZZS**	—	—	211	222	269	2	7.28
	310	34	2	177 000	180 000	16.4	1 900	—	2 200	**16040**	—	—	—	209	—	301	2	10
	310	51	2.1	228 000	226 000	15.6	1 900	—	2 200	**6040**	**ZZS**	—	—	211	231.5	299	2	12
	360	58	4	296 000	310 000	15.2	1 500	—	1 800	**6240**	**ZZS**	—	—	216	252	344	3	26.7
	420	80	5	415 000	445 000	13.8	1 300	—	1 600	**6340**	—	—	—	220	—	400	4	55.3
220	270	24	1.5	84 000	107 000	17.4	1 900	—	2 400	**6844**	**ZZS**	—	—	228	233.5	262	1.5	2.9
	300	38	2.1	161 000	169 000	16.6	1 800	—	2 200	**6944**	**ZZS**	—	—	231	242	289	2	7.88
	340	37	2.1	198 000	217 000	16.5	1 600	—	2 000	**16044**	—	—	—	231	—	329	2	13.1
	340	56	3	259 000	271 000	15.6	1 700	—	2 000	**6044**	**ZZS**	—	—	233	254.5	327	2.5	18.6
	400	65	4	340 000	375 000	15.1	1 300	—	1 600	**6244**	—	—	—	236	—	384	3	37.4
	460	88	5	450 000	520 000	14.3	1 200	—	1 500	**6344**	—	—	—	240	—	440	4	73.9
240	300	28	2	108 000	137 000	17.3	1 700	—	2 000	**6848**	—	—	—	249	—	291	2	4.48
	320	38	2.1	170 000	190 000	16.8	1 700	—	2 000	**6948**	**ZZS**	—	—	251	262	309	2	8.49
	360	37	2.1	215 000	243 000	16.5	1 500	—	1 900	**16048**	—	—	—	251	—	349	2	13.9
	360	56	3	269 000	296 000	15.9	1 500	—	1 900	**6048**	—	—	—	253	—	347	2.5	19.9
	440	72	4	375 000	430 000	15.2	1 200	—	1 500	**6248**	—	—	—	256	—	424	3	50.5
	500	95	5	515 000	625 000	14.2	1 100	—	1 300	**6348**	—	—	—	260	—	480	4	94.4

Note (1) When heavy axial loads are applied, d_a and D_a can be adjusted up to the shoulder diameter of the races. Please consult NSK for details.

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

Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		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

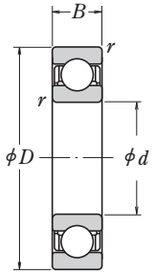
Static Equivalent Load

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

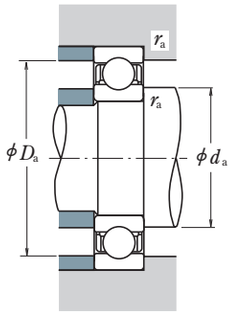
$\frac{F_a}{F_r} \leqq 0.8$, $P_0 = F_r$

■SINGLE-ROW DEEP GROOVE BALL BEARINGS

Bore Diameter 260 – 360 mm



Open



Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min^{-1})		Bearing Designations	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.
260	320	28	2	111 000	148 000	17.4	1 600	1 900	**6852**	269	311	2	4.84
	360	46	2.1	224 000	255 000	16.5	1 500	1 800	**6952**	271	349	2	14
	400	44	3	260 000	310 000	16.4	1 400	1 700	**16052**	273	387	2.5	21.1
	400	65	4	320 000	375 000	15.8	1 400	1 700	**6052**	276	384	3	29.4
	480	80	5	440 000	540 000	15.1	1 100	1 300	**6252**	280	460	4	67
	540	102	6	555 000	710 000	14.6	1 000	1 200	**6352**	286	514	5	118
280	350	33	2	146 000	191 000	17.3	1 500	1 700	**6856**	289	341	2	7.2
	380	46	2.1	230 000	272 000	16.6	1 400	1 700	**6956**	291	369	2	15.1
	420	44	3	267 000	330 000	16.5	1 300	1 600	**16056**	293	407	2.5	22.7
	420	65	4	330 000	410 000	16.0	1 300	1 600	**6056**	296	404	3	31.2
	500	80	5	440 000	550 000	15.2	1 000	1 300	**6256**	300	480	4	70.4
	580	108	6	625 000	840 000	14.5	900	1 100	**6356**	306	554	5	144
300	380	38	2.1	183 000	233 000	17.1	1 300	1 600	**6860**	311	369	2	10.3
	420	56	3	296 000	370 000	16.4	1 300	1 500	**6960**	313	407	2.5	23.9
	460	50	4	315 000	405 000	16.4	1 200	1 400	**16060**	316	444	3	31.5
	460	74	4	390 000	500 000	15.8	1 200	1 400	**6060**	316	444	3	44.2
	540	85	5	510 000	670 000	15.1	950	1 200	**6260**	320	520	4	87.8
320	400	38	2.1	185 000	244 000	17.2	1 300	1 500	**6864**	331	389	2	10.8
	440	56	3	292 000	375 000	16.5	1 200	1 400	**6964**	333	427	2.5	25.3
	480	50	4	320 000	430 000	16.5	1 100	1 300	**16064**	336	464	3	33.2
	480	74	4	430 000	570 000	15.7	1 100	1 300	**6064**	336	464	3	46.5
	580	92	5	585 000	805 000	15.0	850	1 100	**6264**	340	560	4	111
340	420	38	2.1	192 000	265 000	17.3	1 200	1 400	**6868**	351	409	2	11.5
	460	56	3	300 000	400 000	16.6	1 100	1 300	**6968**	353	447	2.5	26.6
	520	82	5	485 000	660 000	15.6	1 000	1 200	**6068**	360	500	4	62.3
	620	92	6	580 000	820 000	15.3	800	1 000	**6268**	366	594	5	129
360	440	38	2.1	211 000	290 000	17.3	1 100	1 300	**6872**	371	429	2	11.8
	480	56	3	310 000	425 000	16.7	1 100	1 300	**6972**	373	467	2.5	27.9
	540	82	5	505 000	720 000	15.7	950	1 200	**6072**	380	520	4	65.3
	650	95	6	615 000	905 000	15.4	750	950	**6272**	386	624	5	145

Note (1) When heavy axial loads are applied, d_a and D_a can be adjusted up to the shoulder diameter of the races. Please consult NSK for details.

Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		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

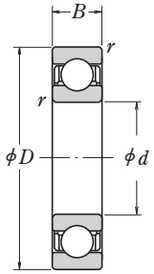
Static Equivalent Load

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

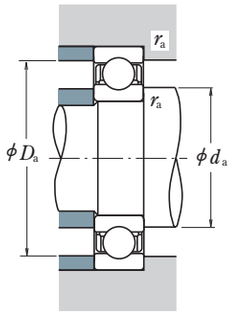
$\frac{F_a}{F_r} \leqq 0.8,\ P_0 = F_r$

SINGLE-ROW DEEP GROOVE BALL BEARINGS

Bore Diameter 380 – 600 mm



Open



Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min^{-1})		Bearing Designations	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	261 000	375 000	17.1	1 000	1 200	**6876**	391	469	2	19.5
	520	65	4	355 000	510 000	16.6	950	1 200	**6976**	396	504	3	40
	560	82	5	505 000	725 000	15.9	900	1 100	**6076**	400	540	4	68
400	500	46	2.1	265 000	390 000	17.2	950	1 200	**6880**	411	489	2	20.5
	540	65	4	365 000	540 000	16.7	900	1 100	**6980**	416	524	3	42
	600	90	5	560 000	825 000	15.7	850	1 000	**6080**	420	580	4	88.4
420	520	46	2.1	269 000	410 000	17.3	900	1 100	**6884**	431	509	2	21.4
	560	65	4	375 000	570 000	16.8	900	1 100	**6984**	436	544	3	43.6
	620	90	5	585 000	895 000	15.8	800	1 000	**6084**	440	600	4	92.2
440	540	46	2.1	273 000	425 000	17.4	900	1 100	**6888**	451	529	2	22.3
	600	74	4	435 000	680 000	16.6	800	1 000	**6988**	456	584	3	60.2
	650	94	6	605 000	965 000	16.0	750	900	**6088**	466	624	5	106
460	580	56	3	340 000	550 000	17.1	800	1 000	**6892**	473	567	2.5	34.3
	620	74	4	450 000	720 000	16.7	800	950	**6992**	476	604	3	62.6
	680	100	6	665 000	1 080 000	15.8	710	850	**6092**	486	654	5	123
480	600	56	3	350 000	575 000	17.2	800	950	**6896**	493	587	2.5	35.4
	650	78	5	495 000	815 000	16.6	750	900	**6996**	500	630	4	73.5
	700	100	6	665 000	1 090 000	15.9	710	850	**6096**	506	674	5	127
500	620	56	3	355 000	600 000	17.3	750	900	**68/500**	513	607	2.5	37.2
	670	78	5	505 000	865 000	16.7	710	850	**69/500**	520	650	4	82
	720	100	6	690 000	1 170 000	16.0	670	800	**60/500**	526	694	5	131
530	650	56	3	360 000	625 000	17.4	710	850	**68/530**	543	637	2.5	39.8
	710	82	5	500 000	870 000	16.8	670	800	**69/530**	550	690	4	89.8
	780	112	6	745 000	1 300 000	16.0	600	750	**60/530**	556	754	5	184
560	680	56	3	360 000	650 000	17.4	670	800	**68/560**	573	667	2.5	41.5
	750	85	5	575 000	1 040 000	16.7	600	750	**69/560**	580	730	4	105
	820	115	6	810 000	1 500 000	16.2	560	670	**60/560**	586	793.5	5	203
600	730	60	3	390 000	735 000	17.5	600	710	**68/600**	613	717	2.5	50.9
	800	90	5	605 000	1 160 000	16.9	560	670	**69/600**	620	780	4	120
	870	118	6	870 000	1 640 000	16.1	530	630	**60/600**	626	844	5	236

Note (1) When heavy axial loads are applied, d_a and D_a can be adjusted up to the shoulder diameter of the races. Please consult NSK for details.

Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		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

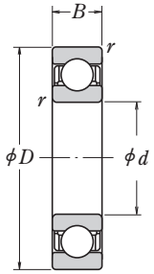
Static Equivalent Load

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

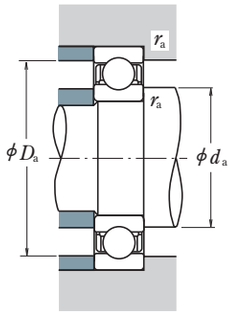
$\frac{F_a}{F_r} \leqq 0.8$, $P_0 = F_r$

■SINGLE-ROW DEEP GROOVE BALL BEARINGS

Bore Diameter 630 – 800 mm



Open



Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min^{-1})		Bearing Designations	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.
630	780	69	4	460 000	890 000	17.3	560	670	**68/630**	646	764	3	71.3
	850	100	6	690 000	1 350 000	16.7	530	630	**69/630**	656	824	5	163
	920	128	7.5	825 000	1 620 000	16.4	480	600	**60/630**	662	888	6	285
670	820	69	4	480 000	965 000	17.4	500	630	**68/670**	686	804	3	75.4
	900	103	6	740 000	1 460 000	16.7	480	560	**69/670**	696	874	5	181
	980	136	7.5	840 000	1 730 000	16.6	450	530	**60/670**	702	948	6	351
710	870	74	4	530 000	1 100 000	17.4	480	560	**68/710**	726	854	3	92.6
	950	106	6	785 000	1 640 000	16.8	450	530	**69/710**	736	924	5	208
750	920	78	5	580 000	1 260 000	17.4	430	530	**68/750**	770	900	4	110
	1 000	112	6	865 000	1 840 000	16.7	400	500	**69/750**	776	974	5	245
800	980	82	5	585 000	1 310 000	17.5	400	480	**68/800**	820	960	4	132
	1 060	115	6	910 000	2 050 000	16.8	380	450	**69/800**	826	1 034	5	275

Note (1) When heavy axial loads are applied, d_a and D_a can be adjusted up to the shoulder diameter of the races. Please consult NSK for details.

Dynamic Equivalent Load

$P = XF_r + YF_a$

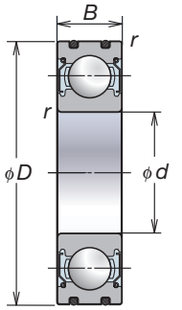
$\frac{f_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

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

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

Bore Diameter 10 – 100 mm



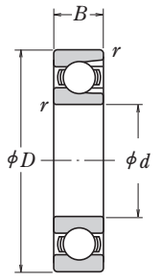
Boundary Dimensions (mm)			Basic Load Ratings (N)		Recommended Fits (1)	Bearing Designations			
d	D	B	C_r	C_{0r}		Basic Designation (Open)	Shields	Contact Seal (2)	Non-Contact Seal
10	26	8	5 050	1 970		**6000**	**ZZ**	**DDU**	**VV**
	30	9	5 600	2 390		**6200**	**ZZ**	**DDU**	**VV**
	35	11	8 900	3 450		**6300**	**ZZ**	**DDU**	**VV**
12	28	8	5 600	2 370		**6001**	**ZZ**	**DDU**	**VV**
	32	10	7 500	3 050		**6201**	**ZZ**	**DDU**	**VV**
	37	12	10 700	4 200		**6301**	**ZZ**	**DDU**	**VV**
15	32	9	6 150	2 830		**6002**	**ZZ**	**DDU**	**VV**
	35	11	8 400	3 750		**6202**	**ZZ**	**DDU**	**VV**
	42	13	12 600	5 450		**6302**	**ZZ**	**DDU**	**VV**
17	35	10	6 600	3 250		**6003**	**ZZ**	**DDU**	**VV**
	40	12	10 500	4 800		**6203**	**ZZ**	**DDU**	**VV**
	47	14	15 000	6 650		**6303**	**ZZ**	**DDU**	**VV**
20	42	12	10 300	5 000		**6004**	**ZZ**	**DDU**	**VV**
	47	14	14 100	6 600		**6204**	**ZZ**	**DDU**	**VV**
	52	15	17 500	7 900		**6304**	**ZZ**	**DDU**	**VV**
25	47	12	11 100	5 850		**6005**	**ZZ**	**DDU**	**VV**
	52	15	15 400	7 850		**6205**	**ZZ**	**DDU**	**VV**
	62	17	22 600	11 200		**6305**	**ZZ**	**DDU**	**VV**
30	55	13	14 600	8 300		**6006**	**ZZ**	**DDU**	**VV**
	62	16	21 400	11 300		**6206**	**ZZ**	**DDU**	**VV**
	72	19	29 300	15 000		**6306**	**ZZ**	**DDU**	**VV**
35	62	14	17 600	10 300		**6007**	**ZZ**	**DDU**	**VV**
	72	17	28 200	15 300		**6207**	**ZZ**	**DDU**	**VV**
	80	21	36 500	19 200		**6307**	**ZZ**	**DDU**	**VV**
40	68	15	18 400	11 500	H7 or	**6008**	**ZZ**	**DDU**	**VV**
	80	18	32 000	17 900	G6	**6208**	**ZZ**	**DDU**	**VV**
	90	23	45 000	24 000		**6308**	**ZZ**	**DDU**	**VV**
45	75	16	23 000	15 200		**6009**	**ZZ**	**DDU**	**VV**
	85	19	34 500	20 400		**6209**	**ZZ**	**DDU**	**VV**
	100	25	58 500	32 000		**6309**	**ZZ**	**DDU**	**VV**
50	80	16	24 000	16 600		**6010**	**ZZ**	**DDU**	**VV**
	90	20	38 500	23 200		**6210**	**ZZ**	**DDU**	**VV**
	110	27	68 000	38 500		**6310**	**ZZ**	**DDU**	**VV**
55	90	18	31 000	21 200		**6011**	**ZZ**	**DDU**	**VV**
	100	21	47 500	29 300		**6211**	**ZZ**	**DDU**	**VV**
	120	29	78 500	44 500		**6311**	**ZZ**	**DDU**	**VV**
60	95	18	32 500	23 200		**6012**	**ZZ**	**DDU**	**VV**
	110	22	57 500	36 000		**6212**	**ZZ**	**DDU**	**VV**
	130	31	90 000	52 000		**6312**	**ZZ**	**DDU**	**VV**
65	100	18	33 500	25 200		**6013**	**ZZ**	**DDU**	**VV**
	120	23	63 000	40 000		**6213**	**ZZ**	**DDU**	**VV**
	140	33	102 000	60 000		**6313**	**ZZ**	**DDU**	**VV**
70	110	20	42 000	31 000		**6014**	**ZZ**	**DDU**	**VV**
	125	24	68 500	44 000		**6214**	**ZZ**	**DDU**	**VV**
	150	35	115 000	68 000		**6314**	**ZZ**	**DDU**	**VV**
75	115	20	43 500	33 500		**6015**	**ZZ**	**DDU**	**VV**
	130	25	73 000	49 500		**6215**	**ZZ**	**DDU**	**VV**
80	125	22	52 500	40 000		**6016**	**ZZ**	**DDU**	**VV**
	140	26	80 000	53 000		**6216**	**ZZ**	**DDU**	**VV**
85	130	22	54 500	43 000		**6017**	**ZZ**	**DDU**	**VV**
	150	28	92 500	62 000		**6217**	**ZZ**	**DDU**	**VV**
90	140	24	64 000	50 000		**6018**	**ZZ**	**DDU**	**VV**
95	145	24	66 500	54 000		**6019**	**ZZ**	**DDU**	**VV**
100	150	24	66 000	54 000		**6020**	**ZZ**	**DDU**	**VV**

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

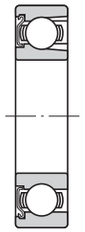
(2) Low-contact seals are available for sealed bearings; contact NSK for details.

MAXIMUM BALL BEARINGS

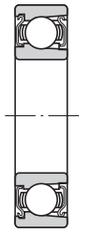
Bore Diameter 25 – 110 mm



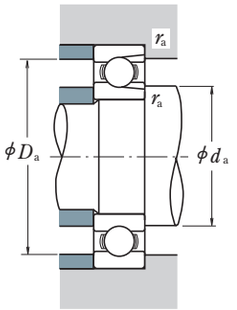
Open

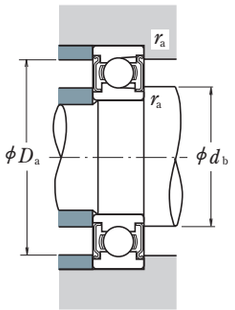


Shielded
(One Shield) Z



Shielded
(Two Shields) ZZ



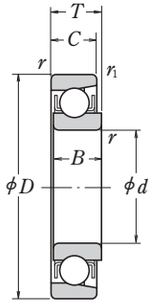


Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations			Abutment and Fillet Dimensions (mm)				Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Grease Open Z · ZZ	Oil Open Z	Open	With One Shield	With Two Shields	d_a min.	d_b max.	D_a max.	r_a max.	approx.
25	52	15	1	15 800	10 500	12 000	15 000	**BL 205**	**BL 205 Z**	**BL 205 ZZ**	30	32	47	1	0.133
	62	17	1.1	23 700	15 500	11 000	13 000	**BL 305**	**BL 305 Z**	**BL 305 ZZ**	31.5	36	55.5	1	0.246
30	62	16	1	23 200	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	30 500	20 700	9 000	11 000	**BL 306**	**BL 306 Z**	**BL 306 ZZ**	36.5	42	65.5	1	0.364
35	72	17	1.1	30 500	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	41 000	29 100	8 000	9 500	**BL 307**	**BL 307 Z**	**BL 307 ZZ**	43	44.5	72	1.5	0.486
40	80	18	1.1	39 000	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	51 000	36 000	7 500	9 000	**BL 308**	**BL 308 Z**	**BL 308 ZZ**	48	52.5	82	1.5	0.685
45	85	19	1.1	41 000	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	61 000	44 000	6 300	8 000	**BL 309**	**BL 309 Z**	**BL 309 ZZ**	53	61.5	92	1.5	0.883
50	90	20	1.1	43 000	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	71 500	52 500	6 000	7 100	**BL 310**	**BL 310 Z**	**BL 310 ZZ**	59	68	101	2	1.16
55	100	21	1.5	53 000	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	82 500	61 500	5 600	6 700	**BL 311**	**BL 311 Z**	**BL 311 ZZ**	64	72.5	111	2	1.49
60	110	22	1.5	64 000	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	94 000	71 500	5 000	6 000	**BL 312**	**BL 312 Z**	**BL 312 ZZ**	71	79	119	2	1.88
65	120	23	1.5	70 000	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	113 000	89 500	4 800	5 600	**BL 313**	**BL 313 Z**	**BL 313 ZZ**	76	85.5	129	2	2.36
70	125	24	1.5	76 000	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	127 000	102 000	4 300	5 300	**BL 314**	**BL 314 Z**	**BL 314 ZZ**	81	92	139	2	2.87
75	130	25	1.5	79 000	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	138 000	116 000	4 000	5 000	**BL 315**	**BL 315 Z**	**BL 315 ZZ**	86	98.5	149	2	3.43
80	140	26	2	92 500	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	150 000	130 000	3 800	4 500	**BL 316**	**BL 316 Z**	**BL 316 ZZ**	91	104.5	159	2	4.08
85	150	28	2	102 000	93 000	4 000	5 000	**BL 217**	**BL 217 Z**	**BL 217 ZZ**	94	102	141	2	1.97
	180	41	3	162 000	145 000	3 600	4 300	**BL 317**	**BL 317 Z**	**BL 317 ZZ**	98	110.5	167	2.5	4.77
90	160	30	2	117 000	107 000	3 800	4 500	**BL 218**	**BL 218 Z**	**BL 218 ZZ**	99	107.5	151	2	2.43
	190	43	3	174 000	161 000	3 400	4 000	**BL 318**	**BL 318 Z**	**BL 318 ZZ**	103	117	177	2.5	5.45
95	170	32	2.1	133 000	123 000	3 600	4 300	**BL 219**	**BL 219 Z**	**BL 219 ZZ**	106	114	159	2	2.95
	200	45	3	186 000	178 000	2 800	3 600	**BL 319**	**BL 319 Z**	**BL 319 ZZ**	108	124	187	2.5	6.4
100	180	34	2.1	149 000	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	162 000	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	176 000	176 000	2 800	3 400	**BL 222**	—	—	121	—	189	2	4.84

Remark When using maximum ball bearings, please contact NSK.

MAGNETO BEARINGS

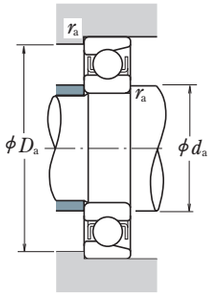
Bore Diameter 4 – 20 mm



Outside Diameter Tolerance (Class N)

Units : μm

Nominal Outside Diameter D (mm)		Single Plane Mean Outside Diameter Δ_{Dmp}			
		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



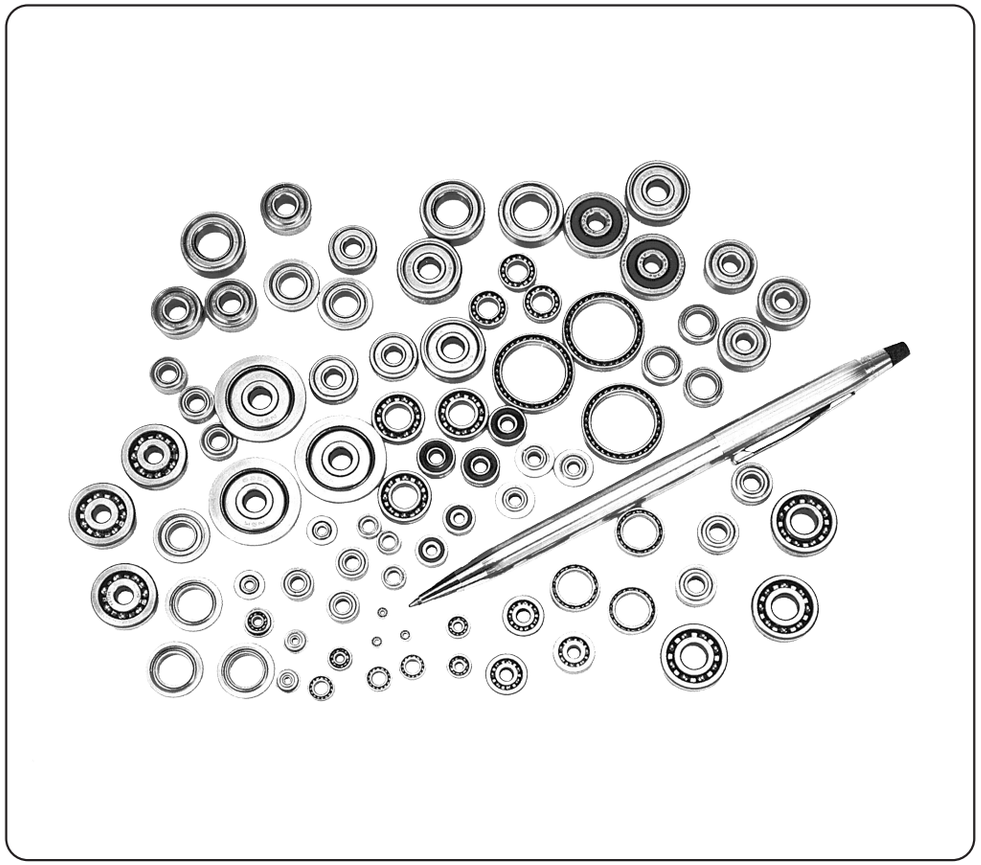
Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$		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 Designations		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	1 820	289	34 000	40 000	**E 4**	**EN 4**	5.2	14.8	0.15	0.005
5	16	5	0.15	0.1	1 820	289	34 000	40 000	**E 5**	**EN 5**	6.2	14.8	0.15	0.004
6	21	7	0.3	0.15	2 740	445	30 000	36 000	**E 6**	**EN 6**	8	19	0.3	0.011
7	22	7	0.3	0.15	2 740	445	30 000	36 000	**E 7**	**EN 7**	9	20	0.3	0.013
8	24	7	0.3	0.15	3 750	650	28 000	34 000	**E 8**	**EN 8**	10	22	0.3	0.014
9	28	8	0.3	0.15	5 000	880	24 000	30 000	**E 9**	**EN 9**	11	26	0.3	0.022
10	28	8	0.3	0.15	5 000	880	24 000	30 000	**E 10**	**EN 10**	12	26	0.3	0.021
11	32	7	0.3	0.15	4 850	845	22 000	26 000	**E 11**	**EN 11**	13	30	0.3	0.029
12	32	7	0.3	0.15	4 850	845	22 000	26 000	**E 12**	**EN 12**	14	30	0.3	0.028
13	30	7	0.3	0.15	4 850	845	22 000	26 000	**E 13**	**EN 13**	15	28	0.3	0.021
14	35	8	0.3	0.15	6 400	1 150	19 000	22 000	—	**EN 14**	16	33	0.3	0.035
15	35	8	0.3	0.15	6 400	1 150	19 000	22 000	**E 15**	**EN 15**	17	33	0.3	0.034
	40	10	0.6	0.3	8 100	1 500	17 000	20 000	**BO 15**	—	19	36	0.6	0.055
16	38	10	0.6	0.2	7 600	1 380	17 000	22 000	—	**EN 16**	20	34	0.6	0.049
17	40	10	0.6	0.3	8 100	1 500	17 000	20 000	**L 17**	—	21	36	0.6	0.051
	44	11	0.6	0.3	8 100	1 500	16 000	19 000	—	**EN 17**	21	40	0.6	0.080
	44	11	0.6	0.3	8 100	1 500	16 000	19 000	**BO 17**	—	21	40	0.6	0.080
18	40	9	0.6	0.2	5 550	1 030	17 000	20 000	—	**EN 18**	22	36	0.6	0.051
19	40	9	0.6	0.2	5 550	1 030	17 000	20 000	**E 19**	**EN 19**	23	36	0.6	0.049
20	47	12	1	0.6	12 100	2 380	14 000	17 000	**E 20**	**EN 20**	25	42	1	0.089
	47	14	1	0.6	12 100	2 380	14 000	17 000	**L 20**	—	25	42	1	0.101

Remarks 1. The outside diameters of Series E magneto bearings always have plus tolerances.
2. Please contact NSK when using magneto bearings outside of the E Series.



2. EXTRA SMALL BALL BEARINGS AND MINIATURE BALL BEARINGS

INTRODUCTION ..... C 054

BEARING TABLES

EXTRA SMALL BALL BEARINGS · MINIATURE BALL BEARINGS

Metric Series — Bore Diameter 1 – 9mm ..... C 058

With Flange — Bore Diameter 1 – 9mm ..... C 062

Inch Series — Bore Diameter 1.016 – 9.525mm ..... C 066

With Flange — Bore Diameter 1.191 – 9.525mm ..... C 068

DESIGN AND TYPES

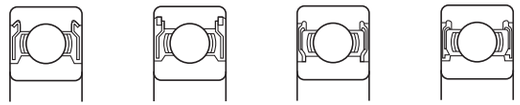
The size ranges of extra small and miniature ball bearings are shown in Table 1, and design/types and type designations are shown in Table 2. Types listed in the bearing tables are indicated by shading ▬ in Table 2.

Table 1 Size Ranges of Bearings

Units : mm

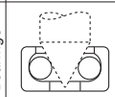
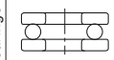
Series	Extra Small Ball Bearings	Miniature Ball Bearings
Metric	Outside diameter $D \geqq 9$ Bore diameter $d < 10$	Outside diameter $D < 9$
Inch	Outside diameter $D \geqq 9.525$ Bore diameter $d < 10$	Outside diameter $D < 9.525$

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



ZZ ZZS DD VV

Table 2 Design/Types and Type Designations of Miniature and Extra Small Bearings

Design/Types		Type Designations				Remarks
		Metric	Inch	Special		
				Metric	Inch	
Single-Row Deep Groove Ball Bearings		6○○	R	MR	—	Shielded and sealed bearings are available.
	 Thin section	—	—	SMT	—	
	 With flange	F6○○	FR	MF	—	Shielded and 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 Other bearings, such as single-row angular contact ball bearings, are available.

TOLERANCES AND RUNNING ACCURACY

METRIC SERIES BEARINGS ····· Table 7.2 (Pages A128 to A131)

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

Table 3 Flange Tolerances for Metric Flanged Bearings

(1) Tolerances of Flange Outside Diameter — Units : μm

Nominal Outer Ring Flange Outside Diameter D_1(mm)		Deviation of a Single Outside Diameter of Outer Ring Flange $\Delta_{D_{1S}}$			
		Position Flange		Non-Position Flange	
over	incl.	high	low	high	low
–	6	+220	−36	0	−36
6	10	+220	−36	0	−36
10	18	+270	−43	0	−43
18	30	+330	−52	0	−52

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

Nominal Outside Diameter D (mm)		Deviation of a Single Outer Ring Flange Width $\Delta_{C_{1S}}$		Variation of Outer Ring Flange Width $V_{C_{1S}}$				Perpendicularity of Outer Ring Outside Surface With Respect to the Flange Back Face S_{D1}			Axial Runout of Outer Ring Flange Back Face of Assembled Bearing S_{ea1}		
		Normal and Classes 6,5,4,2		Normal and Class 6	Class 5	Class 4	Class 2	Class 5	Class 4	Class 2	Class 5	Class 4	Class 2
over	incl.	high	low	max.				max.			max.		
2.5(1)	6	Use the Δ_{B_S} tolerance for d of the same bearing in the same class		Use the Δ_{VB_S} tolerance for d of the same bearing in 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) Including 2.5 mm

INCH SERIES 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)

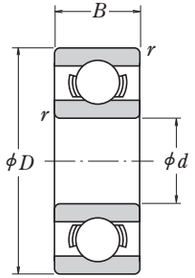
LIMITING SPEEDS

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

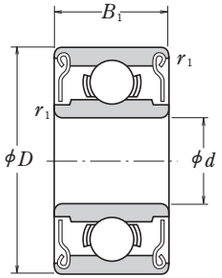
EXTRA SMALL BALL BEARINGS · MINIATURE BALL BEARINGS

Metric Series

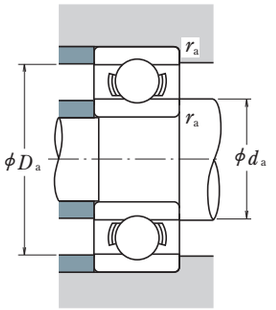
Bore Diameter 1 – 4 mm

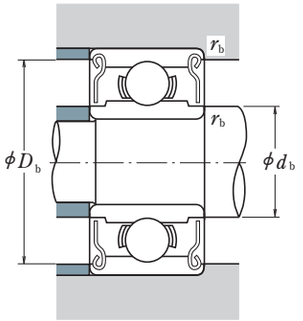


Open



Shielded
ZZ · ZZ1





Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min⁻¹)		Bearing Designations			Abutment and Fillet Dimensions (mm)						Mass (g)	
d	D	B	B_1	r (1) min.	r_1 (1) min.	C_r	C_{0r}	Grease Open Z · ZZ	Oil Open Z	Open	Shielded	Sealed	d_a min.	d_b max.	D_a max.	D_b min.	r_a max.	r_b max.	approx. Open	approx. Shielded
1	3	1	—	0.05	—	88	23	130 000	150 000	**681**	—	— —	1.4	—	2.6	—	0.05	—	0.03	—
	3	1.5	—	0.05	—	88	23	130 000	150 000	**MR 31**	—	— —	1.4	—	2.6	—	0.05	—	0.04	—
	4	1.6	—	0.1	—	153	35	100 000	120 000	**691**	—	— —	1.8	—	3.2	—	0.1	—	0.09	—
1.2	4	1.8	2.5	0.1	0.1	153	35	110 000	130 000	**MR 41 X**	**MR 41 XZZ**	— —	2.0	1.9	3.2	3.5	0.1	0.1	0.10	0.14
1.5	4	1.2	2	0.05	0.05	124	33	100 000	120 000	**681 X**	**681 XZZ**	— —	1.9	2.1	3.6	3.6	0.05	0.05	0.07	0.11
	5	2	2.6	0.15	0.15	262	69	85 000	100 000	**691 X**	**691 XZZ**	— —	2.7	2.5	3.8	4.3	0.15	0.15	0.17	0.20
	6	2.5	3	0.15	0.15	365	98	75 000	90 000	**601 X**	**601 XZZ**	— —	2.7	3.0	4.8	5.4	0.15	0.15	0.33	0.38
2	5	1.5	2.3	0.08	0.08	186	50	85 000	100 000	**682**	**682 ZZ**	— —	2.6	2.7	4.4	4.2	0.08	0.08	0.12	0.17
	5	2	2.5	0.1	0.1	206	58	85 000	100 000	**MR 52 B**	**MR 52 BZZ**	— —	2.8	2.7	4.2	4.4	0.1	0.1	0.16	0.23
	6	2.3	3	0.15	0.15	365	98	75 000	90 000	**692**	**692 ZZ**	— —	3.2	3.0	4.8	5.4	0.15	0.15	0.28	0.38
	6	2.5	2.5	0.15	0.15	365	98	75 000	90 000	**MR 62**	**MR 62 ZZ**	— —	3.2	3.0	4.8	5.2	0.15	0.15	0.30	0.29
	7	2.5	3	0.15	0.15	425	127	63 000	75 000	**MR 72**	**MR 72 ZZ**	— —	3.2	3.8	5.8	6.2	0.15	0.15	0.45	0.49
	7	2.8	3.5	0.15	0.15	425	127	63 000	75 000	**602**	**602 ZZ**	— —	3.2	3.8	5.8	6.2	0.15	0.15	0.51	0.58
2.5	6	1.8	2.6	0.08	0.08	230	74	71 000	80 000	**682 X**	**682 XZZ**	— —	3.1	3.7	5.4	5.4	0.08	0.08	0.23	0.29
	7	2.5	3.5	0.15	0.15	425	127	63 000	75 000	**692 X**	**692 XZZ**	— —	3.7	3.8	5.8	6.2	0.15	0.15	0.41	0.55
	8	2.5	—	0.2	—	615	179	60 000	67 000	**MR 82 X**	—	— —	4.1	—	6.4	—	0.2	—	0.56	—
	8	2.8	4	0.15	0.15	605	175	60 000	71 000	**602 X**	**602 XZZ**	— —	3.7	4.1	6.8	7.0	0.15	0.15	0.63	0.83
3	6	2	2.5	0.1	0.1	230	74	71 000	80 000	**MR 63**	**MR 63 ZZ**	— —	3.8	3.7	5.2	5.4	0.1	0.1	0.20	0.27
	7	2	3	0.1	0.1	425	130	63 000	75 000	**683 A**	**683 AZZ**	— —	3.8	4.0	6.2	6.4	0.1	0.1	0.32	0.45
	8	2.5	—	0.15	—	615	179	60 000	67 000	**MR 83**	—	— —	4.2	—	6.8	—	0.15	—	0.54	—
	8	3	4	0.15	0.15	615	179	60 000	67 000	**693**	**693 ZZ**	— —	4.2	4.3	6.8	7.3	0.15	0.15	0.61	0.83
	9	2.5	4	0.2	0.15	630	187	56 000	67 000	**MR 93**	**MR 93 ZZ**	— —	4.6	4.3	7.4	7.9	0.2	0.15	0.73	1.18
	9	3	5	0.15	0.15	630	187	56 000	67 000	**603**	**603 ZZ**	— —	4.2	4.3	7.8	7.9	0.15	0.15	0.87	1.45
	10	4	4	0.15	0.15	695	218	50 000	60 000	**623**	**623 ZZ**	— —	4.2	4.3	8.8	8.0	0.15	0.15	1.65	1.66
	13	5	5	0.2	0.2	1 430	485	40 000	48 000	**633**	**633 ZZ1**	— —	4.6	6.0	11.4	11.3	0.2	0.2	3.38	3.33
4	7	2	—	0.1	—	345	115	60 000	67 000	**MR 74**	—	— —	4.8	—	6.2	—	0.1	—	0.22	—
	7	—	2.5	—	0.1	280	107	60 000	71 000	—	**MR 74 ZZ**	— —	—	4.8	—	6.3	—	0.1	—	0.29
	8	2	3	0.15	0.1	435	139	56 000	67 000	**MR 84**	**MR 84 ZZ**	— —	5.2	5.0	6.8	7.4	0.15	0.1	0.36	0.56
	9	2.5	4	(0.15)	(0.15)	705	225	53 000	63 000	**684 A**	**684 AZZ1**	— —	4.8	5.2	8.2	8.1	0.1	0.1	0.63	1.01
	10	3	4	0.2	0.15	780	270	50 000	60 000	**MR 104 B**	**MR 104 BZZ**	— —	5.6	5.9	8.4	8.8	0.2	0.15	1.04	1.42
	11	4	4	0.15	0.15	1 050	345	48 000	56 000	**694**	**694 ZZ**	— —	5.2	5.6	9.8	9.9	0.15	0.15	1.7	1.75
	12	4	4	0.2	0.2	1 050	345	48 000	56 000	**604**	**604 ZZ**	— —	5.6	5.6	10.4	9.9	0.2	0.2	2.25	2.29
	13	5	5	0.2	0.2	1 430	485	40 000	48 000	**624**	**624 ZZ1**	— —	5.6	6.0	11.4	11.3	0.2	0.2	3.03	3.04
	16	5	5	0.3	0.3	1 910	670	36 000	43 000	**634**	**634 ZZ1**	— —	6.0	7.5	14.0	13.8	0.3	0.3	5.24	5.21

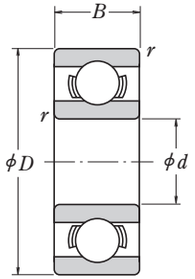
Note (1) Values in parentheses are not based on ISO 15.

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

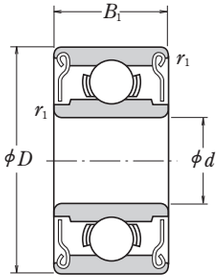
EXTRA SMALL BALL BEARINGS · MINIATURE BALL BEARINGS

Metric Series

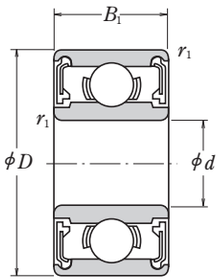
Bore Diameter 5 – 9 mm



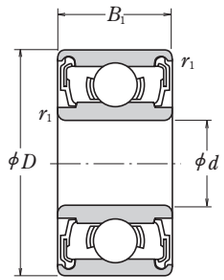
Open



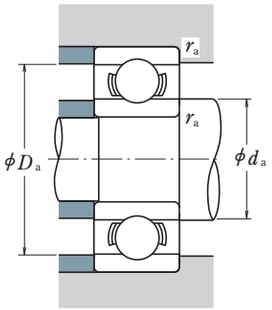
Shielded
ZZ · ZZ1

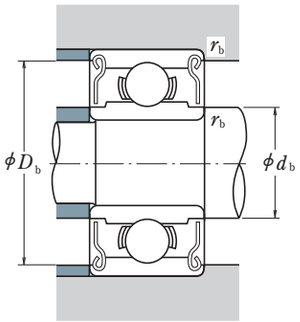


Non-Contact
Sealed
VV



Contact
Sealed
DD





Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min⁻¹) Grease		Oil	Bearing Designations			Abutment and Fillet Dimensions (mm)						Mass (g)	
d	D	B	B_1	r(1) min.	r_1(1) min.	C_r	C_{0r}	Open Z · ZZ V · VV	D · DD	Open Z	Open	Shielded	Sealed	d_a min.	d_b max.	D_a max.	D_b min.	r_a max.	r_b max.	approx. Open	approx. Shielded
5	8	2	—	0.1	—	340	120	53 000	—	63 000	**MR 85**	—	— —	5.8	—	7.2	—	0.1	—	0.26	—
	8	—	2.5	—	0.1	305	131	53 000	—	63 000	—	**MR 85 ZZ**	— —	—	5.8	—	7.4	—	0.1	—	0.34
	9	2.5	3	0.15	0.15	475	168	50 000	—	60 000	**MR 95**	**MR 95 ZZ1**	— —	6.2	6.0	7.8	8.2	0.15	0.15	0.50	0.58
	10	3	4	0.15	0.15	475	168	50 000	—	60 000	**MR 105**	**MR 105 ZZ**	— —	6.2	6.0	8.8	8.4	0.15	0.15	0.95	1.29
	11	—	4	—	0.15	790	276	48 000	—	56 000	—	**MR 115 ZZ**	VV —	—	6.3	—	9.8	—	0.15	—	1.49
	11	3	5	0.15	0.15	790	281	45 000	—	53 000	**685**	**685 ZZ**	— —	6.2	6.2	9.8	9.9	0.15	0.15	1.2	1.96
	13	4	4	0.2	0.2	1 190	430	43 000	40 000	50 000	**695**	**695 ZZ1**	VV DD	6.6	6.6	11.4	11.2	0.2	0.2	2.45	2.5
	14	5	5	0.2	0.2	1 460	505	40 000	38 000	50 000	**605**	**605 ZZ**	— DD	6.6	6.9	12.4	12.2	0.2	0.2	3.54	3.48
	16	5	5	0.3	0.3	1 910	670	36 000	32 000	43 000	**625**	**625 ZZ1**	VV DD	7.0	7.5	14.0	13.8	0.3	0.3	4.95	4.86
	19	6	6	0.3	0.3	2 570	885	32 000	30 000	40 000	**635**	**635 ZZ1**	VV DD	7.0	8.5	17.0	16.5	0.3	0.3	8.56	8.34
6	10	2.5	3	0.15	0.1	545	218	45 000	—	53 000	**MR 106**	**MR 106 ZZ1**	— —	7.2	7.0	8.8	9.3	0.15	0.1	0.56	0.68
	12	3	4	0.2	0.15	790	292	43 000	40 000	50 000	**MR 126**	**MR 126 ZZ**	— DD	7.6	7.2	10.4	10.9	0.2	0.15	1.27	1.74
	13	3.5	5	0.15	0.15	1 190	440	40 000	38 000	50 000	**686 A**	**686 AZZ1**	VV DD	7.2	7.4	11.8	11.7	0.15	0.15	1.91	2.69
	15	5	5	0.2	0.2	1 910	670	40 000	36 000	45 000	**696**	**696 ZZ1**	VV DD	7.6	7.9	13.4	13.3	0.2	0.2	3.88	3.72
	17	6	6	0.3	0.3	2 490	835	38 000	34 000	45 000	**606**	**606 ZZ**	VV DD	8.0	8.2	15.0	14.8	0.3	0.3	5.97	6.08
	19	6	6	0.3	0.3	2 570	885	32 000	30 000	40 000	**626**	**626 ZZ1**	VV DD	8.0	8.5	17.0	16.5	0.3	0.3	8.15	7.94
	22	7	7	0.3	0.3	3 650	1 370	30 000	28 000	36 000	**636**	**636 ZZ1**	VV DD	8.0	10.5	20.0	19.0	0.3	0.3	14	14
7	11	2.5	3	0.15	0.1	500	201	43 000	—	50 000	**MR 117**	**MR 117 ZZ**	— —	8.2	8.0	9.8	10.5	0.15	0.1	0.62	0.72
	13	3	4	0.2	0.15	595	276	40 000	—	48 000	**MR 137**	**MR 137 ZZ**	— —	8.6	9.0	11.4	11.6	0.2	0.15	1.58	2.02
	14	3.5	5	0.15	0.15	1 290	510	40 000	34 000	45 000	**687**	**687 ZZ1**	VV DD	8.2	8.5	12.8	12.7	0.15	0.15	2.13	2.97
	17	5	5	0.3	0.3	1 770	710	36 000	28 000	43 000	**697**	**697 ZZ1**	VV DD	9.0	10.2	15.0	14.8	0.3	0.3	5.26	5.12
	19	6	6	0.3	0.3	2 570	885	36 000	32 000	43 000	**607**	**607 ZZ1**	VV DD	9.0	9.1	17.0	16.5	0.3	0.3	7.67	7.51
	22	7	7	0.3	0.3	3 650	1 370	30 000	28 000	36 000	**627**	**627 ZZ1**	VV DD	9.0	10.5	20.0	19.0	0.3	0.3	12.7	12.9
	26	9	9	0.3	0.3	5 050	1 970	28 000	22 000	34 000	**637**	**637 ZZ1**	VV DD	9.0	12.8	24.0	22.8	0.3	0.3	24	25
8	12	2.5	3.5	0.15	0.1	600	274	40 000	—	48 000	**MR 128**	**MR 128 ZZ1**	— —	9.2	9.0	10.8	11.3	0.15	0.1	0.71	0.97
	14	3.5	4	0.2	0.15	900	385	38 000	32 000	45 000	**MR 148**	**MR 148 ZZ**	VV DD	9.6	9.2	12.4	12.8	0.2	0.15	1.86	2.16
	16	4	5	0.2	0.2	1 770	710	36 000	28 000	43 000	**688 A**	**688 AZZ1**	VV DD	9.6	10.2	14.4	14.2	0.2	0.2	3.12	4.02
	19	6	6	0.3	0.3	2 460	910	36 000	28 000	43 000	**698**	**698 ZZ1**	VV DD	10.0	10.0	17.0	16.5	0.3	0.3	7.23	7.18
	22	7	7	0.3	0.3	3 650	1 370	34 000	28 000	40 000	**608**	**608 ZZ1**	VV DD	10.0	10.5	20.0	19.0	0.3	0.3	12.1	12.2
	24	8	8	0.3	0.3	3 700	1 430	28 000	24 000	34 000	**628**	**628 ZZ**	VV DD	10.0	12.0	22.0	20.5	0.3	0.3	17.2	17.4
	28	9	9	0.3	0.3	5 050	1 970	28 000	22 000	34 000	**638**	**638 ZZ1**	VV DD	10.0	12.8	26.0	22.8	0.3	0.3	28.3	28.6
9	17	4	5	0.2	0.2	1 460	665	36 000	24 000	43 000	**689**	**689 ZZ1**	VV DD	10.6	11.5	15.4	15.2	0.2	0.2	3.53	4.43
	20	6	6	0.3	0.3	1 890	840	34 000	24 000	40 000	**699**	**699 ZZ1**	VV DD	11.0	12.0	18.0	17.2	0.3	0.3	8.45	8.33
	24	7	7	0.3	0.3	3 700	1 430	32 000	24 000	38 000	**609**	**609 ZZ1**	VV DD	11.0	12.0	22.8	20.5	0.3	0.3	14.5	14.7
	26	8	8	(0.6)	(0.6)	5 050	1 970	28 000	22 000	34 000	**629**	**629 ZZ**	VV DD	11.0	12.8	24.0	22.8	0.3	0.3	19.5	19.3
	30	10	10	0.6	0.6	5 600	2 390	24 000	—	30 000	**639**	**639 ZZ**	VV —	13.0	16.1	26.0	25.6	0.6	0.6	36.5	36

Note (1) Values in parentheses are not based on ISO 15.

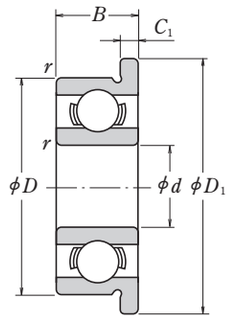
Remarks 1. When using sealed or shielded bearings with a rotating outer ring, please contact NSK.

2. Bearings with snap rings are also available, please contact NSK for details.

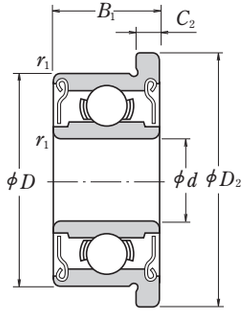
EXTRA SMALL BALL BEARINGS · MINIATURE BALL BEARINGS

Metric Series With Flange

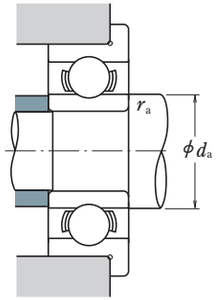
Bore Diameter 1 – 4 mm

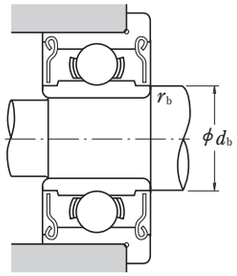


Open



Shielded
ZZ · ZZ1





Boundary Dimensions (mm)										Basic Load Ratings (N)		Limiting Speeds (min⁻¹)		Bearing Designations			Abutment and Fillet Dimensions (mm)				Mass (g)	
d	D	D_1	D_2	B	B_1	C_1	C_2	r(1) min.	r_1(1) min.	C_r	C_{0r}	Grease Open Z · ZZ	Oil Open Z	Open	Shielded	Sealed	d_a min.	d_b max.	r_a max.	r_b max.	approx. Open	approx. Shielded
1	3	3.8	—	1	—	0.3	—	0.05	—	88	23	130 000	150 000	**F 681**	—	— —	1.4	—	0.05	—	0.04	—
	4	5	—	1.6	—	0.5	—	0.1	—	153	36	100 000	120 000	**F 691**	—	— —	1.8	—	0.1	—	0.14	—
1.2	4	4.8	—	1.8	—	0.4	—	0.1	—	153	35	110 000	130 000	**MF 41 X**	—	— —	2.0	—	0.1	—	0.12	—
1.5	4	5	5	1.2	2	0.4	0.6	0.05	0.05	124	33	100 000	120 000	**F 681 X**	**F 681 XZZ**	— —	1.9	2.1	0.05	0.05	0.09	0.14
	5	6.5	6.5	2	2.6	0.6	0.8	0.15	0.15	262	69	85 000	100 000	**F 691 X**	**F 691 XZZ**	— —	2.7	2.5	0.15	0.15	0.23	0.28
	6	7.5	7.5	2.5	3	0.6	0.8	0.15	0.15	365	98	75 000	90 000	**F 601 X**	**F 601 XZZ**	— —	2.7	3.0	0.15	0.15	0.42	0.52
2	5	6.1	6.1	1.5	2.3	0.5	0.6	0.08	0.08	186	50	85 000	100 000	**F 682**	**F 682 ZZ**	— —	2.6	2.7	0.08	0.08	0.16	0.22
	5	6.2	6.2	2	2.5	0.6	0.6	0.1	0.1	206	58	85 000	100 000	**MF 52 B**	**MF 52 BZZ**	— —	2.8	2.7	0.1	0.1	0.21	0.27
	6	7.5	7.5	2.3	3	0.6	0.8	0.15	0.15	365	98	75 000	90 000	**F 692**	**F 692 ZZ**	— —	3.2	3.0	0.15	0.15	0.35	0.48
	6	7.2	—	2.5	—	0.6	—	0.15	—	365	98	75 000	90 000	**MF 62**	—	— —	3.2	—	0.15	—	0.36	—
	7	8.2	8.2	2.5	3	0.6	0.6	0.15	0.15	425	127	63 000	75 000	**MF 72**	**MF 72 ZZ**	— —	3.2	3.8	0.15	0.15	0.52	0.56
	7	8.5	8.5	2.8	3.5	0.7	0.9	0.15	0.15	425	127	63 000	75 000	**F 602**	**F 602 ZZ**	— —	3.2	3.1	0.15	0.15	0.60	0.71
2.5	6	7.1	7.1	1.8	2.6	0.5	0.8	0.08	0.08	230	74	71 000	80 000	**F 682 X**	**F 682 XZZ**	— —	3.1	3.7	0.08	0.08	0.25	0.36
	7	8.5	8.5	2.5	3.5	0.7	0.9	0.15	0.15	425	127	63 000	75 000	**F 692 X**	**F 692 XZZ**	— —	3.7	3.8	0.15	0.15	0.51	0.68
	8	9.2	—	2.5	—	0.6	—	0.2	—	615	179	60 000	67 000	**MF 82 X**	—	— —	4.1	—	0.2	—	0.62	—
	8	9.5	9.5	2.8	4	0.7	0.9	0.15	0.15	605	175	60 000	71 000	**F 602 X**	**F 602 XZZ**	— —	3.7	3.5	0.15	0.15	0.74	0.98
3	6	7.2	7.2	2	2.5	0.6	0.6	0.1	0.1	230	74	71 000	80 000	**MF 63**	**MF 63 ZZ**	— —	3.8	3.7	0.1	0.1	0.27	0.33
	7	8.1	8.1	2	3	0.5	0.8	0.1	0.1	425	130	63 000	75 000	**F 683 A**	**F 683 AZZ**	— —	3.8	4.0	0.1	0.1	0.37	0.53
	8	9.2	—	2.5	—	0.6	—	0.15	—	615	179	60 000	67 000	**MF 83**	—	— —	4.2	—	0.15	—	0.56	—
	8	9.5	9.5	3	4	0.7	0.9	0.15	0.15	615	179	60 000	67 000	**F 693**	**F 693 ZZ**	— —	4.2	4.3	0.15	0.15	0.70	0.97
	9	10.2	10.6	2.5	4	0.6	0.8	0.2	0.15	630	187	56 000	67 000	**MF 93**	**MF 93 ZZ**	— —	4.6	4.3	0.2	0.15	0.81	1.34
	9	10.5	10.5	3	5	0.7	1	0.15	0.15	630	187	56 000	67 000	**F 603**	**F 603 ZZ**	— —	4.2	4.3	0.15	0.15	1.0	1.63
	10	11.5	11.5	4	4	1	1	0.15	0.15	695	218	50 000	60 000	**F 623**	**F 623 ZZ**	— —	4.2	4.3	0.15	0.15	1.85	1.86
	13	15	15	5	5	1	1	0.2	0.2	1 430	485	36 000	43 000	**F 633**	**F 633 ZZ1**	— —	4.6	6.0	0.2	0.2	3.73	3.59
4	7	8.2	—	2	—	0.6	—	0.1	—	345	115	60 000	67 000	**MF 74**	—	— —	4.8	—	0.1	—	0.29	—
	7	—	8.2	—	2.5	—	0.6	—	0.1	280	107	60 000	71 000	—	**MF 74 ZZ**	— —	—	4.8	—	0.1	—	0.35
	8	9.2	9.2	2	3	0.6	0.6	0.15	0.1	435	139	56 000	67 000	**MF 84**	**MF 84 ZZ**	— —	5.2	5.0	0.15	0.1	0.44	0.63
	9	10.3	10.3	2.5	4	0.6	1	(0.15)	(0.15)	705	225	53 000	63 000	**F 684**	**F 684 ZZ**	— —	4.8	5.2	0.1	0.1	0.70	1.14
	10	11.2	11.6	3	4	0.6	0.8	0.2	0.15	780	270	50 000	60 000	**MF 104 B**	**MF 104 BZZ**	— —	5.6	5.9	0.2	0.15	1.13	1.59
	11	12.5	12.5	4	4	1	1	0.15	0.15	1 050	345	48 000	56 000	**F 694**	**F 694 ZZ**	— —	5.2	5.6	0.15	0.15	1.91	1.96
	12	13.5	13.5	4	4	1	1	0.2	0.2	1 050	345	48 000	56 000	**F 604**	**F 604 ZZ**	— —	5.6	5.6	0.2	0.2	2.53	2.53
	13	15	15	5	5	1	1	0.2	0.2	1 430	485	40 000	48 000	**F 624**	**F 624 ZZ**	— —	5.6	6.0	0.2	0.2	3.38	3.53
	16	18	18	5	5	1	1	0.3	0.3	1 910	670	36 000	43 000	**F 634**	**F 634 ZZ1**	— —	6.0	7.5	0.3	0.3	5.73	5.62

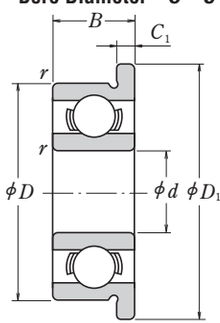
Note (1) Values in parentheses are not based on ISO 15.

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

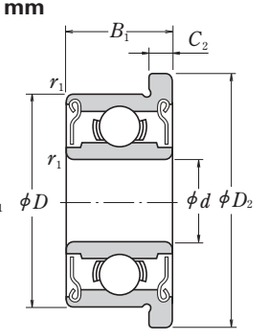
EXTRA SMALL BALL BEARINGS · MINIATURE BALL BEARINGS

Metric Series With Flange

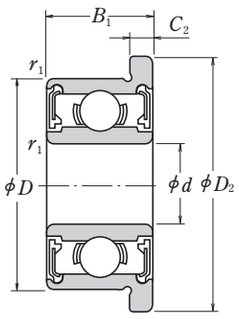
Bore Diameter 5 – 9 mm



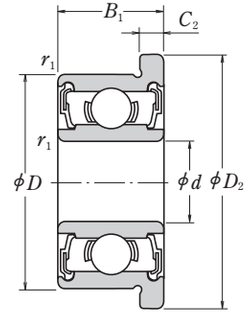
Open



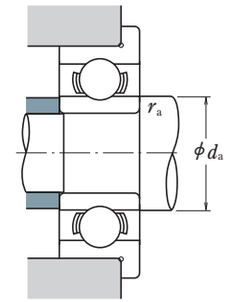
Shielded
ZZ · ZZ1

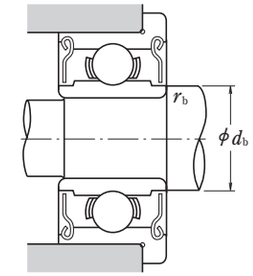


Non-Contact
Sealed
VV



Contact
Sealed
DD





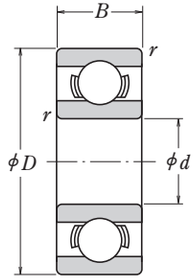
d	D	D1	D2	B	B1	C1	C2	r min.	r1 min.	Cr	C0r	Limiting Speeds (min⁻¹) Grease: Open Z · ZZ V · VV	Grease: D · DD	Oil: Open Z	Bearing Designations: Open	Shielded	Sealed	da min.	db max.	ra max.	rb max.	Mass (g) approx. Open	Shielded
5	8	9.2	—	2	—	0.6	—	0.1	—	340	120	53 000	—	63 000	**MF 85**	—	— —	5.8	—	0.1	—	0.33	—
	8	—	9.2	—	2.5	—	0.6	—	0.1	305	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	475	168	50 000	—	60 000	**MF 95**	**MF 95 ZZ**	— —	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	475	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	790	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	1 190	430	43 000	40 000	50 000	**F 695**	**F 695 ZZ1**	**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	1 460	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	1 910	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	2 570	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	545	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	790	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	1 190	440	40 000	38 000	50 000	**F 686 A**	**F 686 AZZ1**	**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	1 910	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	2 490	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	2 570	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	3 650	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	500	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	595	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	1 290	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	1 770	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	2 570	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	3 650	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	600	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	900	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	1 770	710	36 000	30 000	43 000	**F 688 A**	**F 688 AZZ1**	**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	2 460	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	3 650	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	1 460	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	1 890	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 shielded bearings with a rotating outer ring, please contact NSK.

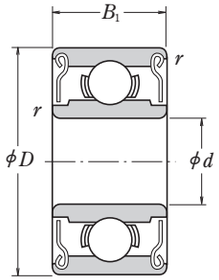
EXTRA SMALL BALL BEARINGS · MINIATURE BALL BEARINGS

Inch Series

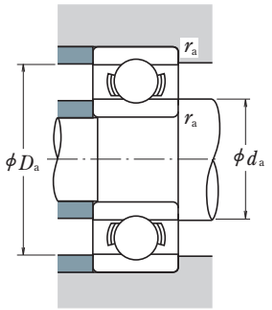
Bore Diameter 1.016 – 9.525 mm

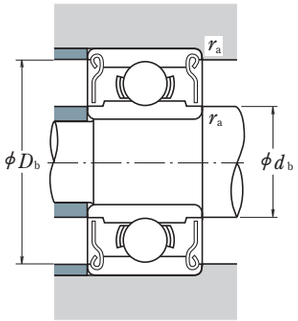


Open



Shielded
ZZ · ZZS





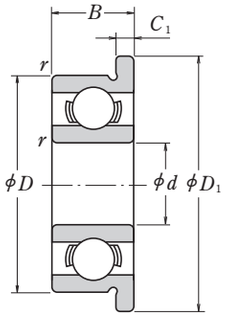
Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing	Designations	Abutment and Fillet Dimensions (mm)					Mass (g)	
d	D	B	B_1	r min.	C_r	C_{0r}	Grease Open Z · ZZ	Oil Open Z	Open	Shielded	d_a min.	d_b max.	D_a max.	D_b min.	r_a max.	approx. Open	approx. Shielded
1.016	3.175	1.191	—	0.1	105	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	153	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	255	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	340	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	208	60	80 000	95 000	**R 133**	—	3.2	—	3.9	—	0.1	0.10	—
	4.762	—	2.380	0.1	159	52	80 000	95 000	—	**R 133 ZZS**	—	3.0	—	4.2	0.1	—	0.13
	7.938	2.779	3.571	0.15	605	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	310	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	615	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	705	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
	9.525	3.967	3.967	0.3	695	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	705	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	395	149	53 000	63 000	**R 155**	**R 155 ZZS**	4.8	5.5	7.1	7.3	0.1	0.51	0.56
4.762	7.938	2.779	3.175	0.1	395	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	780	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	1 430	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	460	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	1 190	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	1 770	660	38 000	45 000	**R 4B**	**R 4B ZZ**	8.4	8.4	13.8	13.8	0.3	4.5	4.43
	19.050	5.558	7.142	0.4	2 880	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
7.938	12.700	3.967	3.967	0.15	595	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	3 650	1 410	32 000	38 000	**R 6**	**R 6 ZZ**	12.6	11.9	19.2	20.0	0.4	9.02	11

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

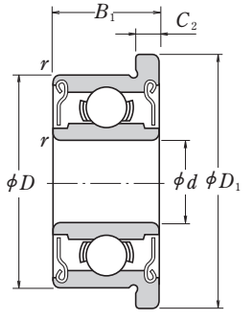
EXTRA SMALL BALL BEARINGS · MINIATURE BALL BEARINGS

Inch Series With Flange

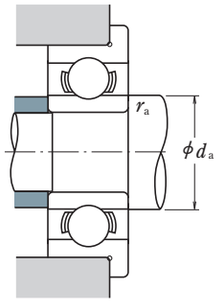
Bore Diameter 1.191 – 9.525 mm

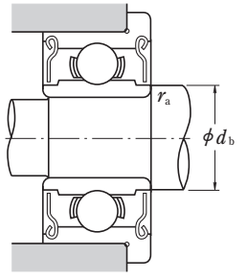


Open



Shielded
ZZ · ZZS





Boundary Dimensions (mm)								Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations		Abutment and Fillet Dimensions (mm)			Mass (g)	
d	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	approx. Shielded
1.191	3.967	5.156	1.588	2.380	0.330	0.790	0.1	153	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	255	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	340	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	208	60	80 000	95 000	**FR 133**	—	3.2	—	0.1	0.13	—
	4.762	5.944	—	2.380	—	0.790	0.1	159	52	80 000	95 000	—	**FR 133 ZZS**	—	3.0	0.1	—	0.19
	7.938	9.119	2.779	3.571	0.580	0.790	0.15	605	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	310	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	615	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	705	225	53 000	63 000	**FR 2-6**	**FR 2-6 ZZS**	4.4	4.6	0.15	1.04	1.25
	9.525	11.176	3.967	3.967	0.760	0.760	0.3	695	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	395	149	53 000	63 000	**FR 155**	**FR 155 ZZS**	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	395	149	53 000	63 000	**FR 156**	**FR 156 ZZS**	5.6	5.5	0.1	0.47	0.53
	9.525	10.719	3.175	3.175	0.580	0.790	0.1	780	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	1 430	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	460	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	1 190	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	1 770	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	595	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	3 650	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 shielded bearings with a rotating outer ring, please contact NSK.
2. Bearings with double shields (ZZ, ZZS) 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

BEARING TABLES

Single-Row and Matched Angular Contact Ball Bearings

Bore Diameter 10 – 200 mm ..... C 086

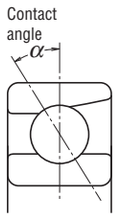
Double-Row Angular Contact Ball Bearings Open, Shielded, and Sealed Types

Bore Diameter 10 – 85 mm ..... C 106

Four-Point-Contact Ball Bearings

Bore Diameter 30 – 200 mm ..... C 110

DESIGN, TYPES, AND FEATURES



SINGLE-ROW ANGULAR CONTACT BALL BEARINGS

Single-row angular contact ball bearings have a contact angle allowing them to 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 or more opposed bearings 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 where high running accuracy is required (refer to Chapter 9: Preload on Page A192 for more information).

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

Though the figures in the bearing tables on Pages C086 to C101 for bearing bore diameters of 10 to 120 show bearings with single-shoulder inner rings, dual-shoulder 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	
Spec.	Method	Pressed	Molded		Molded	Machined	
	Designation	W	TYN	T85	T7	Omitted	MR
Features	High Load Capacity	◎	○	◎	◎	○	◎
	High-Speed	△	◎	○	○	△	○
	High-Temperature	◎	△	△	◎	◎	◎
	Vibration	△	△	△	△	◎	◎

◎ Excellent ○ Good △ Fair

In addition, bearings with the same designation will have different load ratings if the type of cage or number of balls are different.

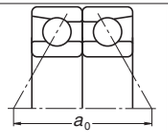
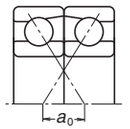
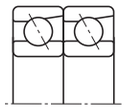
Angular contact ball bearings with contact angles of 15° (designation **C**) and 25° (designation **A5**) are primarily for high precision or high-speed applications, and molded polyamide cages (designation TYN) or machined-brass cages or synthetic resin cages (designation T) are used.

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

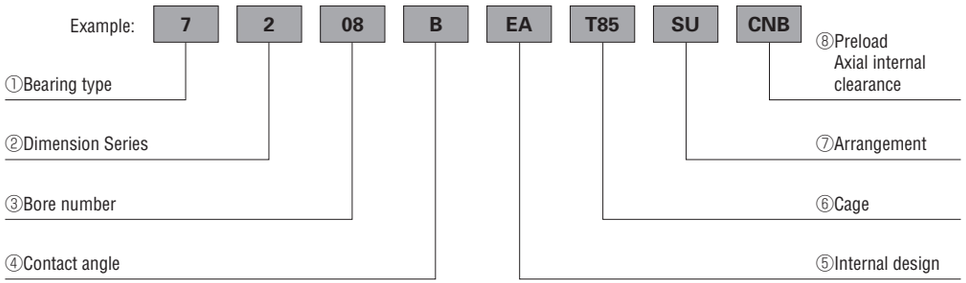
Figure	Arrangement	Features
	Back-to-Back (DB) (Example) 7208 A DB	Radial loads and axial loads in both directions can be sustained. Since the distance between the effective load centers a_0 is large, this type is suitable if moments are applied.
	Face-to-Face (DF) (Example) 7208 B DF	Radial loads and 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.
	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.

HIGH-ACCURACY ANGULAR CONTACT BALL BEARINGS

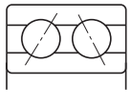
High-accuracy ACBBs come standard with molded polyamide cages and feature high load capacity, high limiting speeds, and the capability for highly accurate universal matching.

☐ Formulation of Bearing Designations

Single-Row Matched Angular Contact Ball Bearings



①Bearing type	7: Single-row angular contact ball bearings, matched angular contact ball bearings
②Dimension Series	2: 02 Series, 3: 03 Series, 9: 19 Series, 0: 10 Series
③Bore number	Bore diameter for 03 and under—00: 10 mm, 01: 12 mm, 02: 15 mm, 03: 17 mm 04 and over—Bore diameter = Bore number × 5 (mm)
④Contact angle	C: 15°, A5: 25°, A: 30°, B: 40°
⑤Internal design	EA: High Load Capacity
⑥Cage	W: Pressed steel Cage, MR: Machined brass cage (ball-guided), No designation: Machined brass cage (inner ring guided), TYN: Polyamide resin cage, T85: Polyamide 46 resin cage, T7: L-PPS resin cage
⑦Arrangement	SU: Universal arrangement (single-row), DU: Universal arrangement (double-row), DB: Back-to-back arrangement, DF: Face-to-face arrangement, DT: Tandem arrangement
⑧Preload / Axial internal clearance	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)

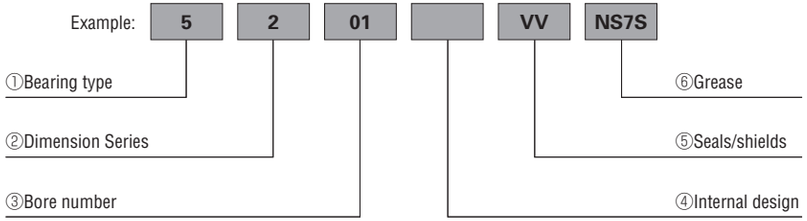


DOUBLE-ROW ANGULAR CONTACT BALL BEARINGS

Double-row angular contact ball bearings are essentially a back-to-back mounting of two single-row angular contact ball bearings, but their inner and outer rings are each integrated into one. These bearings can sustain axial loads in both directions and offer good capacity for sustaining moment loads. They are often used as fixed-end bearings and contain cages made of pressed steel.

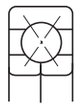
☐ Formulation of Bearing Designations

Double-Row Angular Contact Ball Bearings



①Bearing type	5: Double-row angular contact ball bearings
②Dimension Series	2: 02 Series 3: 03 Series
③Bore number	Bore diameter for 03 and under—00: 10 mm, 01: 12 mm, 02: 15 mm, 03: 17 mm 04 and over—Bore diameter = Bore number × 5 (mm)
④Internal design	ZZ: Steel shield on both sides, DDU: Rubber contact seal on both sides VV: Rubber non-contact seal on both sides
⑤Seals/shields	Z: Steel shield on one sides, DU: Rubber contact seal on one side, V: Rubber non-contact seal on one side
⑥Grease*	NS7: NS HI-LUBE

*A grease code is required when using shields or seals on both sides.



Four-Point-Contact Ball Bearings

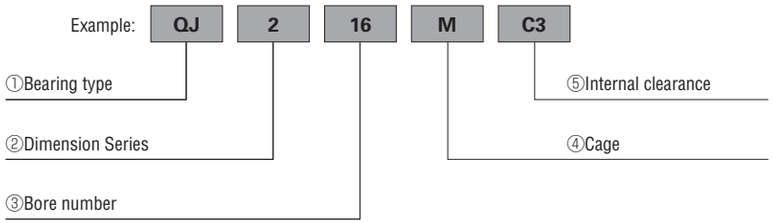
The inner ring is split radially into two pieces. This design allows one bearing to sustain significant axial loads in either direction.

The contact angle is 35°, so axial load capacity is high. These bearings are suitable for carrying pure axial loads or combined loads where axial loads are high.

The cages used are made of machined brass.

☐ Formulation of Bearing Designations

Four-Point-Contact Ball Bearings



①Bearing type	QJ: Four-point contact ball bearings
②Dimension Series	10: 10 Series, 2: 02 Series, 3: 03 Series
③Bore number	Bore diameter for 03 and under—00: 10 mm, 01: 12 mm, 02: 15 mm, 03: 17 mm 04 and over—Bore diameter = Bore number × 5 (mm)
④Cage	M: Machined-brass Cage (outer ring guided)
⑤Internal clearance	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 speed and temperature are close to bearing limits, lubrication is marginal, and vibration and moment loads are heavy, angular contact ball bearings may not be suitable, particularly when using certain types of cages. In such cases, please consult with NSK beforehand.

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*' (listed in the bearing tables) during operation, slippage occurs between the balls and raceways, which may result in smearing. This is especially true with large bearings since the weight of the balls and cage is high. If such load conditions are expected, please consult with NSK for bearing selection.

TOLERANCES AND RUNNING ACCURACY

SINGLE-ROW ANGULAR CONTACT BALL BEARINGS.....Table 7.2 (Pages A128 to A131)
HIGH-ACCURACY ANGULAR CONTACT BALL BEARINGS Tolerances: 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 HIGH-ACCURACY 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 classes over P5 are primarily used in the main spindles of machine tools; as such, they are used with a preload for rigidity. For ease of selection, internal clearances are adjusted to produce Very Light, Light, Medium, and Heavy preloads. These bearings also use a special fitting; please refer to Tables 9.1 and 9.5 (Pages A194 and A197) for more information.

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.

HIGH-ACCURACY 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)

Limiting speeds (grease/oil) listed in the bearing tables are for matched angular contact ball bearings with standard cages. Please consult NSK regarding bearings with optional cages, as limiting speeds (grease/oil) may differ from those listed. For example, limiting speeds (grease/oil) of machined cages (no designation) are 1.25 times higher than pressed cages.

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.

Grease lubrication is usually used with these bearings; however, such grease lubrication may affect the bearing in terms of temperature rise or durability. To allow a bearing to demonstrate its full performance, the bearing must be filled with the proper amount of a suitable grease. To do so, knowledge of the bearing's free space is critical.

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

Table 1 Free Space of Angular Contact Ball Bearings (1) (With Pressed Steel Cages)

Units: cm^3

Bearing Bore No.	Bearing Free Space			
	Bearing Series — Contact Angle Designation			
	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 Bearings (2) (With High-Tension Brass Machined Cages)

Units: cm^3

Bearing Bore No.	Bearing Free Space				
	Bearing Series — Contact Angle Designation				
	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 used to carry a large axial load. There are three combination patterns, which are expressed by combination designations 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.

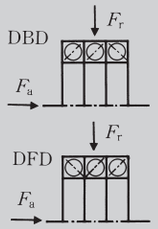
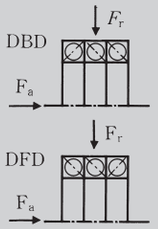
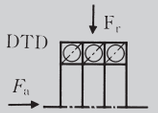
Assuming the dynamic equivalent radial load as P_r, the radial load as F_r, and axial load as F_a, the relationship between the dynamic equivalent radial load and bearing load may be approximated as follows:

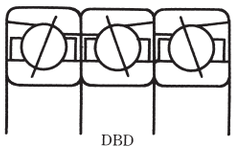
$$P_r = XF_r + YF_a \quad \cdots\cdots (1)$$

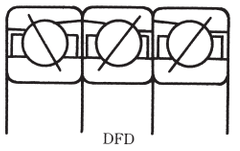
where X: Radial load factor, Y: Axial load factor } See Table 1

The axial load factor varies with contact angle. A small contact angle in an angular contact ball bearing varies substantially when 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. Axial load factors corresponding to this ratio at a contact angle of 15° are shown in Table 1. If 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.

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





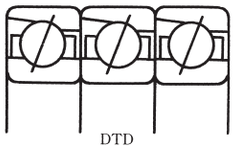


Table 1 Factors X and Y for Triplex Angular Contact Ball Bearing

Contact Angle α	j	$\frac{C_{0r}}{jF_a}$	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$		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 that of a single bearing	3 times that of a single bearing
		10		0.70		1.61	0.47		
		15		0.74		1.70	0.44		
		20		0.76		1.75	0.42		
		25		0.78		1.81	0.41		
		30		0.80		1.83	0.40		
		50		0.83		1.91	0.39		
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 that of a single bearing	3 times that of a single bearing
		10		2.51		2.61	0.47		
		15		2.64		2.76	0.44		
		20		2.73		2.85	0.42		
		25		2.80		2.93	0.41		
		30		2.85		2.98	0.40		
		50		2.98		3.11	0.39		
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 that of a single bearing	3 times that of a single bearing
		10				1.21	0.47		
		15				1.28	0.44		
		20				1.32	0.42		
		25				1.36	0.41		
		30				1.38	0.40		
		50				1.44	0.39		
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		

Angular Clearances in Double-Row Angular Contact Ball Bearings

The angular clearance for 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 refers to 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:

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

where Δ_a : Axial clearance (mm)
m_0 : Distance between inner and outer ring groove curvature centers
$m_0 = r_e + r_i - D_w$ (mm)
r_e : 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 Series 52, 53, 32, and 33 double-row angular contact ball bearings.

The relationship between radial clearance Δ_r and axial clearance Δ_a for double-row angular contact ball bearings is listed on pages C086 and C087. Fig. 2 shows the relationship between angular clearance θ and radial clearance Δ_r based on equations from those pages.

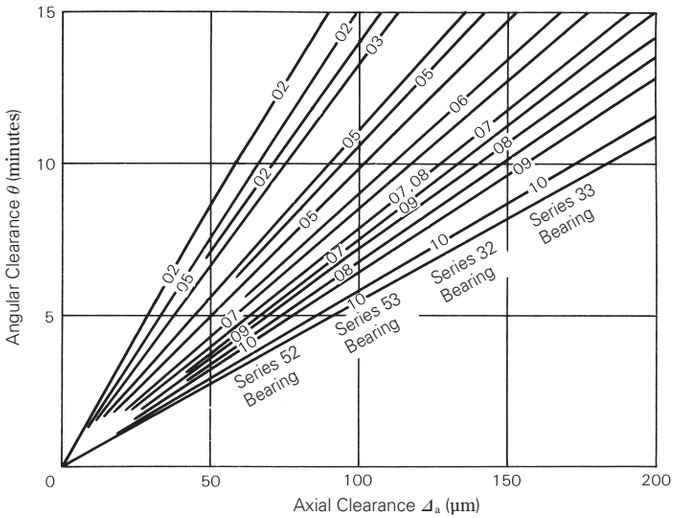


Fig. 1 Relationship Between Axial and Angular Clearances

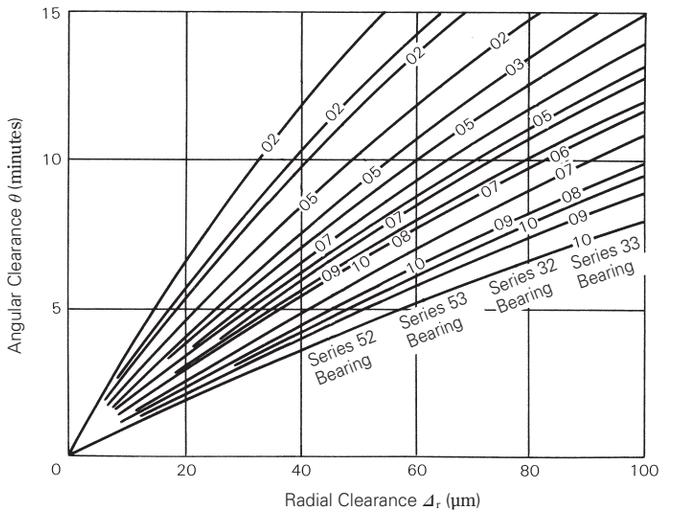


Fig. 2 Relationship Between Radial and Angular Clearances

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.

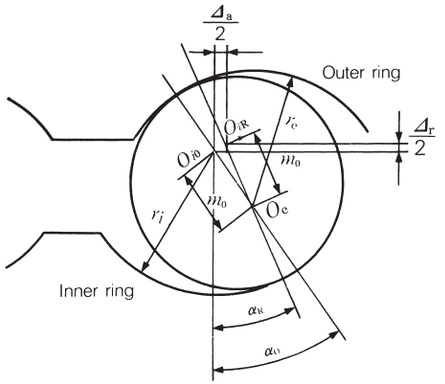


Fig. 1

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_{i0} : 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:

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

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

since $\sin^2\alpha_0=1-\cos^2\alpha_0$,

$$(m_0 \sin\alpha_0)^2=m_0^2-(m_0\cos\alpha_0)^2 \quad \cdots\cdots (3)$$

By combining Equations (1), (2), and (3), we obtain the following:

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

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

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

$$\Delta_a=2\sqrt{m_0^2-\left(m_0-\frac{\Delta_r}{2}\right)^2}$$

$$=2\sqrt{m_0\Delta_r-\frac{\Delta_r^2}{4}}$$

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

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

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 Series 52, 53, 32, and 33 double-row angular contact ball bearings. When the clearance range is small, axial clearance is given approximately by the following:

$$\Delta_a \fallingdotseq \Delta_r \cot\alpha_R \quad \cdots\cdots (7)$$

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).

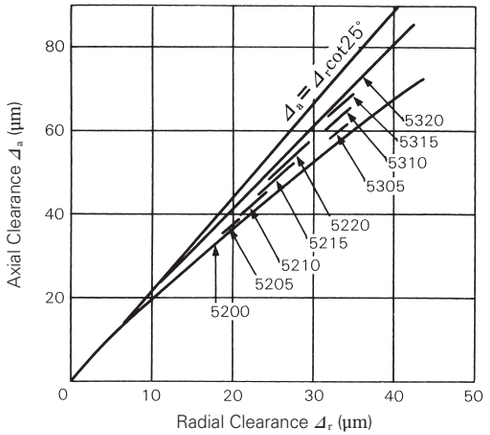


Fig. 2 Radial and Axial Clearances of Series 52 and 53 Bearings

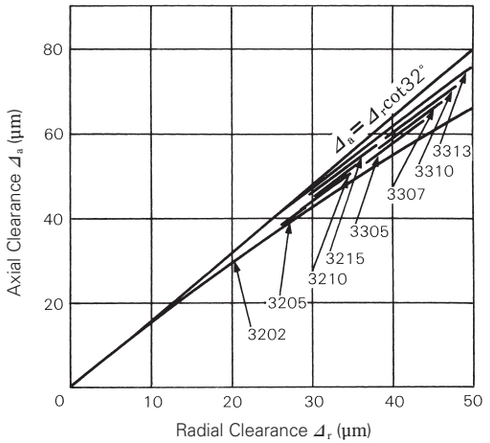
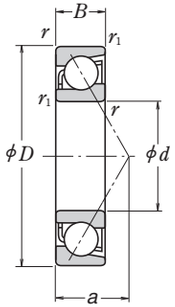


Fig. 3 Radial and Axial Clearances of Series 32 and 33 Bearings

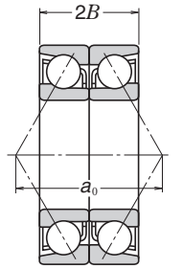
■ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

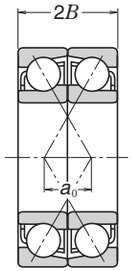
Bore Diameter 10 – 15 mm



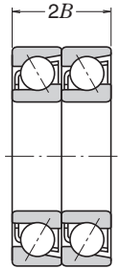
Single



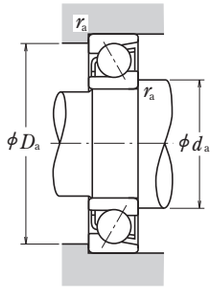
Back-to-Back
DB

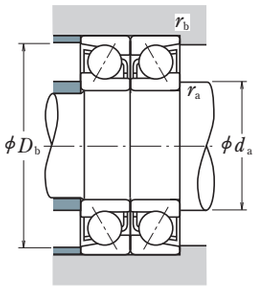


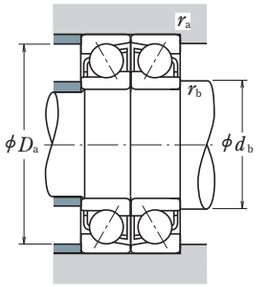
Face-to-Face
DF



Tandem
DT







Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$if_0F_a^*/C_{0r}$	e	Single, DT				DB or DF			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
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 and DF and 1 for DT

Static Equivalent Load $P_0 = X_0F_r + Y_0F_a$

Contact Angle	Single, DT		DB or DF		
	X_0	Y_0	X_0	Y_0	
30°	0.5	0.33	1	0.66	Single or DT mounting When $F_r > 0.5F_r + Y_0F_a$ use $P_0 = F_r$
40°	0.5	0.26	1	0.52	

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min⁻¹)		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2) Cage Designation (4)				Arrangement			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}	f_0	Grease	Oil	a	d_a min.	D_a max.	r_a max.	approx.	Single	Standard	Option					C_r	C_{0r}	Grease	Oil	DB	DF	d_b(3) min.	D_b max.	r_b(3) max.
10	26	8	0.3	0.15	5 900	2 600	—	24 000	34 000	9.2	12.5	23.5	0.3	0.019	**7000 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	9 600	5 200	20 000	28 000	18.4	2.4	11.2	24.8	0.15
	30	9	0.6	0.3	5 950	2 710	—	22 000	30 000	10.3	15	25	0.6	0.032	**7200 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	9 700	5 400	18 000	24 000	20.5	2.5	12.5	27.5	0.3
	30	9	0.6	0.3	5 500	2 500	—	16 000	22 000	12.9	15	25	0.6	0.032	**7200 B**	**W**	**(M), T**	**DB**	**DF**	**DT**	8 900	5 000	13 000	18 000	25.8	7.8	12.5	27.5	0.3
	35	11	0.6	0.3	10 200	4 300	—	16 000	22 000	12.0	15	30	0.6	0.053	**7300 A**	**W**	**(M), T**	**DB**	**DF**	**DT**	16 600	8 600	13 000	17 000	24.0	2.0	12.5	32.5	0.3
	35	11	0.6	0.3	9 600	4 050	—	14 000	20 000	14.9	15	30	0.6	0.054	**7300 B**	**W**	**(M), T**	**DB**	**DF**	**DT**	15 600	8 100	11 000	16 000	29.9	7.9	12.5	32.5	0.3
12	28	8	0.3	0.15	6 350	2 980	—	22 000	30 000	9.8	14.5	25.5	0.3	0.021	**7001 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	10 300	5 950	18 000	24 000	19.5	3.5	13.2	26.8	0.15
	32	10	0.6	0.3	8 800	4 050	—	20 000	28 000	11.4	17	27	0.6	0.037	**7201 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	14 300	8 050	16 000	22 000	22.7	2.7	14.5	29.5	0.3
	32	10	0.6	0.3	8 150	3 750	—	15 000	20 000	14.2	17	27	0.6	0.038	**7201 B**	**W**	**(M),T**	**DB**	**DF**	**DT**	13 300	7 500	12 000	16 000	28.5	8.5	14.5	29.5	0.3
	32	10	0.6	0.3	8 500	3 750	—	20 000	30 000	14.2	17	27	0.6	0.036	***7201 BEA**	**T85**	—	—	—	—	—	—	16 000	24 000	28.5	8.5	14.5	29.5	0.3
	37	12	1	0.6	10 400	4 500	—	15 000	20 000	13.1	18	31	1	0.060	**7301 A**	**W**	**(M), T**	**DB**	**DF**	**DT**	16 900	9 000	12 000	16 000	26.1	2.1	17	32	0.6
	37	12	1	0.6	9 750	4 200	—	13 000	18 000	16.3	18	31	1	0.062	**7301 B**	**W**	**(M), T**	**DB**	**DF**	**DT**	15 800	8 400	10 000	14 000	32.6	8.6	17	32	0.6
	37	12	1	0.6	11 600	4 950	—	18 000	26 000	16.3	18	31	1	0.061	***7301 BEA**	**T85**	—	—	—	—	—	—	15 000	22 000	32.6	8.6	17	32	0.6
15	32	9	0.3	0.15	6 750	3 450	—	19 000	26 000	11.3	17.5	29.5	0.3	0.030	**7002 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	10 900	6 850	15 000	22 000	22.6	4.6	16.2	30.8	0.15
	35	11	0.6	0.3	9 500	4 650	—	18 000	24 000	12.7	20	30	0.6	0.045	**7202 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	15 400	9 300	14 000	20 000	25.4	3.4	17.5	32.5	0.3
	35	11	0.6	0.3	8 750	4 300	—	13 000	18 000	16.0	20	30	0.6	0.046	**7202 B**	**W**	**(M),T**	**DB**	**DF**	**DT**	14 200	8 600	10 000	14 000	32.0	10.0	17.5	32.5	0.3
	35	11	0.6	0.3	10 200	4 800	—	18 000	26 000	16.0	20	30	0.6	0.044	***7202 BEA**	**T85**	—	—	—	—	—	—	14 000	20 000	32.0	10.0	17.5	32.5	0.3
	42	13	1	0.6	14 700	7 100	—	13 000	17 000	14.7	21	36	1	0.084	**7302 A**	**W**	**(M), T**	**DB**	**DF**	**DT**	23 900	14 200	10 000	13 000	29.5	3.5	20	37	0.6
	42	13	1	0.6	13 700	6 600	—	11 000	15 000	18.5	21	36	1	0.086	**7302 B**	**W**	**(M), T**	**DB**	**DF**	**DT**	22 300	13 200	9 000	12 000	36.9	10.9	20	37	0.6
	42	13	1	0.6	15 000	6 900	—	16 000	22 000	18.5	21	36	1	0.084	***7302 BEA**	**T85**	—	—	—	—	—	—	13 000	18 000	36.9	10.9	20	37	0.6

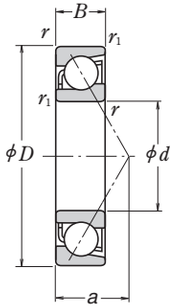
Notes (1) For applications operating near the limiting speed, refer to Page C077.
(2) Suffixes A and B represent contact angles of 30° and 40° respectively.
(3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

Note (4) Cage designation (M) is usually omitted from the bearing designation.
Remark Bearings with an asterisk (*) are high-accuracy angular contact ball bearings. In arrangements, they are limited to SU universal matching types. See Page C073 for details.

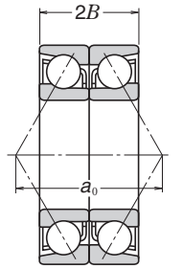
■ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

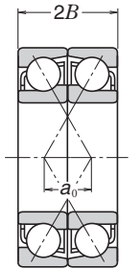
Bore Diameter 17 – 25 mm



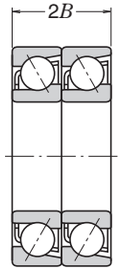
Single



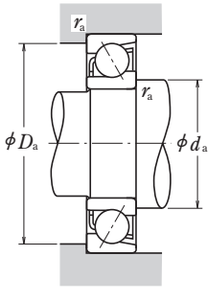
Back-to-Back
DB

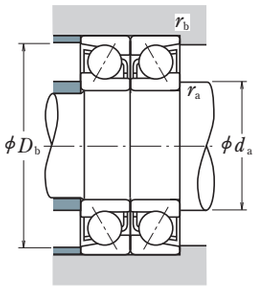


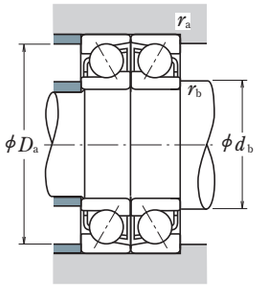
Face-to-Face
DF



Tandem
DT







Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$if_0F_a^*/C_{0r}$	e	Single, DT				DB or DF			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
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 and DF and 1 for DT

Static Equivalent Load $P_0 = X_0F_r + Y_0F_a$

Contact Angle	Single, DT		DB or DF	
	X_0	Y_0	X_0	Y_0
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When $F_r > 0.5F_r + Y_0F_a$ use $P_0 = F_r$

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min^{-1})		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	r_1 min.	C_r	C_{0r}	f_0	Grease	Oil	a	d_a min.	D_a max.	r_a max.	approx.
17	35	10	0.3	0.15	7 050	3 800	—	17 000	24 000	12.5	19.5	32.5	0.3	0.040
	40	12	0.6	0.3	11 900	6 000	—	16 000	22 000	14.2	22	35	0.6	0.067
	40	12	0.6	0.3	10 900	5 500	—	11 000	15 000	18.0	22	35	0.6	0.068
	40	12	0.6	0.3	12 100	6 100	—	16 000	22 000	18.2	22	35	0.6	0.065
	47	14	1	0.6	17 500	8 650	—	11 000	15 000	16.2	23	41	1	0.116
	47	14	1	0.6	16 300	8 000	—	10 000	14 000	20.4	23	41	1	0.118
	47	14	1	0.6	17 600	8 300	—	14 000	20 000	20.4	23	41	1	0.113
20	42	12	0.6	0.3	11 900	6 600	—	14 000	20 000	14.9	25	37	0.6	0.068
	47	14	1	0.6	15 900	8 300	—	13 000	18 000	16.7	26	41	1	0.106
	47	14	1	0.6	14 700	7 650	—	9 500	13 000	21.1	26	41	1	0.109
	47	14	1	0.6	16 300	8 150	—	13 000	19 000	21.1	26	41	1	0.103
	52	15	1.1	0.6	20 600	10 400	—	10 000	13 000	17.9	27	45	1	0.146
	52	15	1.1	0.6	19 100	9 650	—	9 000	12 000	22.6	27	45	1	0.150
	52	15	1.1	0.6	20 800	10 500	—	13 000	18 000	22.6	27	45	1	0.149
25	47	12	0.6	0.3	12 400	7 400	—	12 000	17 000	16.4	30	42	0.6	0.079
	52	15	1	0.6	17 800	10 300	—	12 000	16 000	18.6	31	46	1	0.130
	52	15	1	0.6	16 300	9 400	—	8 500	11 000	23.7	31	46	1	0.133
	52	15	1	0.6	18 400	10 200	—	12 000	17 000	23.7	31	46	1	0.127
	62	17	1.1	0.6	29 100	15 800	—	8 500	11 000	21.1	32	55	1	0.235

Bearing Designations (2) Cage Designation (4)			Arrangement			Basic Load Ratings (Matched) (N)		Limiting Speeds (1) (Matched) (min^{-1})		Load Center Spacings (mm) a_0		Abutment and Fillet Dimensions (mm)		
Single	Standard	Option				C_r	C_{0r}	Grease	Oil	DB	DF	d_b (3) min.	D_b max.	r_b (3) max.
7003 A	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	11 500	7 650	14 000	19 000	25.0	5.0	18.2	33.8	0.15
7203 A	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	19 300	12 000	13 000	17 000	28.5	4.5	19.5	37.5	0.3
7203 B	**W**	**(M),T**	**DB**	**DF**	**DT**	17 800	11 000	9 000	12 000	35.9	11.9	19.5	37.5	0.3
*7203 BEA	T85	T7	—	—	—	—	—	13 000	18 000	36.3	12.3	19.5	37.5	0.3
7303 A	**W**	**(M), T**	**DB**	**DF**	**DT**	28 500	17 300	9 000	12 000	32.5	4.5	22	42	0.6
7303 B	**W**	**(M), T**	**DB**	**DF**	**DT**	26 400	16 000	8 000	11 000	40.9	12.9	22	42	0.6
*7303 BEA	T85	—	—	—	—	—	—	11 000	16 000	40.9	12.9	22	42	0.6
7004 A	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	19 400	13 200	12 000	16 000	29.9	5.9	22.5	39.5	0.3
7204 A	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	25 900	16 600	11 000	15 000	33.3	5.3	25	42	0.6
7204 B	**W**	**(M),T**	**DB**	**DF**	**DT**	23 800	15 300	7 500	11 000	42.1	14.1	25	42	0.6
*7204 BEA	T85	T7	—	—	—	—	—	11 000	16 000	42.1	14.1	25	42	0.6
7304 A	**W**	**(M), T**	**DB**	**DF**	**DT**	33 500	20 800	8 000	11 000	35.8	5.8	25	47	0.6
7304 B	**W**	**(M), T**	**DB**	**DF**	**DT**	31 000	19 300	7 100	10 000	45.2	15.2	25	47	0.6
*7304 BEA	T85	MR, T7	—	—	—	—	—	10 000	14 000	45.2	15.2	25	47	0.6
7005 A	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	20 200	14 800	10 000	14 000	32.8	8.8	27.5	44.5	0.3
7205 A	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	29 000	20 500	9 500	13 000	37.2	7.2	30	47	0.6
7205 B	**W**	**(M),T**	**DB**	**DF**	**DT**	26 400	18 800	6 700	9 000	47.3	17.3	30	47	0.6
*7205 BEA	T85	T7	—	—	—	—	—	9 500	14 000	47.3	17.3	30	47	0.6
7305 A	**W**	**(M), T**	**DB**	**DF**	**DT**	47 000	31 500	6 700	9 000	42.1	8.1	30	57	0.6

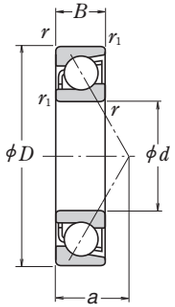
Notes (1) For applications operating near the limiting speed, refer to Page C077.
(2) Suffixes A and B represent contact angles of 30° and 40° respectively.
(3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

Note (4) Cage designation (M) is usually omitted from the bearing designation.
Remark Bearings with an asterisk (*) are high-accuracy angular contact ball bearings. In arrangements, they are limited to SU universal matching types. See Page C073 for details.

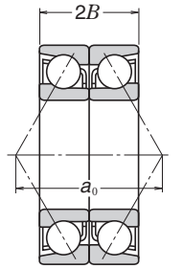
ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

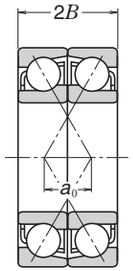
Bore Diameter 25 – 40 mm



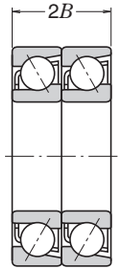
Single



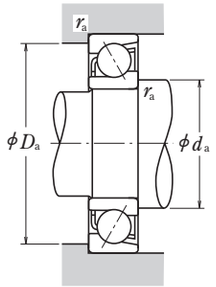
Back-to-Back
DB

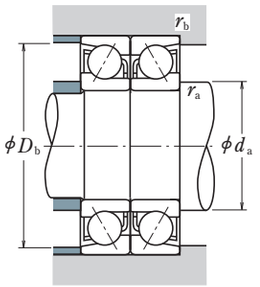


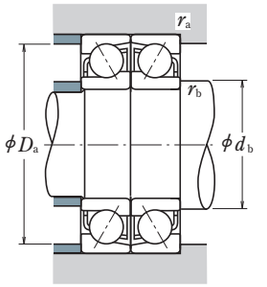
Face-to-Face
DF



Tandem
DT







Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$if_0F_a^*/C_{0r}$	e	Single, DT				DB or DF			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
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 and DF and 1 for DT

Static Equivalent Load $P_0 = X_0F_r + Y_0F_a$

Contact Angle	Single, DT		DB or DF		
	X_0	Y_0	X_0	Y_0	
30°	0.5	0.33	1	0.66	Single or DT mounting When $F_r > 0.5F_r + Y_0F_a$ use $P_0 = F_r$
40°	0.5	0.26	1	0.52	

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min⁻¹)		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2) Cage Designation (4)			Arrangement			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}	f_0	Grease	Oil	a	d_a min.	D_a max.	r_a max.	approx.	Single	Standard	Option				C_r	C_{0r}	Grease	Oil	DB	DF	d_b(3) min.	D_b max.	r_b(3) max.
25	62	17	1.1	0.6	26 800	14 600	—	7 500	10 000	26.7	32	55	1	0.241	**7305 B**	**W**	**(M), T**	**DB**	**DF**	**DT**	43 500	29 300	6 000	8 000	53.5	19.5	30	57	0.6
	62	17	1.1	0.6	28 400	14 900	—	10 000	15 000	26.8	32	55	1	0.229	***7305 BEA**	**T85**	**MR, T7**	—	—	—	—	—	8 500	12 000	53.5	19.5	30	57	0.6
30	55	13	1	0.6	16 000	10 100	—	11 000	14 000	18.8	36	49	1	0.116	**7006 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	26 000	20 200	8 500	12 000	37.5	11.5	35	50	0.6
	62	16	1	0.6	24 800	14 800	—	9 500	13 000	21.3	36	56	1	0.197	**7206 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	40 000	29 500	8 000	11 000	42.6	10.6	35	57	0.6
	62	16	1	0.6	22 600	13 500	—	7 100	9 500	27.3	36	56	1	0.202	**7206 B**	**W**	**(M),T**	**DB**	**DF**	**DT**	36 500	27 000	5 600	7 500	54.6	22.6	35	57	0.6
	62	16	1	0.6	24 900	14 300	—	10 000	14 000	27.3	36	56	1	0.194	***7206 BEA**	**T85**	**MR, T7**	—	—	—	—	—	8 000	11 000	54.6	22.6	35	57	0.6
	72	19	1.1	0.6	37 000	20 900	—	7 100	9 500	24.2	37	65	1	0.346	**7306 A**	**W**	**(M), T**	**DB**	**DF**	**DT**	60 000	41 500	5 600	7 500	48.4	10.4	35	67	0.6
	72	19	1.1	0.6	34 000	19 300	—	6 300	8 500	30.9	37	65	1	0.354	**7306 B**	**W**	**(M), T**	**DB**	**DF**	**DT**	55 500	38 500	5 000	7 100	61.8	23.8	35	67	0.6
	72	19	1.1	0.6	38 000	20 600	—	9 000	13 000	30.9	37	65	1	0.336	***7306 BEA**	**T85**	**MR, T7**	—	—	—	—	—	7 100	10 000	61.8	23.8	35	67	0.6
35	62	14	1	0.6	20 100	13 400	—	9 000	13 000	21.0	41	56	1	0.153	**7007 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	32 500	26 800	7 500	10 000	42.0	14.0	40	57	0.6
	72	17	1.1	0.6	32 500	20 100	—	8 500	12 000	23.9	42	65	1	0.287	**7207 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	53 000	40 000	6 700	9 500	47.9	13.9	40	67	0.6
	72	17	1.1	0.6	29 800	18 400	—	6 000	8 000	30.9	42	65	1	0.294	**7207 B**	**W**	**(M),T**	**DB**	**DF**	**DT**	48 500	36 500	4 800	6 700	61.9	27.9	40	67	0.6
	72	17	1.1	0.6	34 000	19 600	—	8 500	12 000	30.9	42	65	1	0.271	***7207 BEA**	**T85**	**MR, T7**	—	—	—	—	—	6 700	9 500	61.9	27.9	40	67	0.6
	80	21	1.5	1	44 000	26 300	—	6 300	8 500	27.1	44	71	1.5	0.464	**7307 A**	**W**	**(M), T**	**DB**	**DF**	**DT**	71 500	52 500	5 000	6 700	54.2	12.2	41	74	1
	80	21	1.5	1	42 000	24 400	—	8 000	11 000	34.6	44	71	1.5	0.451	***7307 BEA**	**T85**	**MR, T7**	—	—	—	—	—	6 300	9 000	69.2	27.2	41	74	1
	80	21	1.5	1	42 000	24 400	—	5 600	7 500	34.6	44	71	1.5	0.469	**7307 BEA**	**W**	**MR, T7**	**DB**	**DF**	**DT**	68 500	49 000	4 500	6 000	69.2	27.2	41	74	1
40	68	15	1	0.6	21 500	15 400	—	8 500	11 000	23.1	46	62	1	0.190	**7008 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	35 000	31 000	6 700	9 000	46.2	16.2	45	63	0.6
	80	18	1.1	0.6	39 000	25 100	—	7 500	10 000	26.3	47	73	1	0.375	**7208 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	63 000	50 500	6 000	8 500	52.6	16.6	45	75	0.6
	80	18	1.1	0.6	35 500	23 000	—	5 300	7 500	34.2	47	73	1	0.383	**7208 B**	**W**	**(M),T**	**DB**	**DF**	**DT**	57 500	46 000	4 300	6 000	68.3	32.3	45	75	0.6

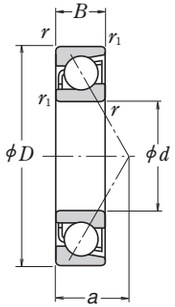
Notes (1) For applications operating near the limiting speed, refer to Page C077.
(2) Suffixes A and B represent contact angles of 30° and 40° respectively.
(3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

Note (4) Cage designation (M) is usually omitted from the bearing designation.
Remark Bearings with an asterisk (*) are high-accuracy angular contact ball bearings. In arrangements, they are limited to SU universal matching types. See Page C073 for details.

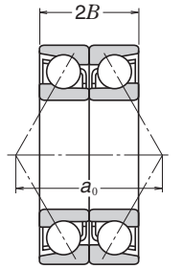
ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

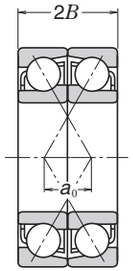
Bore Diameter 40 – 55 mm



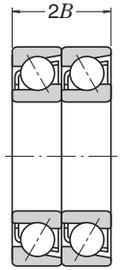
Single



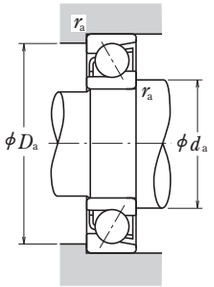
Back-to-Back
DB

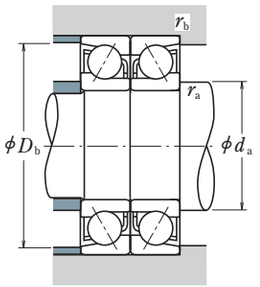


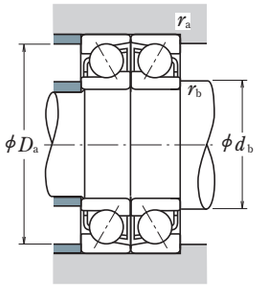
Face-to-Face
DF



Tandem
DT







Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$if_0F_a^*/C_{0r}$	e	Single, DT				DB or DF			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
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 and DF and 1 for DT

Static Equivalent Load $P_0 = X_0F_r + Y_0F_a$

Contact Angle	Single, DT		DB or DF		
	X_0	Y_0	X_0	Y_0	
30°	0.5	0.33	1	0.66	Single or DT mounting When $F_r > 0.5F_r + Y_0F_a$ use $P_0 = F_r$
40°	0.5	0.26	1	0.52	

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min⁻¹)		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2) Cage Designation (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}	f_0	Grease	Oil	a	d_a min.	D_a max.	r_a max.	approx.	Single	Standard	Option	Arrangement	C_r	C_{0r}	Grease	Oil	DB	DF	d_b(3) min.	D_b max.	r_b(3) max.
40	80	18	1.1	0.6	40 500	24 500	—	7 500	11 000	34.2	47	73	1	0.357	*7208 BEA	T85	MR, T7	— — —	—	—	6 000	8 500	68.3	32.3	45	75	0.6
	90	23	1.5	1	53 500	33 000	—	5 600	7 500	30.3	49	81	1.5	0.633	7308 A	W	(M), T	DB DF DT	87 000	66 000	4 500	6 000	60.5	14.5	46	84	1
	90	23	1.5	1	55 500	33 000	—	7 100	10 000	38.8	49	81	1.5	0.619	*7308 BEA	T85	MR, T7	— — —	—	—	5 600	8 000	77.5	31.5	46	84	1
	90	23	1.5	1	55 500	33 000	—	5 000	6 700	38.8	49	81	1.5	0.644	7308 BEA	W	MR, T7	DB DF DT	90 500	65 500	4 000	5 300	77.5	31.5	46	84	1
45	75	16	1	0.6	25 400	18 700	—	7 500	10 000	25.3	51	69	1	0.250	7009 A	W	(M), TYN	DB DF DT	41 500	37 500	6 000	8 500	50.6	18.6	50	70	0.6
	85	19	1.1	0.6	43 500	28 700	—	6 700	9 500	28.3	52	78	1	0.411	7209 A	W	(M), T,TYN	DB DF DT	71 000	57 500	5 600	7 500	56.5	18.5	50	80	0.6
	85	19	1.1	0.6	39 500	26 200	—	5 000	6 700	36.8	52	78	1	0.421	7209 B	W	(M),T	DB DF DT	64 500	52 500	4 000	5 300	73.5	35.5	50	80	0.6
	85	19	1.1	0.6	42 500	27 100	—	7 100	10 000	36.8	52	78	1	0.400	*7209 BEA	T85	MR, T7	— — —	—	—	5 600	8 000	73.5	35.5	50	80	0.6
	100	25	1.5	1	70 000	43 500	—	5 000	6 700	33.4	54	91	1.5	0.848	7309 A	W	(M), T	DB DF DT	113 000	87 000	4 000	5 300	66.9	16.9	51	94	1
	100	25	1.5	1	65 500	39 500	—	6 300	9 000	42.9	54	91	1.5	0.823	*7309 BEA	T85	MR, T7	— — —	—	—	5 000	7 100	85.8	35.8	51	94	1
	100	25	1.5	1	65 500	39 500	—	4 500	6 000	42.9	54	91	1.5	0.860	7309 BEA	W	MR, T7	DB DF DT	107 000	79 500	3 600	4 800	85.8	35.8	51	94	1
50	80	16	1	0.6	26 900	21 100	—	6 700	9 500	26.8	56	74	1	0.263	7010 A	W	(M), T,TYN	DB DF DT	43 500	42 000	5 600	7 500	53.5	21.5	55	75	0.6
	90	20	1.1	0.6	45 500	31 500	—	6 300	9 000	30.2	57	83	1	0.466	7210 A	W	(M), T,TYN	DB DF DT	74 000	63 000	5 000	7 100	60.4	20.4	55	85	0.6
	90	20	1.1	0.6	41 000	28 600	—	4 500	6 300	39.4	57	83	1	0.477	7210 B	W	(M),T	DB DF DT	67 000	57 000	3 600	5 000	78.7	38.7	55	85	0.6
	90	20	1.1	0.6	44 000	29 700	—	6 300	9 500	39.4	57	83	1	0.453	*7210 BEA	T85	MR, T7	— — —	—	—	5 000	7 500	78.7	38.7	55	85	0.6
	110	27	2	1	81 500	52 000	—	4 500	6 000	36.6	60	100	2	1.10	7310 A	W	(M), T	DB DF DT	133 000	104 000	3 600	4 800	73.2	19.2	56	104	1
	110	27	2	1	82 000	50 500	—	5 600	8 000	47.1	60	100	2	1.07	*7310 BEA	T85	MR, T7	— — —	—	—	4 500	6 700	94.1	40.1	56	104	1
	110	27	2	1	82 000	50 500	—	4 000	5 600	47.1	60	100	2	1.11	7310 BEA	W	MR, T7	DB DF DT	133 000	101 000	3 200	4 500	94.1	40.1	56	104	1
55	90	18	1.1	0.6	35 500	27 700	—	6 300	8 500	29.9	62	83	1	0.391	7011 A	W	(M), T,TYN	DB DF DT	57 500	55 500	5 000	6 700	59.9	23.9	60	85	0.6

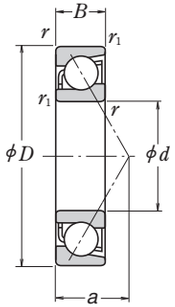
Notes (1) For applications operating near the limiting speed, refer to Page C077.
(2) Suffixes A and B represent contact angles of 30° and 40° respectively.
(3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

Note (4) Cage designation (M) is usually omitted from the bearing designation.
Remark Bearings with an asterisk (*) are high-accuracy angular contact ball bearings. In arrangements, they are limited to SU universal matching types. See Page C073 for details.

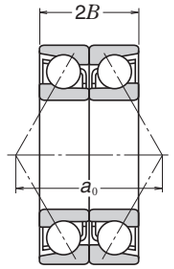
ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

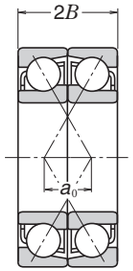
Bore Diameter 55 – 65 mm



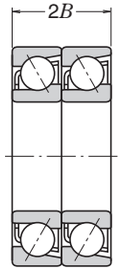
Single



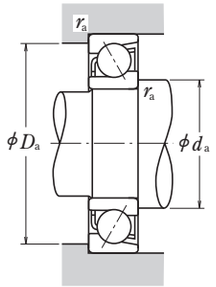
Back-to-Back
DB

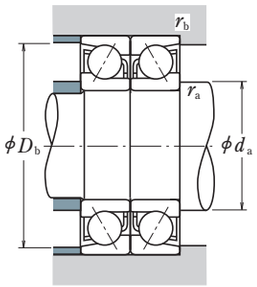


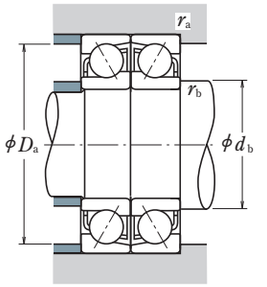
Face-to-Face
DF



Tandem
DT







Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$if_0F_a^*/C_{0r}$	e	Single, DT				DB or DF			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
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 and DF and 1 for DT

Static Equivalent Load $P_0 = X_0F_r + Y_0F_a$

Contact Angle	Single, DT		DB or DF	
	X_0	Y_0	X_0	Y_0
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting
When $F_r > 0.5F_r + Y_0F_a$ use $P_0 = F_r$

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min⁻¹)		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2) Cage Designation (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}	f_0	Grease	Oil	a	d_a min.	D_a max.	r_a max.	approx.	Single	Standard	Option	Arrangement	C_r	C_{0r}	Grease	Oil	DB a_0	DF a_0	d_b(3) min.	D_b max.	r_b(3) max.
55	100	21	1.5	1	56 000	39 500	—	5 600	8 000	32.9	64	91	1.5	0.613	**7211 A**	**W**	**(M), T,TYN**	**DB DF DT**	91 500	79 000	4 500	6 300	65.7	23.7	61	94	1
	100	21	1.5	1	51 000	36 000	—	4 000	5 600	43.0	64	91	1.5	0.627	**7211 B**	**W**	**(M),T**	**DB DF DT**	83 000	72 000	3 400	4 500	86.0	44.0	61	94	1
	100	21	1.5	1	54 000	37 000	—	6 000	8 500	43.0	64	91	1.5	0.596	***7211 BEA**	**T85**	**MR, T7**	— — —	—	—	4 500	6 700	86.0	44.0	61	94	1
	120	29	2	1	94 500	61 500	—	4 000	5 600	39.8	65	110	2	1.41	**7311 A**	**W**	**(M), T**	**DB DF DT**	153 000	123 000	3 200	4 300	79.5	21.5	61	114	1
	120	29	2	1	93 500	58 500	—	5 000	7 500	51.2	65	110	2	1.36	***7311 BEA**	**T85**	**MR, T7**	— — —	—	—	4 000	6 000	102.4	44.4	61	114	1
	120	29	2	1	93 500	58 500	—	3 600	5 000	51.2	65	110	2	1.42	**7311 BEA**	**W**	**MR, T7**	**DB DF DT**	152 000	117 000	3 000	4 000	102.4	44.4	61	114	1
60	95	18	1.1	0.6	36 500	29 500	—	5 600	8 000	31.4	67	88	1	0.417	**7012 A**	**W**	**(M), T,TYN**	**DB DF DT**	59 000	59 000	4 500	6 300	62.7	26.7	65	90	0.6
	110	22	1.5	1	68 000	48 500	—	5 300	7 100	35.5	69	101	1.5	0.798	**7212 A**	**W**	**(M), T,TYN**	**DB DF DT**	110 000	97 500	4 300	6 000	71.1	27.1	66	104	1
	110	22	1.5	1	61 500	44 500	—	3 800	5 300	46.7	69	101	1.5	0.815	**7212 B**	**W**	**(M),T**	**DB DF DT**	100 000	89 000	3 000	4 000	93.3	49.3	66	104	1
	110	22	1.5	1	64 500	45 000	—	5 300	7 500	46.7	69	101	1.5	0.791	***7212 BEA**	**T85**	**MR, T7**	— — —	—	—	4 300	6 000	93.3	49.3	66	104	1
	130	31	2.1	1.1	108 000	71 500	—	3 800	5 000	42.9	72	118	2	1.74	**7312 A**	**W**	**(M), T**	**DB DF DT**	175 000	143 000	3 000	4 000	85.9	23.9	67	123	1
	130	31	2.1	1.1	107 000	68 500	—	4 800	6 700	55.4	72	118	2	1.70	***7312 BEA**	**T85**	**MR, T7**	— — —	—	—	3 800	5 600	110.7	48.7	67	123	1
	130	31	2.1	1.1	107 000	68 500	—	3 400	4 500	55.4	72	118	2	1.77	**7312 BEA**	**W**	**MR, T7**	**DB DF DT**	174 000	137 000	2 600	3 800	110.7	48.7	67	123	1
65	100	18	1.1	0.6	38 500	33 000	—	5 300	7 500	32.8	72	93	1	0.455	**7013 A**	**W**	**(M), T,TYN**	**DB DF DT**	62 000	65 500	4 300	6 000	65.6	29.6	70	95	0.6
	120	23	1.5	1	77 500	58 000	—	4 800	6 700	38.2	74	111	1.5	1.03	**7213 A**	**W**	**(M), T,TYN**	**DB DF DT**	126 000	116 000	3 800	5 300	76.4	30.4	71	114	1
	120	23	1.5	1	70 000	52 500	—	3 400	4 800	50.3	74	111	1.5	1.05	**7213 B**	**W**	**(M),T**	**DB DF DT**	114 000	105 000	2 800	3 800	100.6	54.6	71	114	1
	120	23	1.5	1	73 500	53 500	—	4 800	7 100	50.3	74	111	1.5	1.01	***7213 BEA**	**T85**	**MR, T7**	— — —	—	—	3 800	5 600	100.6	54.6	71	114	1
	140	33	2.1	1.1	122 000	82 000	—	3 600	4 800	46.1	77	128	2	2.12	**7313 A**	**W**	**(M), T**	**DB DF DT**	198 000	164 000	2 800	3 800	92.2	26.2	72	133	1
	140	33	2.1	1.1	119 000	77 000	—	4 300	6 300	59.5	77	128	2	2.09	***7313 BEA**	**T85**	**MR, T7**	— — —	—	—	3 600	5 000	119.0	53.0	72	133	1
	140	33	2.1	1.1	119 000	77 000	—	3 200	4 300	59.5	77	128	2	2.17	**7313 BEA**	**W**	**MR, T7**	**DB DF DT**	193 000	154 000	2 400	3 400	119.0	53.0	72	133	1

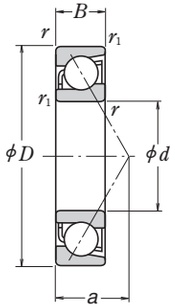
Notes (1) For applications operating near the limiting speed, refer to Page C077.
(2) Suffixes A and B represent contact angles of 30° and 40° respectively.
(3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

Note (4) Cage designation (M) is usually omitted from the bearing designation.
Remark Bearings with an asterisk (*) are high-accuracy angular contact ball bearings. In arrangements, they are limited to SU universal matching types. See Page C073 for details.

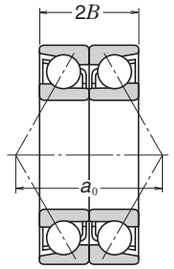
■ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

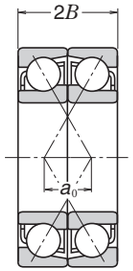
Bore Diameter 70 – 80 mm



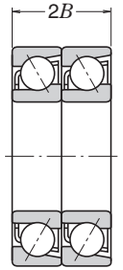
Single



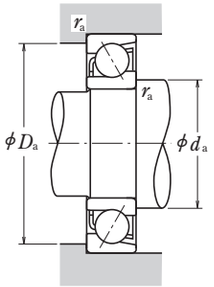
Back-to-Back
DB

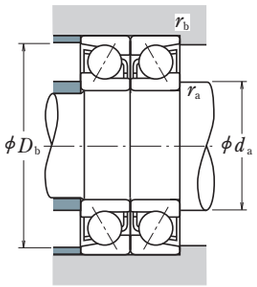


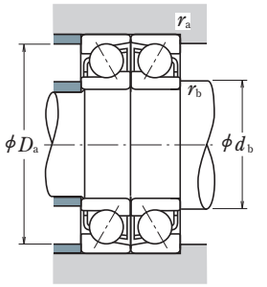
Face-to-Face
DF



Tandem
DT







Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$if_0F_a^*/C_{0r}$	e	Single, DT				DB or DF			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
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 and DF and 1 for DT

Static Equivalent Load $P_0 = X_0F_r + Y_0F_a$

Contact Angle	Single, DT		DB or DF		
	X_0	Y_0	X_0	Y_0	
30°	0.5	0.33	1	0.66	Single or DT mounting When $F_r > 0.5F_r + Y_0F_a$ use $P_0 = F_r$
40°	0.5	0.26	1	0.52	

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min⁻¹)		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2) Cage Designation (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}	f_0	Grease	Oil	a	d_a min.	D_a max.	r_a max.	approx.	Single	Standard	Option	Arrangement	C_r	C_{0r}	Grease	Oil	DB a_0	DF a_0	d_b(3) min.	D_b max.	r_b(3) max.
70	110	20	1.1	0.6	48 500	41 500	—	5 000	6 700	36.0	77	103	1	0.625	**7014 A**	**W**	**(M), T,TYN**	**DB DF DT**	79 000	82 500	4 000	5 600	72.0	32.0	75	105	0.6
	125	24	1.5	1	84 000	63 500	—	4 500	6 300	40.1	79	116	1.5	1.11	**7214 A**	**W**	**(M), T,TYN**	**DB DF DT**	136 000	127 000	3 600	5 000	80.3	32.3	76	119	1
	125	24	1.5	1	76 000	58 000	—	3 200	4 500	52.9	79	116	1.5	1.14	**7214 B**	**W**	**(M),T**	**DB DF DT**	124 000	116 000	2 600	3 600	105.8	57.8	76	119	1
	125	24	1.5	1	79 500	58 500	—	4 500	6 700	52.9	79	116	1.5	1.08	***7214 BEA**	**T85**	**MR, T7**	— — —	—	—	3 600	5 300	105.8	57.8	76	119	1
	150	35	2.1	1.1	137 000	93 500	—	3 200	4 300	49.3	82	138	2	2.60	**7314 A**	**W**	**(M), T**	**DB DF DT**	223 000	187 000	2 600	3 400	98.5	28.5	77	143	1
	150	35	2.1	1.1	129 000	87 500	—	4 000	6 000	63.7	82	138	2	2.53	***7314 BEA**	**T85**	**MR, T7**	— — —	—	—	3 200	4 800	127.3	57.3	77	143	1
	150	35	2.1	1.1	129 000	87 500	—	2 800	4 000	63.6	82	138	2	2.62	**7314 BEA**	**W**	**MR, T7**	**DB DF DT**	210 000	175 000	2 400	3 200	127.3	57.3	77	143	1
75	115	20	1.1	0.6	49 500	43 500	—	4 800	6 300	37.4	82	108	1	0.661	**7015 A**	**W**	**(M), T,TYN**	**DB DF DT**	80 500	87 500	3 800	5 300	74.8	34.8	80	110	0.6
	130	25	1.5	1	83 500	64 500	—	4 300	6 000	42.1	84	121	1.5	1.19	**7215 A**	**W**	**(M), T,TYN**	**DB DF DT**	136 000	129 000	3 600	4 800	84.2	34.2	81	124	1
	130	25	1.5	1	75 500	58 500	—	3 200	4 300	55.5	84	121	1.5	1.22	**7215 B**	**W**	**(M),T**	**DB DF DT**	123 000	117 000	2 400	3 400	111.0	61.0	81	124	1
	130	25	1.5	1	82 500	63 500	—	4 300	6 300	55.5	84	121	1.5	1.18	***7215 BEA**	**T85**	**MR**	— — —	—	—	3 600	5 000	111.0	61.0	81	124	1
	160	37	2.1	1.1	149 000	106 000	—	3 000	4 000	52.4	87	148	2	3.13	**7315 A**	**W**	**(M), T**	**DB DF DT**	243 000	212 000	2 400	3 200	104.8	30.8	82	153	1
	160	37	2.1	1.1	140 000	98 500	—	3 800	5 600	67.8	87	148	2	3.03	***7315 BEA**	**T85**	**MR**	— — —	—	—	3 000	4 500	135.6	61.6	82	153	1
	160	37	2.1	1.1	140 000	98 500	—	2 800	3 800	67.8	87	148	2	3.13	**7315 BEA**	**W**	**MR, T7**	**DB DF DT**	228 000	197 000	2 200	3 000	135.6	61.6	82	153	1
80	125	22	1.1	0.6	60 500	53 000	—	4 300	6 000	40.6	87	118	1	0.880	**7016 A**	**W**	**(M), T,TYN**	**DB DF DT**	98 500	106 000	3 600	4 800	81.2	37.2	85	120	0.6
	140	26	2	1	98 000	76 000	—	4 000	5 600	44.8	90	130	2	1.46	**7216 A**	**W**	**(M), T,TYN**	**DB DF DT**	159 000	152 000	3 200	4 500	89.5	37.5	86	134	1
	140	26	2	1	88 500	69 500	—	2 800	4 000	59.1	90	130	2	1.49	**7216 B**	**W**	**(M),T**	**DB DF DT**	144 000	139 000	2 400	3 200	118.3	66.3	86	134	1
	140	26	2	1	92 000	70 000	—	4 000	6 000	59.2	90	130	2	1.42	***7216 BEA**	**T85**	**MR, T7**	— — —	—	—	3 200	4 800	118.3	66.3	86	134	1
	170	39	2.1	1.1	162 000	119 000	—	2 800	3 800	55.6	92	158	2	3.71	**7316 A**	**W**	**(M), T**	**DB DF DT**	263 000	238 000	2 200	3 000	111.2	33.2	87	163	1
	170	39	2.1	1.1	151 000	110 000	—	3 600	5 300	71.9	92	158	2	3.59	***7316 BEA**	**T85**	**MR, T7**	— — —	—	—	2 800	4 300	143.9	65.9	87	163	1
	170	39	2.1	1.1	151 000	110 000	—	2 600	3 400	71.9	92	158	2	3.84	**7316 BEA**	**W**	**MR, T7**	**DB DF DT**	246 000	220 000	2 000	2 800	143.9	65.9	87	163	1

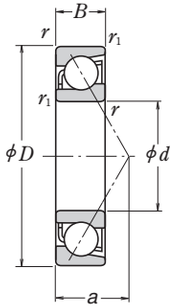
Notes (1) For applications operating near the limiting speed, refer to Page C077.
(2) Suffixes A and B represent contact angles of 30° and 40° respectively.
(3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

Note (4) Cage designation (M) is usually omitted from the bearing designation.
Remark Bearings with an asterisk (*) are high-accuracy angular contact ball bearings. In arrangements, they are limited to SU universal matching types. See Page C073 for details.

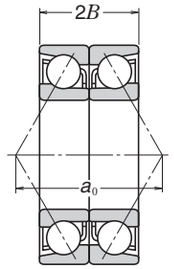
■ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

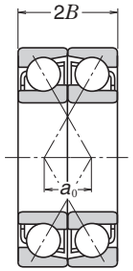
Bore Diameter 85 – 100 mm



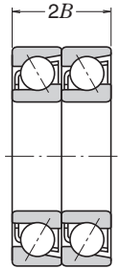
Single



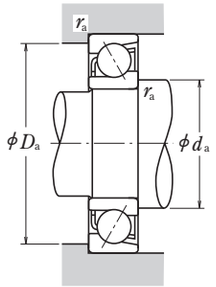
Back-to-Back
DB

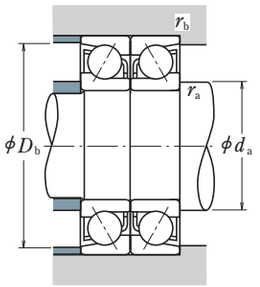


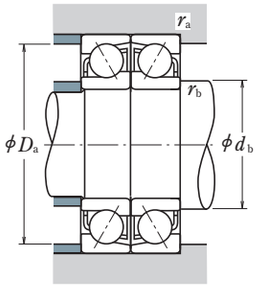
Face-to-Face
DF



Tandem
DT







Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$if_0F_a^*/C_{0r}$	e	Single, DT				DB or DF			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
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 and DF and 1 for DT

Static Equivalent Load $P_0 = X_0F_r + Y_0F_a$

Contact Angle	Single, DT		DB or DF	
	X_0	Y_0	X_0	Y_0
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When $F_r > 0.5F_r + Y_0F_a$ use $P_0 = F_r$

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min⁻¹)		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2) Cage Designation (4)				Arrangement			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}	f_0	Grease	Oil	a	d_a min.	D_a max.	r_a max.	approx.	Single	Standard	Option					C_r	C_{0r}	Grease	Oil	DB	DF	d_b(3) min.	D_b max.	r_b(3) max.
85	130	22	1.1	0.6	62 000	56 000	—	4 300	5 600	42.0	92	123	1	0.913	**7017 A**	**W**	**(M), T,TYN**		**DB**	**DF**	**DT**	101 000	112 000	3 400	4 500	84.1	40.1	90	125	0.6
	150	28	2	1	113 000	89 000	—	3 800	5 300	47.9	95	140	2	1.83	**7217 A**	**W**	**(M), T,TYN**		**DB**	**DF**	**DT**	184 000	178 000	3 000	4 300	95.8	39.8	91	144	1
	150	28	2	1	102 000	81 000	—	2 800	3 800	63.3	95	140	2	1.87	**7217 B**	**W**	**(M), T**		**DB**	**DF**	**DT**	166 000	162 000	2 200	3 000	126.6	70.6	91	144	1
	150	28	2	1	106 000	81 500	—	3 800	5 600	63.3	95	140	2	1.75	**7217 BEA**	**T85**	**—**		—	—	—	—	—	3 200	4 500	126.6	70.6	91	144	1
	180	41	3	1.1	175 000	133 000	—	2 600	3 600	58.8	99	166	2.5	4.33	**7317 A**	**W**	**(M), T**		**DB**	**DF**	**DT**	284 000	265 000	2 200	2 800	117.5	35.5	92	173	1
	180	41	3	1.1	160 000	122 000	—	2 400	3 200	76.1	99	166	2.5	4.42	**7317 B**	**W**	**(M), T**		**DB**	**DF**	**DT**	260 000	244 000	1 900	2 600	152.2	70.2	92	173	1
	180	41	3	1.1	172 000	133 000	—	3 400	5 000	76.1	99	166	2.5	4.34	**7317 BEA**	**T85**	**MR, T7**		—	—	—	—	—	2 800	4 000	152.2	70.2	92	173	1
90	140	24	1.5	1	74 000	66 500	—	3 800	5 300	45.2	99	131	1.5	1.19	**7018 A**	**W**	**(M), T,TYN**		**DB**	**DF**	**DT**	120 000	133 000	3 200	4 300	90.4	42.4	96	134	1
	160	30	2	1	130 000	103 000	—	3 600	4 800	51.1	100	150	2	2.25	**7218 A**	**W**	**(M), T,TYN**		**DB**	**DF**	**DT**	210 000	206 000	2 800	4 000	102.2	42.2	96	154	1
	160	30	2	1	117 000	94 000	—	2 600	3 400	67.4	100	150	2	2.29	**7218 B**	**W**	**(M), T**		**DB**	**DF**	**DT**	191 000	188 000	2 000	2 800	134.9	74.9	96	154	1
	160	30	2	1	120 000	93 500	—	3 600	5 300	67.4	100	150	2	2.19	**7218 BEA**	**T85**	**MR**		—	—	—	—	—	3 000	4 300	134.9	74.9	96	154	1
	190	43	3	1.1	188 000	147 000	—	2 600	3 400	61.9	104	176	2.5	5.06	**7318 A**	**W**	**(M), T**		**DB**	**DF**	**DT**	305 000	294 000	2 000	2 800	123.8	37.8	97	183	1
	190	43	3	1.1	172 000	135 000	—	2 200	3 000	80.2	104	176	2.5	5.17	**7318 B**	**W**	**(M), T**		**DB**	**DF**	**DT**	279 000	270 000	1 800	2 400	160.5	74.5	97	183	1
	190	43	3	1.1	186 000	146 000	—	3 200	4 500	80.2	104	176	2.5	4.97	**7318 BEA**	**T85**	**MR**		—	—	—	—	—	2 600	3 600	160.5	74.5	97	183	1
95	145	24	1.5	1	73 500	67 000	—	4 500	6 300	46.6	104	136	1.5	1.43	**7019 A**	**(M)**	**T,TYN**		**DB**	**DF**	**DT**	119 000	134 000	3 800	5 000	93.3	45.3	—	139	1
	170	32	2.1	1.1	141 000	111 000	—	3 400	4 500	54.2	107	158	2	2.68	**7219 A**	**W**	**(M), T,TYN**		**DB**	**DF**	**DT**	228 000	221 000	2 600	3 600	108.5	44.5	102	163	1
	170	32	2.1	1.1	127 000	101 000	—	2 400	3 200	71.6	107	158	2	2.74	**7219 B**	**W**	**(M), T**		**DB**	**DF**	**DT**	207 000	202 000	1 900	2 600	143.2	79.2	102	163	1
	170	32	2.1	1.1	136 000	107 000	—	3 400	5 000	71.6	107	158	2	2.67	**7219 BEA**	**T85**	**MR, T7**		—	—	—	—	—	2 800	4 000	143.2	79.2	102	163	1
	200	45	3	1.1	201 000	162 000	—	2 400	3 200	65.1	109	186	2.5	5.83	**7319 A**	**W**	**(M), T**		**DB**	**DF**	**DT**	325 000	325 000	1 900	2 600	130.2	40.2	102	193	1
	200	45	3	1.1	184 000	149 000	—	2 200	3 000	84.3	109	186	2.5	5.98	**7319 B**	**W**	**(M), T**		**DB**	**DF**	**DT**	299 000	298 000	1 700	2 400	168.7	78.7	102	193	1
	200	45	3	1.1	198 000	160 000	—	3 000	4 500	84.3	109	186	2.5	5.82	**7319 BEA**	**T85**	**MR**		—	—	—	—	—	2 400	3 600	168.7	78.7	102	193	1
100	150	24	1.5	1	75 000	70 500	—	4 500	6 000	48.1	109	141	1.5	1.48	**7020 A**	**(M)**	**T,TYN**		**DB**	**DF**	**DT**	122 000	141 000	3 600	5 000	96.2	48.2	—	144	1

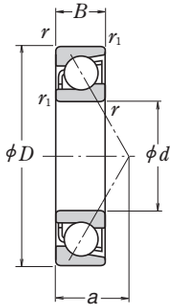
Notes (1) For applications operating near the limiting speed, refer to Page C077.
(2) Suffixes A and B represent contact angles of 30° and 40° respectively.
(3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

Note (4) Cage designation (M) is usually omitted from the bearing designation.

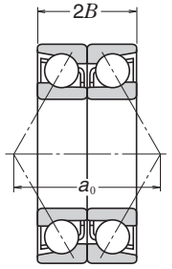
ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

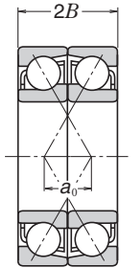
Bore Diameter 100 – 120 mm



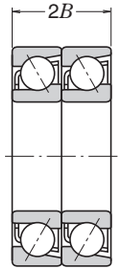
Single



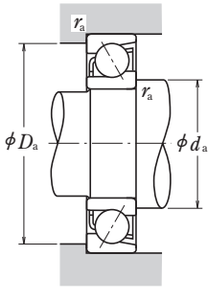
Back-to-Back
DB

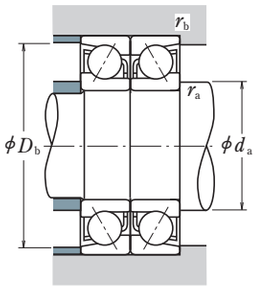


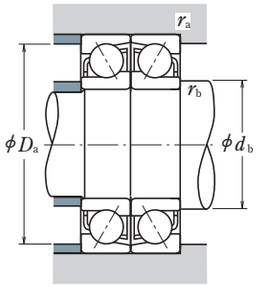
Face-to-Face
DF



Tandem
DT







Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$if_0F_a^*/C_{0r}$	e	Single, DT				DB or DF			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
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 and DF and 1 for DT

Static Equivalent Load $P_0 = X_0F_r + Y_0F_a$

Contact Angle	Single, DT		DB or DF		
	X_0	Y_0	X_0	Y_0	
30°	0.5	0.33	1	0.66	Single or DT mounting When $F_r > 0.5F_r + Y_0F_a$ use $P_0 = F_r$
40°	0.5	0.26	1	0.52	

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min^{-1})		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2) Cage Designation (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}	f_0	Grease	Oil	a	d_a min.	D_a max.	r_a max.	approx.	Single	Standard	Option	Arrangement	C_r	C_{0r}	Grease	Oil	DB	DF	d_b (3) min.	D_b max.	r_b (3) max.
100	180	34	2.1	1.1	158 000	126 000	—	3 200	4 300	57.4	112	168	2	3.22	**7220 A**	**W**	**(M), T,TYN**	**DB DF DT**	257 000	251 000	2 600	3 400	114.8	46.8	107	173	1
	180	34	2.1	1.1	143 000	114 000	—	2 200	3 000	75.7	112	168	2	3.28	**7220 B**	**W**	**(M), T**	**DB DF DT**	233 000	229 000	1 800	2 400	151.5	83.5	107	173	1
	180	34	2.1	1.1	150 000	122 000	—	3 200	4 500	75.7	112	168	2	3.27	**7220 BEA**	**T85**	**MR**	— — —	—	—	2 600	3 600	151.5	83.5	107	173	1
	215	47	3	1.1	228 000	193 000	—	2 200	3 000	69.0	114	201	2.5	7.29	**7320 A**	**W**	**(M), T**	**DB DF DT**	370 000	385 000	1 800	2 400	137.9	43.9	107	208	1
	215	47	3	1.1	209 000	178 000	—	2 000	2 800	89.6	114	201	2.5	7.43	**7320 B**	**W**	**(M), T**	**DB DF DT**	340 000	355 000	1 600	2 200	179.2	85.2	107	208	1
	215	47	3	1.1	222 000	187 000	—	2 800	4 000	89.6	114	201	2.5	7.14	**7320 BEA**	**T85**	**MR, T7**	— — —	—	—	2 200	3 200	179.2	85.2	107	208	1
105	160	26	2	1	88 000	81 500	—	4 300	5 600	51.2	115	150	2	1.84	**7021 A**	**(M)**	**T,TYN**	**DB DF DT**	143 000	163 000	3 400	4 500	102.5	50.5	—	154	1
	190	36	2.1	1.1	172 000	142 000	—	3 000	4 000	60.6	117	178	2	3.84	**7221 A**	**W**	**(M), T**	**DB DF DT**	280 000	283 000	2 400	3 400	121.2	49.2	112	183	1
	190	36	2.1	1.1	156 000	129 000	—	2 200	3 000	79.9	117	178	2	3.92	**7221 B**	**W**	**(M), T**	**DB DF DT**	254 000	258 000	1 700	2 400	159.8	87.8	112	183	1
	190	36	2.1	1.1	162 000	133 000	—	3 000	4 500	79.9	117	178	2	3.69	**7221 BEA**	**T85**	—	— — —	—	—	2 400	3 600	159.8	87.8	112	183	1
	225	49	3	1.1	228 000	193 000	—	2 600	3 600	72.1	119	211	2.5	9.34	**7321 A**	**(M)**	**T**	**DB DF DT**	370 000	385 000	2 200	2 800	144.3	46.3	—	218	1
	225	49	3	1.1	210 000	177 000	—	2 400	3 200	93.7	119	211	2.5	9.43	**7321 B**	**(M)**	**T**	**DB DF DT**	340 000	355 000	1 900	2 600	187.4	89.4	—	218	1
	225	49	3	1.1	235 000	203 000	—	2 600	4 000	93.7	119	211	2.5	8.12	**7321 BEA**	**T85**	**T7**	— — —	—	—	2 200	3 200	187.4	89.4	—	218	1
110	170	28	2	1	106 000	95 500	—	4 000	5 300	54.4	120	160	2	2.28	**7022 A**	**(M)**	**T,TYN**	**DB DF DT**	173 000	191 000	3 200	4 300	108.8	52.8	—	164	1
	200	38	2.1	1.1	187 000	158 000	—	2 800	3 800	63.7	122	188	2	4.49	**7222 A**	**W**	**(M), T,TYN**	**DB DF DT**	305 000	315 000	2 200	3 200	127.5	51.5	117	193	1
	200	38	2.1	1.1	169 000	144 000	—	2 000	2 800	84.0	122	188	2	4.58	**7222 B**	**W**	**(M), T**	**DB DF DT**	275 000	289 000	1 600	2 200	168.1	92.1	117	193	1
	200	38	2.1	1.1	169 000	144 000	—	2 800	4 300	84.0	122	188	2	4.48	**7222 BEA**	**T85**	**MR**	— — —	—	—	2 400	3 400	168.1	92.1	117	193	1
	240	50	3	1.1	242 000	215 000	—	2 600	3 400	75.5	124	226	2.5	11.1	**7322 A**	**(M)**	**W,T**	**DB DF DT**	395 000	430 000	2 000	2 600	151.0	51.0	—	233	1
	240	50	3	1.1	222 000	197 000	—	2 200	3 000	98.4	124	226	2.5	11.2	**7322 B**	**(M)**	**W,T**	**DB DF DT**	360 000	395 000	1 800	2 400	196.8	96.8	—	233	1
	240	50	3	1.1	249 000	226 000	—	2 600	3 800	98.4	124	226	2.5	9.91	**7322 BEA**	**T85**	**MR**	— — —	—	—	2 000	3 000	196.8	96.8	—	233	1
120	180	28	2	1	112 000	107 000	—	3 600	5 000	57.3	130	170	2	2.45	**7024 A**	**(M)**	**T,TYN**	**DB DF DT**	182 000	213 000	3 000	4 000	114.6	58.6	—	174	1
	215	40	2.1	1.1	201 000	177 000	—	3 200	4 500	68.3	132	203	2	6.22	**7224 A**	**(M)**	**T**	**DB DF DT**	325 000	355 000	2 600	3 600	136.7	56.7	—	208	1
	215	40	2.1	1.1	182 000	162 000	—	2 400	3 200	90.3	132	203	2	6.26	**7224 B**	**(M)**	**T**	**DB DF DT**	296 000	325 000	1 900	2 600	180.5	100.5	—	208	1
	215	40	2.1	1.1	197 000	177 000	—	2 600	3 800	90.3	132	203	2	5.37	**7224 BEA**	**T85**	**MR, T7**	— — —	—	—	2 200	3 000	180.5	100.5	—	208	1
	260	55	3	1.1	271 000	252 000	—	2 200	3 000	82.3	134	246	2.5	14.5	**7324 A**	**(M)**	**T**	**DB DF DT**	440 000	505 000	1 800	2 400	164.7	54.7	—	253	1
	260	55	3	1.1	248 000	231 000	—	2 000	2 800	107.2	134	246	2.5	14.4	**7324 B**	**(M)**	**T**	**DB DF DT**	400 000	460 000	1 600	2 200	214.4	104.4	—	253	1
	260	55	3	1.1	261 000	250 000	—	2 200	3 400	107.2	134	246	2.5	12.8	**7324 BEA**	**T85**	**MR**	— — —	—	—	1 900	2 800	214.4	104.4	—	253	1

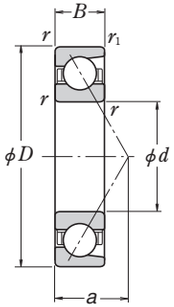
Notes (1) For applications operating near the limiting speed, refer to Page C077.
(2) Suffixes A and B represent contact angles of 30° and 40° respectively.
(3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

Note (4) Cage designation (M) is usually omitted from the bearing designation.

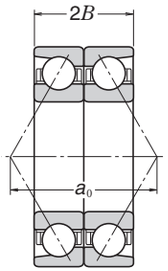
ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

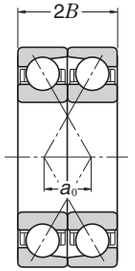
Bore Diameter 130 – 170 mm



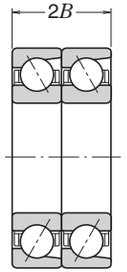
Single



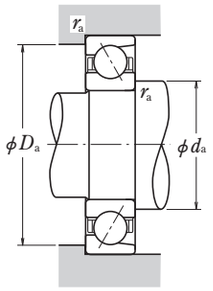
Back-to-Back
DB

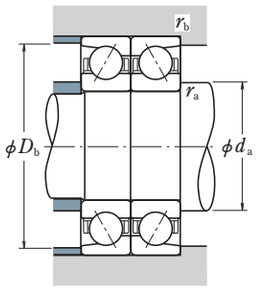


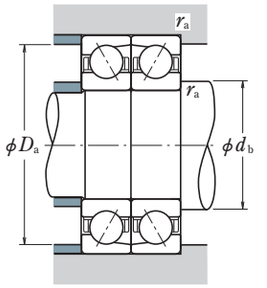
Face-to-Face
DF



Tandem
DT







Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$if_0F_a^*/C_{or}$	e	Single, DT				DB or DF			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
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 and DF and 1 for DT

Static Equivalent Load $P_0 = X_0F_r + Y_0F_a$

Contact Angle	Single, DT		DB or DF	
	X_0	Y_0	X_0	Y_0
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting
When $F_r > 0.5F_r + Y_0F_a$ use $P_0 = F_r$

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min⁻¹)		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2) Cage Designation (4)			Arrangement			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}	f_0	Grease	Oil	a	d_a min.	D_a max.	r_a max.	approx.	Single	Standard	Option				C_r	C_{0r}	Grease	Oil	DB	DF	d_b (3) min.	D_b max.	r_b (3) max.
130	200	33	2	1	129 000	125 000	—	3 400	4 500	64.1	140	190	2	3.68	**7026 A**	(M)	**T,TYN**	**DB**	**DF**	**DT**	210 000	251 000	2 600	3 600	128.3	62.3	—	194	1
	230	40	3	1.1	208 000	193 000	—	2 400	3 200	72.0	144	216	2.5	7.06	**7226 A**	(M)	**T**	**DB**	**DF**	**DT**	340 000	385 000	1 900	2 600	143.9	63.9	—	223	1
	230	40	3	1.1	188 000	175 000	—	2 200	3 000	95.5	144	216	2.5	7.10	**7226 B**	(M)	**T**	**DB**	**DF**	**DT**	305 000	350 000	1 700	2 400	191.0	111.0	—	223	1
	280	58	4	1.5	300 000	293 000	—	2 200	2 800	88.2	148	262	3	17.5	**7326 A**	(M)	**T**	**DB**	**DF**	**DT**	490 000	585 000	1 700	2 200	176.3	60.3	—	271	1.5
	280	58	4	1.5	275 000	268 000	—	1 900	2 600	115.0	148	262	3	17.6	**7326 B**	(M)	**T**	**DB**	**DF**	**DT**	445 000	535 000	1 500	2 000	230.0	114.0	—	271	1.5
140	210	33	2	1	132 000	133 000	—	3 200	4 300	67.0	150	200	2	3.90	**7028 A**	(M)	**T**	**DB**	**DF**	**DT**	214 000	265 000	2 600	3 400	134.0	68.0	—	204	1
	250	42	3	1.1	240 000	234 000	—	2 200	3 000	77.3	154	236	2.5	8.92	**7228 A**	(M)	**T**	**DB**	**DF**	**DT**	390 000	470 000	1 800	2 400	154.6	70.6	—	243	1
	250	42	3	1.1	217 000	213 000	—	2 000	2 800	102.8	154	236	2.5	8.94	**7228 B**	(M)	**T**	**DB**	**DF**	**DT**	355 000	425 000	1 600	2 200	205.6	121.6	—	243	1
	300	62	4	1.5	330 000	335 000	—	2 000	2 600	94.5	158	282	3	21.4	**7328 A**	(M)	**T**	**DB**	**DF**	**DT**	540 000	670 000	1 600	2 000	189.0	65.0	—	291	1.5
	300	62	4	1.5	305 000	310 000	—	1 700	2 400	123.3	158	282	3	21.6	**7328 B**	(M)	**T**	**DB**	**DF**	**DT**	490 000	615 000	1 400	1 900	246.6	122.6	—	291	1.5
150	225	35	2.1	1.1	151 000	154 000	—	2 400	3 000	71.6	162	213	2	4.75	**7030 A**	(M)	**T**	**DB**	**DF**	**DT**	245 000	305 000	1 900	2 400	143.3	73.3	—	218	1
	270	45	3	1.1	273 000	280 000	—	2 000	2 800	83.1	164	256	2.5	11.2	**7230 A**	(M)	—	**DB**	**DF**	**DT**	445 000	560 000	1 600	2 200	166.3	76.3	—	263	1
	270	45	3	1.1	247 000	254 000	—	1 800	2 600	110.6	164	256	2.5	11.2	**7230 B**	(M)	**T**	**DB**	**DF**	**DT**	400 000	510 000	1 500	2 000	221.2	131.2	—	263	1
	320	65	4	1.5	350 000	370 000	—	1 800	2 400	100.3	168	302	3	26.0	**7330 A**	(M)	—	**DB**	**DF**	**DT**	565 000	745 000	1 500	1 900	200.7	70.7	—	311	1.5
	320	65	4	1.5	320 000	340 000	—	1 600	2 200	131.1	168	302	3	25.9	**7330 B**	(M)	**T**	**DB**	**DF**	**DT**	515 000	680 000	1 300	1 800	262.2	132.2	—	311	1.5
160	240	38	2.1	1.1	171 000	176 000	—	2 200	2 800	76.7	172	228	2	5.77	**7032 A**	(M)	**T**	**DB**	**DF**	**DT**	277 000	355 000	1 700	2 400	153.5	77.5	—	233	1
	290	48	3	1.1	289 000	305 000	—	1 900	2 600	89.0	174	276	2.5	14.1	**7232 A**	(M)	**T**	**DB**	**DF**	**DT**	470 000	615 000	1 500	2 000	177.9	81.9	—	283	1
	290	48	3	1.1	261 000	279 000	—	1 700	2 400	118.4	174	276	2.5	14.2	**7232 B**	(M)	—	**DB**	**DF**	**DT**	425 000	555 000	1 400	1 900	236.8	140.8	—	283	1
	340	68	4	1.5	380 000	420 000	—	1 700	2 200	106.2	178	322	3	30.7	**7332 A**	(M)	**T**	**DB**	**DF**	**DT**	620 000	845 000	1 400	1 800	212.3	76.3	—	331	1.5
	340	68	4	1.5	350 000	385 000	—	1 500	2 000	138.9	178	322	3	30.8	**7332 B**	(M)	**T**	**DB**	**DF**	**DT**	565 000	770 000	1 200	1 700	277.8	141.8	—	331	1.5
170	260	42	2.1	1.1	204 000	214 000	—	2 000	2 600	83.1	182	248	2	7.90	**7034 A**	(M)	—	**DB**	**DF**	**DT**	330 000	430 000	1 600	2 200	166.1	82.1	—	253	1
	310	52	4	1.5	325 000	360 000	—	1 800	2 400	95.3	188	292	3	17.3	**7234 A**	(M)	—	**DB**	**DF**	**DT**	525 000	715 000	1 400	1 900	190.6	86.6	—	301	1.5
	310	52	4	1.5	293 000	325 000	—	1 600	2 200	126.7	188	292	3	17.6	**7234 B**	(M)	—	**DB**	**DF**	**DT**	475 000	650 000	1 300	1 700	253.4	149.4	—	301	1.5
	360	72	4	1.5	425 000	485 000	—	1 600	2 200	112.5	188	342	3	35.8	**7334 A**	(M)	—	**DB**	**DF**	**DT**	695 000	970 000	1 300	1 700	225.0	81.0	—	351	1.5
	360	72	4	1.5	390 000	445 000	—	1 400	2 000	147.2	188	342	3	35.6	**7334 B**	(M)	**T**	**DB**	**DF**	**DT**	635 000	890 000	1 100	1 600	294.3	150.3	—	351	1.5

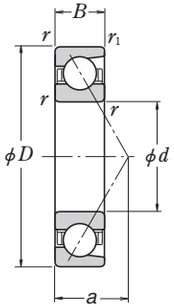
Notes (1) For applications operating near the limiting speed, refer to Page C077.
(2) Suffixes A and B represent contact angles of 30° and 40° respectively.
(3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

Note (4) Cage designation (M) is usually omitted from the bearing designation.

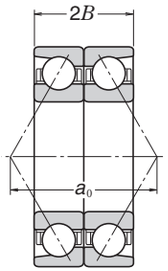
■ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

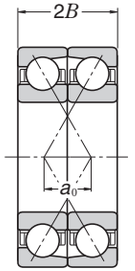
Bore Diameter 180 – 200 mm



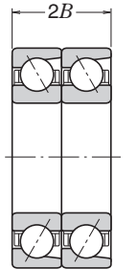
Single



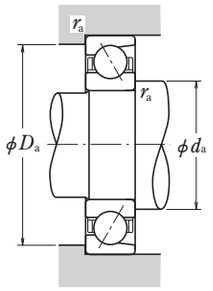
Back-to-Back
DB

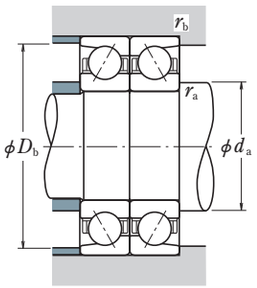


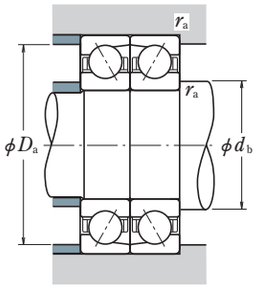
Face-to-Face
DF



Tandem
DT







Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$if_0F_a^*/C_{0r}$	e	Single, DT				DB or DF			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
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 and DF and 1 for DT

Static Equivalent Load $P_0 = X_0F_r + Y_0F_a$

Contact Angle	Single, DT		DB or DF	
	X_0	Y_0	X_0	Y_0
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting
When $F_r > 0.5F_r + Y_0F_a$ use $P_0 = F_r$

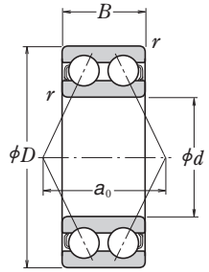
Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min^{-1})		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2) Cage Designation (4)				Basic Load Ratings (Matched) (N)		Limiting Speeds (1) (Matched) (min^{-1})		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
d	D	B	r min.	r_1 min.	C_r	C_{0r}	f_0	Grease	Oil	a	d_a min.	D_a max.	r_a max.	approx.	Single	Standard	Option	Arrangement	C_r	C_{0r}	Grease	Oil	DB a_0	DF a_0	d_b (3) min.	D_b max.	r_b (3) max.
180	280	46	2.1	1.1	228 000	252 000	—	1 900	2 400	89.4	192	268	2	10.5	**7036 A**	**(M)**	—	**DB DF DT**	370 000	505 000	1 500	2 000	178.8	86.8	—	273	1
	320	52	4	1.5	335 000	385 000	—	1 700	2 200	98.2	198	302	3	18.1	**7236 A**	**(M)**	—	**DB DF DT**	545 000	770 000	1 400	1 800	196.3	92.3	—	311	1.5
	320	52	4	1.5	305 000	350 000	—	1 500	2 000	130.9	198	302	3	18.4	**7236 B**	**(M)**	—	**DB DF DT**	495 000	700 000	1 200	1 700	261.8	157.8	—	311	1.5
	380	75	4	1.5	450 000	535 000	—	1 500	2 000	118.3	198	362	3	42.1	**7336 A**	**(M)**	—	**DB DF DT**	730 000	1 070 000	1 200	1 600	236.6	86.6	—	371	1.5
	380	75	4	1.5	410 000	490 000	—	1 300	1 800	155.0	198	362	3	42.6	**7336 B**	**(M)**	—	**DB DF DT**	665 000	975 000	1 100	1 500	309.9	159.9	—	371	1.5
190	290	46	2.1	1.1	246 000	280 000	—	1 800	2 400	92.3	202	278	2	11.3	**7038 A**	**(M)**	—	**DB DF DT**	400 000	560 000	1 400	1 900	184.6	92.6	—	283	1
	340	55	4	1.5	345 000	410 000	—	1 600	2 200	104.0	208	322	3	22.4	**7238 A**	**(M)**	—	**DB DF DT**	565 000	825 000	1 300	1 700	208.0	98.0	—	331	1.5
	340	55	4	1.5	310 000	375 000	—	1 400	2 000	138.7	208	322	3	22.5	**7238 B**	**(M)**	—	**DB DF DT**	505 000	750 000	1 100	1 600	277.3	167.3	—	331	1.5
	400	78	5	2	495 000	600 000	—	1 400	1 900	124.2	212	378	4	47.5	**7338 A**	**(M)**	**T**	**DB DF DT**	805 000	1 200 000	1 100	1 500	248.3	92.3	—	390	2
	400	78	5	2	455 000	550 000	—	1 300	1 700	162.8	212	378	4	47.2	**7338 B**	**(M)**	—	**DB DF DT**	735 000	1 100 000	1 000	1 400	325.5	169.5	—	390	2
200	310	51	2.1	1.1	264 000	310 000	—	1 700	2 200	99.1	212	298	2	13.7	**7040 A**	**(M)**	**T**	**DB DF DT**	430 000	620 000	1 300	1 800	198.2	96.2	—	303	1
	360	58	4	1.5	370 000	450 000	—	1 500	2 000	109.8	218	342	3	26.5	**7240 A**	**(M)**	—	**DB DF DT**	605 000	900 000	1 200	1 600	219.6	103.6	—	351	1.5
	360	58	4	1.5	335 000	410 000	—	1 300	1 800	146.5	218	342	3	26.6	**7240 B**	**(M)**	—	**DB DF DT**	545 000	815 000	1 100	1 500	292.9	176.9	—	351	1.5
	420	80	5	2	520 000	660 000	—	1 300	1 800	129.5	222	398	4	54.4	**7340 A**	**(M)**	**T**	**DB DF DT**	850 000	1 320 000	1 100	1 400	259.0	99.0	—	410	2
	420	80	5	2	475 000	600 000	—	1 200	1 600	170.1	222	398	4	55.3	**7340 B**	**(M)**	—	**DB DF DT**	775 000	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) Suffixes A and B represent contact angles of 30° and 40° respectively.
(3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

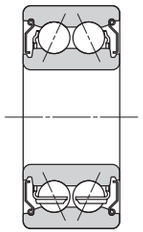
Note (4) Cage designation (M) is usually omitted from the bearing designation.

DOUBLE-ROW ANGULAR CONTACT BALL BEARINGS

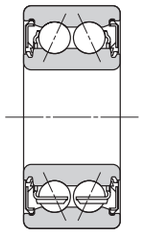
Bore Diameter 10 – 45 mm



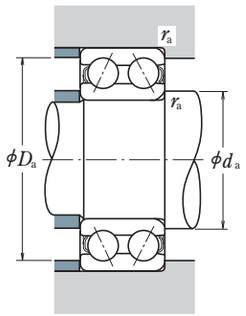
Open



Shielded (ZZ)



Sealed (DDU)



Dynamic Equivalent Load

$P = XF_r + YF_a$

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

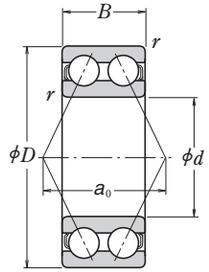
Static Equivalent Load

$P_0 = F_r + 0.76\,F_a$

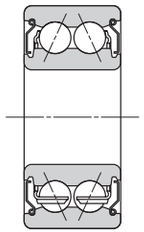
Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min^{-1}) Grease		Oil	Bearing Designations			Load Center Spacings (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Open ZZ	DDU	Open	Open	Shielded	Sealed	a_0	d_a min.	D_a max.	r_a max.	approx.
10	30	14.3	0.6	7 850	3 900	17 000	—	22 000	**5200**	—	—	14.5	15	25	0.6	0.050
	30	14.3	0.6	7 850	3 900	17 000	15 000	—	—	**5200ZZ**	**5200DDU**	14.5	14	26	0.6	0.050
12	32	15.9	0.6	11 600	5 800	15 000	—	20 000	**5201**	—	—	16.7	17	27	0.6	0.060
	32	15.9	0.6	9 350	5 300	15 000	12 000	—	—	**5201BZZ**	**5201BDDU**	16.3	16	28	0.6	0.060
15	35	15.9	0.6	12 900	7 050	13 000	—	17 000	**5202**	—	—	18.3	20	30	0.6	0.070
	35	15.9	0.6	9 350	5 300	13 000	12 000	—	—	**5202BZZ**	**5202BDDU**	16.3	19	31	0.6	0.070
	42	19	1	19 400	10 200	11 000	—	15 000	**5302**	—	—	22	21	36	1	0.13
	42	19	1	16 100	9 100	11 000	10 000	—	—	**5302AZZ**	**5302ADDU**	21	21	36	1	0.13
17	40	17.5	0.6	16 100	9 050	11 000	—	15 000	**5203**	—	—	20.8	22	35	0.6	0.10
	40	17.5	0.6	14 000	8 300	11 000	10 000	—	—	**5203AZZ**	**5203ADDU**	20.1	21	36	0.6	0.10
	47	22.2	1	23 100	12 600	10 000	—	13 000	**5303**	—	—	25	23	41	1	0.18
	47	22.2	1	21 600	12 400	10 000	9 500	—	—	**5303AZZ**	**5303ADDU**	24.3	23	41	1	0.18
20	47	20.6	1	21 600	12 400	10 000	—	13 000	**5204**	—	—	24.3	26	41	1	0.16
	47	20.6	1	17 500	10 700	10 000	9 000	—	—	**5204AZZ**	**5204ADDU**	23	26	41	1	0.16
	52	22.2	1.1	27 100	15 000	9 000	—	12 000	**5304**	—	—	26.7	27	45	1	0.22
	52	22.2	1.1	21 600	12 800	9 000	8 500	—	—	**5304AZZ**	**5304ADDU**	25.4	27	45	1	0.22
25	52	20.6	1	23 400	14 700	8 500	—	11 000	**5205**	—	—	26.8	31	46	1	0.18
	52	20.6	1	18 600	12 300	8 500	7 500	—	—	**5205BZZ**	**5205BDDU**	25.4	31	46	1	0.18
	62	25.4	1.1	36 000	20 700	7 500	—	10 000	**5305**	—	—	31.8	32	55	1	0.35
	62	25.4	1.1	27 800	18 200	7 500	6 300	—	—	**5305AZZ**	**5305ADDU**	30.9	32	55	1	0.36
30	62	23.8	1	32 500	21 100	7 100	—	9 500	**5206**	—	—	31.6	36	56	1	0.30
	62	23.8	1	27 800	18 200	7 100	6 300	—	—	**5206BZZ**	**5206BDDU**	30.9	36	56	1	0.30
	72	30.2	1.1	45 000	28 100	6 300	—	8 500	**5306**	—	—	36.5	37	65	1	0.57
	72	30.2	1.1	43 000	28 700	6 300	5 300	—	—	**5306AZZ**	**5306ADDU**	36.6	37	65	1	0.57
35	72	27	1.1	43 000	28 700	6 300	—	8 000	**5207**	—	—	36.6	42	65	1	0.46
	72	27	1.1	37 500	25 300	6 300	5 300	—	—	**5207AZZ**	**5207ADDU**	36.3	42	65	1	0.46
	80	34.9	1.5	56 000	36 000	5 600	—	7 500	**5307**	—	—	41.6	44	71	1.5	0.76
	80	34.9	1.5	48 500	33 500	5 600	4 800	—	—	**5307AZZ**	**5307ADDU**	41.5	44	71	1.5	0.79
40	80	30.2	1.1	48 500	33 500	5 600	—	7 100	**5208**	—	—	41.5	47	73	1	0.62
	80	30.2	1.1	40 000	29 000	5 600	4 800	—	—	**5208AZZ**	**5208ADDU**	39.4	47	73	1	0.63
	90	36.5	1.5	62 500	41 000	5 300	—	6 700	**5308**	—	—	45.5	49	81	1.5	1.03
	90	36.5	1.5	54 500	38 000	5 300	4 500	—	—	**5308AZZ**	**5308ADDU**	43.8	49	81	1.5	1.05
45	85	30.2	1.1	54 500	38 000	5 000	—	6 700	**5209**	—	—	43.4	52	78	1	0.67
	85	30.2	1.1	45 500	33 500	5 000	4 300	—	—	**5209A1ZZ**	**5209A1DDU**	42.5	52	78	1	0.67
	100	39.7	1.5	75 500	51 000	4 500	—	6 000	**5309**	—	—	50.6	54	91	1.5	1.37

■DOUBLE-ROW ANGULAR CONTACT BALL BEARINGS

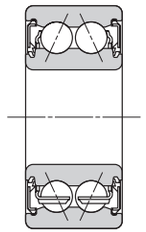
Bore Diameter 50 – 85 mm



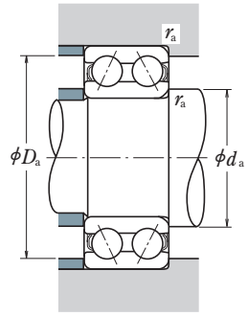
Open



Shielded (ZZ)



Sealed (DDU)



Dynamic Equivalent Load

$P = XF_r + YF_a$

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

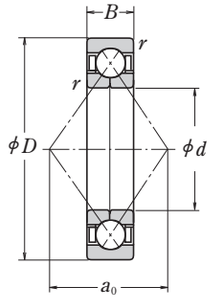
Static Equivalent Load

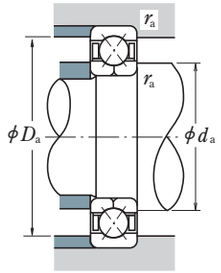
$P_0 = F_r + 0.76\,F_a$

Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min^{-1})			Bearing Designations			Load Center Spacings (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
						Grease		Oil								
d	D	B	r min.	C_r	C_{0r}	Open ZZ	DDU	Open	Open	Shielded	Sealed	a_0	d_a min.	D_a max.	r_a max.	approx.
50	90	30.2	1.1	58 500	43 500	4 800	—	6 000	**5210**	—	—	45.9	57	83	1	0.72
	90	30.2	1.1	44 500	36 000	4 800	4 000	—	—	**5210AZZ**	**5210ADDU**	44	57	83	1	0.73
	110	44.4	2	89 500	61 500	4 300	—	5 600	**5310**	—	—	55.6	60	100	2	1.84
55	100	33.3	1.5	61 500	49 000	4 300	—	5 600	**5211**	—	—	50.1	64	91	1.5	1.01
	100	33.3	1.5	54 500	43 500	4 300	3 600	—	—	**5211AZZ**	**5211ADDU**	49.2	64	91	1.5	1.01
	120	49.2	2	105 000	73 000	3 800	—	5 000	**5311**	—	—	60.6	65	110	2	2.40
60	110	36.5	1.5	76 000	62 000	3 800	—	5 000	**5212**	—	—	56.5	69	101	1.5	1.33
	130	54	2.1	138 000	98 500	3 400	—	4 500	**5312**	—	—	69.2	72	118	2	2.92
65	120	38.1	1.5	84 000	69 000	3 600	—	4 500	**5213**	—	—	59.7	74	111	1.5	1.71
	140	58.7	2.1	156 000	113 000	3 200	—	4 300	**5313**	—	—	72.8	77	128	2	3.67
70	125	39.7	1.5	103 000	82 000	3 400	—	4 500	**5214**	—	—	63.8	79	116	1.5	1.75
	150	63.5	2.1	175 000	128 000	3 000	—	3 800	**5314**	—	—	78.3	82	138	2	4.55
75	130	41.3	1.5	103 000	83 000	3 200	—	4 300	**5215**	—	—	66.1	84	121	1.5	1.88
80	140	44.4	2	109 000	93 000	3 000	—	3 800	**5216**	—	—	69.6	90	130	2	2.51
85	150	49.2	2	128 000	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

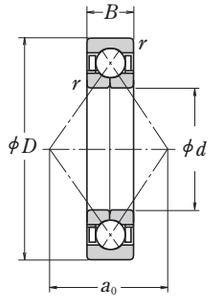
$P_{0a} = F_a$

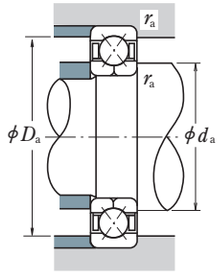
Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	Load Center Spacing (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	C_a	C_{0a}	Grease	Oil		a_0	d_a min.	D_a max.	r_a max.	approx.
30	62	16	1	34 000	45 000	8 500	12 000	**QJ 206**	32.2	36	56	1	0.24
	72	19	1.1	51 000	63 000	8 000	11 000	**QJ 306**	35.7	37	65	1	0.42
35	72	17	1.1	45 000	61 500	7 500	10 000	**QJ 207**	37.5	42	65	1	0.35
	80	21	1.5	60 500	80 000	7 100	9 500	**QJ 307**	40.3	44	71	1.5	0.57
40	80	18	1.1	53 500	77 500	6 700	9 000	**QJ 208**	42.0	47	73	1	0.45
	90	23	1.5	74 000	100 000	6 300	8 500	**QJ 308**	45.5	49	81	1.5	0.78
45	85	19	1.1	60 000	88 500	6 300	8 500	**QJ 209**	45.5	52	78	1	0.52
	100	25	1.5	96 000	133 000	5 600	7 500	**QJ 309**	50.8	54	91	1.5	1.05
50	90	20	1.1	63 000	97 000	5 600	8 000	**QJ 210**	49.0	57	83	1	0.59
	110	27	2	112 000	159 000	5 000	6 700	**QJ 310**	56.0	60	100	2	1.35
55	100	21	1.5	78 000	122 000	5 300	7 100	**QJ 211**	54.3	64	91	1.5	0.77
	120	29	2	130 000	187 000	4 500	6 300	**QJ 311**	61.3	65	110	2	1.75
60	110	22	1.5	94 000	150 000	4 800	6 300	**QJ 212**	59.5	69	101	1.5	0.98
	130	31	2.1	148 000	217 000	4 300	5 600	**QJ 312**	66.5	72	118	2	2.15
65	120	23	1.5	107 000	179 000	4 300	6 000	**QJ 213**	64.8	74	111	1.5	1.2
	140	33	2.1	168 000	250 000	3 800	5 300	**QJ 313**	71.8	77	128	2	2.7
70	125	24	1.5	117 000	197 000	4 000	5 600	**QJ 214**	68.3	79	116	1.5	1.3
	150	35	2.1	189 000	285 000	3 600	5 000	**QJ 314**	77.0	82	138	2	3.18
75	130	25	1.5	121 000	212 000	3 800	5 300	**QJ 215**	71.8	84	121	1.5	1.5
	160	37	2.1	206 000	320 000	3 400	4 800	**QJ 315**	82.3	87	148	2	3.9
80	125	22	1.1	84 500	167 000	3 800	5 300	**QJ 1016**	71.8	87	118	1	1.05
	140	26	2	136 000	236 000	3 600	5 000	**QJ 216**	77.0	90	130	2	1.85
	170	39	2.1	223 000	360 000	3 200	4 300	**QJ 316**	87.5	92	158	2	4.6
85	130	22	1.1	86 500	176 000	3 800	5 000	**QJ 1017**	75.3	92	123	1	1.1
	150	28	2	157 000	276 000	3 400	4 800	**QJ 217**	82.3	95	140	2	2.2
	180	41	3	240 000	405 000	3 000	4 000	**QJ 317**	92.8	99	166	2.5	5.34
90	140	24	1.5	103 000	208 000	3 400	4 800	**QJ 1018**	80.5	99	131	1.5	1.45
	160	30	2	180 000	320 000	3 200	4 300	**QJ 218**	87.5	100	150	2	2.75
	190	43	3	258 000	450 000	2 800	3 800	**QJ 318**	98.0	104	176	2.5	6.4
95	145	24	1.5	106 000	220 000	3 400	4 500	**QJ 1019**	84.0	104	136	1.5	1.5
	170	32	2.1	195 000	340 000	3 000	4 000	**QJ 219**	92.8	107	158	2	3.35
	200	45	3	276 000	495 000	2 600	3 600	**QJ 319**	103.3	109	186	2.5	7.4

Remark Please contact NSK when using four-point contact ball bearings.

FOUR-POINT-CONTACT BALL BEARINGS

Bore Diameter 100 – 200 mm





Dynamic Equivalent Load

$P_a = F_a$

Static Equivalent Load

$P_{0a} = F_a$

Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	Load Center Spacing (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	C_a	C_{0a}	Grease	Oil		a_0	d_a min.	D_a max.	r_a max.	approx.
100	150	24	1.5	108 000	232 000	3 200	4 300	**QJ 1020**	87.5	109	141	1.5	1.6
	180	34	2.1	219 000	390 000	2 800	3 800	**QJ 220**	98.0	112	168	2	4.0
	215	47	3	335 000	640 000	2 400	3 400	**QJ 320**	110.3	114	201	2.5	9.3
105	160	26	2	127 000	269 000	3 000	4 000	**QJ 1021**	92.8	115	150	2	2.0
	190	36	2.1	239 000	435 000	2 600	3 600	**QJ 221**	103.3	117	178	2	4.7
	225	49	3	335 000	640 000	2 400	3 200	**QJ 321**	115.5	119	211	2.5	10.5
110	170	28	2	153 000	315 000	2 800	3 800	**QJ 1022**	98.0	120	160	2	2.5
	200	38	2.1	259 000	490 000	2 600	3 400	**QJ 222**	108.5	122	188	2	5.6
	240	50	3	355 000	710 000	2 200	3 000	**QJ 322**	122.5	124	226	2.5	12.5
120	180	28	2	162 000	350 000	2 600	3 600	**QJ 1024**	105.0	130	170	2	2.65
	215	40	2.1	291 000	585 000	2 400	3 200	**QJ 224**	117.3	132	203	2	6.9
	260	55	3	395 000	835 000	2 000	2 800	**QJ 324**	133.0	134	246	2.5	15.4
130	200	33	2	186 000	415 000	2 400	3 200	**QJ 1026**	115.5	140	190	2	4.0
	230	40	3	300 000	635 000	2 200	3 000	**QJ 226**	126.0	144	216	2.5	7.7
	280	58	4	440 000	970 000	1 900	2 600	**QJ 326**	143.5	148	262	3	19
140	210	33	2	190 000	435 000	2 200	3 000	**QJ 1028**	122.5	150	200	2	4.3
	250	42	3	350 000	775 000	2 000	2 800	**QJ 228**	136.5	154	236	2.5	9.8
	300	62	4	480 000	1 110 000	1 700	2 400	**QJ 328**	154.0	158	282	3	24
150	225	35	2.1	217 000	505 000	2 000	2 800	**QJ 1030**	131.3	162	213	2	5.2
	270	45	3	395 000	925 000	1 800	2 600	**QJ 230**	147.0	164	256	2.5	12
	320	65	4	505 000	1 230 000	1 600	2 200	**QJ 330**	164.5	168	302	3	29
160	240	38	2.1	246 000	580 000	1 900	2 600	**QJ 1032**	140.0	172	228	2	6.4
	290	48	3	420 000	1 010 000	1 700	2 400	**QJ 232**	157.5	174	276	2.5	15
	340	68	4	555 000	1 400 000	1 500	2 000	**QJ 332**	175.1	178	322	3	31
170	260	42	2.1	295 000	705 000	1 800	2 400	**QJ 1034**	150.5	182	248	2	8.6
	310	52	4	470 000	1 180 000	1 600	2 200	**QJ 234**	168.0	188	292	3	19.5
	360	72	4	620 000	1 610 000	1 400	2 000	**QJ 334**	185.6	188	342	3	41
180	280	46	2.1	330 000	830 000	1 700	2 200	**QJ 1036**	161.0	192	268	2	11
	320	52	4	485 000	1 270 000	1 500	2 000	**QJ 236**	175.1	198	302	3	20.5
	380	75	4	655 000	1 770 000	1 300	1 800	**QJ 336**	196.1	198	362	3	48
190	290	46	2.1	355 000	925 000	1 600	2 200	**QJ 1038**	168.0	202	278	2	11.5
	340	55	4	480 000	1 290 000	1 400	2 000	**QJ 238**	185.6	208	322	3	23
	400	78	5	720 000	1 980 000	1 300	1 700	**QJ 338**	206.6	212	378	4	54.5
200	310	51	2.1	380 000	1 020 000	1 500	2 000	**QJ 1040**	178.6	212	298	2	15
	360	58	4	535 000	1 480 000	1 300	1 800	**QJ 240**	196.1	218	342	3	27
	420	80	5	760 000	2 180 000	1 200	1 600	**QJ 340**	217.1	222	398	4	61.5

Remark Please contact NSK when using four-point contact ball bearings.

4. SELF-ALIGNING BALL BEARINGS

INTRODUCTION ..... C 116

BEARING TABLES

SELF-ALIGNING BALL BEARINGS

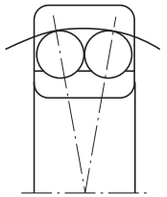
Bore Diameter 5 – 110 mm ..... C 118



DESIGN, TYPES, AND FEATURES

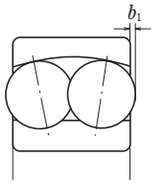
The outer ring of a self-aligning ball bearing has a spherical raceway and its center of curvature coincides with that of the bearing; therefore, the axis of the inner ring, balls and cage can deflect to some extent around the bearing center. This type is recommended when the alignment of the shaft and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

Pressed-steel cages are usually used.



PROTRUSION AMOUNT

Some self-aligning ball bearings have balls that protrude from the side face as shown below. This protrusion amount b_1 is listed in the following table.



Bearing Designation	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)

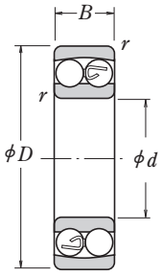
INTERNAL CLEARANCE ..... Table 8.13 (Page A170)

PERMISSIBLE MISALIGNMENT

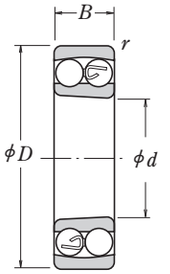
The permissible misalignment of self-aligning ball bearings is approximately 0.07 to 0.12 radian (4° to 7°) under normal loads. However, depending on the surrounding structure, such an angle may not be possible. Take care in the design of the bearing surroundings.

SELF-ALIGNING BALL BEARINGS

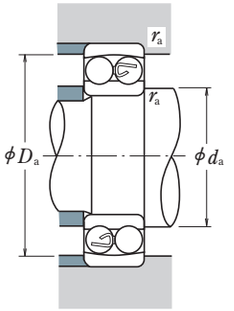
Bore Diameter 5 – 30 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

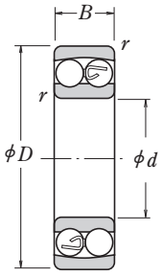
Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min⁻¹)		Bearing	Designations	Abutment and Fillet Dimensions (mm)			Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Grease	Oil	Cylindrical Bore	Tapered Bore[1]	d_a min.	D_a max.	r_a max.	e	Y_2	Y_3	Y_0	approx.
5	19	6	0.3	2 790	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	2 790	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	3 000	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	3 000	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	4 550	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	6 150	1 190	22 000	28 000	**1200**	—	14	26	0.6	0.32	3.1	2.0	2.1	0.034
	30	14	0.6	8 200	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	8 100	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	10 100	2 010	18 000	22 000	**2300**	—	14	31	0.6	0.71	1.4	0.89	0.93	0.080
12	32	10	0.6	6 250	1 270	22 000	26 000	**1201**	—	16	28	0.6	0.36	2.7	1.8	1.8	0.041
	32	14	0.6	8 500	1 730	22 000	26 000	**2201**	—	16	28	0.6	0.58	1.7	1.1	1.1	0.051
	37	12	1	10 600	2 160	18 000	22 000	**1301**	—	17	32	1	0.33	2.9	1.9	2.0	0.068
	37	17	1	13 300	2 730	17 000	22 000	**2301**	—	17	32	1	0.60	1.6	1.1	1.1	0.089
15	35	11	0.6	8 350	1 750	18 000	22 000	**1202**	—	19	31	0.6	0.32	3.1	2.0	2.1	0.050
	35	14	0.6	8 550	1 850	18 000	22 000	**2202**	—	19	31	0.6	0.50	1.9	1.3	1.3	0.058
	42	13	1	10 700	2 290	16 000	20 000	**1302**	—	20	37	1	0.33	2.9	1.9	2.0	0.101
	42	17	1	13 500	2 910	14 000	18 000	**2302**	—	20	37	1	0.51	1.9	1.2	1.3	0.116
17	40	12	0.6	8 800	2 010	16 000	20 000	**1203**	—	21	36	0.6	0.31	3.1	2.0	2.1	0.074
	40	16	0.6	10 900	2 420	16 000	20 000	**2203**	—	21	36	0.6	0.50	1.9	1.3	1.3	0.089
	47	14	1	14 000	3 200	14 000	17 000	**1303**	—	22	42	1	0.32	3.1	2.0	2.1	0.13
	47	19	1	16 200	3 550	13 000	16 000	**2303**	—	22	42	1	0.51	1.9	1.2	1.3	0.16
20	47	14	1	11 000	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	14 100	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	13 800	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	20 300	4 700	11 000	14 000	**2304**	**2304 K**	26.5	45.5	1	0.50	1.9	1.2	1.3	0.210
25	52	15	1	13 400	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	13 600	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	20 000	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	27 300	6 600	9 500	12 000	**2305**	**2305 K**	31.5	55.5	1	0.47	2.1	1.4	1.4	0.340
30	62	16	1	17 300	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	16 800	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	23 600	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	35 000	8 750	8 000	10 000	**2306**	**2306 K**	36.5	65.5	1	0.44	2.2	1.4	1.5	0.51

Note (1) Suffix K represents bearings with tapered bores (1 : 12).

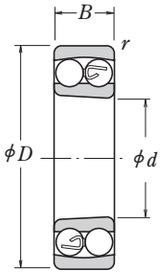
Remark For dimensions related to adapters, refer to Page C348.

SELF-ALIGNING BALL BEARINGS

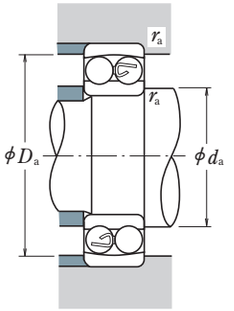
Bore Diameter 35 – 70 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

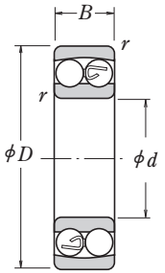
Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing	Designations	Abutment and Fillet Dimensions (mm)			Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Grease	Oil	Cylindrical Bore	Tapered Bore(1)	d_a min.	D_a max.	r_a max.	e	Y_2	Y_3	Y_0	approx.
35	72	17	1.1	17 500	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	23 900	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	27 800	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	44 000	11 300	7 100	9 000	**2307**	**2307 K**	43	72	1.5	0.46	2.1	1.4	1.4	0.687
40	80	18	1.1	21 200	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	24 700	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	33 000	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	50 000	13 500	6 300	8 000	**2308**	**2308 K**	48	82	1.5	0.43	2.3	1.5	1.5	0.940
45	85	19	1.1	24 200	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	25 700	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	42 000	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	60 500	16 700	5 600	7 100	**2309**	**2309 K**	53	92	1.5	0.41	2.4	1.5	1.6	1.3
50	90	20	1.1	25 100	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	25 700	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	48 000	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	72 000	20 200	5 000	6 300	**2310**	**2310 K**	59	101	2	0.42	2.3	1.5	1.6	1.66
55	100	21	1.5	29 600	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	29 300	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	57 000	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	84 000	24 000	4 800	6 000	**2311**	**2311 K**	64	111	2	0.41	2.4	1.5	1.6	2.12
60	110	22	1.5	33 500	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	37 500	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	63 500	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	97 000	28 300	4 300	5 300	**2312**	**2312 K**	71	119	2	0.40	2.4	1.6	1.6	2.63
65	120	23	1.5	34 000	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	48 000	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	68 500	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	107 000	32 500	3 800	4 800	**2313**	**2313 K**	76	129	2	0.39	2.5	1.6	1.7	3.3
70	125	24	1.5	38 500	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	48 500	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	82 500	27 700	4 000	5 000	**1314**	—	81	139	2	0.22	4.4	2.8	3.0	3.03
	150	51	2.1	122 000	37 500	3 600	4 500	**2314**	—	81	139	2	0.38	2.6	1.7	1.8	4.0

Note (1) Suffix K represents bearings with tapered bores (1 : 12).

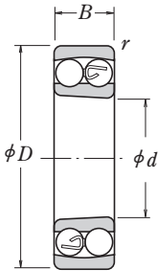
Remark For dimensions related to adapters, refer to Pages C348 and C349.

■SELF-ALIGNING BALL BEARINGS

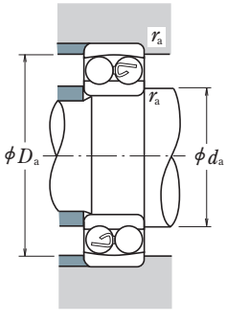
Bore Diameter 75 – 110 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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	Designations	Abutment and Fillet Dimensions (mm)			Constant	Axial Load Factors			Mass (kg)
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.	e	Y_2	Y_3	Y_0	approx.
75	130	25	1.5	43 000	15 700	4 300	5 300	**1215**	**1215 K**	83	122	1.5	0.17	5.6	3.6	3.8	1.36
	130	31	1.5	49 000	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	88 000	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	137 000	43 000	3 400	4 300	**2315**	**2315 K**	86	149	2	0.38	2.5	1.6	1.7	4.84
80	140	26	2	44 000	17 000	4 000	5 000	**1216**	**1216 K**	89	131	2	0.16	6.0	3.9	4.1	1.68
	140	33	2	54 000	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	98 000	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	143 000	45 000	3 200	4 000	**∗ 2316**	**∗ 2316 K**	91	159	2	0.39	2.5	1.6	1.7	5.75
85	150	28	2	54 500	20 800	3 800	4 500	**1217**	**1217 K**	94	141	2	0.17	5.7	3.7	3.8	2.1
	150	36	2	64 500	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	108 000	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	156 000	51 500	3 000	3 800	**2317**	**2317 K**	98	167	2.5	0.37	2.6	1.7	1.8	6.68
90	160	30	2	63 000	23 500	3 600	4 300	**1218**	**1218 K**	99	151	2	0.17	5.8	3.8	3.9	2.56
	160	40	2	77 500	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	129 000	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	170 000	57 500	2 800	3 600	**2318**	**2318 K**	103	177	2.5	0.38	2.6	1.7	1.7	7.87
95	170	32	2.1	70 500	27 100	3 400	4 000	**1219**	**1219 K**	106	159	2	0.17	5.8	3.7	3.9	3.12
	170	43	2.1	92 000	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	142 000	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	177 000	64 500	2 800	3 400	**∗ 2319**	**∗ 2319 K**	108	187	2.5	0.38	2.6	1.7	1.8	9.09
100	180	34	2.1	76 500	29 700	3 200	3 800	**1220**	**1220 K**	111	169	2	0.17	5.6	3.6	3.8	3.74
	180	46	2.1	104 000	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	155 000	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	206 000	79 000	2 400	3 200	**∗ 2320**	**∗ 2320 K**	113	202	2.5	0.38	2.6	1.7	1.8	11.7
105	190	36	2.1	82 500	32 500	3 000	3 600	**1221**	—	116	179	2	0.18	5.5	3.6	3.7	4.43
	190	50	2.1	120 000	45 000	3 000	3 600	**2221**	—	116	179	2	0.28	3.5	2.3	2.4	5.73
	225	49	3	169 000	64 500	2 600	3 200	**∗ 1321**	—	118	212	2.5	0.23	4.2	2.7	2.9	9.58
	225	77	3	220 000	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	96 000	38 500	2 800	3 400	**1222**	**1222 K**	121	189	2	0.17	5.7	3.7	3.9	5.21
	200	53	2.1	135 000	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	177 000	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	233 000	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) 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 dimensions related to adapters, refer to Pages C350 and C351.



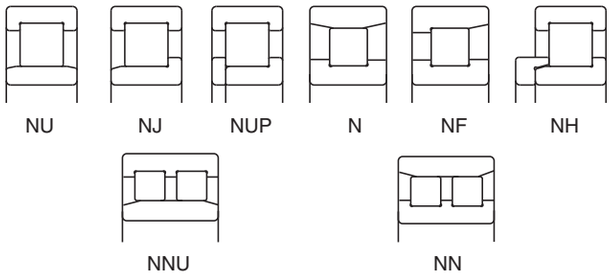
5. CYLINDRICAL ROLLER BEARINGS

SINGLE-ROW AND DOUBLE-ROW CYLINDRICAL ROLLER BEARINGS
INTRODUCTION ..... C 126
TECHNICAL DATA
Free Space of Cylindrical Roller Bearings ..... C 130
BEARING TABLES
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
BEARING TABLES
Single-Row(NCF) Bore Diameter 100 – 800 mm ..... C 166
Double-Row(NNCF) Bore Diameter 100 – 500 mm ..... C 170
For Sheaves: Open Fixed-End Bearings RS-48E4, RS-49E4
Free-End Bearings RSF-48E4, RSF-49E4
Bore Diameter 50 – 530 mm ..... C 174
For Sheaves: Prelubricated Type RS-50, RS-50NR
Bore Diameter 40 – 400 mm ..... C 178

DESIGN, TYPES, AND FEATURES

Cylindrical roller bearings are classified into the following types depending on whether or not they have ribs on their rings:



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.

The NH type consists of NJ-type cylindrical roller bearings and HJ-type L-shaped thrust collars (see Pages C156 and C157).

The inner ring loose rib of the NUP type 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	
		Method	Pressed		Molded		Machined	
		Designation	W	EW	ET	ET7	M	EM
Features		High Load Capacity	○	◎	◎	◎	△	◎
		High-Speed	△	○	○	○	○	◎
		High-Temperature	○	○	△	○	○	○
		Vibration	×	×	×	×	△	○

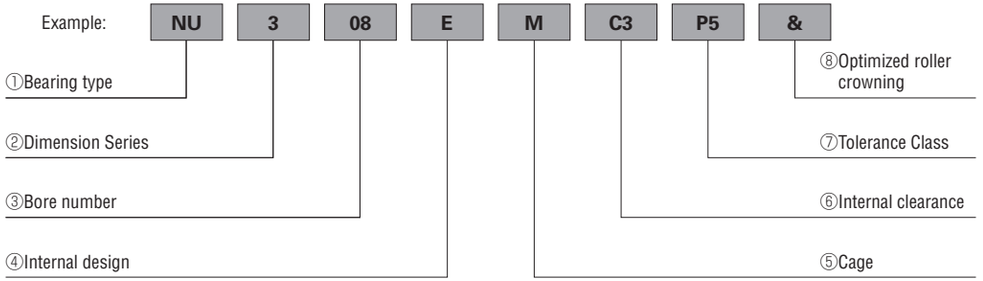
◎ Excellent ○ Good △ Fair × Poor

If a cage is nonstandard for a given designation, the number of rollers may vary; in such a case, the load rating will differ from that listed in the bearing tables.

Many NN double-row bearings have tapered bores, and they are primarily used in the main spindles of machine tools. Cages are made of either molded polyphenylenesulfide (PPS) or machined brass.

Formulation of Bearing Designations

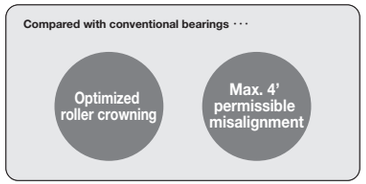
Single-Row Cylindrical Roller Bearing



①Bearing type	NU: Single-row cylindrical roller bearings (Outer ring with both ribs + Inner ring without rib) Please refer to page C126 for detailed information.
②Dimension Series	10: 10 Series, 2: 02 Series, 22: 22 Series, 3: 03 Series, 23: 23 Series, 4: 04 Series,
③Bore number	Bore diameter for 03 and under—01: 12 mm, 02: 15 mm, 03: 17 mm 04 and over—Bore diameter = Bore number × 5 (mm)
④Internal design	E: High load capacity
⑤Cage	W: Pressed-steel Cage, M: Machined Brass Cage, No designation: Machined-brass cage (in Series 10) T: Polyamide 66 resin cage, T7: L-PPS resin cage
⑥Internal clearance	For Interchangeable Cylindrical Roller Bearings— 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
⑦Tolerance class	Omitted: ISO Normal, P6: ISO Class 6, P5: ISO Class 5, P4: ISO Class 4
⑧Optimized roller crowning	&: Optimized roller crowing (Uses high load capacity machined brass cage and ISO Normal tolerance with clearance CN, C3, or C4)

Cylindrical Roller Bearings with Optimized Roller Crowning

Features



1. Increased reliability
A special crowning applied to the rollers optimizes the distribution of surface pressure at the roller contact area inside the bearing.
2. Improved performance
Accommodate a maximum permissible misalignment of 4'
—twice that of conventional products.

PRECAUTIONS FOR USE OF CYLINDRICAL ROLLER BEARINGS

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

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

If very small bearing loads, 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 to be used in gear oil, nonflammable hydraulic oil, or ester oil at a temperature over 100 °C, please contact NSK beforehand.

TOLERANCES AND RUNNING ACCURACY

CYLINDRICAL ROLLER BEARINGS ..... Table 7.2 (Pages A128 to A131)
WITH OPTIMIZED ROLLER CROWNING
Tolerance for Dimensions : ISO Normal
Running Accuracy : ISO Normal

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 With Interchangeable Rings

Units : μm

Nominal Bore Diameter d (mm)		Tolerances for F_w of Types NU, NJ, NUP, NH, and NNU Δ_{F_w}		Tolerances for E_w of Types N, NF, and NN Δ_{E_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)
WITH OPTIMIZED ROLLER CROWNING
INTERNAL CLEARANCE DESIGNATION : CN, C3, C4
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 reflect values for the standard cage type. Please consult with NSK regarding limiting speeds (mechanical) for optional cages.

LIMITING SPEEDS (Grease/Oil)

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

TECHNICAL DATA

Free Space of Cylindrical Roller Bearings

Cylindrical roller bearings often employ grease lubrication because it makes maintenance easier and simplifies the peripheral construction of the housing. Select a grease brand appropriate for the operating conditions while noting the grease fill amount and position of the bearing and housing.

Cylindrical roller bearings can be divided into types NU, NJ, N, NF, NH, and NUP 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 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 for the free space of NU type bearings.

For other types, the free space can be determined from a free space ratio based on the NU type, as shown in Table 3. For example, the free space of an NJ310 bearing with a pressed steel cage may be calculated approximately as 47 cm^3. This result was obtained by multiplying the free space of the bearing (52 cm^3) in Table 1 by the space ratio 0.90 for the NJ type (Table 3).

Table 1 Free Space of Cylindrical Roller Bearings (NU Type) (1) (With Pressed Cage)

Units: cm^3

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 Bearings (NU Type) (2) (With High-Tension Brass Machined Cage)

Units: cm^3

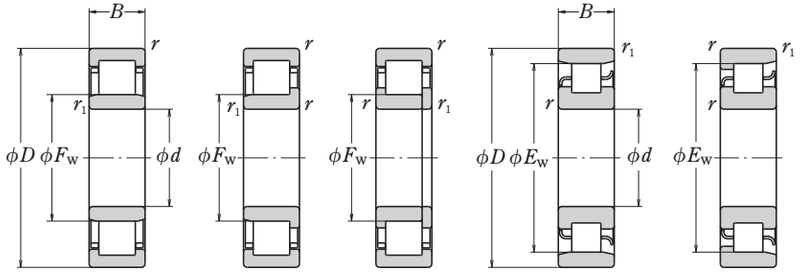
Bearing Bore No.	Bearing Free Space			
	Bearing Series			
	NU2	NU3	NU22	NU23
05	5.0	7.6	5.7	10
06	7.4	12	7.9	16
07	9.6	16	12	27
08	12	21	15	32
09	15	29	16	45
10	18	38	17	58
11	22	52	24	77
12	26	62	31	88
13	31	74	43	104
14	37	92	44	129
15	42	102	50	149
16	51	122	60	181
17	64	164	74	200
18	79	193	96	279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

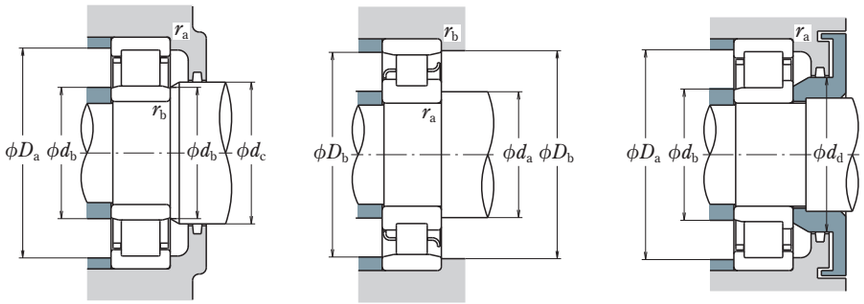
Table 3 Ratio of Free Space in Cylindrical Roller Bearing Types

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

■SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 20 – 30 mm



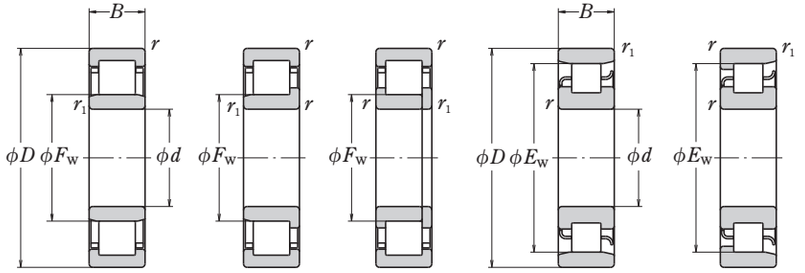


Bearing Designations								Boundary Dimensions (mm)						Basic Load Ratings(6) (N)		Speeds(5) (min−1) Limiting Speeds			Abutment and Fillet Dimensions (mm)								Mass (kg)
	Cage(1) Standard Option		(2) NU	NJ	NUP	N	NF	d	D	B	r min.	r1 min.	FW	EW	Cr	C0r	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	da(3) min.	db min.	db(4) max.	dc min.	dd min.	Da(3) max.	Db max.	Db min.	ra max.	rb max.	approx.
N 204	**W**	—	—	—	—	**N**	**NF**	**20**	47	14	1	0.6	—	40	19 000	12 700	18 000	—	12 000	14 000	25	—	—	—	—	—	43	42	1	0.6	0.107
NU204E	**T**	**T7**	**NU**	**NJ**	**NUP**	—	—		47	14	1	0.6	26.5	—	31 500	22 600	16 000	19 000	13 000	16 000	25	24	25	29	32	42	—	—	1	0.6	0.107
NU2204	**W**	**M**	**NU**	**NJ**	—	—	—		47	18	1	0.6	27	—	25 400	18 400	19 000	—	11 000	13 000	25	24	25	29	32	42	—	—	1	0.6	0.144
N 304	**W**	—	—	—	—	**N**	**NF**		52	15	1.1	0.6	—	44.5	26 300	17 300	14 000	—	10 000	12 000	26.5	—	—	—	—	—	48	46	1	0.6	0.148
NU304E	**T**	**T7**	**NU**	**NJ**	**NUP**	—	—		52	15	1.1	0.6	27.5	—	39 000	26 900	13 000	18 000	12 000	15 000	26.5	24	26	30	33	45.5	—	—	1	0.6	0.145
NU2304	**M**	—	**NU**	**NJ**	**NUP**	—	—		52	21	1.1	0.6	28.5	—	40 500	30 000	14 000	—	11 000	14 000	26.5	24	27	30	33	45.5	—	—	1	0.6	0.217
NU2304E	**T7**	—	**NU**	**NJ**	**NUP**	—	—		52	21	1.1	0.6	27.5	—	51 500	39 000	13 000	—	11 000	14 000	26.5	24	26	30	33	45.5	—	—	1	0.6	0.209
NU1005	**(M)**	—	**NU**	—	—	—	—	**25**	47	12	0.6	0.3	30.5	—	17 600	13 100	15 000	—	15 000	18 000	—	27	30	32	—	43	—	—	0.6	0.3	0.094
N 205	**W**	**M**	—	—	—	**N**	**NF**		52	15	1	0.6	—	45	21 800	15 700	16 000	—	10 000	12 000	30	—	—	—	—	—	48	46	1	0.6	0.135
NU205E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—		52	15	1	0.6	31.5	—	36 000	27 700	14 000	20 000	12 000	14 000	30	29	30	34	37	47	—	—	1	0.6	0.136
NU2205E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—		52	18	1	0.6	31.5	—	43 000	34 500	14 000	17 000	12 000	14 000	30	29	30	34	37	47	—	—	1	0.6	0.16
N 305	**W**	**M**	—	—	—	**N**	**NF**		62	17	1.1	1.1	—	53	36 000	25 200	12 000	—	8 000	10 000	31.5	—	—	—	—	—	55.5	50	1	1	0.233
NU305E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—		62	17	1.1	1.1	34	—	51 000	37 500	11 000	18 000	10 000	12 000	31.5	31.5	32	37	40	55.5	—	—	1	1	0.269
NU2305E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—		62	24	1.1	1.1	34	—	70 000	56 000	11 000	15 000	9 000	11 000	31.5	31.5	32	37	40	55.5	—	—	1	1	0.338
NU1006	**(M)**	—	**NU**	—	—	**N**	—	**30**	55	13	1	0.6	36.5	48.5	24 200	19 600	13 000	—	12 000	15 000	35	34	36	38	—	50	51	49	1	0.6	0.136
N 206	**W**	**M**	—	—	—	**N**	**NF**		62	16	1	0.6	—	53.5	30 500	23 300	13 000	—	8 500	10 000	35	—	—	—	—	—	58	56	1	0.6	0.208
NU206E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—		62	16	1	0.6	37.5	—	48 000	37 500	12 000	17 000	9 500	12 000	35	34	36	40	44	57	—	—	1	0.6	0.205
NU2206E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—		62	20	1	0.6	37.5	—	60 000	50 000	12 000	14 000	9 500	12 000	35	34	36	40	44	57	—	—	1	0.6	0.255
N 306	**W**	**M**	—	—	—	**N**	**NF**		72	19	1.1	1.1	—	62	47 500	35 000	10 000	—	7 100	8 500	36.5	—	—	—	—	—	65.5	64	1	1	0.353
NU306E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—		72	19	1.1	1.1	40.5	—	65 500	50 000	9 500	16 000	8 500	10 000	36.5	36.5	39	44	48	65.5	—	—	1	1	0.409
NU2306E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—		72	27	1.1	1.1	40.5	—	92 000	77 500	9 500	13 000	8 000	9 500	36.5	36.5	39	44	48	65.5	—	—	1	1	0.518

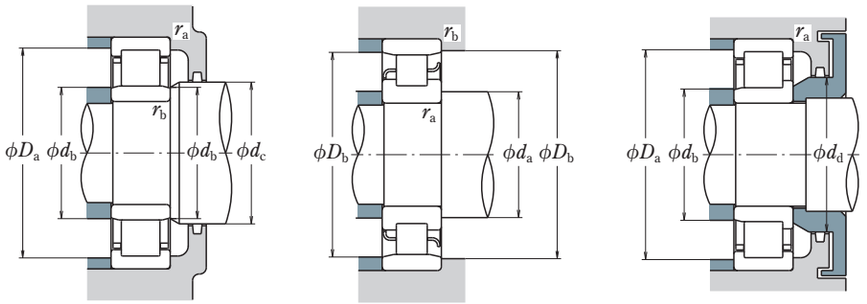
Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
(4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.

SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 35 – 40 mm



NU NJ NUP N NF

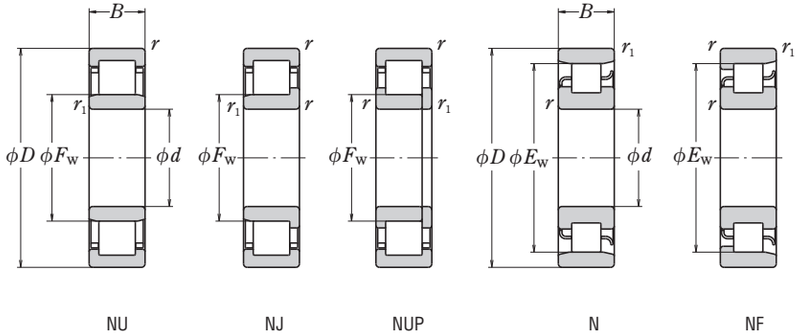


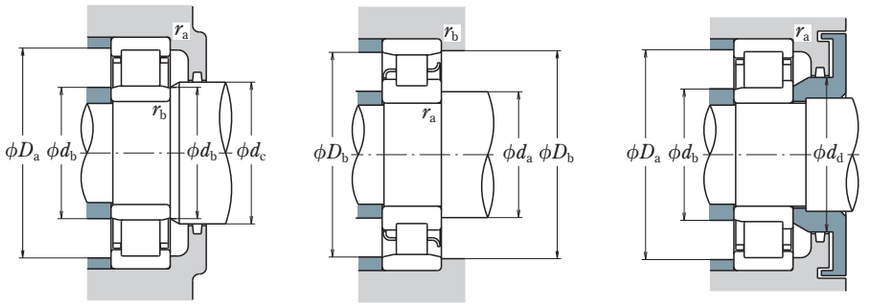
Bearing Designations								Boundary Dimensions (mm)						Basic Load Ratings[6] (N)		Speeds[5] (min⁻¹) Limiting Speeds			Abutment and Fillet Dimensions (mm)										Mass (kg)
	Cage[1] Standard Option		[2] NU	NJ	NUP	N	NF	d	D	B	r min.	r_1 min.	F_W	E_W	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	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.	approx.
NU1007	(M)	—	**NU**	**NJ**	—	**N**	—	**35**	62	14	1	0.6	42	55	27 800	23 200	11 000	—	11 000	13 000	40	39	41	44	—	57	58	56	1	0.6	0.18
N 207	W	M	—	—	—	**N**	**NF**		72	17	1.1	0.6	—	61.8	44 000	34 000	11 000	—	7 500	9 000	41.5	—	—	—	—	—	68	64	1	0.6	0.301
NU207E	W	M, T, T7	**NU**	**NJ**	**NUP**	—	—		72	17	1.1	0.6	44	—	62 000	50 000	10 000	15 000	8 500	10 000	41.5	39	42	46	50	65.5	—	—	1	0.6	0.304
NU2207E	T	M, T7	**NU**	**NJ**	**NUP**	—	—		72	23	1.1	0.6	44	—	76 000	65 500	11 000	12 000	8 500	10 000	41.5	39	42	46	50	65.5	—	—	1	0.6	0.40
N 307	W	M	—	—	—	**N**	**NF**		80	21	1.5	1.1	—	68.2	61 000	47 000	9 500	—	6 300	7 500	43	—	—	—	—	—	73.5	70	1.5	1	0.476
NU307E	W	M, T, T7	**NU**	**NJ**	**NUP**	—	—		80	21	1.5	1.1	46.2	—	82 000	65 500	8 500	14 000	7 500	9 500	43	41.5	45	48	53	72	—	—	1.5	1	0.545
NU2307E	T	M, T7	**NU**	**NJ**	**NUP**	—	—		80	31	1.5	1.1	46.2	—	115 000	101 000	9 000	11 000	6 700	8 500	43	41.5	45	48	53	72	—	—	1.5	1	0.711
NU1008	(M)	—	**NU**	**NJ**	**NUP**	**N**	—	**40**	68	15	1	0.6	47	61	33 500	29 000	10 000	—	10 000	12 000	45	44	46	49	—	63	64	62	1	0.6	0.223
N 208	W	M	—	—	—	**N**	**NF**		80	18	1.1	1.1	—	70	54 000	43 000	9 500	—	6 700	8 000	46.5	—	—	—	—	—	73.5	72	1	1	0.375
NU208E	W	M, T, T7	**NU**	**NJ**	**NUP**	—	—		80	18	1.1	1.1	49.5	—	68 500	55 500	9 000	13 000	7 500	9 000	46.5	46.5	48	52	56	73.5	—	—	1	1	0.379
NU2208E	T	M, T7	**NU**	**NJ**	**NUP**	—	—		80	23	1.1	1.1	49.5	—	89 000	77 500	9 000	11 000	7 500	9 000	46.5	46.5	48	52	56	73.5	—	—	1	1	0.480
N 308	W	M	—	—	—	**N**	**NF**		90	23	1.5	1.5	—	77.5	72 000	57 000	8 500	—	5 600	6 700	48	—	—	—	—	—	82	79	1.5	1.5	0.649
NU308E	W	M, T, T7	**NU**	**NJ**	**NUP**	—	—		90	23	1.5	1.5	52	—	102 000	81 500	7 500	12 000	6 700	8 000	48	48	50	55	60	82	—	—	1.5	1.5	0.747
NU2308E	T	M, T7	**NU**	**NJ**	**NUP**	—	—		90	33	1.5	1.5	52	—	140 000	122 000	8 000	10 000	6 000	7 500	48	48	50	55	60	82	—	—	1.5	1.5	0.933

Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
(4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.

SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 45 – 50 mm





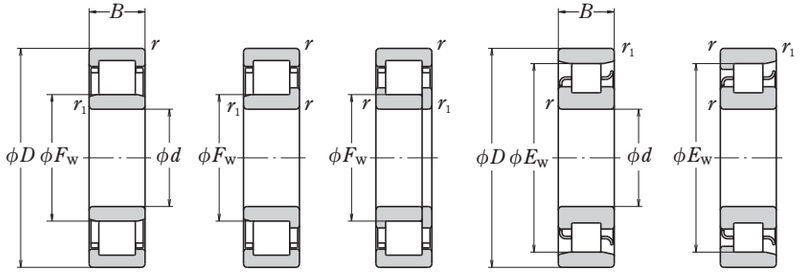
Boundary Dimensions (mm)							Basic Load Ratings[6] (N)		Speeds[5] (min^{-1}) Limiting Speeds			
d	D	B	r min.	r_1 min.	F_W	E_W	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)
45	75	16	1	0.6	52.5	67.5	40 000	35 500	9 500	—	9 000	11 000
	85	19	1.1	1.1	—	75	56 500	47 000	9 000	—	6 300	7 500
	85	19	1.1	1.1	54.5	—	77 500	66 500	8 500	12 000	6 700	8 000
	85	23	1.1	1.1	54.5	—	93 500	84 500	8 500	10 000	6 700	8 500
	100	25	1.5	1.5	—	86.5	97 000	77 500	7 500	—	5 000	6 000
	100	25	1.5	1.5	58.5	—	120 000	98 500	7 100	11 000	6 000	7 500
	100	36	1.5	1.5	58.5	—	169 000	153 000	7 100	9 000	5 300	6 700
50	80	16	1	0.6	57.5	72.5	39 500	36 000	8 500	—	8 000	10 000
	90	20	1.1	1.1	—	80.4	59 500	51 000	8 500	—	5 600	6 700
	90	20	1.1	1.1	59.5	—	85 000	76 500	8 000	11 000	6 300	7 500
	90	23	1.1	1.1	59.5	—	102 000	97 000	7 500	9 000	6 300	8 000
	110	27	2	2	—	95	107 000	86 000	7 100	—	4 500	5 600
	110	27	2	2	65	—	135 000	113 000	6 700	10 000	5 000	6 000
	110	40	2	2	65	—	200 000	187 000	6 700	8 000	5 000	6 300

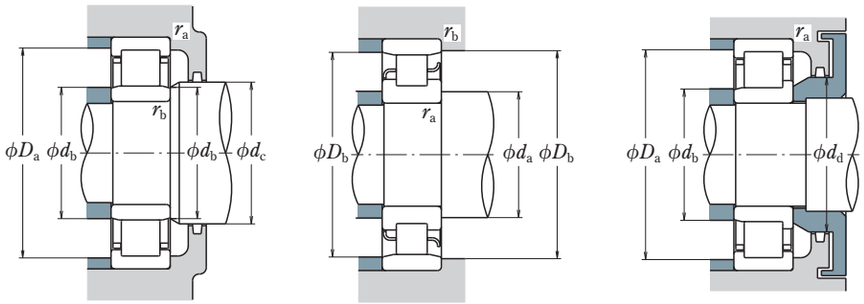
Bearing Designations							Abutment and Fillet Dimensions (mm)										Mass (kg)
	Cage[1] Standard Option		(2) NU	NJ	NUP	N	NF	d_a[3] min.	d_b min.	d_b[4] max.	d_c min.	d_d min.	D_a[3] max.	D_b max.	D_b min.	r_a max.	r_b max.	approx.
NU1009	(M)	—	**NU**	—	—	**N**	**NF**	50	49	51	54	—	70	71	68	1	0.6	0.279
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
NU2209E	**T**	**M, 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
NU2309E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	53	53	56	60	66	92	—	—	1.5	1.5	1.28
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
NU2210E	**T**	**M, 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
NU2310E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	59	59	63	67	73	101	—	—	2	2	1.7

Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
(4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.

SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 55 – 60 mm





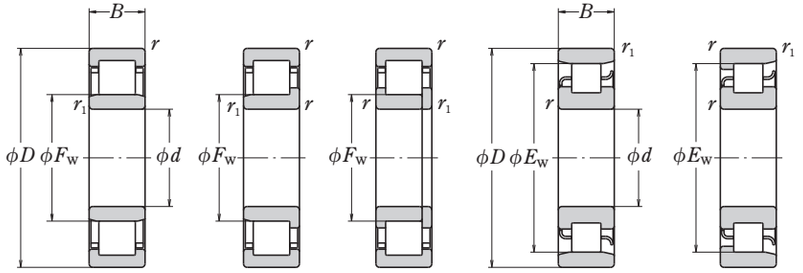
Boundary Dimensions (mm)							Basic Load Ratings[6] (N)		Speeds[5] (min^{-1}) Limiting Speeds			
d	D	B	r min.	r_1 min.	F_W	E_W	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)
55	90	18	1.1	1	64.5	80.5	46 500	44 000	8 000	—	7 500	9 000
	100	21	1.5	1.1	—	88.5	71 500	62 500	7 500	—	5 300	6 300
	100	21	1.5	1.1	66	—	106 000	98 500	6 700	10 000	5 600	7 100
	100	25	1.5	1.1	66	—	125 000	122 000	6 700	8 500	5 600	7 100
	120	29	2	2	—	104.5	136 000	111 000	6 300	—	4 000	5 000
	120	29	2	2	70.5	—	169 000	143 000	6 000	9 000	4 500	5 600
	120	43	2	2	70.5	—	247 000	233 000	6 000	7 500	4 500	5 600
60	95	18	1.1	1	69.5	85.5	49 500	48 500	7 500	—	6 700	8 500
	110	22	1.5	1.5	—	97.5	84 500	75 000	7 100	—	4 800	5 600
	110	22	1.5	1.5	72	—	120 000	107 000	6 300	9 500	5 300	6 300
	110	28	1.5	1.5	72	—	161 000	157 000	6 300	7 500	5 300	6 300
	130	31	2.1	2.1	—	113	152 000	126 000	6 000	—	3 800	4 500
	130	31	2.1	2.1	77	—	152 000	126 000	6 000	—	3 800	4 500
	130	31	2.1	2.1	77	—	184 000	157 000	5 600	9 500	4 800	5 600
	130	46	2.1	2.1	77	—	274 000	262 000	5 600	6 700	4 300	5 300

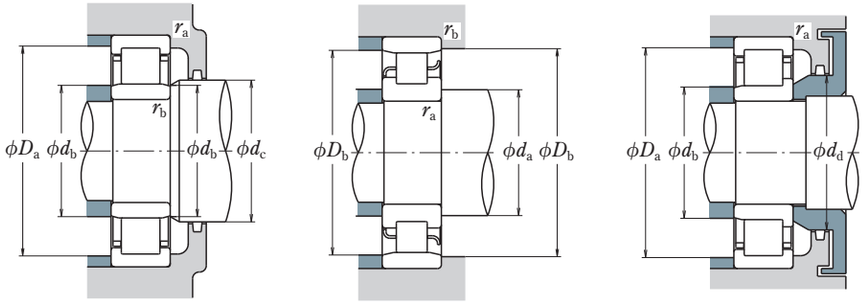
Bearing Designations								Abutment and Fillet Dimensions (mm)									Mass (kg)
	Cage[1] Standard Option		(2) NU	NJ	NUP	N	NF	d_a[3] min.	d_b min.	d_b[4] max.	d_c min.	d_d min.	D_a[3] max.	D_b max.	D_b min.	r_a max.	r_b max.	approx.
NU1011	**(M)**	—	**NU**	**NJ**	—	**N**	—	61.5	60	63	66	—	83.5	85	82	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
NU2211E	**T**	**M, 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
NU2311E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	64	64	68	72	80	111	—	—	2	2	2.18
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
NU2212E	**T**	**M, 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**	—	**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
NU2312E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	71	71	75	79	86	119	—	—	2	2	2.7

Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
(4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.

■SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 65 – 70 mm





Boundary Dimensions (mm)							Basic Load Ratings[6] (N)		Speeds[5] (min⁻¹) Limiting Speeds			
d	D	B	r min.	r_1 min.	F_W	E_W	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)
65	100	18	1.1	1	74.5	90.5	50 500	51 000	6 700	—	6 300	8 000
	120	23	1.5	1.5	—	105.6	103 000	94 500	6 300	—	4 300	5 300
	120	23	1.5	1.5	78.5	—	132 000	119 000	6 000	8 500	4 800	5 600
	120	31	1.5	1.5	78.5	—	183 000	181 000	6 000	7 100	4 800	6 000
	140	33	2.1	2.1	—	121.5	166 000	139 000	5 600	—	3 600	4 300
	140	33	2.1	2.1	83.5	—	166 000	139 000	5 600	—	3 600	4 300
	140	33	2.1	2.1	82.5	—	222 000	191 000	5 300	8 500	4 300	5 300
	140	48	2.1	2.1	82.5	—	287 000	265 000	5 600	6 300	3 800	4 800
70	110	20	1.1	1	80	100	71 500	70 500	6 300	—	6 000	7 100
	125	24	1.5	1.5	—	110.5	103 000	95 000	6 300	—	4 000	5 000
	125	24	1.5	1.5	83.5	—	146 000	137 000	5 600	9 000	5 000	6 300
	125	31	1.5	1.5	83.5	—	191 000	194 000	5 600	6 700	4 500	5 600
	150	35	2.1	2.1	—	130	183 000	156 000	5 600	—	3 200	4 000
	150	35	2.1	2.1	90	—	195 000	168 000	5 300	—	3 200	4 000
	150	35	2.1	2.1	89	—	252 000	222 000	4 800	8 000	4 000	5 000
	150	51	2.1	2.1	89	—	335 000	325 000	5 000	6 000	3 600	4 500

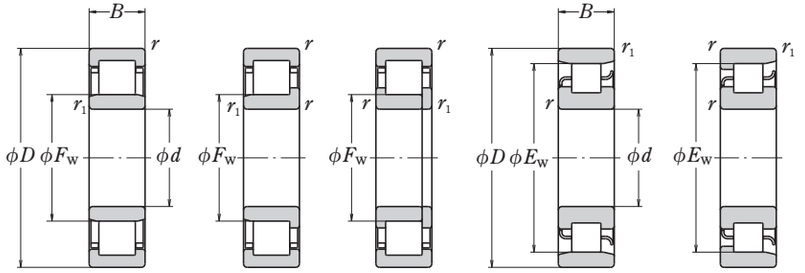
Bearing Designations								Abutment and Fillet Dimensions (mm)									Mass (kg)
	Cage[1] Standard Option		(2) NU	NJ	NUP	N	NF	d_a[3] min.	d_b min.	d_b[4] max.	d_c min.	d_d min.	D_a[3] max.	D_b max.	D_b min.	r_a max.	r_b max.	approx.
NU1013	(M)	—	**NU**	**NJ**	—	**N**	**NF**	71.5	70	73	76	—	93.5	95	92	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
NU2213E	**T**	**M, 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**	—	**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
NU2313E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	76	76	80	85	93	129	—	—	2	2	3.16
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
NU2214E	**T**	**M, 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**	—	**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
NU2314E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	81	81	86	92	100	139	—	—	2	2	3.92

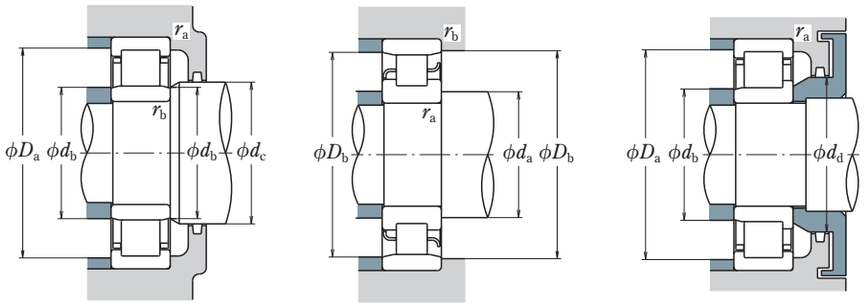
Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.

Notes (4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.

■SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 75 mm





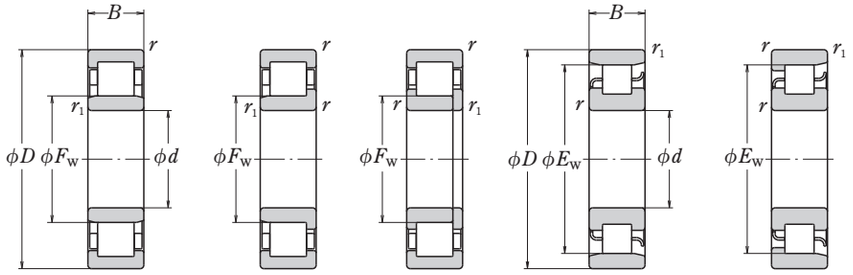
Boundary Dimensions (mm)							Basic Load Ratings[6] (N)		Speeds[5] (min^{-1}) Limiting Speeds			
d	D	B	r min.	r_1 min.	F_W	E_W	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)
75	115	20	1.1	1	85	105	74 000	74 500	6 000	—	5 600	6 700
	130	25	1.5	1.5	—	116.5	119 000	111 000	6 000	—	3 800	4 800
	130	25	1.5	1.5	88.5	—	160 000	156 000	5 300	8 500	4 800	6 000
	130	31	1.5	1.5	88.5	—	199 000	207 000	5 300	6 300	4 300	5 300
	160	37	2.1	2.1	—	139.5	220 000	189 000	5 000	—	3 000	3 800
	160	37	2.1	2.1	95.5	—	220 000	189 000	5 000	—	3 000	3 800
	160	37	2.1	2.1	95	—	295 000	263 000	4 500	7 500	3 800	4 800
	160	55	2.1	2.1	95	—	405 000	395 000	4 800	5 600	3 400	4 300

Bearing Designations								Abutment and Fillet Dimensions (mm)									Mass (kg)
	Cage[1] Standard Option		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.	approx.
NU1015	**(M)**	—	**NU**	—	—	**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**	**NU**	**NJ**	**NUP**	—	—	83	83	86	90	96	122	—	—	1.5	1.5	1.44
NU2215E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	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**	—	**NU**	**NJ**	**NUP**	—	—	86	86	93	97	106	149	—	—	2	2	3.26
NU315E	**M**	**T, T7**	**NU**	**NJ**	**NUP**	—	—	86	86	92	97	106	149	—	—	2	2	3.73
NU2315E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	86	86	92	97	106	149	—	—	2	2	4.86

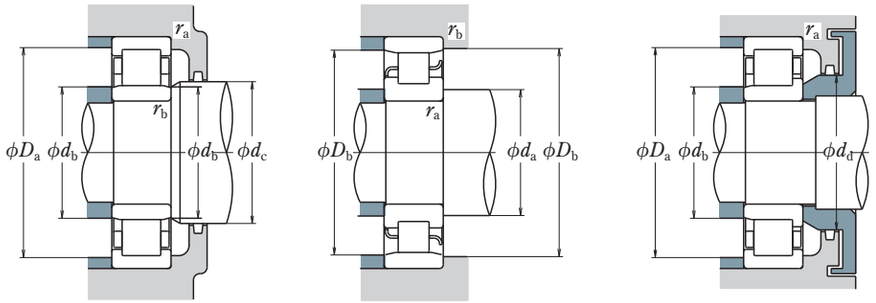
Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
(4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.

SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 80 – 90 mm



NU NJ NUP N NF



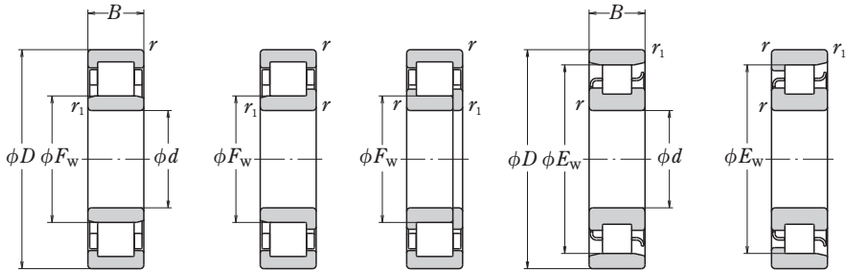
Bearing Designations								Boundary Dimensions (mm)						Basic Load Ratings(6) (N)		Speeds(5) (min−1) Limiting Speeds			Abutment and Fillet Dimensions (mm)										Mass (kg)
	Cage(1) Standard Option	(2) NU	NJ	NUP	N	NF	d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	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.	approx.
NU1016	(M)	—	**NU**	—	**NUP**	**N**	—	**80**	125	22	1.1	1	91.5	113.5	89 000	90 500	6 000	—	5 300	6 300	86.5	85	90	94	—	118.5	120	115	1	1	0.969
N 216	W	M	—	—	—	**N**	**NF**		140	26	2	2	—	125.3	131 000	122 000	5 600	—	3 600	4 300	89	—	—	—	—	—	131	128	2	2	1.47
NU216E	M	T, T7	**NU**	**NJ**	**NUP**	—	—		140	26	2	2	95.3	—	171 000	167 000	5 000	8 000	4 500	5 300	89	89	93	97	104	131	—	—	2	2	1.7
NU2216E	T	M, T7	**NU**	**NJ**	**NUP**	—	—		140	33	2	2	95.3	—	229 000	243 000	5 000	6 000	4 000	5 000	89	89	93	97	104	131	—	—	2	2	1.96
N 316	W	M	—	—	—	**N**	**NF**		170	39	2.1	2.1	—	147	234 000	207 000	4 800	—	2 800	3 400	91	—	—	—	—	—	159	150	2	2	3.85
NU316E	M	T, T7	**NU**	**NJ**	**NUP**	—	—		170	39	2.1	2.1	101	—	315 000	282 000	4 300	7 100	3 600	4 300	91	91	98	105	114	159	—	—	2	2	4.45
NU2316E	T	M, T7	**NU**	**NJ**	**NUP**	—	—		170	58	2.1	2.1	101	—	440 000	430 000	4 500	5 300	3 200	4 000	91	91	98	105	114	159	—	—	2	2	5.73
NU1017	(M)	—	**NU**	—	—	**N**	—	**85**	130	22	1.1	1	96.5	118.5	91 500	95 500	5 600	—	5 000	6 000	91.5	90	95	99	—	123.5	125	120	1	1	1.01
N 217	W	M	—	—	—	**N**	**NF**		150	28	2	2	—	133.8	148 000	140 000	5 300	—	3 400	4 000	94	—	—	—	—	—	141	137	2	2	1.87
NU217E	M	T, T7	**NU**	**NJ**	**NUP**	—	—		150	28	2	2	100.5	—	206 000	199 000	4 800	7 500	4 300	5 000	94	94	98	104	110	141	—	—	2	2	2.11
NU2217E	T	M, T7	**NU**	**NJ**	**NUP**	—	—		150	36	2	2	100.5	—	268 000	279 000	4 800	5 600	3 800	4 500	94	94	98	104	110	141	—	—	2	2	2.44
N 317	W	M	—	—	—	**N**	**NF**		180	41	3	3	—	156	277 000	247 000	4 500	—	2 600	3 200	98	—	—	—	—	—	167	159	2.5	2.5	4.53
NU317	W	M	**NU**	**NJ**	**NUP**	—	—		180	41	3	3	108	—	261 000	228 000	4 800	—	2 600	3 200	98	98	105	110	119	167	—	—	2.5	2.5	4.6
***NU317E**	M	T, T7	**NU**	**NJ**	**NUP**	—	—		180	41	3	3	108	—	360 000	330 000	4 000	6 700	3 400	4 000	98	98	105	110	119	167	—	—	2.5	2.5	5.26
***NU2317E**	T	M, T7	**NU**	**NJ**	**NUP**	—	—		180	60	3	3	108	—	485 000	485 000	4 300	6 000	3 000	3 800	98	98	105	110	119	167	—	—	2.5	2.5	6.77
NU1018	(M)	—	**NU**	—	**NUP**	**N**	—	**90**	140	24	1.5	1.1	103	127	108 000	114 000	5 300	—	4 500	5 600	98	96.5	101	106	—	132	133.5	129	1.5	1	1.35
N 218	W	M	—	—	—	**N**	**NF**		160	30	2	2	—	143	187 000	178 000	5 000	—	3 200	3 800	99	—	—	—	—	—	151	146	2	2	2.31
NU218E	M	T, T7	**NU**	**NJ**	**NUP**	—	—		160	30	2	2	107	—	224 000	217 000	4 800	7 100	4 000	4 800	99	99	104	109	116	151	—	—	2	2	2.6
NU2218E	T	M, T7	**NU**	**NJ**	**NUP**	—	—		160	40	2	2	107	—	298 000	315 000	4 800	5 300	3 600	4 300	99	99	104	109	116	151	—	—	2	2	3.11
N 318	W	M	—	—	—	**N**	**NF**		190	43	3	3	—	165	295 000	265 000	4 500	—	2 600	3 000	103	—	—	—	—	—	177	168	2.5	2.5	5.31
NU318	W	—	**NU**	**NJ**	**NUP**	—	—		190	43	3	3	115	—	295 000	265 000	4 500	—	2 600	3 000	103	103	112	117	127	177	—	—	2.5	2.5	5.38
***NU318E**	M	T, T7	**NU**	**NJ**	**NUP**	—	—		190	43	3	3	113.5	—	390 000	355 000	4 000	6 300	3 200	3 800	103	103	111	117	127	177	—	—	2.5	2.5	6.1
***NU2318E**	T	M, T7	**NU**	**NJ**	**NUP**	—	—		190	64	3	3	113.5	—	535 000	535 000	4 000	5 600	2 800	3 400	103	103	111	117	127	177	—	—	2.5	2.5	7.9

Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
(4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.

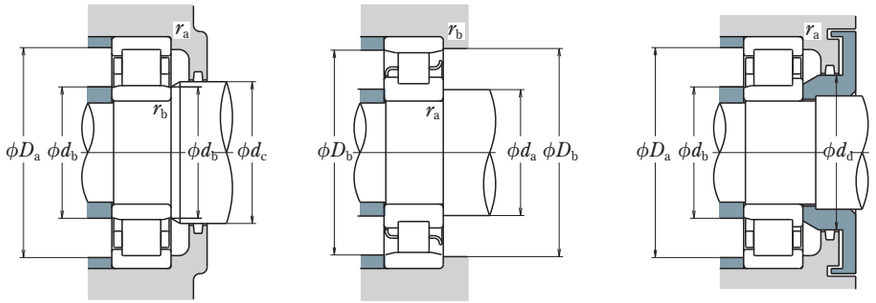
Remark Bearings with an asterisk (*) may be manufactured with an optimized roller crowning. Consult NSK for details.

■SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 95 – 105 mm



NU NJ NUP N NF



Bearing Designations								Boundary Dimensions (mm)						Basic Load Ratings(6) (N)		Speeds(5) (min⁻¹) Limiting Speeds			
	Cage(1) Standard Option		(2) NU	NJ	NUP	N	NF	d	D	B	r min.	r1 min.	Fw	Ew	Cr	C0r	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)
95								145	24	1.5	1.1	108	132	111 000	120 000	5 000	—	4 300	5 300
								170	32	2.1	2.1	—	151.5	204 000	195 000	4 800	—	3 000	3 600
								170	32	2.1	2.1	112.5	—	271 000	265 000	4 300	6 700	3 800	4 500
								170	43	2.1	2.1	112.5	—	350 000	370 000	4 500	4 800	3 400	4 000
								200	45	3	3	—	173.5	320 000	289 000	4 300	—	2 400	3 000
								200	45	3	3	121.5	—	320 000	289 000	4 300	—	2 400	3 000
								200	45	3	3	121.5	—	410 000	385 000	3 800	6 000	3 000	3 600
								200	67	3	3	121.5	—	565 000	585 000	3 800	5 300	2 600	3 400
100								150	24	1.5	1.1	113	137	114 000	126 000	4 800	—	4 300	5 300
								180	34	2.1	2.1	—	160	225 000	217 000	4 500	—	2 800	3 400
								180	34	2.1	2.1	119	—	305 000	305 000	4 300	6 300	3 600	4 300
								180	46	2.1	2.1	119	—	410 000	445 000	4 300	4 500	3 200	3 800
								215	47	3	3	—	185.5	365 000	335 000	4 000	—	2 200	2 800
								215	47	3	3	129.5	—	365 000	335 000	4 000	—	2 200	2 800
								215	47	3	3	127.5	—	465 000	425 000	3 600	5 600	2 800	3 400
								215	73	3	3	127.5	—	700 000	715 000	3 400	4 000	2 400	3 000
105								160	26	2	1.1	119.5	145.5	134 000	149 000	4 500	—	4 000	4 800
								190	36	2.1	2.1	—	168.8	247 000	241 000	4 500	—	2 600	3 200
								190	36	2.1	2.1	125	—	320 000	310 000	4 300	6 000	3 400	4 000
								225	49	3	3	—	195	420 000	390 000	3 800	—	2 200	2 600
								225	49	3	3	133	—	525 000	480 000	3 400	5 300	2 600	3 200

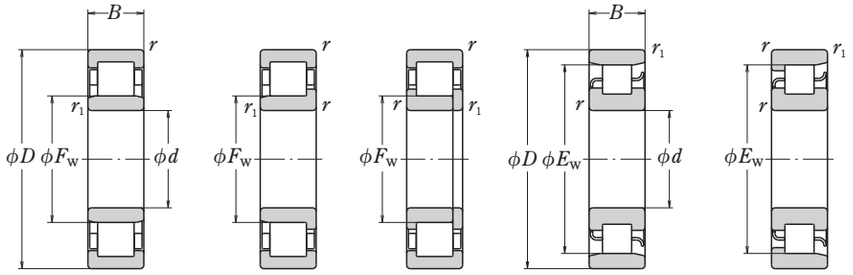
Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.

Bearing Designations								Abutment and Fillet Dimensions (mm)										Mass (kg)
	Cage(1) Standard Option		(2) NU	NJ	NUP	N	NF	da(3) min.	db min.	db(4) max.	dc min.	dd min.	Da(3) max.	Db max.	Db min.	ra max.	rb max.	approx.
NU1019	(M)	—	**NU**	**NJ**	—	**N**	—	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**	**NU**	**NJ**	**NUP**	—	—	106	106	110	116	123	159	—	—	2	2	3.17
NU2219E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	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**	—	**NU**	**NJ**	**NUP**	—	—	108	108	118	124	134	187	—	—	2.5	2.5	6.23
∗**NU319E**	**M**	**T, T7**	**NU**	**NJ**	**NUP**	—	—	108	108	118	124	134	187	—	—	2.5	2.5	7.13
∗**NU2319E**	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	108	108	118	124	134	187	—	—	2.5	2.5	9.21
NU1020	(M)	—	**NU**	**NJ**	**NUP**	**N**	—	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**	**NU**	**NJ**	**NUP**	—	—	111	111	116	122	130	169	—	—	2	2	3.81
∗**NU2220E**	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	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**	—	**NU**	**NJ**	**NUP**	—	—	113	113	126	132	143	202	—	—	2.5	2.5	7.69
∗**NU320E**	**M**	**T, T7**	**NU**	**NJ**	**NUP**	—	—	113	113	124	132	143	202	—	—	2.5	2.5	8.63
∗**NU2320E**	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	113	113	124	132	143	202	—	—	2.5	2.5	11.8
NU1021	(M)	—	**NU**	—	—	**N**	**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**	—	**NU**	**NJ**	**NUP**	—	—	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**	—	**NU**	**NJ**	**NUP**	—	—	118	118	129	137	149	212	—	—	2.5	2.5	9.84

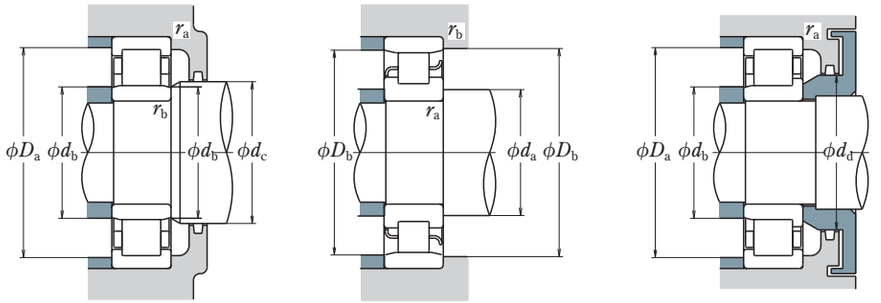
Notes (4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.
Remark Bearings with an asterisk (∗) may be manufactured with an optimized roller crowning. Consult NSK for details.

■SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 110 – 130 mm



NU NJ NUP N NF



Boundary Dimensions (mm)							Basic Load Ratings(6) (N)		Speeds(5) (min−1) Limiting Speeds			
d	D	B	r min.	r_1 min.	F_W	E_W	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)
110	170	28	2	1.1	125	155	161 000	174 000	4 500	—	3 800	4 500
	200	38	2.1	2.1	—	178.5	281 000	272 000	4 300	—	2 600	3 000
	200	38	2.1	2.1	132.5	—	360 000	365 000	4 000	5 600	3 200	3 800
	200	53	2.1	2.1	132.5	—	470 000	515 000	4 000	5 000	2 800	3 400
	240	50	3	3	—	207	465 000	435 000	3 400	—	2 000	2 400
	240	50	3	3	143	—	555 000	525 000	3 200	5 000	2 600	3 000
	240	80	3	3	143	—	830 000	880 000	3 000	4 500	2 200	2 800
120	180	28	2	1.1	135	165	171 000	191 000	4 000	—	3 400	4 300
	215	40	2.1	2.1	—	191.5	320 000	320 000	4 000	—	2 400	2 800
	215	40	2.1	2.1	143.5	—	410 000	420 000	3 600	5 300	3 000	3 400
	215	58	2.1	2.1	143.5	—	555 000	620 000	3 600	4 800	2 600	3 200
	260	55	3	3	—	226	550 000	510 000	3 000	—	2 200	2 800
	260	55	3	3	154	—	650 000	610 000	2 800	4 800	2 200	2 800
	260	86	3	3	154	—	975 000	1 030 000	2 600	4 300	2 000	2 600
130	200	33	2	1.1	148	182	211 000	238 000	4 000	—	3 200	3 800
	230	40	3	3	—	204	335 000	340 000	3 800	—	2 200	2 600
	230	40	3	3	153.5	—	445 000	455 000	3 400	5 000	2 600	3 200
	230	64	3	3	153.5	—	650 000	735 000	3 400	4 500	2 400	3 000
	280	58	4	4	—	243	685 000	665 000	2 600	—	2 200	2 600
	280	58	4	4	167	—	760 000	735 000	2 600	4 300	2 200	2 600
	280	93	4	4	167	—	1 130 000	1 230 000	2 400	3 800	1 900	2 400

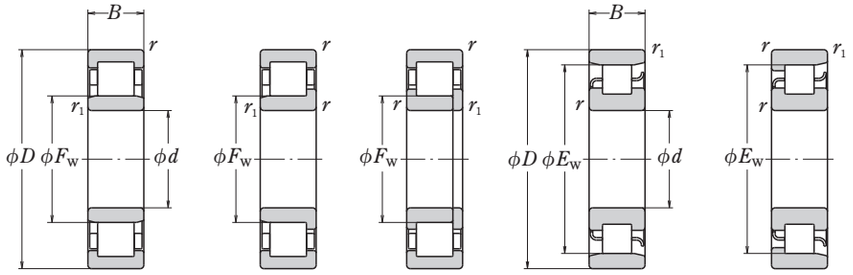
Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.

Bearing Designations								Abutment and Fillet Dimensions (mm)									Mass (kg)
	Cage(1) Standard Option		(2) 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.	approx.
NU1022	**(M)**	—	**NU**	**NJ**	—	**N**	**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**	**NU**	**NJ**	**NUP**	—	—	121	121	129	135	144	189	—	—	2	2	5.37
∗**NU2222E**	**M**	—	**NU**	**NJ**	**NUP**	—	—	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**	—	**NU**	**NJ**	**NUP**	—	—	123	123	139	145	158	227	—	—	2.5	2.5	11.8
∗**NU2322E**	**M**	—	**NU**	**NJ**	**NUP**	—	—	123	123	139	145	158	227	—	—	2.5	2.5	18.8
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
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

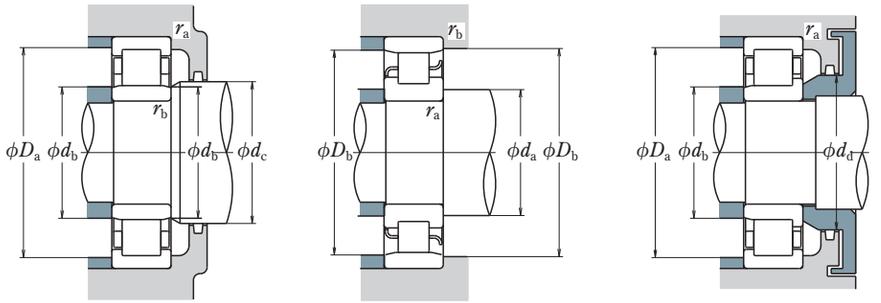
Notes (4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.
Remark Bearings with an asterisk (∗) may be manufactured with an optimized roller crowning. Consult NSK for details.

■SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 140 – 160 mm



NU NJ NUP N NF



Bearing Designations								Boundary Dimensions (mm)						Basic Load Ratings(6) (N)		Speeds(5) (min−1) Limiting Speeds			Mass (kg)
	Cage(1) Standard Option		(2) NU	NJ	NUP	N	NF	d	D	B	r min.	r1 min.	Fw	Ew	Cr	C0r	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	approx.
NU1028	(M)	—	**NU**	**NJ**	**NUP**	**N**	—	**140**	210	33	2	1.1	158	192	216 000	250 000	3 800	—	3 000	3 600	3.87
N 228	**W**	**M**	—	—	—	**N**	**NF**		250	42	3	3	—	221	365 000	375 000	3 400	—	2 000	2 400	8.08
∗**NU228E**	**M**	—	**NU**	**NJ**	**NUP**	—	—		250	42	3	3	169	—	485 000	515 000	3 200	4 500	2 400	3 000	9.38
∗**NU2228E**	**M**	—	**NU**	**NJ**	**NUP**	—	—		250	68	3	3	169	—	675 000	790 000	3 200	4 000	2 200	2 800	15.2
N 328	**M**	—	—	—	—	**N**	**NF**		300	62	4	4	—	260	760 000	745 000	2 400	—	2 000	2 400	21.7
∗**NU328E**	**M**	—	**NU**	**NJ**	**NUP**	—	—		300	62	4	4	180	—	815 000	795 000	2 400	4 000	2 000	2 400	22.8
∗**NU2328E**	**M**	—	**NU**	**NJ**	**NUP**	—	—		300	102	4	4	180	—	1 250 000	1 380 000	2 200	2 600	1 700	2 200	37.7
NU1030	(M)	—	**NU**	**NJ**	—	**N**	**NF**	**150**	225	35	2.1	1.5	169.5	205.5	249 000	294 000	3 600	—	2 800	3 400	4.77
N 230	**W**	**M**	—	—	—	**N**	**NF**		270	45	3	3	—	238	440 000	465 000	3 000	—	1 800	2 200	10.4
∗**NU230E**	**M**	—	**NU**	**NJ**	**NUP**	—	—		270	45	3	3	182	—	550 000	595 000	2 800	4 300	2 200	2 800	11.9
∗**NU2230E**	**M**	—	**NU**	**NJ**	**NUP**	—	—		270	73	3	3	182	—	780 000	930 000	2 800	3 800	2 000	2 600	19.3
N 330	**M**	—	—	—	—	**N**	**NF**		320	65	4	4	—	277	815 000	805 000	2 200	—	1 800	2 200	25.8
∗**NU330E**	**M**	—	**NU**	**NJ**	**NUP**	—	—		320	65	4	4	193	—	930 000	920 000	2 200	3 800	1 800	2 200	27.1
∗**NU2330E**	**M**	—	**NU**	**NJ**	**NUP**	—	—		320	108	4	4	193	—	1 430 000	1 600 000	2 000	2 400	1 600	2 000	45.1
NU1032	(M)	—	**NU**	**NJ**	—	**N**	**NF**	**160**	240	38	2.1	1.5	180	220	292 000	340 000	3 400	—	2 600	3 200	5.81
N 232	**M**	—	—	—	—	**N**	**NF**		290	48	3	3	—	255	525 000	570 000	2 800	—	2 200	2 600	14.1
∗**NU232E**	**M**	—	**NU**	**NJ**	**NUP**	—	—		290	48	3	3	195	—	615 000	665 000	2 600	4 000	2 200	2 600	14.7
∗**NU2232E**	**M**	—	**NU**	**NJ**	**NUP**	—	—		290	80	3	3	193	—	995 000	1 190 000	2 400	3 600	1 900	2 400	24.5
N 332	**M**	—	—	—	—	**N**	—		340	68	4	4	—	292	860 000	875 000	2 000	—	1 700	2 000	30.8
∗**NU332E**	**M**	—	**NU**	**NJ**	**NUP**	—	—		340	68	4	4	204	—	1 060 000	1 050 000	1 900	3 600	1 700	2 000	32.1
NU2332E	**M**	—	**NU**	**NJ**	**NUP**	—	—		340	114	4	4	204	—	1 610 000	1 820 000	1 800	2 400	1 500	1 900	53.9

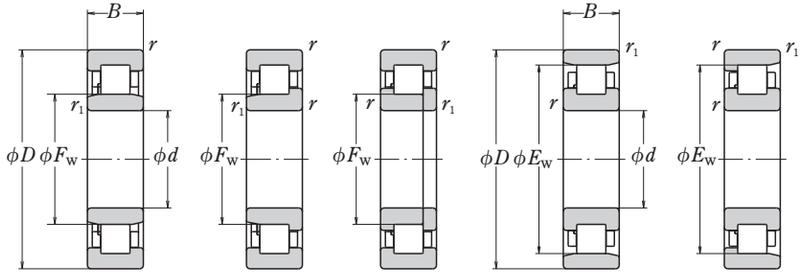
Abutment and Fillet Dimensions (mm)											
da(3) min.	db min.	db(4) max.	dc min.	dd min.	Da(3) max.	Db max.	Db min.	ra max.	rb max.
149	146.5	156	161	—	201	203.5	194	2	1
153	—	—	—	—	—	237	225	2.5	2.5
153	153	165	171	182	237	—	—	2.5	2.5
153	153	165	171	182	237	—	—	2.5	2.5
156	—	—	—	—	—	284	266	3	3
156	156	176	182	198	284	—	—	3	3
156	156	176	182	198	284	—	—	3	3
161	158	167	173	—	214	217	208	2	1.5
163	—	—	—	—	—	257	242	2.5	2.5
163	163	177	184	196	257	—	—	2.5	2.5
163	163	177	184	196	257	—	—	2.5	2.5
166	—	—	—	—	—	304	283	3	3
166	166	188	195	213	304	—	—	3	3
166	166	188	195	213	304	—	—	3	3
171	168	178	184	—	229	232	222	2	1.5
173	—	—	—	—	—	277	261	2.5	2.5
173	173	190	197	210	277	—	—	2.5	2.5
173	173	188	197	210	277	—	—	2.5	2.5
176	—	—	—	—	—	324	298	3	3
176	176	199	211	228	324	—	—	3	3
176	176	199	211	228	324	—	—	3	3

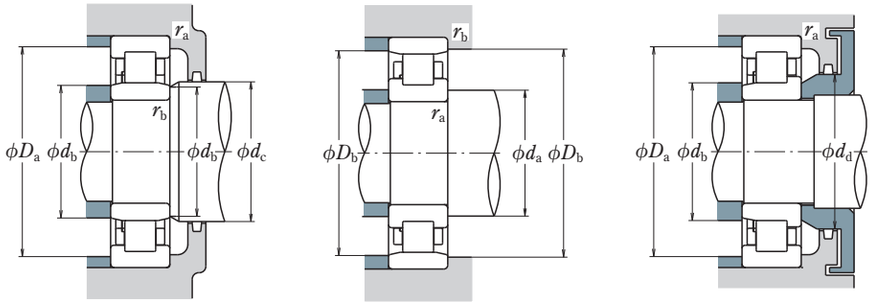
Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
(4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.

Remark Bearings with an asterisk (∗) may be manufactured with an optimized roller crowning. Consult NSK for details.

SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 170 – 200 mm





Boundary Dimensions (mm)							Basic Load Ratings[6] (N)		Speeds[5] (min⁻¹) Limiting Speeds			
d	D	B	r min.	r_1 min.	F_W	E_W	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)
170	260	42	2.1	2.1	193	237	355 000	415 000	3 200	—	2 400	2 800
	310	52	4	4	—	272	585 000	635 000	2 600	—	2 000	2 400
	310	52	4	4	207	—	740 000	800 000	2 400	3 800	2 000	2 400
	310	86	4	4	205	—	1 140 000	1 330 000	2 200	3 200	1 800	2 200
	360	72	4	4	—	310	980 000	1 010 000	1 900	—	1 600	2 000
	360	72	4	4	218	—	1 140 000	1 150 000	1 800	3 400	1 600	2 000
	360	120	4	4	216	—	1 830 000	2 070 000	1 600	2 200	1 400	1 800
180	280	46	2.1	2.1	205	255	435 000	510 000	3 000	—	2 200	2 600
	320	52	4	4	—	282	610 000	675 000	2 400	—	1 900	2 200
	320	52	4	4	217	—	770 000	850 000	2 200	3 600	1 900	2 200
	320	86	4	4	215	—	1 240 000	1 510 000	2 000	3 200	1 700	2 000
	380	75	4	4	—	328	1 110 000	1 150 000	1 700	—	1 500	1 800
	380	75	4	4	231	—	1 210 000	1 230 000	1 700	2 800	1 500	1 800
	380	126	4	4	227	—	1 920 000	2 220 000	1 500	2 000	1 300	1 700
190	290	46	2.1	2.1	215	265	445 000	535 000	2 800	—	2 000	2 600
	340	55	4	4	—	299	685 000	770 000	2 200	—	1 800	2 200
	340	55	4	4	230	—	855 000	955 000	2 000	3 400	1 800	2 200
	340	92	4	4	228	—	1 360 000	1 670 000	1 900	3 000	1 600	2 000
	400	78	5	5	—	345	1 200 000	1 260 000	1 600	—	1 400	1 700
	400	78	5	5	245	—	1 300 000	1 340 000	1 600	2 600	1 400	1 700
	400	132	5	5	240	—	2 170 000	2 520 000	1 400	2 000	1 300	1 600
200	310	51	2.1	2.1	229	281	480 000	580 000	2 600	—	2 000	2 400
	360	58	4	4	—	316	765 000	865 000	2 000	—	1 700	2 000
	360	58	4	4	243	—	945 000	1 060 000	1 900	3 200	1 700	2 000
	360	98	4	4	241	—	1 500 000	1 870 000	1 800	2 200	1 500	1 800
	420	80	5	5	—	360	1 200 000	1 270 000	1 600	—	1 300	1 600
	420	80	5	5	258	—	1 400 000	1 450 000	1 500	2 600	1 300	1 600
	420	138	5	5	253	—	2 350 000	2 760 000	1 300	1 900	1 200	1 500

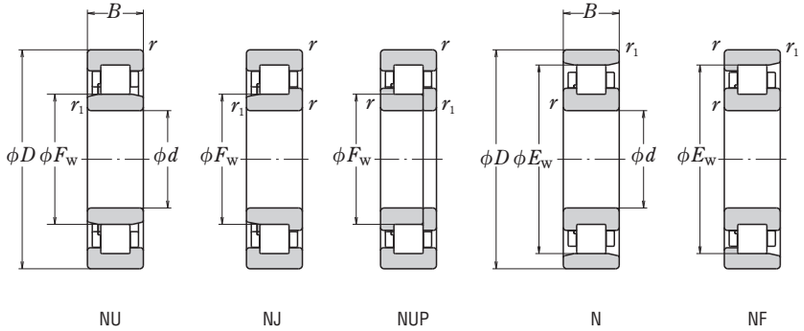
Bearing Designations								Abutment and Fillet Dimensions (mm)									Mass (kg)
	Cage[1] Standard Option		NU	NJ	[2] NUP	N	NF	d_a[3] min.	d_b min.	d_b[4] max.	d_c min.	d_d min.	D_a[3] max.	D_b max.	D_b min.	r_a max.	r_b max.	approx.
NU1034	(M)	—	**NU**	**NJ**	—	**N**	—	181	181	190	197	—	249	249	239	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
***NU2234E**	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	211	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	236	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

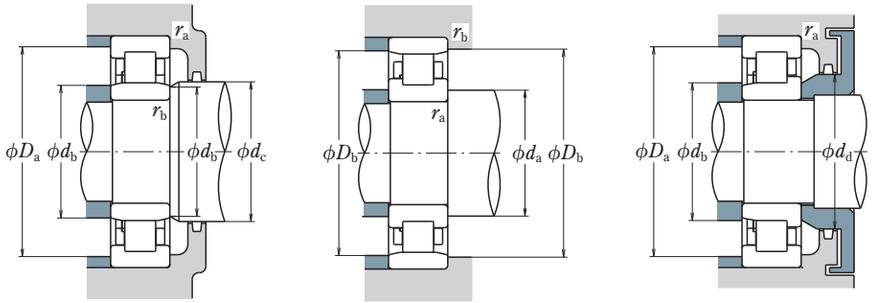
Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
(4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.

Remark Bearings with an asterisk (*) may be manufactured with an optimized roller crowning. Consult NSK for details.

SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 220 – 500 mm





Bearing Designations								Boundary Dimensions (mm)						Basic Load Ratings(6) (N)		Speeds(5) (min−1) Limiting Speeds			Abutment and Fillet Dimensions (mm)										Mass (kg)
	Cage(1) Standard Option	(2) NU	NJ	NUP	N	NF		d	D	B	r min.	r_1 min.	F_W	E_W	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease / Oil (Oil Bath)	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.	approx.
NU1044	(M)	—	**NU**	**NJ**	—	**N**	—	**220**	340	56	3	3	250	310	615 000	750 000	2 400	—	1 800 / 2 200	233	233	247	254	—	327	327	313	2.5	2.5	18.2
N 244	M	—	—	—	—	**N**	**NF**		400	65	4	4	—	350	935 000	1 080 000	1 800	—	1 500 / 1 800	236	—	—	—	—	—	384	357	3	3	37
∗**NU244E**	M	—	**NU**	**NJ**	**NUP**	—	—		400	65	4	4	268	—	1 110 000	1 250 000	1 700	—	1 500 / 1 800	236	236	264	273	289	384	—	—	3	3	37.4
NU2244	M	—	**NU**	—	—	—	—		400	108	4	4	270	—	1 400 000	1 810 000	1 700	—	1 300 / 1 600	—	236	264	273	289	384	—	—	3	3	61.8
N 344	M	—	—	—	—	**N**	**NF**		460	88	5	5	—	396	1 470 000	1 570 000	1 400	—	1 200 / 1 500	240	—	—	—	—	—	440	403	4	4	72.8
NU344	M	—	**NU**	**NJ**	—	—	—		460	88	5	5	284	—	1 470 000	1 570 000	1 400	—	1 200 / 1 500	240	240	278	287	307	440	—	—	4	4	74.6
NU1048	(M)	—	**NU**	**NJ**	—	**N**	—	**240**	360	56	3	3	270	330	650 000	820 000	2 200	—	1 600 / 2 000	253	253	266	275	—	347	347	333	2.5	2.5	19.5
N 248	M	—	—	—	—	**N**	**NF**		440	72	4	4	—	385	1 150 000	1 340 000	1 600	—	1 300 / 1 600	256	—	—	—	—	—	424	392	3	3	49.6
NU248	M	—	**NU**	**NJ**	**NUP**	—	—		440	72	4	4	295	—	1 150 000	1 340 000	1 600	—	1 300 / 1 600	256	256	289	298	316	424	—	—	3	3	50.4
NU2248	M	—	**NU**	—	—	—	—		440	120	4	4	295	—	1 770 000	2 320 000	1 500	—	1 200 / 1 500	—	256	289	298	316	424	—	—	3	3	84.9
N 348	M	—	—	—	—	**N**	**NF**		500	95	5	5	—	430	1 680 000	1 820 000	1 200	—	1 100 / 1 300	260	—	—	—	—	—	480	438	4	4	92.3
NU348	M	—	**NU**	**NJ**	—	—	—		500	95	5	5	310	—	1 680 000	1 820 000	1 200	—	1 100 / 1 300	260	260	304	313	333	480	—	—	4	4	94.6
NU1052	(M)	—	**NU**	**NJ**	—	**N**	**NF**	**260**	400	65	4	4	296	364	790 000	1 000 000	1 900	—	1 500 / 1 800	276	276	292	300	—	384	384	367	3	3	29.1
N 252	M	—	—	—	—	**N**	—		480	80	5	5	—	420	1 360 000	1 580 000	1 500	—	1 200 / 1 500	280	—	—	—	—	—	460	428	4	4	66.2
NU252	M	—	**NU**	**NJ**	—	—	—		480	80	5	5	320	—	1 360 000	1 580 000	1 500	—	1 200 / 1 500	280	280	314	323	343	460	—	—	4	4	67.1
NU2252	M	—	**NU**	—	**NUP**	—	—		480	130	5	5	320	—	2 110 000	2 770 000	1 300	—	1 100 / 1 300	280	280	314	323	343	460	—	—	4	4	111
NU352	M	—	**NU**	**NJ**	—	—	—		540	102	6	6	336	—	1 900 000	2 090 000	1 100	—	1 000 / 1 200	286	286	330	339	359	514	—	—	5	5	118
NU1056	(M)	—	**NU**	**NJ**	**NUP**	**N**	**NF**	**280**	420	65	4	4	316	384	810 000	1 050 000	1 800	—	1 400 / 1 700	296	296	312	320	—	404	404	387	3	3	30.8
N 256	M	—	—	—	—	**N**	**NF**		500	80	5	5	—	440	1 410 000	1 680 000	1 300	—	1 100 / 1 400	300	—	—	—	—	—	480	448	4	4	69.6
NU256	M	—	**NU**	**NJ**	—	—	—		500	80	5	5	340	—	1 410 000	1 680 000	1 300	—	1 100 / 1 400	300	300	334	344	364	480	—	—	4	4	70.7
NU1060	(M)	—	**NU**	**NJ**	—	**N**	**NF**	**300**	460	74	4	4	340	420	1 090 000	1 400 000	1 600	—	1 300 / 1 500	316	316	336	344	—	444	444	424	3	3	43.7
NU260	M	—	**NU**	**NJ**	—	—	—		540	85	5	5	364	—	1 730 000	2 070 000	1 200	—	1 100 / 1 300	320	320	358	368	391	520	—	—	4	4	89.2
NU1064	(M)	—	**NU**	—	—	**N**	**NF**	**320**	480	74	4	4	360	440	1 110 000	1 470 000	1 500	—	1 200 / 1 400	336	336	356	365	—	464	464	444	3	3	46.1
N 264	M	—	—	—	—	**N**	—		580	92	5	5	—	510	1 890 000	2 270 000	1 100	—	950 / 1 200	340	—	—	—	—	—	560	519	4	4	110
NU264	M	—	**NU**	**NJ**	—	—	—		580	92	5	5	390	—	1 890 000	2 270 000	1 100	—	950 / 1 200	340	340	384	394	420	560	—	—	4	4	112
NU1068	(M)	—	**NU**	**NJ**	—	**N**	**NF**	**340**	520	82	5	5	385	475	1 330 000	1 740 000	1 400	—	1 100 / 1 300	360	360	381	390	—	500	500	479	4	4	61.8
NU1072	(M)	—	**NU**	—	—	**N**	**NF**	**360**	540	82	5	5	405	495	1 370 000	1 830 000	1 300	—	1 000 / 1 300	380	380	400	410	—	520	520	499	4	4	64.6
NU1076	(M)	—	**NU**	—	—	—	—	**380**	560	82	5	5	425	—	1 400 000	1 910 000	1 200	—	1 000 / 1 200	—	400	420	430	—	540	—	—	4	4	67.5
NU1080	(M)	—	**NU**	—	**NUP**	**N**	—	**400**	600	90	5	5	450	550	1 670 000	2 280 000	1 100	—	900 / 1 100	420	420	445	455	—	580	580	554.5	4	4	88.2
NU1084	(M)	—	**NU**	—	—	**N**	—	**420**	620	90	5	5	470	570	1 710 000	2 380 000	1 100	—	850 / 1 100	440	440	465	475	—	600	600	574.5	4	4	91.7
NU1088	(M)	—	**NU**	—	—	—	—	**440**	650	94	6	6	493	—	1 810 000	2 530 000	1 000	—	800 / 1 000	—	466	488	498	—	624	—	—	5	5	105
NU1092	(M)	—	**NU**	—	**NUP**	**N**	—	**460**	680	100	6	6	516	624	1 950 000	2 740 000	950	—	750 / 950	486	486	511	521	—	654	654	628.5	5	5	123
NU1096	(M)	—	**NU**	**NJ**	—	**N**	—	**480**	700	100	6	6	536	644	1 990 000	2 860 000	900	—	750 / 900	506	506	531	541	—	674	674	654	5	5	127
NU10/500	(M)	—	**NU**	—	—	**N**	—	**500**	720	100	6	6	556	664	2 040 000	2 970 000	900	—	710 / 850	526	526	551	558	—	694	694	674	5	5	131

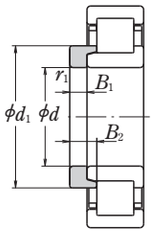
Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.

Notes (4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.
Remark Bearings with an asterisk (∗) may be manufactured with an optimized roller crowning. Consult NSK for details.

CYLINDRICAL ROLLER BEARINGS

L-Shaped Thrust Collars

Bore Diameter 20 – 85 mm

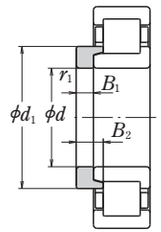


L-Shaped Thrust Collar

Boundary Dimensions (mm) d	d_1	B_1	B_2	r_1 min.	Bearing Designation	Mass (kg) approx.
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
	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
	43.6	6	10.5	1.5	**HJ 405**	0.057
30	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
	45.1	5	9.5	1.1	HJ 2306 E	0.043
	50.5	7	11.5	1.5	**HJ 406**	0.080
35	48.2	4	7	0.6	**HJ 207 E**	0.033
	48.2	4	8.5	0.6	**HJ 2207 E**	0.035
	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
40	54.1	5	8.5	1.1	**HJ 208 E**	0.049
	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
45	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
	71.7	8	13.5	2	**HJ 409**	0.175
50	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
	71.4	8	14.5	2	HJ 2310 E	0.155
	78.8	9	14.5	2.1	**HJ 410**	0.23

Boundary Dimensions (mm) d	d_1	B_1	B_2	r_1 min.	Bearing Designation	Mass (kg) approx.
55	70.9	6	9.5	1.1	**HJ 211 E**	0.087
	70.9	6	10	1.1	**HJ 2211 E**	0.088
	77.6	9	14	2	**HJ 311 E**	0.195
	77.6	9	15.5	2	HJ 2311 E	0.20
	85.2	10	16.5	2.1	**HJ 411**	0.29
60	77.7	6	10	1.5	**HJ 212 E**	0.108
	77.7	6	10	1.5	**HJ 2212 E**	0.108
	84.5	9	14.5	2.1	**HJ 312 E**	0.231
	84.5	9	16	2.1	HJ 2312 E	0.237
	91.8	10	16.5	2.1	**HJ 412**	0.34
65	84.5	6	10	1.5	HJ 213 E	0.129
	84.5	6	10.5	1.5	HJ 2213 E	0.131
	90.6	10	15.5	2.1	HJ 313 E	0.288
	90.6	10	18	2.1	HJ 2313 E	0.298
	98.5	11	18	2.1	**HJ 413**	0.42
70	89.5	7	11	1.5	HJ 214 E	0.157
	89.5	7	11.5	1.5	HJ 2214 E	0.158
	97.5	10	15.5	2.1	HJ 314 E	0.33
	97.5	10	18.5	2.1	HJ 2314 E	0.345
	110.5	12	20	3	**HJ 414**	0.605
75	94.5	7	11	1.5	HJ 215 E	0.166
	94.5	7	11.5	1.5	HJ 2215 E	0.167
	104.2	11	16.5	2.1	HJ 315 E	0.41
	104.2	11	19.5	2.1	HJ 2315 E	0.43
	116	13	21.5	3	**HJ 415**	0.71
80	101.6	8	12.5	2	HJ 216 E	0.222
	101.6	8	12.5	2	HJ 2216 E	0.222
	110.6	11	17	2.1	HJ 316 E	0.46
	111	11	20	2.1	HJ 2316 E	0.48
	122	13	22	3	**HJ 416**	0.78
85	107.6	8	12.5	2	HJ 217 E	0.25
	107.6	8	13	2	HJ 2217 E	0.252
	117.9	12	18.5	3	HJ 317 E	0.575
	117.9	12	22	3	HJ 2317 E	0.595
	126	14	24	4	**HJ 417**	0.88

Bore Diameter 90 – 320 mm



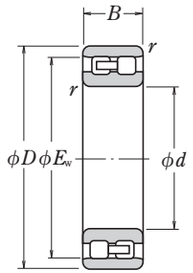
L-Shaped Thrust Collar

Boundary Dimensions (mm) d	d_1	B_1	B_2	r_1 min.	Bearing Designation	Mass (kg) approx.
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
	137	14	24	4	**HJ 418**	1.05
95	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
	132.2	13	24.5	3	HJ 2319 E	0.815
	147	15	25.5	4	**HJ 419**	1.3
100	127.5	10	15	2.1	HJ 220 E	0.44
	127.5	10	16	2.1	HJ 2220 E	0.45
	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
105	145	13	20.5	3	**HJ 321 E**	0.97
	159.5	16	27	4	**HJ 421**	1.65
110	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
	155.8	14	26.5	3	HJ 2322 E	1.27
	171	17	29.5	4	**HJ 422**	2.1
120	153.4	11	17	2.1	HJ 224 E	0.71
	153.4	11	20	2.1	HJ 2224 E	0.745
	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
130	164.2	11	17	3	HJ 226 E	0.79
	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
	219	18	33	5	**HJ 428**	3.75

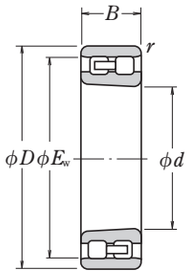
Boundary Dimensions (mm) d	d_1	B_1	B_2	r_1 min.	Bearing Designation	Mass (kg) approx.
150	193.7	12	19.5	3	HJ 230 E	1.26
	193.7	12	24.5	3	HJ 2230 E	1.35
	210	15	25	4	HJ 330 E	2.35
	210	15	31.5	4	HJ 2330 E	2.48
	234	20	36.5	5	**HJ 430**	4.7
160	207.3	12	20	3	HJ 232 E	1.48
	206.1	12	24.5	3	HJ 2232 E	1.55
	222	15	25	4	HJ 332 E	2.59
	222.1	15	32	4	HJ 2332 E	2.76
170	220.8	12	20	4	HJ 234 E	1.7
	219.5	12	24	4	HJ 2234 E	1.79
	238	16	33.5	4	**HJ 2334 E**	3.25
180	230.8	12	20	4	HJ 236 E	1.79
	229.5	12	24	4	HJ 2236 E	1.88
	252	17	35	4	**HJ 2336 E**	3.85
190	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
240	313	16	29.5	4	**HJ 248**	4.65
	313	16	38.5	4	**HJ 2248**	4.65
	334	22	39.5	5	**HJ 348**	8.2
260	340	18	33	5	**HJ 252**	6.2
	340	18	40.5	5	**HJ 2252**	6.2
	362	24	43	6	**HJ 352**	11.4
280	360	18	33	5	**HJ 256**	7.4
300	387	20	34.5	5	**HJ 260**	9.15
320	415	21	37	5	**HJ 264**	11.3

DOUBLE-ROW CYLINDRICAL ROLLER BEARINGS

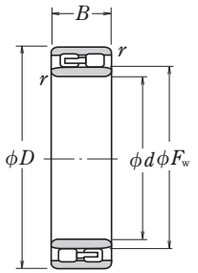
Bore Diameter 25 – 140 mm



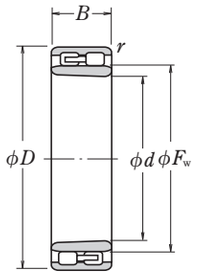
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Cylindrical Bore



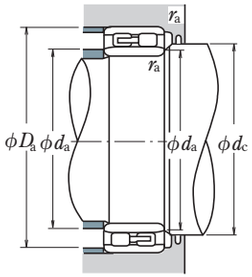
NN
Tapered Bore

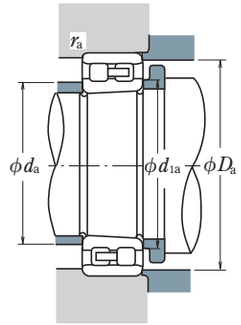


NNU
Cylindrical Bore



NNU
Tapered Bore





Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min⁻¹)	
d	D	B	r min.	F_W	E_W	C_r	C_{0r}	Grease	Oil
25	47	16	0.6	—	41.3	31 500	30 000	14 000	17 000
30	55	19	1	—	48.5	38 000	37 000	12 000	14 000
35	62	20	1	—	55	48 500	50 000	10 000	12 000
40	68	21	1	—	61	53 000	55 500	9 000	11 000
45	75	23	1	—	67.5	63 500	68 500	8 500	10 000
50	80	23	1	—	72.5	65 500	72 500	7 500	9 000
55	90	26	1.1	—	81	85 500	96 500	6 700	8 000
60	95	26	1.1	—	86.1	90 000	106 000	6 300	7 500
65	100	26	1.1	—	91	95 000	116 000	6 000	7 100
70	110	30	1.1	—	100	120 000	148 000	5 600	6 700
75	115	30	1.1	—	105	119 000	149 000	5 300	6 300
80	125	34	1.1	—	113	147 000	186 000	4 800	6 000
85	130	34	1.1	—	118	154 000	201 000	4 500	5 600
90	140	37	1.5	—	127	176 000	228 000	4 300	5 000
95	145	37	1.5	—	132	185 000	246 000	4 000	5 000
100	140	40	1.1	112	—	190 000	295 000	4 000	5 000
	150	37	1.5	—	137	193 000	265 000	4 000	4 800
105	145	40	1.1	117	—	198 000	315 000	3 800	4 800
	160	41	2	—	146	243 000	320 000	3 800	4 500
110	150	40	1.1	122	—	205 000	335 000	3 600	4 500
	170	45	2	—	155	281 000	375 000	3 400	4 300
120	165	45	1.1	133.5	—	225 000	360 000	3 200	4 000
	180	46	2	—	165	294 000	405 000	3 200	3 800
130	180	50	1.5	144	—	335 000	545 000	3 000	3 800
	200	52	2	—	182	350 000	475 000	3 000	3 600
140	190	50	1.5	154	—	350 000	585 000	2 800	3 600
	210	53	2	—	192	365 000	515 000	2 800	3 400

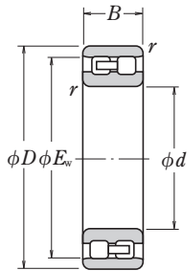
Bearing Designations		Abutment and Fillet Dimensions (mm)							Mass (kg)
Cylindrical Bore	Tapered Bore(1)	d_a(2) min.	d_a(2) max.	d_{1a} min.	d_c min.	D_a max.	D_a min.	r_a max.	approx.
NN 3005	**NN 3005 KR**	29	—	29	—	43	42	0.6	0.127
NN 3006	**NN 3006 KR**	35	—	36	—	50	50	1	0.198
NN 3007	**NN 3007 KR**	40	—	41	—	57	56	1	0.258
NN 3008	**NN 3008 KR**	45	—	46	—	63	62	1	0.309
NN 3009	**NN 3009 KR**	50	—	51	—	70	69	1	0.407
NN 3010	**NN 3010 KR**	55	—	56	—	75	74	1	0.436
NN 3011	**NN 3011 KR**	61.5	—	62	—	83.5	83	1	0.647
NN 3012	**NN 3012 KR**	66.5	—	67	—	88.5	88	1	0.693
NN 3013	**NN 3013 KR**	71.5	—	72	—	93.5	93	1	0.741
NN 3014	**NN 3014 KR**	76.5	—	77	—	103.5	102	1	1.06
NN 3015	**NN 3015 KR**	81.5	—	82	—	108.5	107	1	1.11
NN 3016	**NN 3016 KR**	86.5	—	87	—	118.5	115	1	1.54
NN 3017	**NN 3017 KR**	91.5	—	92	—	123.5	120	1	1.63
NN 3018	**NN 3018 KR**	98	—	99	—	132	129	1.5	2.09
NN 3019	**NN 3019 KR**	103	—	104	—	137	134	1.5	2.19
NNU 4920	**NNU 4920 KR**	106.5	111	108	115	133.5	—	1	1.9
NN 3020	**NN 3020 KR**	108	—	109	—	142	139	1.5	2.28
NNU 4921	**NNU 4921 KR**	111.5	116	113	120	138.5	—	1	1.99
NN 3021	**NN 3021 KR**	114	—	115	—	151	148	2	2.88
NNU 4922	**NNU 4922 KR**	116.5	121	118	125	143.5	—	1	2.07
NN 3022	**NN 3022 KR**	119	—	121	—	161	157	2	3.71
NNU 4924	**NNU 4924 KR**	126.5	133	128	137	158.5	—	1	2.85
NN 3024	**NN 3024 KR**	129	—	131	—	171	167	2	4.04
NNU 4926	**NNU 4926 KR**	138	143	140	148	172	—	1.5	3.85
NN 3026	**NN 3026 KR**	139	—	141	—	191	185	2	5.88
NNU 4928	**NNU 4928 KR**	148	153	150	158	182	—	1.5	4.08
NN 3028	**NN 3028 KR**	149	—	151	—	201	195	2	6.34

Note (1) Suffix KR represents bearings with tapered bores (taper 1 : 12).
Remark Double-row cylindrical roller bearings are generally produced in high precision classes (Class 5 or better).

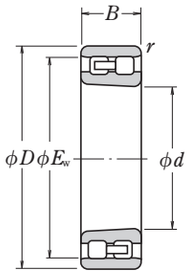
Note (2) d_a (max.) refers to values for adjusting rings for NNU bearings.

DOUBLE-ROW CYLINDRICAL ROLLER BEARINGS

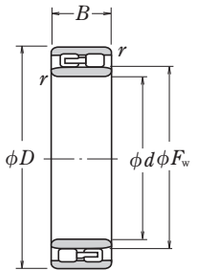
Bore Diameter 150 – 360 mm



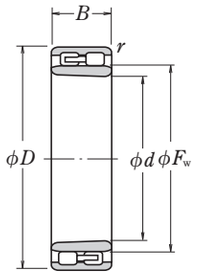
NN
Cylindrical Bore



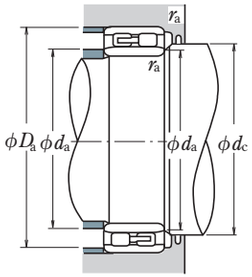
NN
Tapered Bore

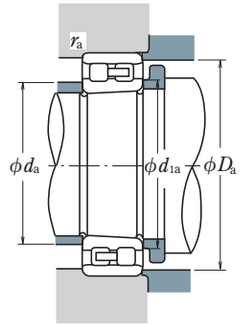


NNU
Cylindrical Bore



NNU
Tapered Bore





Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min⁻¹)	
d	D	B	r min.	F_W	E_W	C_r	C_{0r}	Grease	Oil
150	210	60	2	167	—	435 000	715 000	2 600	3 200
	225	56	2.1	—	206	410 000	585 000	2 600	3 000
160	220	60	2	177	—	450 000	760 000	2 400	3 000
	240	60	2.1	—	219	460 000	660 000	2 400	2 800
170	230	60	2	187	—	465 000	805 000	2 400	2 800
	260	67	2.1	—	236	555 000	805 000	2 200	2 600
180	250	69	2	200	—	590 000	1 020 000	2 200	2 600
	280	74	2.1	—	255	695 000	995 000	2 000	2 400
190	260	69	2	211.5	—	595 000	1 060 000	2 000	2 600
	290	75	2.1	—	265	730 000	1 080 000	2 000	2 400
200	280	80	2.1	223	—	700 000	1 220 000	1 900	2 400
	310	82	2.1	—	282	805 000	1 170 000	1 800	2 200
220	300	80	2.1	243	—	735 000	1 330 000	1 700	2 200
	340	90	3	—	310	1 000 000	1 480 000	1 700	2 000
240	320	80	2.1	263	—	770 000	1 450 000	1 600	2 000
	360	92	3	—	330	1 050 000	1 600 000	1 500	1 800
260	360	100	2.1	289	—	1 150 000	2 100 000	1 400	1 800
	400	104	4	—	364	1 270 000	1 920 000	1 400	1 700
280	380	100	2.1	309	—	1 180 000	2 230 000	1 300	1 700
	420	106	4	—	384	1 330 000	2 080 000	1 300	1 500
300	420	118	3	336	—	1 510 000	2 870 000	1 200	1 500
	460	118	4	—	418	1 590 000	2 460 000	1 200	1 400
320	440	118	3	356	—	1 560 000	3 050 000	1 100	1 400
	480	121	4	—	438	1 660 000	2 670 000	1 100	1 300
340	520	133	5	—	473	2 050 000	3 300 000	1 000	1 200
360	540	134	5	—	493	2 090 000	3 450 000	950	1 200

Note (1) Suffix KR represents bearings with tapered bores (taper 1 : 12).
Remark Double-row cylindrical roller bearings are generally produced in high precision classes (Class 5 or better).

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

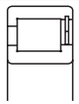
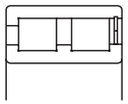
FULL COMPLEMENT SINGLE-ROW (NCF) / DOUBLE-ROW (NNCF) CYLINDRICAL ROLLER BEARINGS

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.

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

Table 1 Features of Full Complement Cylindrical Roller Bearings

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

Tolerances and Running Accuracy ..... Table 7.2 (Pages A128 to A131)

Single-Row
Double-Row

Recommended Fits

Single-Row
Double-Row

Inner Ring Rotation ..... Table 8.3 (Page A164)
Table 8.5 (Page A165)
Outer Ring Rotation ..... Table 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 no 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 double-row bearings. They are also widely used in 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	—

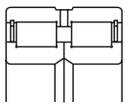
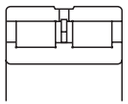
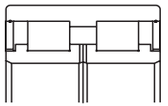
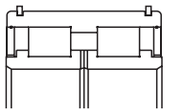
All bearings are inseparable, and the RSF type can be used as a free-end bearing. In this case, please refer to the permissible axial displacement in the bearing tables.

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

Shielded bearing units allow for the reduction of the number of parts surrounding the bearing, therefore allowing for a simple, compact design.

The surface of these bearings is treated with a rust preventive.

Table 2 Features of Full Complement Cylindrical Roller Bearings for Sheaves

Diagram	Type	Design and Features
	RS-48E4 RS-49E4	These types feature a double-row outer ring with center rib and two single-row inner rings with ribs. The outer and inner rings and rollers are inseparable 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 may be used as fixed-end bearings. An oil groove and holes are located at the center of the outer ring.
	RSF-48E4 RSF-49E4	These types feature a double-row outer ring without ribs and a double-row inner ring with three ribs. The outer and inner rings and rollers are inseparable since there is a retaining snap ring at the middle of the outer ring. They can be used as free-end bearings, and permissible axial movement is listed in the bearing tables. An oil groove and holes are located at the center of the outer ring.
 	RS-50 RS-50NR	These types are shielded on both sides and feature a double-row outer ring with center rib and 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 hole. The RS-50NR type is designated if there are snap rings at the outside of the outer ring. Surfaces are treated with a rust preventive.

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 used with inner ring rotation in general applications, and internal clearance should conform to Table 4.

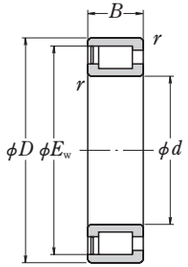
Table 4

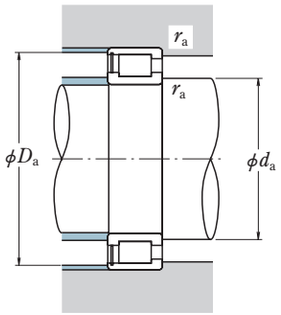
Units : μm

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





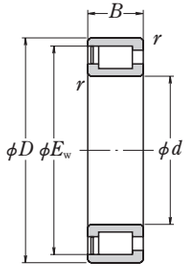
Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Designation
d	D	B	r min.	E_W	C_r	C_{0r}	
100	140	24	1.1	130.5	162	209	**NCF2920V**
	150	37	1.5	139.7	257	310	**NCF3020V**
110	150	24	1.1	141	170	229	**NCF2922V**
	170	45	2	156.3	340	405	**NCF3022V**
120	165	27	1.1	154	217	305	**NCF2924V**
	180	46	2	167.58	360	440	**NCF3024V**
130	180	30	1.5	166.5	258	370	**NCF2926V**
	200	52	2	183.81	520	685	NCF3026V
140	190	30	1.5	179.4	280	395	**NCF2928V**
	210	53	2	197.82	540	680	**NCF3028V**
150	210	36	2	195	355	505	**NCF2930V**
	225	56	2.1	206.82	565	710	**NCF3030V**
160	220	36	2	207	380	535	**NCF2932V**
	240	60	2.1	224.8	640	810	**NCF3032V**
170	215	22	1.5	203.5	184	272	**NCF1834V**
	230	36	2	218	390	570	**NCF2934V**
	260	67	2.1	242.87	835	1 070	**NCF3034V**
180	225	22	1.5	215	190	290	**NCF1836V**
	250	42	2	231.5	480	695	**NCF2936V**
	280	74	2.1	260.3	965	1 260	**NCF3036V**
190	240	24	1.5	228.7	219	335	NCF1838V
	260	42	2	243.6	535	785	**NCF2938V**
	290	75	2.1	269.9	990	1 320	**NCF3038V**
200	250	24	1.5	237	224	350	**NCF1840V**
	280	48	2.1	261	650	955	**NCF2940V**
	310	82	2.1	287.8	1 120	1 510	**NCF3040V**
220	270	24	2	257.7	235	385	**NCF1844V**
	300	48	2.1	282	680	1 050	**NCF2944V**
	340	90	3	312.3	1 350	1 820	**NCF3044V**
240	300	28	2	283	290	470	**NCF1848V**
	320	48	2.1	303	715	1 140	**NCF2948V**
	360	92	3	335.25	1 430	1 990	**NCF3048V**
260	320	28	2	307	305	510	**NCF1852V**
	360	60	2.1	333.2	925	1 460	**NCF2952V**
	400	104	4	376.1	1 930	2 600	**NCF3052V**

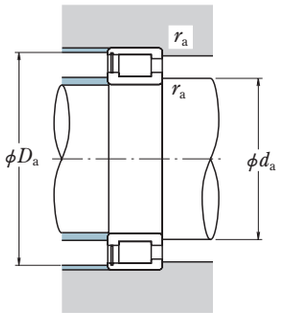
Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a	D_a	r_a max.	approx.
109	131	1	1.0
111	140	1.5	2.1
119	142	1	1.1
122	157	2	3.3
130	155	1	1.7
132	168	2	3.6
141	168	1.5	2.2
142	187	2	5.6
151	180	1.5	2.3
152	198	2	5.9
163	196	2	3.7
165	209	2	7.1
173	208	2	3.8
175	225	2	8.6
182	204	1.5	1.8
183	219	2	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





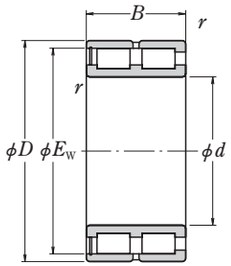
Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Designation
d	D	B	r min.	E_W	C_r	C_{0r}	
300	380	38	2.5	359	550	870	**NCF1860V**
	420	72	3	389.6	1 380	2 200	**NCF2960V**
	460	118	4	431.7	2 440	3 500	**NCF3060V**
320	400	38	2.1	380	565	925	**NCF1864V**
	440	72	3	410	1 420	2 340	**NCF2964V**
	480	121	4	449.6	2 680	3 900	NCF3064V
340	420	38	2.1	401	585	985	**NCF1868V**
	460	72	3	430.3	1 460	2 470	**NCF2968V**
	520	133	5	485.8	3 000	4 400	NCF3068V
360	440	38	2.5	422	605	1 040	**NCF1872V**
	480	72	3	450.7	1 510	2 610	**NCF2972V**
	540	134	5	503.6	3 150	4 600	NCF3072V
380	480	46	2.5	452.8	705	1 230	**NCF1876V**
	520	82	4	486.7	1 970	3 350	**NCF2976V**
	560	135	5	521.4	3 200	4 800	NCF3076V
400	500	46	2.5	475.7	725	1 300	**NCF1880V**
	540	82	4	511	2 030	3 550	**NCF2980V**
	600	148	5	558.7	3 800	5 750	**NCF3080AV**
420	520	46	2.1	491	740	1 340	**NCF1884V**
	560	82	4	523.2	2 060	3 650	**NCF2984V**
	620	150	5	577.7	3 700	5 650	NCF3084V
440	540	46	2.1	514	760	1 410	**NCF1888V**
	600	95	4	562	2 540	4 300	**NCF2988V**
460	580	56	3	552.7	1 130	1 950	**NCF1892V**
	620	95	4	576.5	2 510	4 500	NCF2992V
480	600	56	3	573	1 160	2 040	**NCF1896V**
	650	100	5	615	2 930	5 100	**NCF2996V**
500	620	56	3	593.5	1 180	2 120	**NCF18/500V**
	670	100	5	630.2	2 980	5 250	NCF29/500V
530	650	56	3	624	1 220	2 240	**NCF18/530V**
560	680	56	3	654.7	1 250	2 360	**NCF18/560V**
	820	195	6	770	6 900	11 300	**NCF30/560V**
600	730	60	3	695.5	1 400	2 680	NCF18/600V
	800	118	5	752	3 750	7 300	**NCF29/600V**
630	780	69	4	742	1 810	3 400	**NCF18/630V**
670	820	69	4	780	1 870	3 550	NCF18/670V
710	870	74	4	832.5	2 030	3 900	**NCF18/710V**
750	920	78	5	882.3	2 370	4 600	**NCF18/750V**
800	980	82	5	936	2 600	5 100	**NCF18/800V**

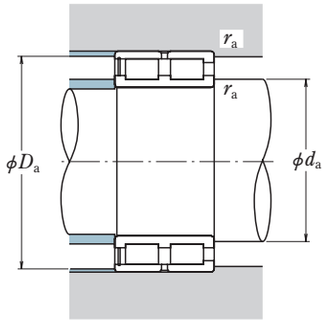
Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a	D_a	r_a max.	approx.
319	360	2	9.7
320	398	2.5	30.7
323	435	3	67.6
338	381	2	10.3
340	418	2.5	33
343	454	3	73
359	402	2	10.7
361	438	2.5	34.1
368	490	4	97
380	423	2	11.5
381	457	2.5	36
388	509	4	102
400	458	2	18.6
404	493	3	52
408	529	4	108
421	478	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

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FULL COMPLEMENT CYLINDRICAL ROLLER BEARINGS

NNCF Type, Double-Row
Bore Diameter 100 – 260 mm





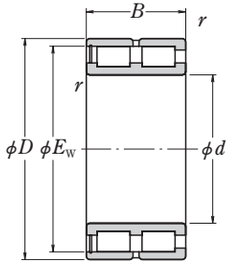
Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Designation
d	D	B	r min.	E_W	C_r	C_{0r}	
100	140	40	1.1	129.8	239	400	NNCF4920V
	150	67	1.5	139.7	440	615	**NNCF5020V**
110	150	40	1.1	138.4	248	430	NNCF4922V
	170	80	2	156.3	605	840	**NNCF5022V**
120	165	45	1.1	153.8	278	480	NNCF4924V
	180	80	2	167.58	615	885	**NNCF5024V**
130	180	50	1.5	165.7	320	555	NNCF4926V
	200	95	2	183.81	875	1 260	NNCF5026V
140	190	50	1.5	176.2	335	595	NNCF4928V
	210	95	2	197.82	920	1 360	**NNCF5028V**
150	210	60	2	191.6	485	865	NNCF4930V
	225	100	2.1	206.82	965	1 420	**NNCF5030V**
160	220	60	2	204.1	500	930	NNCF4932V
	240	109	2.1	224.8	1 100	1 620	**NNCF5032V**
170	230	60	2	212.4	515	975	**NNCF4934V**
	260	122	2.1	242.87	1 430	2 140	**NNCF5034V**
180	250	69	2	230.5	675	1 230	**NNCF4936V**
	280	136	2.1	260.3	1 650	2 510	**NNCF5036V**
190	260	69	2	240.7	695	1 290	**NNCF4938V**
	290	136	2.1	269.9	1 690	2 630	NNCF5038V
200	250	50	1.5	235.9	395	825	NNCF4840V
	280	80	2.1	259.5	820	1 500	NNCF4940V
	310	150	2.1	287.75	1 920	3 000	NNCF5040V
220	270	50	1.5	256.9	415	905	NNCF4844V
	300	80	2.1	277	855	1 620	NNCF4944V
	340	160	3	312.3	2 320	3 650	**NNCF5044V**
240	300	60	2	282.6	605	1 340	NNCF4848V
	320	80	2.1	300	895	1 770	NNCF4948V
	360	160	3	335.25	2 440	4 000	**NNCF5048V**
260	320	60	2	303.6	630	1 450	NNCF4852V
	360	100	2.1	331.5	1 290	2 530	NNCF4952V
	400	190	4	376.1	3 300	5 200	NNCF5052V

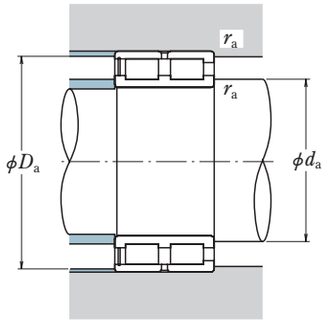
Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a	D_a	r_a max.	approx.
109	130	1	2.0
111	140	1.5	3.8
119	140	1	2.1
122	157	2	6.1
130	155	1	2.9
132	168	2	6.5
141	168	1.5	3.9
142	187	2	10.3
151	178	1.5	4.2
152	198	2	10.8
163	196	2	6.6
165	209	2	13
173	206	2	7.0
175	225	2	15.8
183	216	2	7.3
185	244	2	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

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FULL COMPLEMENT CYLINDRICAL ROLLER BEARINGS

NNCF Type, Double-Row
Bore Diameter 280 – 500 mm





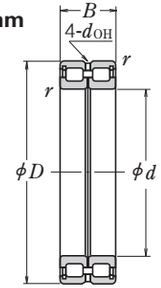
Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Designation
d	D	B	r min.	E_W	C_r	C_{0r}	
280	350	69	2	332.5	840	1 860	NNCF4856V
	380	100	2.1	352.5	1 340	2 720	NNCF4956V
	420	190	4	390.5	3 400	5 450	NNCF5056V
300	380	80	2.1	357.2	990	2 160	NNCF4860V
	420	118	3	386.5	1 870	3 600	NNCF4960V
	460	218	4	431.7	4 200	7 000	NNCF5060V
320	400	80	2.1	380.2	1 030	2 310	NNCF4864V
	440	118	3	404.5	2 000	4 000	NNCF4964V
	480	218	4	446.9	4 300	7 350	NNCF5064V
340	420	80	2.1	397.4	1 050	2 430	NNCF4868V
	460	118	3	431	2 080	4 300	NNCF4968V
	520	243	5	485.8	5 250	8 750	NNCF5068V
360	440	80	2.1	420.4	1 190	2 500	NNCF4872V
	480	118	3	449	2 130	4 500	NNCF4972V
	540	243	5	503.6	5 400	9 150	NNCF5072V
380	480	100	2.1	450.6	1 550	3 600	NNCF4876V
	520	140	4	482.5	2 690	5 650	NNCF4976V
	560	243	5	521.4	5 500	9 600	NNCF5076V
400	500	100	2.1	471.7	1 590	3 750	NNCF4880V
	540	140	4	503	2 760	5 900	NNCF4980V
	600	272	5	558.7	6 200	10 900	NNCF5080V
420	520	100	2.1	492	1 630	3 950	NNCF4884V
	560	140	4	523	2 820	6 200	NNCF4984V
	620	272	5	577.7	6 350	11 300	**NNCF5084V**
440	540	100	2.1	513	1 670	4 150	NNCF4888V
	600	160	4	560.5	3 700	7 850	NNCF4988V
460	580	118	3	549.2	2 130	5 150	NNCF4892V
	620	160	4	573	3 750	8 050	NNCF4992V
480	600	118	3	565.8	2 170	5 300	NNCF4896V
	650	170	5	603	4 100	8 900	NNCF4996V
500	620	118	3	590.7	2 220	5 600	NNCF48/500V
	670	170	5	629	4 200	9 350	NNCF49/500V

Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a	D_a	r_a max.	approx.
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

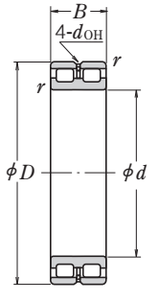
Remark Full complement cylindrical roller bearings are designed for specific applications; when using them, please contact NSK.

FULL COMPLEMENT CYLINDRICAL ROLLER BEARINGS FOR SHEAVES

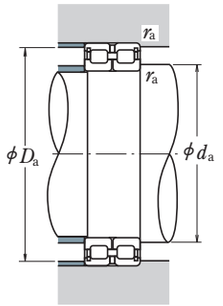
RS-48 · RS-49 Types
RSF-48 · RSF-49 Types
Bore Diameter 50 – 220 mm



Fixed-End Bearing
RS



Free-End Bearing
RSF



Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min^{-1})	
d	D	B	r min.	C_r	C_{0r}	Grease	Oil
50	72	22	0.6	59 500	75 500	2 000	4 000
60	85	25	1	84 000	118 000	1 600	3 200
65	90	25	1	86 500	125 000	1 600	3 200
70	100	30	1	125 000	168 000	1 400	2 800
80	110	30	1	134 000	191 000	1 300	2 600
90	125	35	1.1	181 000	268 000	1 100	2 200
100	125	25	1	108 000	189 000	1 100	2 200
	140	40	1.1	239 000	400 000	1 000	2 000
105	130	25	1	109 000	196 000	1 000	2 000
	145	40	1.1	245 000	420 000	950	1 900
110	150	40	1.1	248 000	430 000	900	1 800
120	150	30	1	147 000	283 000	900	1 800
	165	45	1.1	278 000	480 000	800	1 600
130	165	35	1.1	199 000	390 000	800	1 600
	180	50	1.5	320 000	555 000	750	1 500
140	175	35	1.1	206 000	415 000	750	1 500
	190	50	1.5	335 000	595 000	710	1 400
150	190	40	1.1	288 000	575 000	670	1 400
	210	60	2	485 000	865 000	670	1 300
160	200	40	1.1	299 000	615 000	630	1 300
	220	60	2	500 000	930 000	600	1 200
170	215	45	1.1	325 000	650 000	600	1 200
	230	60	2	515 000	975 000	600	1 200
180	225	45	1.1	335 000	685 000	560	1 100
	250	69	2	610 000	1 130 000	530	1 100
190	240	50	1.5	385 000	785 000	530	1 100
	260	69	2	625 000	1 180 000	500	1 000
200	250	50	1.5	395 000	825 000	500	1 000
	280	80	2.1	820 000	1 500 000	480	950
220	270	50	1.5	415 000	905 000	450	900
	300	80	2.1	855 000	1 620 000	430	850

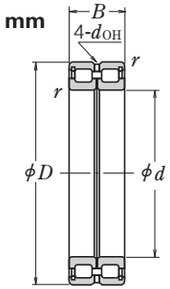
Bearing Designations[1]		Dimensions (mm)		Abutment and Fillet Dimensions (mm)			Mass (kg)
Fixed-End Bearing	Free-End Bearing	d_{OH}[2]	Axial Disp.[3]	d_a min.	D_a max.	r_a max.	approx.
RS-4910E4	**RSF-4910E4**	2.5	1.5	54	68	0.6	0.30
RS-4912E4	**RSF-4912E4**	2.5	1.5	65	80	1	0.46
RS-4913E4	**RSF-4913E4**	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-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

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

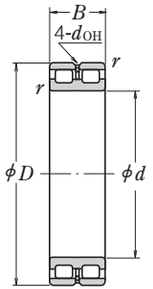
Notes (1) Suffix E4 indicates that the outer ring contains oil holes and an oil groove.
(2) d_{OH} represents the oil hole diameter in the outer ring.
(3) Axial Disp. refers to permissible axial displacement for free-end bearings.

FULL COMPLEMENT CYLINDRICAL ROLLER BEARINGS FOR SHEAVES

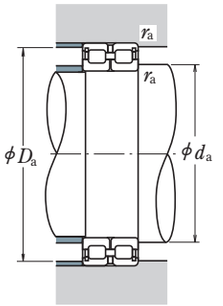
RS-48 · RS-49 Types
RSF-48 · RSF-49 Types
Bore Diameter 240 – 530 mm



Fixed-End Bearing
RS



Free-End Bearing
RSF



Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min^{-1})	
d	D	B	r min.	C_r	C_{0r}	Grease	Oil
240	300	60	2	605 000	1 340 000	430	850
	320	80	2.1	895 000	1 770 000	400	800
260	320	60	2	630 000	1 450 000	380	750
	360	100	2.1	1 290 000	2 530 000	360	710
280	350	69	2	755 000	1 690 000	340	710
	380	100	2.1	1 340 000	2 720 000	340	670
300	380	80	2.1	990 000	2 160 000	320	630
	420	118	3	1 800 000	3 400 000	300	600
320	400	80	2.1	1 030 000	2 310 000	300	600
	440	118	3	1 850 000	3 600 000	280	560
340	420	80	2.1	1 050 000	2 430 000	280	560
	460	118	3	1 920 000	3 900 000	260	530
360	440	80	2.1	1 090 000	2 580 000	260	530
	480	118	3	1 970 000	4 050 000	260	500
380	480	100	2.1	1 550 000	3 600 000	240	500
	520	140	4	2 520 000	5 200 000	240	450
400	500	100	2.1	1 590 000	3 750 000	240	480
	540	140	4	2 580 000	5 450 000	220	450
420	520	100	2.1	1 630 000	3 950 000	220	450
	560	140	4	2 640 000	5 700 000	200	430
440	540	100	2.1	1 670 000	4 150 000	200	430
	600	160	4	3 500 000	7 350 000	190	380
460	580	118	3	2 130 000	5 150 000	190	380
	620	160	4	3 550 000	7 500 000	190	380
480	600	118	3	2 170 000	5 300 000	190	380
	650	170	5	3 950 000	8 500 000	180	360
500	620	118	3	2 220 000	5 600 000	180	360
	670	170	5	4 050 000	8 900 000	170	340
530	710	180	5	4 200 000	9 200 000	160	320

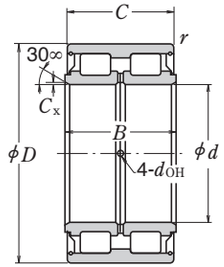
Remark Cylindrical roller bearings for sheaves are designed for specific applications; when using them, please contact NSK.

Bearing Designations[1]		Dimensions (mm)		Abutment and Fillet Dimensions (mm)			Mass (kg)
Fixed-End Bearing	Free-End Bearing	d_{OH}[2]	Axial Disp.[3]	d_a min.	D_a max.	r_a max.	approx.
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

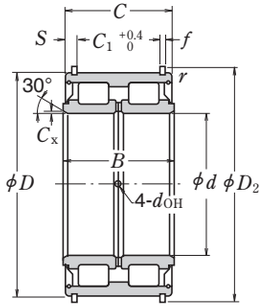
Notes (1) Suffix E4 indicates that the outer ring contains oil holes and an oil groove.
(2) d_{OH} represents the oil hole diameter in the outer ring.
(3) Axial Disp. refers to permissible axial displacement for free-end bearings.

FULL COMPLEMENT CYLINDRICAL ROLLER BEARINGS FOR SHEAVES

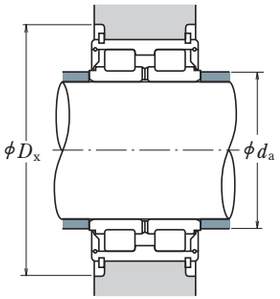
RS-50 Type (Prelubricated)
Bore Diameter 40 – 400 mm



Without Locating Ring



With Locating Ring



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})
d	D	B	C	C_x (1) min.	r min.	C_r	C_{0r}	Grease
40	68	38	37	0.4	0.6	98 000	116 000	2 400
45	75	40	39	0.4	0.6	117 000	144 000	2 200
50	80	40	39	0.4	0.6	123 000	158 000	2 000
55	90	46	45	0.6	0.6	145 000	193 000	1 800
60	95	46	45	0.6	0.6	152 000	208 000	1 700
65	100	46	45	0.6	0.6	158 000	224 000	1 600
70	110	54	53	0.6	0.6	211 000	285 000	1 400
75	115	54	53	0.6	0.6	220 000	305 000	1 400
80	125	60	59	0.6	0.6	310 000	430 000	1 200
85	130	60	59	0.6	0.6	315 000	445 000	1 200
90	140	67	66	1	0.6	375 000	540 000	1 100
95	145	67	66	1	0.6	385 000	565 000	1 100
100	150	67	66	1	0.6	390 000	585 000	1 000
110	170	80	79	1.1	1	470 000	695 000	900
120	180	80	79	1.1	1	490 000	750 000	850
130	200	95	94	1.1	1	660 000	1 000 000	750
140	210	95	94	1.1	1	675 000	1 040 000	710
150	225	100	99	1.3	1	765 000	1 210 000	670
160	240	109	108	1.3	1.1	855 000	1 370 000	630
170	260	122	121	1.3	1.1	1 060 000	1 680 000	600
180	280	136	135	1.3	1.1	1 200 000	1 910 000	530
190	290	136	135	1.3	1.1	1 370 000	2 230 000	500
200	310	150	149	1.3	1.1	1 610 000	2 650 000	480
220	340	160	159	1.5	1.1	1 860 000	3 100 000	430
240	360	160	159	1.5	1.1	1 940 000	3 350 000	400
260	400	190	189	2	1.5	2 620 000	4 500 000	360
280	420	190	189	2	1.5	2 670 000	4 700 000	340
300	460	218	216	2	1.5	3 300 000	5 850 000	300
320	480	218	216	2	1.5	3 350 000	6 100 000	300
340	520	243	241	2.1	2	4 150 000	7 550 000	260
360	540	243	241	2.1	2	4 200 000	7 850 000	260
380	560	243	241	2.1	2	4 400 000	8 400 000	240
400	600	272	270	2.1	2	5 250 000	9 950 000	220

Bearing Designations		Locating Ring Dimensions (mm)				Oil Holes (mm)	Abutment and Fillet Dimensions (mm)		Mass (kg)
Without Locating Ring	With Locating Ring	C_1	S	D_2	f	d_{OH}	d_a min.	D_x min.	approx.
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

Note (1) These values represent chamfer dimensions of the inner ring in the radial direction.

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

Remarks 3. Cylindrical roller bearings for sheaves are designed for specific applications; when using them, please contact NSK.
4. For shields with outside diameters larger than 180 mm, the above figure is different from the actual shape. For detailed drawings, please contact NSK.



6. TAPERED ROLLER BEARINGS

INTRODUCTION ..... C 182

TECHNICAL DATA

Free Space of Tapered Roller Bearings ..... C 188

BEARING TABLES

METRIC SERIES 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 SERIES TAPERED ROLLER BEARINGS

Bore Diameter 12.000 – 47.625 mm ..... C 210

Bore Diameter 48.412 – 69.850 mm ..... C 224

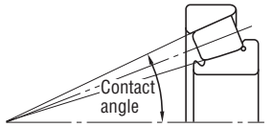
Bore Diameter 70.000 – 206.375 mm ..... C 232

Appendix 14 (Page E020) contains the index for inch series tapered roller bearings.

DOUBLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 40 – 260 mm ..... C 246

DESIGN, TYPES, AND FEATURES

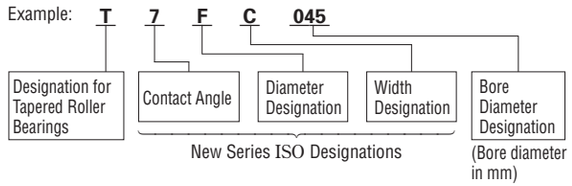


Tapered roller bearings are designed so the apices of the cones formed by the raceways of the inner and outer rings and the inner ring rollers all coincide at one point on the axis of the bearing. When a radial load is imposed, a component axial force occurs; therefore, it is necessary to use two bearings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

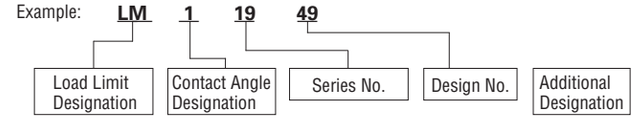
For Metric Series medium-angle or steep-angle tapered roller bearings, the respective contact angle designation C or D is added after the bore number. For normal-angle tapered roller bearings, no contact angle designation is used. Medium-angle tapered roller bearings are primarily used for the pinion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

Some bearings with high load capacity (HR Series) contain a J suffix that indicates they conform to ISO specifications for outer ring back face raceway diameter, outer ring width, and contact angle. Therefore, the inner ring assembly and outer ring of bearings with a J suffix are internationally interchangeable.

Some Metric Series tapered roller bearings specified by ISO 355 have different dimensions from past Series 3XX bearings. Some of these are listed in the bearing tables. These conform to ISO specifications for the small-end diameter of the inner ring and contact angle. The inner and outer ring assemblies are internationally interchangeable. The bearing designation structure, which has changed from the past, is listed below:



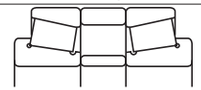
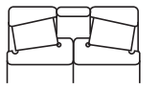
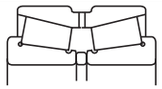
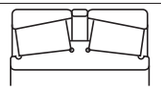
Inch Series bearings also exist. Inner ring assemblies and outer rings are approximately formulated as follows (excluding four-row tapered roller bearings):



Various arrangements of tapered roller bearings (excluding single-row bearings) are available.

The cages of tapered roller bearings are usually made of pressed steel.

Table 1 Design and Features of Tapered Roller Bearing Arrangements

Design	Arrangement	Ex. Bearing Designation	Features
	Back-to-back	HR30210JDB+KLR10	Two standard bearings are combined. The bearing clearances are adjusted by inner ring spacers or outer ring spacers. The inner rings, outer rings, and spacers are marked with serial numbers and mating marks. Components with the same serial number can be assembled by referring to the matching indications.
	Face-to-face	HR30210JDF+KR	
	KBE Type	100KBE31+L	The KBE type is a back-to-back arrangement of bearings with an integrated outer ring spacer. The KH type is a face-to-face arrangement in which the inner rings are integrated. Since the bearing clearance is adjusted using spacers, components must have the same serial number for assembly with reference to the matching indications.
	KH Type	110KH31+K	

TOLERANCES AND RUNNING ACCURACY

METRIC SERIES TAPERED ROLLER BEARINGS ..... Table 7.3 (Pages A132 to A135)
INCH SERIES TAPERED ROLLER BEARINGS ..... Table 7.4 (Pages A136 and A137)

The following precision classes apply to some Inch Series tapered roller bearings. For more details, please consult with NSK.

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

Table 2 Tolerances for Inner Rings (CLASS K)

Units : μm

Nominal Bore Diameter d (mm)		Δ_{dmp}		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 Outer Rings (CLASS K)

Units : μm

Nominal Outside Diameter D (mm)		Δ_{Dmp}		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 Deviations of Actual Bearing Width and Actual Effective Widths of Inner Subunit and Outer Ring (CLASS K)

Units : μm

Nominal Bore Diameter d (mm)		Deviation of Actual Effective Width of Inner Subunit Δ_{T1s}		Deviation of Actual Effective Width of Outer Ring Δ_{T2s}		Deviation of Actual Bearing Width Δ_{Ts}	
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, these are preceded by "T")

Table 5 Tolerances for Deviations of a Single Bore Diameter and Actual Bearing Width

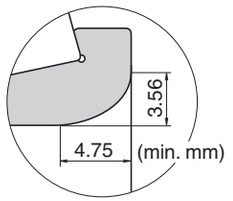
Units : μm

Nominal Bore Diameter d				Deviation of a Single Bore Diameter Δ_{ds}		Deviation of Actual Bearing Width Δ_{Ts}	
over		incl.					
(mm)	1/25.4	(mm)	1/25.4	high	low	high	low
—		76.200	3.0000	+20	0	+356	0

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

(3) Special Chamfer Dimensions

For bearings marked “spec.” in the r column of the bearing tables have inner ring back-face side dimensions as shown in the following figure:



RECOMMENDED FITS

METRIC SERIES TAPERED ROLLER BEARINGS ..... Table 8.3 (Page A164)
Table 8.5 (Page A165)

INCH SERIES TAPERED ROLLER BEARINGS ..... Table 8.7 (Page A166)
Table 8.8 (Page A167)

INTERNAL CLEARANCE

METRIC SERIES TAPERED ROLLER BEARINGS (Matched and Double-Row) ..... Table 8.17 (Page A173)

INCH SERIES 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 inner ring 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 bearing load conditions. Furthermore, higher speeds are attainable by making changes in the lubrication method, cage design, etc. Refer to page A098 for more 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 during operation exceeds 'e' as listed in the bearing tables, slippage between the rollers and raceways occurs, which may result in smearing. This is especially prevalent 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 dimensions of D_a, D_b, S_a, and S_b when adopting HR Series bearings.

TECHNICAL DATA

Free Space of Tapered Roller Bearings

Tapered roller bearings can carry radial loads and unidirectional axial loads and offer high capacity. These bearings are used widely in machines with relatively severe loading conditions, usually in various combinations of opposed or combined single-row bearings.

Tapered roller bearings are usually lubricated with grease to facilitate easier maintenance and inspection. Be sure to select a grease appropriate for operating conditions and use the proper amount of grease in the housing space. The necessary free space for various bearing Series are listed in Table 6.

The free space of a tapered roller bearing is measured as the outer volume of the bearing less the inner ring, outer ring, and cage, as shown in Figure 1. The bearing is filled so that grease reaches the inner ring rib surface and pocket surface sufficiently. Take care regarding the fill amount and state of the grease, especially if grease leakage occurs or if maintaining low running torque is important.

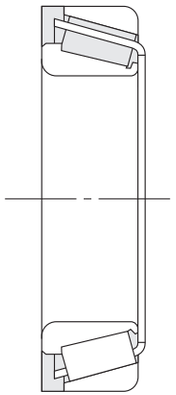


Fig. 1 Free Space in a Tapered Roller Bearing

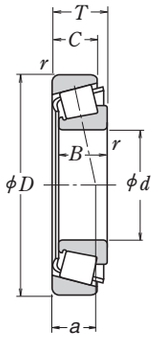
Table 6 Free Space of Tapered Roller Bearings

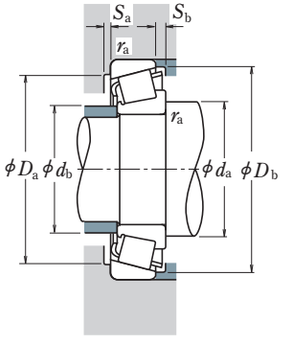
Units: cm^3

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

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 $P_0 = F_r$

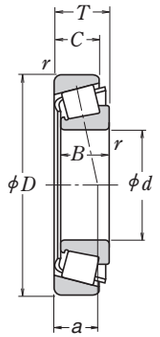
The values of e, Y_1, and Y_0 are given in the table below.

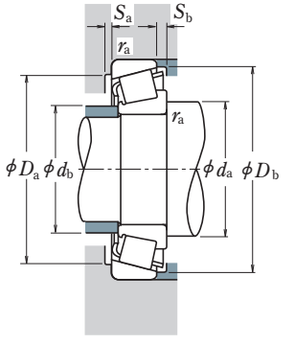
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer						
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.	a	e	Y_1	Y_0	approx.
15	35	11.75	11	10	0.6 0.6	18 200	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	29 000	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	0.098
17	40	13.25	12	11	1 1	24 800	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	33 500	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	36 000	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
	47	15.25	14	10.5	1 1	27 000	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	46 000	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
20	42	15	15	12	0.6 0.6	30 500	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	34 500	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
	47	15.25	14	12	0.3 1	29 400	24 000	8 000	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	44 000	37 500	8 500	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
	47	19.25	18	15	1 1	38 500	33 500	8 000	11 000	**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	13	1.5 1.5	43 000	33 500	7 500	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	16.25	15	12	1.5 1.5	31 000	24 500	7 100	10 000	**30304 D**	—	34	26	43	37	49	2	4	1.5 1.5	16.7	0.81	0.74	0.41	0.168
	52	22.25	21	18	1.5 1.5	56 000	47 500	8 000	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
22	44	15	15	11.5	0.6 0.6	31 500	29 400	8 500	11 000	**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	36 000	30 500	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	15.25	14	12	1 1	33 500	29 500	7 500	10 000	**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	45 000	40 500	7 500	11 000	**HR 322/22**	—	31	28	44	41	47	2	4	1 1	13.5	0.37	1.6	0.89	0.18
	50	19.25	18	15	1 1	41 500	39 500	7 500	10 000	**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	14	1.5 1.5	45 500	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	42 500	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
25	47	15	15	11.5	0.6 0.6	34 000	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	38 000	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	39 500	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	34 500	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	49 000	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	43 000	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
	52	22	22	18	1 1	58 500	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
	62	18.25	17	15	1.5 1.5	58 500	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	52 000	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	47 000	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	47 000	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	77 000	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
28	52	16	16	12	1 1	39 500	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	48 500	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	42 000	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	58 500	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	52 000	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	68 000	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	60 500	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 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

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 $P_0 = F_r$

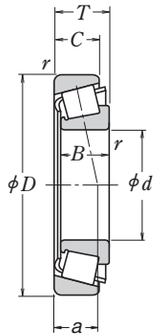
The values of e, Y_1, and Y_0 are given in the table below.

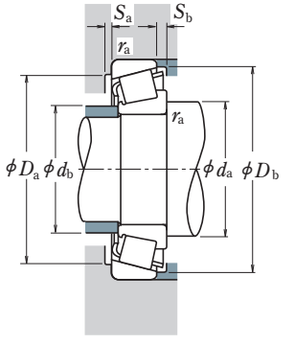
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer						
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.		a	e	Y_1	Y_0	approx.
30	47	12	12	9	0.3	0.3	21 700	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	44 500	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	51 500	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	53 000	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	44 000	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	64 000	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	59 000	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	82 000	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	73 000	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	70 000	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	60 500	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	60 500	52 500	4 800	6 800	**HR 31306 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	98 000	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	93 500	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	46 000	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	50 500	50 000	6 300	8 500	**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	59 500	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	56 500	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	69 000	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	60 500	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	86 000	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	69 000	56 000	5 300	7 100	**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	33 500	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	53 000	55 500	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	60 000	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	66 500	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	57 500	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	86 500	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	74 500	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	107 000	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	93 500	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	83 500	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	76 500	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	76 500	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	122 000	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 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

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 $P_0 = F_r$

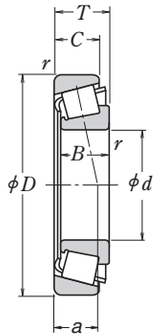
The values of e, Y_1, and Y_0 are given in the table below.

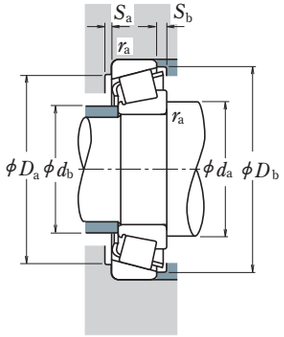
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer						
d	D	T	B	C	r min.		C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.		a	e	Y_1	Y_0	approx.
40	62	15	15	12	0.6	0.6	41 500	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	65 000	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	72 500	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	96 500	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	78 000	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	95 000	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	91 000	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	32	32	25	1.5	1.5	131 000	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	111 000	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	104 000	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	98 000	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	98 000	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	147 000	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	42 500	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	0.187
	75	20	20	15.5	1	1	74 000	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	85 000	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	103 000	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	84 000	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	102 000	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	91 500	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	136 000	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	109 000	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	171 000	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	138 000	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	118 000	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	118 000	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	177 000	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	177 000	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	44 000	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	75 500	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	86 500	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	110 000	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	94 000	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	108 000	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	95 000	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	146 000	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	134 000	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	160 000	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	141 000	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	141 000	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	216 000	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	202 000	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 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

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 $P_0 = F_r$

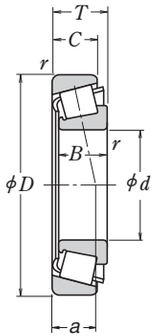
The values of e, Y_1, and Y_0 are given in the table below.

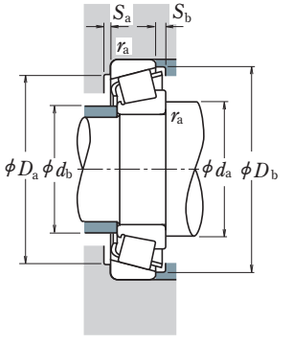
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min⁻¹)		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
d	D	T	B	C	Ring: Inner r min.	Ring: Outer r min.	C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	Ring: Inner r_a max.	Ring: Outer r_a max.	a	e	Y_1	Y_0	approx.
55	80	17	17	14	1	1	55 500	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	100 000	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	112 000	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	138 000	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	116 000	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	135 000	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	174 000	193 000	3 600	5 000	**HR 33211 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	155 000	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	184 000	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	161 000	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	161 000	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	251 000	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	240 000	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	60 000	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	105 000	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	118 000	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	142 000	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	127 000	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	161 000	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	204 000	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	186 000	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	214 000	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	186 000	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	186 000	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	286 000	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	241 000	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	60 000	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	106 000	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	120 000	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	182 000	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	151 000	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	193 000	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	249 000	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	245 000	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	213 000	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	213 000	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	330 000	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 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

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 $P_0 = F_r$

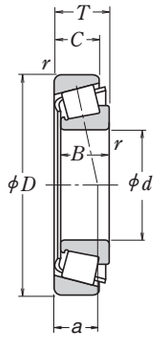
The values of e, Y_1, and Y_0 are given in the table below.

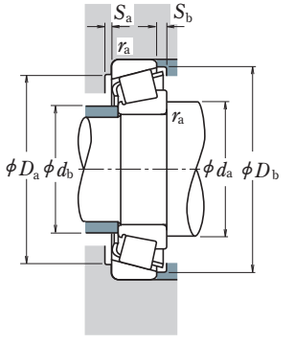
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer						
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.	a	e	Y_1	Y_0	approx.
70	100	20	20	16	1 1	86 000	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	128 000	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	156 000	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	218 000	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	163 000	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	194 000	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	257 000	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	219 000	235 000	2 400	3 400	**T 7 FC070**	7FC	88	81	126	106	133	5	12	2.5 2.5	46.4	0.87	0.69	0.38	2.58
	150	38	35	30	3 2.5	279 000	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	236 000	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	236 000	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	370 000	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	345 000	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	89 000	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	134 000	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	163 000	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	224 000	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	176 000	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	203 000	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	265 000	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	310 000	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	259 000	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	259 000	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	420 000	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	385 000	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	92 000	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	173 000	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	211 000	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	229 000	289 000	2 600	3 600	**HR 33116 J**	3DE	82	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	193 000	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	181 000	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	237 000	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	315 000	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	340 000	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	290 000	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	290 000	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	470 000	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	450 000	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 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

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 $P_0 = F_r$

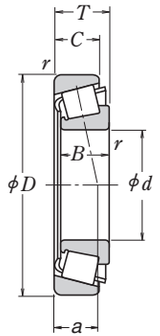
The values of e, Y_1, and Y_0 are given in the table below.

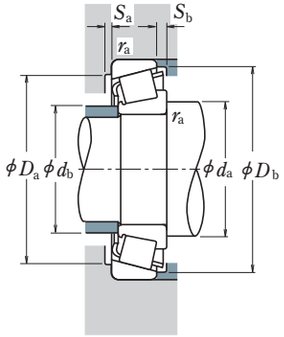
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer						
d	D	T	B	C	r min.		C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.		a	e	Y_1	Y_0	approx.
85	120	23	23	18	1.5	1.5	115 000	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	176 000	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	221 000	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	283 000	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	226 000	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	211 000	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	259 000	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	345 000	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	380 000	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	320 000	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	320 000	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	505 000	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	119 000	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	209 000	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	270 000	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	320 000	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	247 000	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	315 000	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	425 000	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	325 000	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	325 000	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	555 000	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	120 000	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	212 000	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	284 000	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	350 000	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	275 000	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	355 000	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	460 000	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	430 000	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	380 000	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	380 000	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	645 000	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	144 000	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	139 000	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	216 000	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	290 000	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	390 000	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	315 000	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	400 000	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	505 000	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	520 000	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	475 000	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	695 000	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 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

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

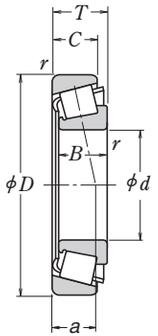
When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

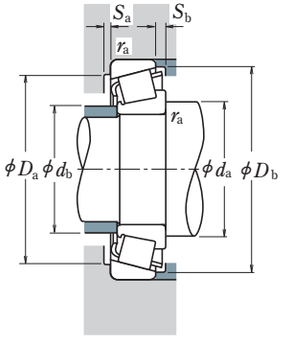
The values of e, Y_1, and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner / Outer r min.							d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	Ring: Inner / Outer r_a max.		a	e	Y_1	Y_0	
d	D	T	B	C		C_r	C_{0r}	Grease	Oil		approx.														approx.
105	145	25	25	20	1.5	1.5	146 000	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	250 000	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	315 000	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	345 000	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	445 000	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	560 000	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	510 000	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	820 000	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	151 000	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	290 000	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	360 000	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	450 000	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	390 000	420 000	1 800	2 400	**HR 30222 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	490 000	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	595 000	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	580 000	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	830 000	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	198 000	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	188 000	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	297 000	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	370 000	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	565 000	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	410 000	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	540 000	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	660 000	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	685 000	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	950 000	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	205 000	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	246 000	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	225 000	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	395 000	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	485 000	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	460 000	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	650 000	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	675 000	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	795 000	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	770 000	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	1 020 000	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

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

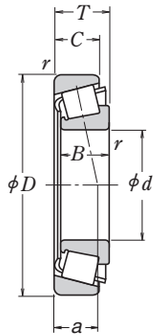
When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

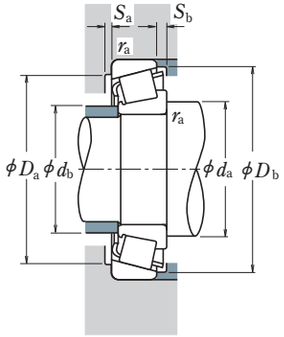
The values of e, Y_1, and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)									Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner / Outer r min.							d_a	d_b	D_a	D_b	S_a	S_b	Ring: Inner / Outer r_a		a	e	Y_1	Y_0	
d	D	T	B	C		C_r	C_{0r}	Grease	Oil		approx.	min.	max.	max.	min.	min.	min.	max.						approx.
140	190	32	32	25	2	1.5	253 000	390 000	1 700	2 200	**HR 32928 J**	2CC	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	400 000	555 000	1 600	2 200	**HR 32028 XJ**	4DC	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	505 000	770 000	1 600	2 200	**HR 33028 J**	2DE	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	480 000	515 000	1 400	1 900	**HR 30228 J**	4FB	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	750 000	915 000	1 400	1 900	**HR 32228 J**	4FD	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	910 000	945 000	1 200	1 700	**HR 30328 J**	2GB	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	855 000	955 000	1 100	1 500	**HR 31328 J**	7GB	184	174	282	236	280	9	30	4	3	92.9	0.83	0.73	0.40	23.1
	300	107.75	102	85	5	4	1 210 000	1 440 000	1 200	1 600	**32328**	—	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	305 000	440 000	1 500	2 000	**32930**	—	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	345 000	520 000	1 500	2 000	**HR 32930 J**	2DC	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	460 000	650 000	1 400	2 000	**HR 32030 XJ**	4EC	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	535 000	805 000	1 400	2 000	**HR 33030 J**	2EE	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	595 000	665 000	1 300	1 800	**HR 32230 J**	2GB	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	865 000	1 080 000	1 300	1 800	**HR 32230 J**	4GD	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	845 000	860 000	1 100	1 500	**30330**	—	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	1 020 000	1 060 000	1 100	1 600	**HR 30330 J**	2GB	177	190	302	276	292	8	17	4	3	60.0	0.35	1.7	0.96	25
	320	82	75	50	5	4	975 000	1 100 000	1 000	1 400	**HR 31330 J**	7GB	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	1 370 000	1 700 000	1 100	1 500	**32330**	—	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	365 000	570 000	1 400	1 900	**HR 32932 J**	2DC	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	525 000	750 000	1 300	1 800	**HR 32032 XJ**	4EC	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	655 000	730 000	1 200	1 600	**HR 30232 J**	4GB	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	975 000	1 220 000	1 200	1 600	**HR 32232 J**	4GD	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	940 000	960 000	1 000	1 400	**30332**	—	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	1 120 000	1 180 000	1 100	1 400	**HR 30332 J**	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	830 000	875 000	950	1 300	**30332 D**	—	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	1 480 000	1 770 000	1 000	1 400	**32332**	—	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	315 000	485 000	1 300	1 800	**32934**	—	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	360 000	560 000	1 400	1 800	**HR 32934 J**	3DC	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	620 000	890 000	1 200	1 700	**HR 32034 XJ**	4EC	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	775 000	885 000	1 100	1 500	**HR 30234 J**	4GB	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	1 140 000	1 450 000	1 100	1 500	**HR 32234 J**	4GD	197	197	292	262	294	10	20	4	3	76.4	0.44	1.4	0.76	28
	360	80	72	62	5	4	1 040 000	1 080 000	950	1 300	**30334**	—	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	1 240 000	1 230 000	1 000	1 300	**HR 30334 J**	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	935 000	1 040 000	900	1 200	**30334 D**	—	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	1 690 000	2 050 000	1 000	1 300	**32334**	—	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

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

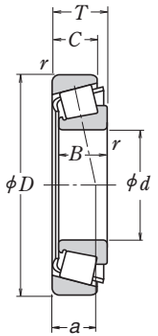
When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

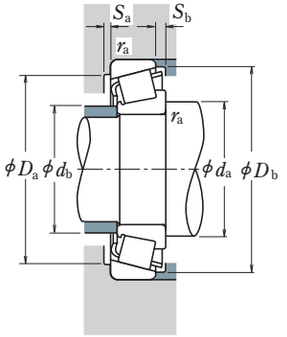
The values of e, Y_1, and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer						
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.	a	e	Y_1	Y_0	approx.
180	250	45	45	34	2.5 2	435 000	685 000	1 300	1 700	**HR 32936 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	785 000	1 130 000	1 200	1 600	**HR 32036 XJ**	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	800 000	930 000	1 100	1 400	**HR 30236 J**	4GB	207	210	302	281	297	9	14	4 3	61.8	0.45	1.3	0.73	17.8
	320	91	86	71	5 4	1 180 000	1 540 000	1 100	1 400	**HR 32236 J**	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	1 150 000	1 230 000	900	1 300	**30336**	—	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	1 010 000	1 120 000	850	1 200	**30336 D**	—	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	1 870 000	2 290 000	950	1 300	**32336**	—	212	225	362	310	353	10	28	4 3	96.6	0.37	1.6	0.88	66.8
190	260	45	45	34	2.5 2	445 000	715 000	1 200	1 600	**HR 32938 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	800 000	1 170 000	1 100	1 500	**HR 32038 XJ**	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	880 000	1 020 000	1 000	1 300	**HR 30238 J**	4GB	217	223	322	302	318	9	14	4 3	65.6	0.44	1.4	0.76	21.4
	340	97	92	75	5 4	1 370 000	1 770 000	1 000	1 400	**HR 32238 J**	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	1 250 000	1 340 000	850	1 200	**30338**	—	223	248	378	346	366	11	21	5 4	76.1	0.36	1.7	0.92	46
	400	140	132	109	6 5	2 040 000	2 580 000	850	1 200	**32338**	—	229	243	378	332	375	11	31	5 4	102.7	0.37	1.6	0.88	78.9
200	280	51	48	41	3 2.5	505 000	780 000	1 100	1 500	**32940**	—	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	590 000	935 000	1 100	1 500	**HR 32940 J**	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	935 000	1 370 000	1 000	1 400	**HR 32040 XJ**	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	975 000	1 120 000	950	1 300	**HR 30240 J**	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	1 480 000	1 920 000	950	1 300	**HR 32240 J**	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	1 260 000	1 390 000	850	1 200	**30340**	—	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	1 190 000	1 330 000	750	1 000	**30340 D**	—	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	2 240 000	2 870 000	800	1 100	**32340**	—	239	253	398	346	392	11	31	5 4	106.7	0.37	1.6	0.88	90.9
220	300	51	51	39	3 2.5	600 000	990 000	1 000	1 400	**HR 32944 J**	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	1 090 000	1 610 000	950	1 300	**HR 32044 XJ**	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	995 000	1 150 000	850	1 100	**30244**	—	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	1 650 000	2 210 000	850	1 100	**32244**	—	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	1 760 000	1 990 000	750	1 000	**30344**	—	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	2 480 000	3 200 000	750	1 000	**32344**	—	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	615 000	1 040 000	950	1 300	**HR 32948 J**	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	1 130 000	1 730 000	850	1 200	**HR 32048 XJ**	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	1 220 000	1 400 000	750	1 000	**30248**	—	267	288	422	384	408	11	19	4 3	85.1	0.44	1.4	0.74	45.2
	440	127	120	100	5 4	2 000 000	2 730 000	750	1 000	**32248**	—	267	285	422	374	416	12	27	4 3	102.5	0.40	1.5	0.82	78
	500	105	95	80	6 5	2 040 000	2 340 000	670	950	**30348**	—	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	3 100 000	4 100 000	670	900	**32348**	—	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

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

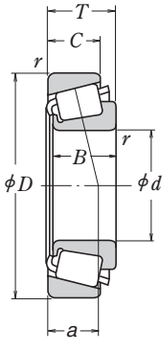
When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

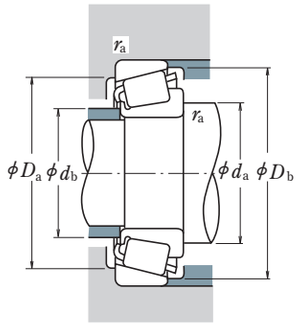
The values of e, Y_1, and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)									Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer							
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.		a	e	Y_1	Y_0	approx.
260	360	63.5	63.5	48	3	2.5	900 000	1 450 000	850	1 100	**HR 32952 J**	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	1 430 000	2 160 000	800	1 100	**HR 32052 XJ**	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	1 460 000	1 700 000	670	900	**30252**	—	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	2 340 000	3 300 000	670	950	**32252**	—	293	305	458	394	446	14	31	5	4	116.0	0.45	1.3	0.73	103
	540	113	102	85	6	6	2 300 000	2 640 000	630	850	**30352**	—	293	336	512	460	487	16	28	5	5	101.6	0.36	1.7	0.92	114
280	380	63.5	63.5	48	3	2.5	945 000	1 580 000	800	1 100	**HR 32956 J**	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	1 450 000	2 240 000	710	1 000	**HR 32056 XJ**	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	1 530 000	1 900 000	630	850	**30256**	—	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	2 400 000	3 450 000	630	850	**32256**	—	313	325	478	412	467	14	31	5	4	123.1	0.47	1.3	0.70	109
	580	187	175	145	6	6	4 050 000	5 400 000	560	800	**32356**	—	319	353	552	475	532	14	42	5	5	139.6	0.37	1.6	0.89	224
300	420	76	72	62	4	3	1 100 000	1 820 000	710	950	**32960**	—	321	326	406	386	405	13	14	3	2.5	79.3	0.37	1.6	0.88	30.5
	420	76	76	57	4	3	1 240 000	2 100 000	710	950	**HR 32960 J**	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	1 770 000	2 700 000	670	900	**HR 32060 XJ**	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	1 770 000	2 100 000	600	800	**30260**	—	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	2 730 000	3 700 000	600	800	**32260**	—	333	352	518	458	514	15	34	5	4	131.7	0.46	1.3	0.72	132
320	440	76	72	63	4	3	1 110 000	1 880 000	670	900	**32964**	—	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	1 280 000	2 220 000	670	900	**HR 32964 J**	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	1 850 000	2 910 000	630	850	**HR 32064 XJ**	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	2 020 000	2 420 000	530	750	**30264**	—	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	3 500 000	5 050 000	530	750	**32264**	—	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	5 150 000	7 100 000	480	670	**32364**	—	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	1 120 000	1 940 000	630	850	**32968**	—	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	1 290 000	2 220 000	630	850	**HR 32968 J**	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	2 030 000	3 400 000	560	750	**32068**	—	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	1 160 000	2 100 000	600	800	**32972**	—	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	1 330 000	2 340 000	560	800	**HR 32972 J**	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	2 060 000	3 500 000	530	750	**32072**	—	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	1 490 000	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	1 540 000	2 700 000	530	710	**32980**	—	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	2 410 000	4 050 000	480	670	**32080**	—	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	1 590 000	2 810 000	500	670	**32984**	—	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	2 460 000	4 200 000	450	630	**32084**	—	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	2 740 000	4 600 000	430	600	**32088**	—	473	487	622	582	616	5	26	5	5	126.3	0.36	1.7	0.92	136

■SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 12.000 – 22.225 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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)					Ring: Inner Outer		Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations		Abutment and Fillet Dimensions (mm)				Ring: Inner Outer		Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
d	D	T	B	C	r min.		C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	r_a max.		a	e	Y_1	Y_0	approx. Inner Ring	Outer Ring
12.000	31.991	10.008	10.785	7.938	0.8	1.3	12 700	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	14 400	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	14 400	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	17 000	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	18 400	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	26 200	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	21 300	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	33 000	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	29 300	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	46 000	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	43 000	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	18 400	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	14 300	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	27 700	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	29 300	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	18 400	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	35 000	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	29 300	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	46 000	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	46 000	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	46 000	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	46 000	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	50 000	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	29 300	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	32 000	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	46 000	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	44 000	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	47 500	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	36 000	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	36 000	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	32 000	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	47 500	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	50 000	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	50 000	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	47 000	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	59 000	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).

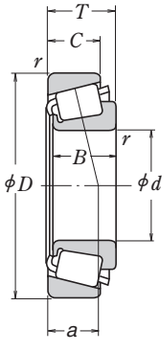
** The maximum outside diameter is listed and its tolerance is negative (see Table 7.4.2 on Pages A136 and A137).

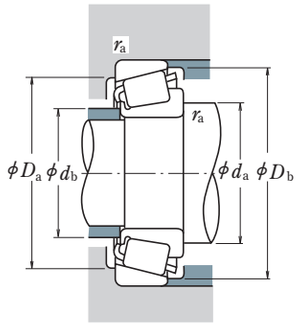
† The tolerances for the bore diameter and overall bearing width differ from the standard (see Table 5 on Page C185).

*† The tolerance for the bore diameter is 0 to −20 μm, and the tolerance for overall bearing width is +356 to 0 μm.

■SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 22.606 – 28.575 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

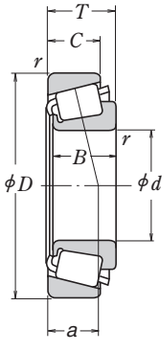
Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations		Abutment and Fillet Dimensions (mm)						Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
d	D	T	B	C	Ring: Inner r min.	Ring: Outer r min.	C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	Cone r_a max.	Cup r_a max.	a	e	Y_1	Y_0	approx. Inner Ring	approx. Outer Ring
22.606	47.000	15.500	15.500	12.000	1.5	1.0	32 500	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	0.70	0.086	0.046
23.812	50.292	14.224	14.732	10.668	1.5	1.3	34 000	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	47 000	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	21.000	2.0	2.0	61 000	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	32 000	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	32 000	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	45 500	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	32 000	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	32 000	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	32 000	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	0.035
	50.005	13.495	14.260	9.525	1.0	1.0	32 000	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	34 000	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	49 000	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
	57.150	19.431	19.431	14.732	1.5	1.5	52 000	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	61 500	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	56 500	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
	63.500	20.638	20.638	15.875	3.5	1.5	56 500	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	63 000	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	55 500	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
	68.262	22.225	22.225	17.462	0.8	1.5	68 000	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	78 000	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	73 500	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	34 000	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	49 500	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	49 000	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
	62.000	19.050	20.638	14.288	0.8	1.3	56 500	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
28.575	57.150	19.845	19.355	15.875	3.5	1.5	49 500	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	42 500	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
	62.000	19.050	20.638	14.288	3.5	1.3	56 500	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	56 500	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	63 000	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
	68.262	22.225	22.225	17.462	0.8	1.5	68 000	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	73 500	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	73 500	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	67 000	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

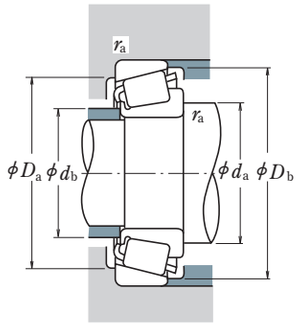
Notes † The tolerances for the bore diameter and overall bearing width differ from the standard (see Table 5 on Page C185).

▲ Tolerances are listed in Tables 2, 3, and 4 on Pages C184 and C185.

■SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 29.000 – 32.000 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

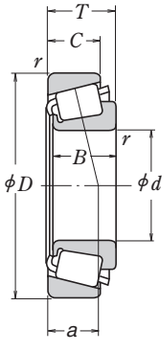
Boundary Dimensions (mm)					Ring:		Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations		Abutment and Fillet Dimensions (mm)				Ring:		Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
d	D	T	B	C	Inner r min.	Outer r min.	C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	Inner r_a max.	Outer r_a max.	a	e	Y_1	Y_0	approx. Inner Ring	approx. Outer Ring
29.000	50.292	14.224	14.732	10.668	3.5	1.3	33 000	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	80 000	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	45 500	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	56 500	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	56 500	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	64 000	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	56 500	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	35 500	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	63 000	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	68 000	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	87 000	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	87 000	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	83 000	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	56 500	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	56 500	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	56 500	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	63 000	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	35 500	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	42 500	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	56 500	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	56 500	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	56 500	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	56 500	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	68 000	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	68 000	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	58 000	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	58 000	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	87 000	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	87 000	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	97 500	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	91 000	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	84 000	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	78 000	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

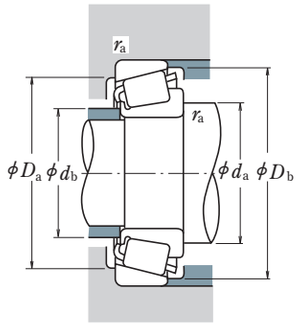
Notes ∗ The maximum bore diameter is listed and its tolerance is negative (see Table 7.4.1 on Page A136).

† 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 SERIES)

Bore Diameter 33.338 – 35.000 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 Designations		Abutment and Fillet Dimensions (mm)						Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
d	D	T	B	C	Ring: Inner r min.	Ring: Outer r min.	C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	Cone r_a max.	Cup r_a max.	a	e	Y_1	Y_0	approx. Inner Ring	approx. Outer Ring
33.338	66.675	20.638	20.638	15.875	3.5	1.5	56 500	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	68 000	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	58 000	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	58 000	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	87 000	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	64 000	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	97 500	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	91 000	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	96 500	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	96 500	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	83 000	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	58 500	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	58 500	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	65 500	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	58 000	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	58 000	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	78 000	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	67 000	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	78 000	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	87 500	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	87 500	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	96 500	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	96 500	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	96 500	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	99 000	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	108 000	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	55 500	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	58 000	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	69 500	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	43 000	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	43 000	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	47 000	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	47 000	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	65 500	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	92 500	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).

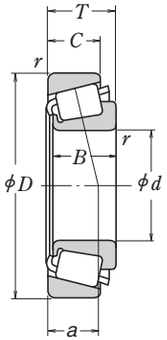
** The maximum outside diameter is listed and its tolerance is negative (see Table 7.4.2 on Pages A136 and A137).

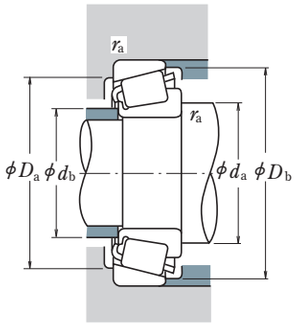
† The tolerances for the bore diameter and overall bearing width differ from the standard (see Table 5 on Page C185).

*† The tolerance for the bore diameter is 0 to −20 μm, and the tolerance for overall bearing width is +356 to 0 μm.

■SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 35.717 – 41.275 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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)					Ring: Inner	Ring: Outer	Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations		Abutment and Fillet Dimensions (mm)				Ring: Inner	Ring: Outer	Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
d	D	T	B	C	r min.		C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	r_a max.		a	e	Y_1	Y_0	approx. Inner Ring	Outer Ring
35.717	72.233	25.400	25.400	19.842	3.5	2.3	78 000	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	87 500	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	96 500	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	108 000	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	89 500	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	129 000	133 000	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	47 000	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	29 700	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	52 000	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	52 000	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	52 000	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	55 500	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	60 000	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	60 000	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	60 000	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	90 500	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	90 500	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	90 500	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	108 000	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	84 500	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	107 000	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	85 000	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	118 000	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	96 000	93 000	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	77 000	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	90 500	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	114 000	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	84 000	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	84 000	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	85 000	75 500	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	53 500	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	55 000	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	67 000	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	67 000	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

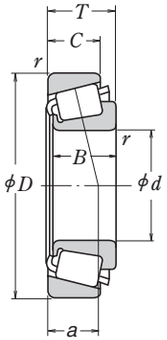
∗ The maximum bore diameter is listed and its tolerance is negative (see Table 7.4.1 on Page A136).

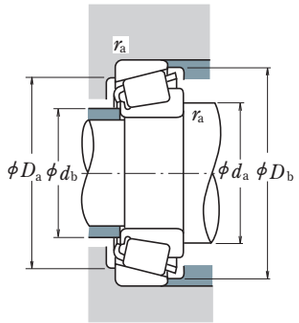
∗∗ The maximum outside diameter is listed and its tolerance is negative (see Table 7.4.2 on Pages A136 and A137).

▲ Tolerances are listed in Tables 2, 3, and 4 on Pages C184 and C185.

■SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 41.275 – 44.450 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 $P_0 = F_r$

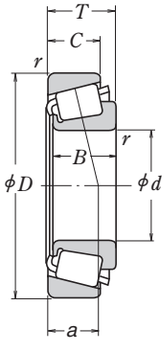
The values of e, Y_1, and Y_0 are given in the table below.

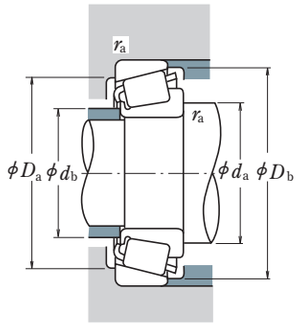
Boundary Dimensions (mm)					Ring: Inner / Outer r min.		Basic Load Ratings (N)		Limiting Speeds (min⁻¹)		Bearing Designations		Abutment and Fillet Dimensions (mm)				Ring: Inner / Outer ra max.		Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
d	D	T	B	C			Cr	C0r	Grease	Oil	INNER RING	OUTER RING	da	db	Da	Db			a	e	Y1	Y0	approx. Inner Ring	approx. Outer Ring
41.275	76.200	18.009	17.384	14.288	1.5	1.5	52 000	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	81 000	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	81 000	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	95 000	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	84 000	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	84 000	75 500	4 500	6 300	**342**	**332**	53	46	73	75	3.5	1.3	14.5	0.27	2.2	1.2	0.323	0.146
	80.167	25.400	25.400	20.638	3.5	3.3	95 000	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	96 500	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	112 000	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	118 000	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	85 000	75 500	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	118 000	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	118 000	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	171 000	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	135 000	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	130 000	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	96 000	93 000	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	54 000	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	71 500	69 000	4 500	6 300	**22168**	**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	94 000	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	94 000	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	95 000	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	84 000	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	94 000	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	94 000	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	64 500	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	55 500	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	0.144
	82.931	23.812	25.400	19.050	3.5	0.8	94 000	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	94 000	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	118 000	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	118 000	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	127 000	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	147 000	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	147 000	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	129 000	133 000	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	131 000	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 SERIES)

Bore Diameter 44.450 – 47.625 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

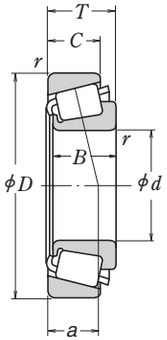
Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations		Abutment and Fillet Dimensions (mm)						Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
					Ring: Inner	Outer											Ring: Inner	Outer					approx.	
d	D	T	B	C	r min.		C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	r_a max.		a	e	Y_1	Y_0	Inner Ring	Outer Ring
44.450	95.250	30.162	29.370	23.020	3.5	3.3	130 000	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	96 000	93 000	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	96 000	93 000	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	96 000	93 000	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	123 000	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	123 000	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	96 000	93 000	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	219 000	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	171 000	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	143 000	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	114 000	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	211 000	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	94 000	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	95 000	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	0.174
45.230	79.985	19.842	20.638	15.080	2.0	1.3	76 000	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	66 000	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	0.102
	77.788	19.842	19.842	15.080	3.5	0.8	69 000	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	69 000	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
45.618	82.931	23.812	25.400	19.050	3.5	0.8	94 000	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
	82.931	26.988	25.400	22.225	3.5	2.3	94 000	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	63 000	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	0.096
46.038	79.375	17.462	17.462	13.495	2.8	1.5	56 500	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	55 500	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	88 000	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	97 500	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	131 000	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	90 000	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	106 000	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	130 000	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	169 000	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	114 000	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	114 000	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	168 000	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	176 000	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

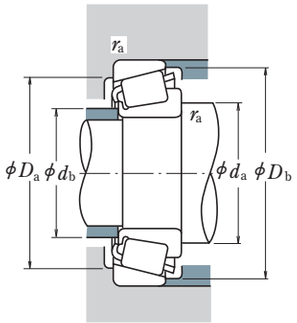
Notes * The maximum bore diameter is listed and its tolerance is negative (see Table 7.4.1 on Page A136).

** 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 SERIES)

Bore Diameter 48.412 – 52.388 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

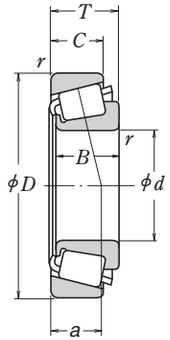
d	Boundary Dimensions (mm) D	T	B	C	Ring: Inner r min.	Ring: Outer r min.	Basic Load Ratings (N) C_r	C_{0r}	Limiting Speeds (min^{-1}) Grease	Oil	Bearing Designations INNER RING	OUTER RING	Abutment and Fillet Dimensions (mm) d_a	d_b	D_a	D_b	Ring: Inner r_a max.	Ring: Outer r_a max.	Eff. Load Center (mm) a	Constant e	Axial Load Factors Y_1	Y_0	Mass (kg) approx. Inner Ring	Outer Ring
48.412	95.250	30.162	29.370	23.020	3.5	3.3	130 000	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	130 000	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	171 000	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	242 000	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	87 500	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	87 500	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	90 000	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	128 000	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
	105.000	37.000	36.000	29.000	3.0	2.5	171 000	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
50.800	80.962	18.258	18.258	14.288	1.5	1.5	65 500	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
	82.550	23.622	22.225	18.542	3.5	0.8	87 500	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	87 500	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	59 500	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	52 500	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	90 000	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	90 000	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	104 000	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	127 000	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	127 000	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	135 000	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	146 000	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	169 000	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	169 000	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	171 000	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	171 000	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	178 000	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	139 000	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	114 000	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	199 000	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	176 000	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	244 000	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	290 000	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	104 000	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	95 000	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	114 000	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

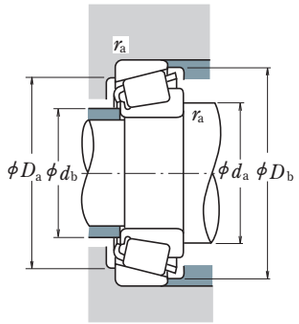
Notes ✻ The maximum bore diameter is listed and its tolerance is negative (see Table 7.4.1 on Page A136).

▲ Tolerances are listed in Tables 2, 3, and 4 on Pages C184 and C185.

SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 53.975 – 58.738 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 $P_0 = F_r$

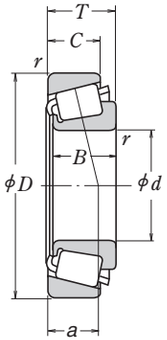
The values of e, Y_1, and Y_0 are given in the table below.

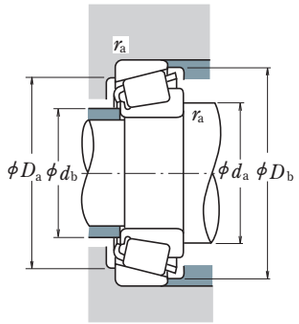
Boundary Dimensions (mm)					Ring: Inner Outer	Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations		Abutment and Fillet Dimensions (mm)				Ring: Inner Outer	Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	r_a max.	a	e	Y_1	Y_0	approx. Inner Ring	Outer Ring
53.975	104.775	39.688	40.157	33.338	3.5	3.3	185 000	210 000	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	177 000	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	166 000	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	176 000	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	199 000	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	198 000	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	244 000	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	290 000	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	164 000	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	97 500	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	136 000	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	99 000	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	217 000	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
	115.000	41.021	41.275	31.496	3.0	3.0	212 000	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
55.562	97.630	24.608	24.608	19.446	3.5	0.8	110 000	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	243 000	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	176 000	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	199 000	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	99 000	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	0.179
	96.838	21.000	21.946	15.875	2.3	0.8	99 000	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	99 000	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	99 000	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	143 000	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	143 000	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	160 000	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	160 000	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	166 000	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	199 000	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	198 000	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	187 000	183 000	2 600	3 600	**78225**	**78551**	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	187 000	183 000	2 600	3 600	**78225**	**78571**	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	335 000	385 000	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	99 000	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	26.988	3.5	3.3	147 000	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 ▲ Tolerances are listed in Tables 2, 3, and 4 on Pages C184 and C185.

■SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 60.000 – 64.963 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

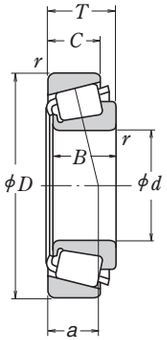
d	Boundary Dimensions (mm) D	T	B	C	Ring: Inner r min.	Ring: Outer r min.	Basic Load Ratings (N) C_r	C_{0r}	Limiting Speeds (min^{-1}) Grease	Oil	Bearing Designations INNER RING	OUTER RING	Abutment and Fillet Dimensions (mm) d_a	d_b	D_a	D_b	Cone r_a max.	Cup r_a max.	Eff. Load Center (mm) a	Constant e	Axial Load Factors Y_1	Y_0	Mass (kg) approx. Inner Ring	Outer Ring
60.000	95.000	24.000	24.000	19.000	5.0	2.5	106 000	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	102 000	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	105 000	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	166 000	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	112 000	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	112 000	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	198 000	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	231 000	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
	122.238	43.658	43.764	36.512	0.8	3.3	243 000	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	244 000	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	239 000	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	320 000	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
61.912	136.525	46.038	46.038	36.512	3.5	3.3	287 000	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	214 000	195 000	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	292 000	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
63.500	94.458	19.050	19.050	15.083	1.5	1.5	73 000	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	88 000	91 500	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	111 000	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	105 000	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	105 000	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	147 000	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	175 000	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	147 000	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	231 000	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	231 000	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	231 000	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	243 000	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	198 000	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	204 000	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	239 000	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	187 000	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	239 000	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	187 000	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	204 000	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

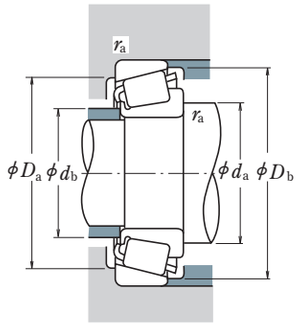
Notes * The maximum bore diameter is listed and its tolerance is negative (see Table 7.4.1 on Page A136).

▲ Tolerances are listed in Tables 2, 3, and 4 on Pages C184 and C185.

■SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 65.000 – 69.850 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 $P_0 = F_r$

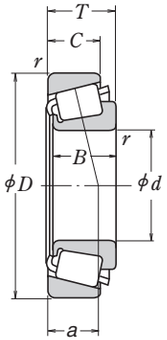
The values of e, Y_1, and Y_0 are given in the table below.

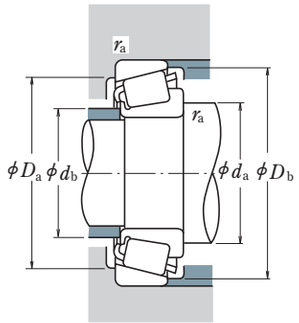
Boundary Dimensions (mm)					Ring: Inner / Outer		Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations		Abutment and Fillet Dimensions (mm)						Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
d	D	T	B	C	r min.		C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	r_a max.		a	e	Y_1	Y_0	approx. Inner Ring	Outer Ring
65.000	105.000	24.000	23.000	18.500	3.0	1.0	114 000	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	147 000	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	151 000	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	227 000	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	320 000	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	287 000	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	105 000	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	105 000	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	147 000	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	147 000	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
	112.712	30.162	30.162	23.812	3.5	0.8	175 000	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	175 000	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	147 000	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	198 000	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	231 000	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	231 000	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	198 000	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	287 000	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
68.262	110.000	22.000	21.996	18.824	2.3	1.3	105 000	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	151 000	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	198 000	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	204 000	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	282 000	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	287 000	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	292 000	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	105 000	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	118 000	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	147 000	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	178 000	215 000	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	118 000	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	204 000	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	239 000	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	238 000	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	254 000	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	335 000	385 000	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	325 000	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 ▲ Tolerances are listed in Tables 2, 3, and 4 on Pages C184 and C185.

■SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 70.000 – 76.200 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 $P_0 = F_r$

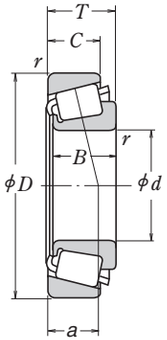
The values of e, Y_1, and Y_0 are given in the table below.

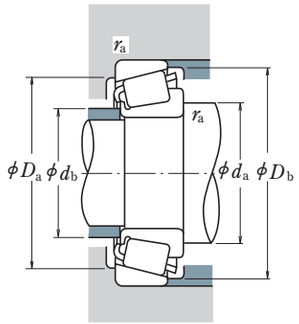
Boundary Dimensions (mm)					Ring:		Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations		Abutment and Fillet Dimensions (mm)				Ring:		Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
d	D	T	B	C	Inner r min.	Outer r min.	C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	Inner r_a max.	Outer r_a max.	a	e	Y_1	Y_0	approx. Inner Ring	approx. Outer Ring
70.000	110.000	26.000	25.000	20.500	1.0	2.5	121 000	152 000	3 000	4 000	▲**JLM 813049**	▲**JLM 813010**	78	77	98	105	1	2.5	26.2	0.49	1.2	0.68	0.604	0.304
	115.000	29.000	29.000	23.000	3.0	2.5	155 000	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	151 000	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	147 000	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	178 000	215 000	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	204 000	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	204 000	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	239 000	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	239 000	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	282 000	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	287 000	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	118 000	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	147 000	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	204 000	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	254 000	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	355 000	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	204 000	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	254 000	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	125 000	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	158 000	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	350 000	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	110 000	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	170 000	194 000	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	170 000	194 000	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	185 000	236 000	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	266 000	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	160 000	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	160 000	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	215 000	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	335 000	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	225 000	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	254 000	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	305 000	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	400 000	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	400 000	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	400 000	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 ▲ Tolerances are listed in Tables 2, 3, and 4 on Pages C184 and C185.

■SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 76.200 – 83.345 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 $P_0 = F_r$

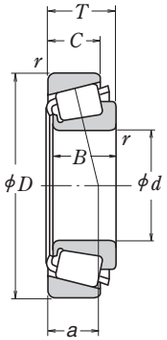
The values of e, Y_1, and Y_0 are given in the table below.

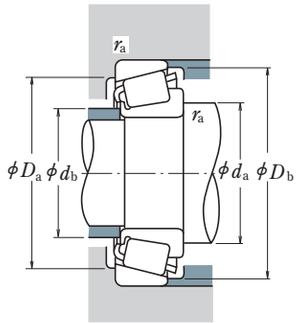
Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min⁻¹)		Bearing Designations		Abutment and Fillet Dimensions (mm)						Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
					Ring: Inner	Outer											Ring: Inner	Outer					approx.	
d	D	T	B	C	r min.		C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	r_a max.		a	e	Y_1	Y_0	Inner Ring	Outer Ring
76.200	168.275	53.975	56.363	41.275	6.4	3.3	425 000	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	0.8	3.3	425 000	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	3.5	3.3	315 000	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	3.5	3.3	315 000	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	3.5	2.0	110 000	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	3.5	3.3	170 000	194 000	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	3.5	3.3	266 000	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	3.5	3.3	254 000	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	3.5	3.3	325 000	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	3.0	2.5	205 000	252 000	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	3.5	3.3	160 000	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	3.5	3.3	215 000	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	3.5	3.3	215 000	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	3.5	1.5	126 000	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	3.5	3.3	160 000	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	3.5	3.3	189 000	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
	133.350	33.338	33.338	26.195	0.8	3.3	189 000	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	6.8	3.3	189 000	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	6.8	3.3	221 000	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
	136.525	30.162	29.769	22.225	3.5	3.3	160 000	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	3.5	3.3	215 000	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	3.5	3.3	215 000	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
	139.992	36.512	36.098	28.575	6.8	3.3	215 000	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	3.5	3.3	254 000	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	3.5	3.3	325 000	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
	150.089	44.450	46.672	36.512	3.5	3.3	325 000	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	3.5	3.3	254 000	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	3.5	3.3	340 000	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	3.5	3.3	400 000	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	3.5	3.3	340 000	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
	168.275	53.975	56.363	41.275	3.5	3.3	425 000	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
83.345	125.412	25.400	25.400	19.845	3.5	1.5	126 000	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	0.8	1.5	126 000	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 ▲ Tolerances are listed in Tables 2, 3, and 4 on Pages C184 and C185.

SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 84.138 – 90.488 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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)					Ring: Inner Outer	Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations		Abutment and Fillet Dimensions (mm)				Ring: Inner Outer	Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	r_a max.	a	e	Y_1	Y_0	approx. Inner Ring	approx. Outer Ring
84.138	136.525	30.162	29.769	22.225	3.5 3.3	160 000	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	254 000	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	315 000	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	170 000	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	170 000	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	248 000	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	340 000	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	325 000	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	325 000	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	160 000	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	160 000	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	272 000	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	254 000	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	254 000	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	225 000	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	340 000	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	274 000	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	480 000	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	172 000	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	225 000	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	310 000	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	340 000	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	340 000	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	400 000	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	340 000	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	425 000	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	435 000	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	480 000	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	234 000	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	282 000	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	340 000	390 000	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	340 000	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

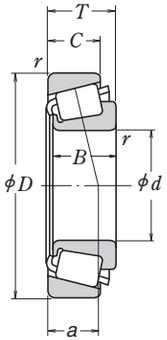
* The maximum bore diameter is listed and its tolerance is negative (see Table 7.4.1 on Page A136).

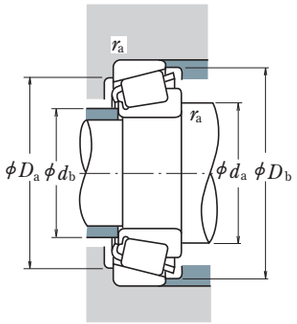
** The maximum outside diameter is listed and its tolerance is negative (see Table 7.4.2 on Pages A136 and A137).

▲ Tolerances are listed in Tables 2, 3, and 4 on Pages C184 and C185.

■SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 92.075 – 100.012 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 $P_0 = F_r$

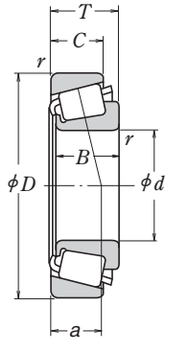
The values of e, Y_1, and Y_0 are given in the table below.

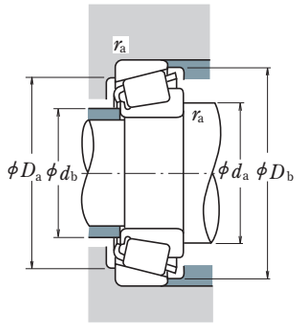
Boundary Dimensions (mm)					Ring: Inner Outer	Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations		Abutment and Fillet Dimensions (mm)				Ring: Inner Outer	Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	r_a max.	a	e	Y_1	Y_0	approx. Inner Ring	approx. Outer Ring
92.075	146.050	33.338	34.925	26.195	3.5 3.3	208 000	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	172 000	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	225 000	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	225 000	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	274 000	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	435 000	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
93.662	148.430	28.575	28.971	21.433	3.0 3.0	172 000	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	172 000	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
	152.400	39.688	36.322	30.162	3.5 3.2	225 000	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
95.000	150.000	35.000	34.000	27.000	3.0 2.5	225 000	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
95.250	146.050	33.338	34.925	26.195	3.5 3.3	208 000	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
	148.430	28.575	28.971	21.433	3.0 3.0	172 000	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	172 000	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	225 000	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	225 000	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	274 000	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	345 000	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	315 000	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	435 000	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	480 000	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	172 000	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	172 000	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	222 000	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	274 000	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	315 000	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	435 000	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
	190.500	57.150	57.531	46.038	3.5 3.3	480 000	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
99.982	190.500	57.150	57.531	46.038	6.4 3.3	480 000	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
100.000	150.000	32.000	30.000	26.000	2.3 2.3	179 000	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
	155.000	36.000	35.000	28.000	3.0 2.5	235 000	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	294 000	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	222 000	286 000	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 ▲ Tolerances are listed in Tables 2, 3, and 4 on Pages C184 and C185.

■SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 101.600 – 117.475 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

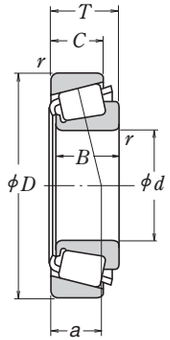
Boundary Dimensions (mm)					Ring: Inner Outer	Basic Load Ratings (N)		Limiting Speeds (min⁻¹)		Bearing Designations		Abutment and Fillet Dimensions (mm)				Ring: Inner Outer		Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	r_a max.		a	e	Y_1	Y_0	approx. Inner Ring	approx. Outer Ring
101.600	157.162	36.512	36.116	26.195	3.5	3.3	222 000	286 000	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	222 000	286 000	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	274 000	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	315 000	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	435 000	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	480 000	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	700 000	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	315 000	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	315 000	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	365 000	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	239 000	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
107.950	158.750	23.020	21.438	15.875	3.5	3.3	126 000	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
	159.987	34.925	34.925	26.988	3.5	3.3	201 000	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	202 000	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
	165.100	36.512	36.512	26.988	3.5	3.3	239 000	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	365 000	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	700 000	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
109.987	159.987	34.925	34.925	26.988	3.5	3.3	201 000	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
	159.987	34.925	34.925	26.988	8.0	3.3	201 000	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
109.992	177.800	41.275	41.275	30.162	3.5	3.3	286 000	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	239 000	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	380 000	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	365 000	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
114.300	152.400	21.433	21.433	16.670	1.5	1.5	110 000	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
	177.800	41.275	41.275	30.162	3.5	3.3	286 000	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	214 000	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	365 000	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	585 000	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	700 000	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	365 000	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	25.400	3.5	3.3	214 000	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

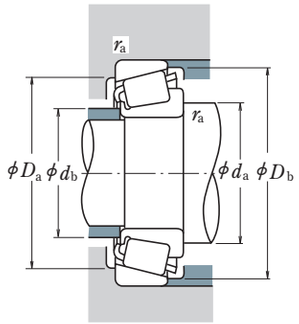
Notes ** The maximum outside diameter is listed and its tolerance is negative (see Table 7.4.2 on Pages A136 and A137).

▲ Tolerances are listed in Tables 2, 3, and 4 on Pages C184 and C185.

■SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 120.000 – 165.100 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

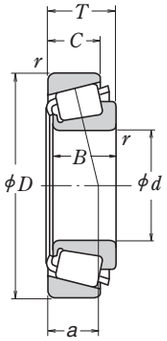
Boundary Dimensions (mm)					Ring: Inner Outer	Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations		Abutment and Fillet Dimensions (mm)				Ring: Inner Outer		Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	r_a max.		a	e	Y_1	Y_0	approx. Inner Ring	Outer Ring
120.000	170.000	25.400	25.400	19.050	3.3	3.3	160 000	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	261 000	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	280 000	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	390 000	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	280 000	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	165 000	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	0.573
127.000	165.895	18.258	17.462	13.495	1.5	1.5	104 000	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	280 000	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	385 000	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	355 000	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	390 000	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	1.9
130.000	206.375	47.625	47.625	34.925	3.5	3.3	390 000	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	385 000	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	2.06
	206.375	47.625	47.625	34.925	3.5	3.3	390 000	530 000	1 600	2 200	**799 A**	**792**	148	142	186	198	3.5	3.3	45.7	0.46	1.3	0.72	3.74	1.9
133.350	177.008	25.400	26.195	20.638	1.5	1.5	153 000	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	265 000	440 000	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
	196.850	46.038	46.038	38.100	3.5	3.3	385 000	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	355 000	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
136.525	190.500	39.688	39.688	33.338	3.5	3.3	265 000	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
	217.488	47.625	47.625	34.925	3.5	3.3	355 000	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
139.700	187.325	28.575	29.370	23.020	1.5	1.5	189 000	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
	215.900	47.625	47.625	34.925	3.5	3.3	355 000	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	635 000	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
142.875	200.025	41.275	39.688	34.130	3.5	3.3	279 000	460 000	1 600	2 200	**48685**	**48620**	158	151	185	193	3.5	3.3	37.6	0.34	1.8	0.98	2.63	1.19
146.050	193.675	28.575	28.575	23.020	1.5	1.5	205 000	345 000	1 600	2 200	**36690**	**36620**	155	154	182	188	1.5	1.5	33.5	0.37	1.6	0.90	1.64	0.725
	236.538	57.150	56.642	44.450	3.5	3.3	555 000	720 000	1 400	1 900	**HM 231140**	**HM 231110**	164	160	217	224	3.5	3.3	45.9	0.32	1.9	1.0	6.07	2.93
	254.000	66.675	66.675	47.625	7.0	3.3	635 000	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	3.83
149.225	254.000	66.675	66.675	47.625	7.0	3.3	635 000	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
152.400	254.000	66.675	66.675	47.625	7.0	3.3	635 000	830 000	1 300	1 800	**99600**	**99100**	181	167	227	238	7	3.3	55.3	0.41	1.5	0.81	8.46	3.83
158.750	225.425	41.275	39.688	33.338	3.5	3.3	295 000	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
165.100	247.650	47.625	47.625	38.100	3.5	3.3	425 000	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

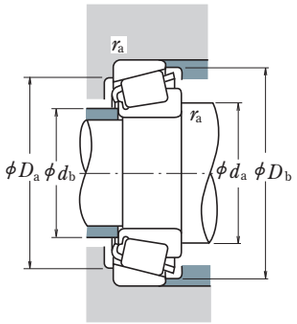
Notes ✻ The maximum bore diameter is listed and its tolerance is negative (see Table 7.4.1 on Page A136).

▲ Tolerances are listed in Tables 2, 3, and 4 on Pages C184 and C185.

■SINGLE-ROW TAPERED ROLLER BEARINGS (INCH SERIES)

Bore Diameter 170.000 – 206.375 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 $P_0 = F_r$

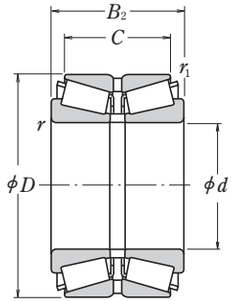
The values of e, Y_1, and Y_0 are given in the table below.

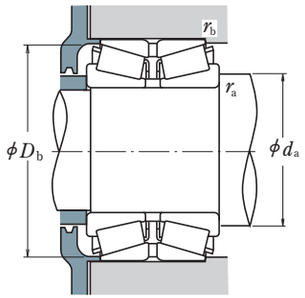
Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min⁻¹)		Bearing Designations		Abutment and Fillet Dimensions (mm)						Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)	
					Ring: Inner	Outer											Ring: Inner	Outer					approx. Inner Ring	Outer Ring
d	D	T	B	C	r min.		C_r	C_{0r}	Grease	Oil	INNER RING	OUTER RING	d_a	d_b	D_a	D_b	r_a max.		a	e	Y_1	Y_0		
170.000	230.000	39.000	38.000	31.000	3.0	2.5	340 000	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	470 000	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	425 000	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	215 000	395 000	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	425 000	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	560 000	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	455 000	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
190.500	266.700	47.625	46.833	38.100	3.5	3.3	425 000	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	755 000	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
203.200	282.575	46.038	46.038	36.512	3.5	3.3	450 000	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
206.375	282.575	46.038	46.038	36.512	3.5	3.3	450 000	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 ◮ 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

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$

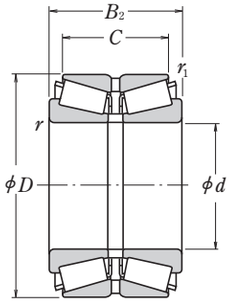
The values of e, Y_2, Y_3, and Y_0 are given in the table below.

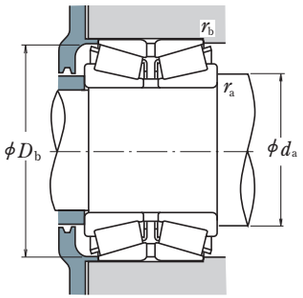
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors			Mass (kg)
d	D	B_2	C	r min.	r_1 min.	C_r	C_{0r}	Grease	Oil		d_a min.	D_b min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	approx.
40	80	45	37.5	1.5	0.6	134 000	140 000	3 700	5 100	**HR 40 KBE 42+L**	51	75	1.5	0.6	0.37	2.7	1.8	1.8	0.97
45	85	47	37.5	1.5	0.6	144 000	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	175 000	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	161 000	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	161 000	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	184 000	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	275 000	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	200 000	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	200 000	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	232 000	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	315 000	340 000	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	218 000	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	276 000	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	365 000	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	258 000	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	258 000	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	330 000	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	420 000	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	279 000	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	330 000	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	480 000	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	300 000	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	350 000	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	535 000	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	330 000	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	330 000	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	405 000	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	585 000	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	385 000	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	445 000	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	655 000	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	425 000	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	425 000	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	540 000	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

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$

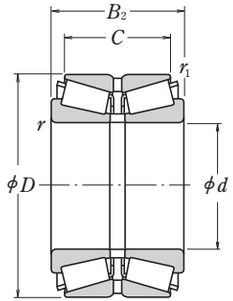
The values of e, Y_2, Y_3, and Y_0 are given in the table below.

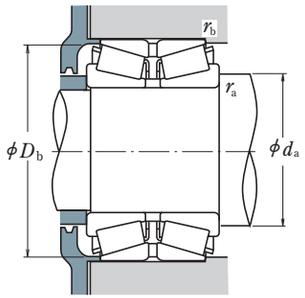
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors			Mass (kg)
d	D	B_2	C	r min.	r_1 min.	C_r	C_{0r}	Grease	Oil		d_a min.	D_b min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	approx.
90	190	102	81	4	1	730 000	845 000	1 600	2 100	**HR 90 KBE 043+L**	111	178	3	1	0.35	2.9	2.0	1.9	12.7
	190	144	115	4	1	950 000	1 180 000	1 600	2 200	**HR 90 KBE 1901+L**	111	179	3	1	0.35	2.9	2.0	1.9	17.9
95	170	78	63	3	1	470 000	570 000	1 700	2 300	**HR 95 KBE 42+L**	113	161	2.5	1	0.42	2.4	1.6	1.6	6.75
	170	100	83	3	1	610 000	800 000	1 700	2 300	**HR 95 KBE 52+L**	113	163	2.5	1	0.42	2.4	1.6	1.6	8.60
	200	108	85	4	1	785 000	910 000	1 500	2 000	**HR 95 KBE 43+L**	116	187	3	1	0.35	2.9	2.0	1.9	14.7
100	165	52	46	2.5	0.6	273 000	340 000	1 700	2 300	**100 KBE 31+L**	115	156	2	0.6	0.33	3.0	2.0	2.0	4.04
	180	81	64	3	1	540 000	665 000	1 600	2 200	**HR100 KBE 1805+L**	118	170	2.5	1	0.42	2.4	1.6	1.6	8.16
	180	81	65	3	1	540 000	665 000	1 600	2 200	**HR100 KBE 042+L**	118	170	2.5	1	0.42	2.4	1.6	1.6	8.13
	180	82	66	3	1	540 000	665 000	1 600	2 200	**HR100 KBE 1801+L**	118	170	2.5	1	0.42	2.4	1.6	1.6	8.22
	180	83	67	3	1	540 000	665 000	1 600	2 200	**HR100 KBE 42+L**	118	170	2.5	1	0.42	2.4	1.6	1.6	8.7
	180	105	85	3	1	685 000	905 000	1 600	2 200	**HR100 KBE 1802+L**	118	173	2.5	1	0.42	2.4	1.6	1.6	10.6
	180	107	87	3	1	685 000	905 000	1 600	2 200	**HR100 KBE 52X+L**	118	173	2.5	1	0.42	2.4	1.6	1.6	10.7
	180	110	90	3	1	685 000	905 000	1 600	2 200	**HR100 KBE 1804+L**	118	173	2.5	1	0.42	2.4	1.6	1.6	11
	215	112	87	4	1	895 000	1 050 000	1 400	1 900	HR100 KBE 043+L	121	200	3	1	0.35	2.9	2.0	1.9	18.1
105	190	88	70	3	1	590 000	735 000	1 500	2 000	**HR105 KBE 42X+L**	123	179	2.5	1	0.42	2.4	1.6	1.6	9.76
	190	117	96	3	1	765 000	1 020 000	1 500	2 000	**HR105 KBE 1902+L**	123	182	2.5	1	0.42	2.4	1.6	1.6	13.4
	190	115	95	3	1	765 000	1 020 000	1 500	2 000	**HR105 KBE 52+L**	123	182	2.5	1	0.42	2.4	1.6	1.6	13.1
110	180	56	50	2.5	0.6	325 000	400 000	1 500	2 000	**110 KBE 31+L**	125	172	2	0.6	0.39	2.6	1.7	1.7	5.11
	180	70	56	2.5	0.6	420 000	555 000	1 500	2 000	**110 KBE 031+L**	125	172	2	0.6	0.39	2.6	1.7	1.7	6.33
	180	125	100	2.5	0.6	675 000	1 060 000	1 500	2 100	**110 KBE 1802+L**	125	172	2	0.6	0.26	3.8	2.6	2.5	11.4
	200	90	72	3	1	665 000	840 000	1 400	1 900	**HR110 KBE 42+L**	128	190	2.5	1	0.42	2.4	1.6	1.6	11.2
	200	92	74	3	1	665 000	840 000	1 400	1 900	**HR110 KBE 42X+L**	128	190	2.5	1	0.42	2.4	1.6	1.6	11.5
	200	120	100	3	1	840 000	1 130 000	1 400	1 900	**HR110 KBE 2001+L**	128	193	2.5	1	0.42	2.4	1.6	1.6	15.4
	200	121	101	3	1	840 000	1 130 000	1 400	1 900	**HR110 KBE 52X+L**	128	193	2.5	1	0.42	2.4	1.6	1.6	15.2
120	180	46	41	2.5	0.6	227 000	296 000	1 500	2 000	**120 KBE 30+L**	135	172	2	0.6	0.40	2.5	1.7	1.6	3.75
	180	58	46	2.5	0.6	320 000	450 000	1 500	2 000	**120 KBE 030+L**	135	172	2	0.6	0.39	2.6	1.7	1.7	4.64
	200	62	55	2.5	0.6	385 000	500 000	1 400	1 800	**120 KBE 31+L**	135	190	2	0.6	0.39	2.6	1.7	1.7	7.35
	200	78	62	2.5	0.6	510 000	690 000	1 400	1 900	**120 KBE 031+L**	135	190	2	0.6	0.39	2.6	1.7	1.7	8.97
	200	100	84	2.5	0.6	635 000	885 000	1 400	1 800	**120 KBE 2001+L**	135	193	2	0.6	0.37	2.7	1.8	1.8	11.3
	215	97	78	3	1	705 000	900 000	1 300	1 800	**HR120 KBE 42X+L**	138	204	2.5	1	0.44	2.3	1.6	1.5	13.7
	215	132	109	3	1	925 000	1 270 000	1 300	1 800	**HR120 KBE 52X+L**	138	207	2.5	1	0.44	2.3	1.6	1.5	18.8
	260	128	101	4	1	1 130 000	1 310 000	1 100	1 500	**HR120 KBE 43+L**	141	240	3	1	0.35	2.9	2.0	1.9	29.4
	260	188	145	4	1	1 630 000	2 110 000	1 100	1 500	**HR120 KBE 2601+L**	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

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$

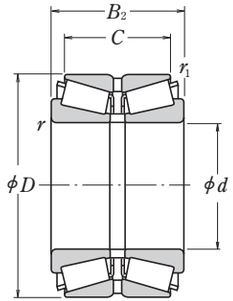
The values of e, Y_2, Y_3, and Y_0 are given in the table below.

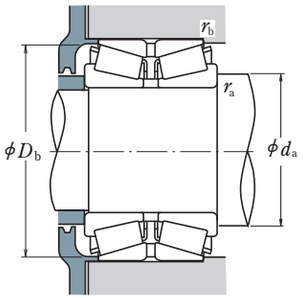
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors			Mass (kg)
d	D	B_2	C	r min.	r_1 min.	C_r	C_{0r}	Grease	Oil		d_a min.	D_b min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	approx.
125	210	110	88	4	1	690 000	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	790 000	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	790 000	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	1 150 000	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
	230	145	115	4	1	1 120 000	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	1 120 000	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	1 120 000	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	345 000	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	370 000	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	685 000	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
	225	68	61	3	1	490 000	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	605 000	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	605 000	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
	230	120	94	3	1	840 000	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	1 010 000	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	845 000	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
	250	102	82.5	4	1	825 000	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	1 280 000	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	1 270 000	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	370 000	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	485 000	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	625 000	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
	250	100	80	3	1	775 000	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	920 000	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	1 000 000	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
	270	109	87	4	1	1 020 000	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	1 480 000	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	1 480 000	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	1 740 000	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

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$

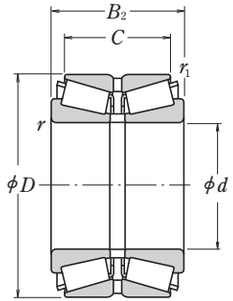
The values of e, Y_2, Y_3, and Y_0 are given in the table below.

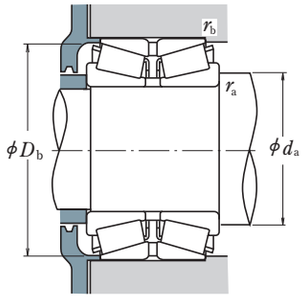
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors			Mass (kg)
d	D	B_2	C	r min.	r_1 min.	C_r	C_{0r}	Grease	Oil		d_a min.	D_b min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	approx.
160	240	60	53	3	1	435 000	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	485 000	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	800 000	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	660 000	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	955 000	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	1 220 000	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	1 360 000	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	985 000	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	1 670 000	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	1 610 000	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	1 400 000	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	535 000	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	490 000	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	705 000	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	775 000	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	1 010 000	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	1 360 000	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	1 960 000	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
180	280	74	66	3	1	560 000	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	810 000	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	890 000	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	1 160 000	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	1 100 000	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	2 020 000	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	1 740 000	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	605 000	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	820 000	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	985 000	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	1 320 000	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	1 220 000	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	2 340 000	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	1 600 000	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	1 220 000	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	1 710 000	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	1 160 000	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	1 550 000	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	1 360 000	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	2 540 000	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

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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 Designation	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors			Mass (kg)
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.	e	Y_2	Y_3	Y_0	approx.
206	283	102	83	4	1.5	715 000	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	1 110 000	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	900 000	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	855 000	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	1 130 000	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
	370	120	107	5	1.5	1 360 000	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	1 800 000	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	1 710 000	2 300 000	600	900	**220 KBE 42+L**	247	371	4	1.5	0.40	2.5	1.7	1.6	74.2
240	360	92	82	4	1.5	960 000	1 490 000	700	900	**240 KBE 30+L**	261	344	3	1.5	0.39	2.6	1.7	1.7	30.1
	360	115	92	4	1.5	1 250 000	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	1 450 000	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	1 990 000	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	2 720 000	4 450 000	600	900	**240 KBE 4003+L**	267	384	4	1.5	0.33	3.0	2.0	2.0	96.4
250	380	98	87	4	1	980 000	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	1 100 000	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	1 490 000	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	1 890 000	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	2 290 000	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	2 600 000	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 – 1320 mm ..... C 266

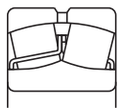
DESIGN, TYPES, AND FEATURES

Various types of high load capacity spherical roller bearings are available. Types EA, C and CD have pressed-steel cages, and type CA has machined-brass cages. EA-type bearings listed here are classified as NSKHPS™ bearings, which offer particularly high load-carrying capacity, high limiting speeds, and superior performance under high-temperature operating conditions up to 200 °C. Machined brass cages are recommended for applications with vibrations or shocks.

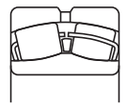
An oil groove and holes are located in the outer ring to supply lubricant, and bearing designations are suffixed with E4.

To use bearings with oil grooves and holes, an oil groove should be located in the housing bore since depth for the groove in the bearing is limited. The dimensions of the oil groove and number of holes present are listed in Tables 1 and 2.

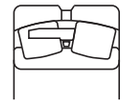
When requiring bearings with a hole for a locking pin to prevent outer ring rotation, please contact NSK.



EA



C and CD

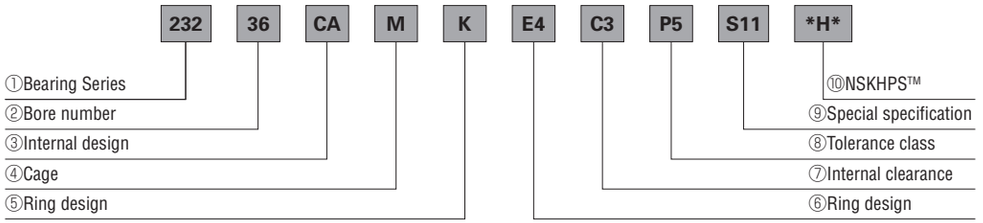


CA

☐ Formulation of Bearing Designations

Spherical Roller Bearings

Example:



①Bearing Series	239, 230, 240, 231, 241, 222, 232, 213, 223: Spherical roller bearings
②Bore number	Bore diameter = Bore number × 5 (mm)
③Internal design	EA, CA: High load capacity
④Cage	M: Machined-brass cage (for CA Design)
	Omitted: Pressed-steel cage (for EA Design)
⑤⑥Ring design	K: Tapered bore of inner ring (taper 1: 12)
	K30: Tapered bore of inner ring (taper 1: 30)
	E4: Lubricating groove on outside surface and holes in outer ring
⑦Internal clearance	Omitted: CN clearance, C3: Clearance greater than CN,
	C4: Clearance greater than C3, C5: Clearance greater than C4
⑧Tolerance class	Omitted: ISO Normal, P6: ISO Class 6, P5: ISO Class 5, P4: ISO Class 4
⑨Special specification	S11: Dimensional stabilizing treatment: working temperature under 200 °C
	(omitted for EA design)
⑩NSKHPS™	*H*: NSKHPS™ designation
	Tolerance Class: ISO Normal

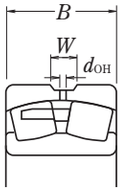


Table 1 Dimensions of Oil Grooves and Holes Units : mm

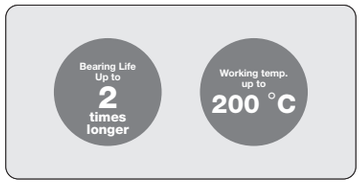
Nominal Width B over	Nominal Width B incl.	Oil Groove Width W	Hole Diameter d_{OH}
18	30	5	2.5
30	40	6	3
40	50	7	4
50	65	8	5
65	80	10	6
80	100	12	8
100	120	15	10
120	160	20	12
160	200	25	15
200	250	30	20
250	315	35	20
315	400	40	25
400	—	40	25

Table 2 Number of Oil Holes

Nominal Outer Ring Dia D (mm) over	Nominal Outer Ring Dia D (mm) incl.	Number of Holes
—	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

NSKHPS™ Spherical Roller Bearings

Features Compared with conventional bearings...



1. Improved reliability
Bearing life is up to twice that of conventional bearings thanks to optimization of the bearing's internal design and improvement of processing technology.
2. High-temperature dimensional stabilizing treatment comes standard
NSK's exclusive heat treatment technology achieves dimensional stability up to 200 °C.

TOLERANCES AND RUNNING ACCURACY

SPHERICAL ROLLER BEARINGS ..... Table 7.2 (Pages A128 to A131)
NSKHPS SPHERICAL ROLLER BEARINGS
Tolerance for Dimensions: ISO Normal
Running Accuracy: ISO Normal

RECOMMENDED FITS

SPHERICAL ROLLER BEARINGS ..... Table 8.3 (Page A164)
Table 8.5 (Page A165)

INTERNAL CLEARANCES

SPHERICAL ROLLER BEARINGS ..... Table 8.16 (Page A172)
NSKHPS SPHERICAL ROLLER BEARINGS
INTERNAL CLEARANCE DESIGNATION : CN, C3, C4

PERMISSIBLE MISALIGNMENT

The permissible misalignment of spherical roller bearings varies depending on bearing size and load but 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 bearing load conditions. Furthermore, higher speeds may be 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' as listed in the bearing tables, slippage occurs between the rollers and raceways, which may result in smearing. The higher the weight, 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.

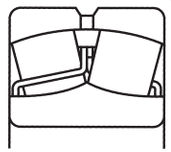
TECHNICAL DATA

Free Space of Spherical Roller Bearings

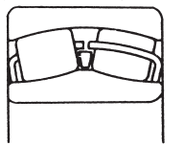
Spherical roller bearings have self-aligning capabilities and the capacity to carry substantially large radial and bi-axial loads. For these reasons, this bearing is used widely in many applications, such as plumber blocks. Application problems include a long span, which causes substantial deflection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

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 while considering the housing internal space.

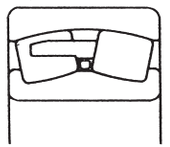
The amount of bearing free space for various spherical roller bearings is shown in Table 1. Under general operating conditions, a user may pack up to 1/3 to 2/3 of the free space of the bearing with grease.



EA type



C, CD type



CA type

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

Units: cm^3

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

Measurement of Clearance in SRBs

The measurement of internal bearing clearance before mounting is critical. Before handling the bearing and measuring the internal bearing clearance, be sure to wear thin rubber gloves.

If bearings are touched with bare hands, the touched part may rust.

When measuring the internal bearing clearance, ensure that the rollers are positioned correctly.

1. Measurement of Bearing Clearance

To measure only internal bearing clearance, set the bearing upright (vertically) on a flat surface while holding the outer ring with one hand. Take care not to incline the inner and outer rings, and stabilize the rollers by turning the inner ring clockwise and counter-clockwise by about one half to one full rotation. Adjust the rollers until a random roller is positioned at the very top of the bearing. Next, use a thickness gauge to measure the internal clearance. Measurement positioning and location may vary slightly depending on the size of the outer ring outside diameter.

1.1 When Bearing Outside Diameter Is Under 200 mm

Insert the thickness gauge between the two rows of rollers and the outer ring at the rollers located at the very top of the bearing. Then, measure the internal clearance Δ_r (see Fig. 1).

1.2 When Bearing Outside Diameter Is Over 200 mm

Insert the thickness gauge between the two rows of rollers and the outer ring at the very top of the bearing and on the sides at two symmetrical points relative to the bearing center. Then, take respective measurements for the bearing internal clearance (see Fig. 2).

Take the individual values measured at the very top of bearing and outer ring as Δ_{rT1} and Δ_{rT2}, and determine the internal clearance at the top of the bearing Δ_{rT} by the following equation:

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

Then, take the measurements between the two rows of rollers on the left side as Δ_{rL1} and Δ_{rL2}, and determine the internal clearance on the left side of the bearing Δ_{rL} by the following equation:

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

Next, take the measurements between the two rows of rollers on the right side as Δ_{rR1} and Δ_{rR2}, and determine the internal clearance on the right side of the bearing Δ_{rR} by the following equation:

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

Finally, determine the internal bearing clearance Δ_r by the following equation:

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

2. Measuring Bearing Clearance When Mounted on Shaft or Sleeve

In this case, clearance measurements are taken with the outer ring of the bearing hanging down from the rollers. First, while holding the bearing upright, rotate the outer ring clockwise and counter-clockwise by one-half to one full rotation until both rows have a random roller positioned exactly at the bottom. Use a thickness gauge to measure the clearance at the designated measuring points.

The measurement points vary slightly depending on the size of the outer ring outside diameter.

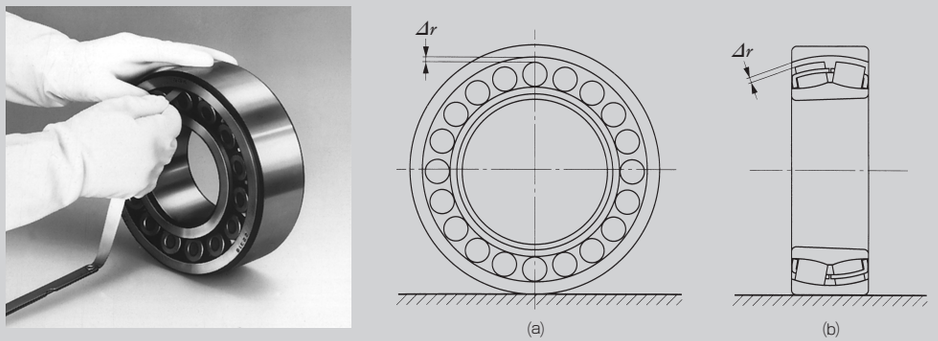


Fig. 1 Clearance Measurement Point (Bearing Outside Diameter: Less Than 200 mm)

2.1 When Bearing Outside Diameter is Under 200 mm

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

2.2 When Bearing Outside Diameter Is Over 200 mm

Insert the thickness gauge between the two rows of rollers and the outer ring at the very bottom of the bearing and on the sides at two symmetrical points relative to the bearing center. Then, take respective measurements for the bearing internal clearance Δ_r (Fig. 3). Because the bearing has two rows, two measurements of bearing internal clearance should be taken as Δ_{rS1} and Δ_{rS2}, and the internal clearance at the very bottom of the bearing Δ_{rS} should be determined by the following equation:

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

Then, take the individual values on the left side as Δ_{rL1} and Δ_{rL2}, and determine the internal clearance on the left side of bearing Δ_{rL} by the following equation:

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

Next, take the individual values on the right side as Δ_{rR1} and Δ_{rR2}, and determine the internal clearance on the right side of bearing Δ_{rR} by the following equation:

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

Finally, determine internal bearing clearance (Δ_r) by the following equation:

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

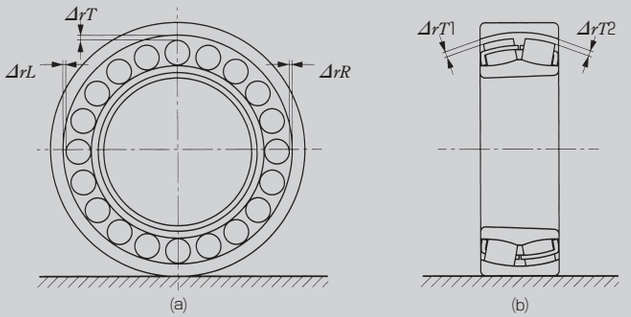


Fig. 2 Clearance Measurement Points (Bearing Outside Diameter: Larger Than 200 mm)

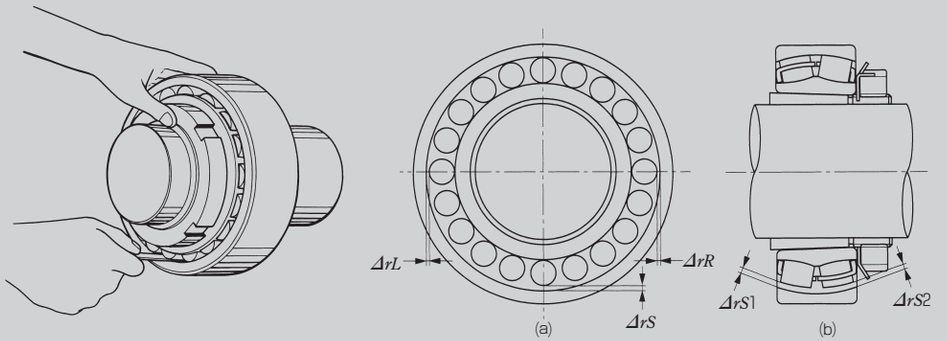


Fig. 3 Clearance Measurement Points

3. Temperature Equilibrium When Taking Measurements

To ensure accurate bearing measurements, the temperature of the measurement instrument and components to be measured must be the same. If the bearing is mounted with an oil heating tank or induction heater, be sure to measure the internal clearance only after a complete cooldown. If a bearing is brought from a warehouse to the measurement area, the temperature of the bearing may still be high; thus, if clearance or dimensions were measured without confirming bearing temperature, the measured value may be wrong.

For a large bearing with an outer ring outside diameter larger than 400 mm, the unpacked bearing should be left on a surface plate for about 24 hours before making a clearance or dimensional measurement. Put the end face of the bearing on a surface plate prior to measurement to ensure both objects have the same temperature.

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

When mounting a bearing with a tapered bore to a tapered shaft or sleeve (adapter or removable sleeve), the inner ring of the bearing will widen and interference will increase when pushing in the bearing, resulting in reduced internal clearance depending on the taper. Be sure to provide proper interference and internal clearance when mounting the bearing. See Table 2 for the clearance reduction amounts when mounting spherical roller bearings with tapered bores.

Each time the bearing is pushed further onto the tapered shaft or sleeve, measure the variation of the internal clearance and repeat the above procedure until the clearance reduction amount specified in Table 2 is attained. This procedure is called “clearance adjustment,” and when the proper reduction amount is attained, the clearance necessary for operation is secured. The clearance reduction amount must be confirmed by a thickness gauge; however, depending on the method of clearance adjustment, the measured value obtained with the thickness gauge may not be correct. Therefore, execute the following corrective procedures:

1. When using heat:
   When the bearing and shaft are both at room temperature, measure the clearance again with a thickness gauge to confirm that the speified value is secured.
2. When using a lockwasher as a turning stopper for the locknut:
   Prior to bending the tooth of the lockwasher into the cutout for the locknut, measure the clearance with the thickness gauge again to confirm that the specified value is secured.
3. When using a hydraulic nut:
   After removal of the hydraulic nut, mount the locknut and measure the clearance again to confirm that the specified value remains constant prior to stopping turning.
4. When using an oil injection pump:
   Drop the pressure of the oil fed from the oil injection pump to zero so that there is no pressure on the bearing or fitted part of the sleeve. Next, measure the clearance with a thickness gauge to confirm that the specified value remains secured.

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

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

Internal Clearance Adjustment of Tapered Bore Bearings

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

1. For measurement location and positioning, refer to Section 2 (Page C262) of this catalog.
2. When mounting a bearing on a tapered shaft, perform a clearance adjustment each time the bearing is pushed in by a locknut, end plate, end cap, or hydraulic nut.
3. When using an adapter sleeve, perform a clearance adjustment each time the bearing is pushed in by a locknut or hydraulic nut.
4. When using a removable sleeve, perform an adjustment each time the removable sleeve is pushed in by a locknut or hydraulic nut.

Since the outer ring of the bearing hangs down from the rollers, turn the outer ring clockwise and counterclockwise by onehalf to one full rotation while maintaining the proper bearing position before taking clearance measurements for these operations. Position one randomly chosen roller from each row at the very bottom of the bearing. Then, insert the thickness gauge to measure the internal clearance at the appropriate location(s) based on the size of the outer ring outside diameter. These clearance measurement values should be recorded.

Table 2 Mounting of Spherical Roller Bearings With Tapered Bores

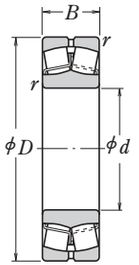
Units : mm

Bore Diameter d (mm) over	incl.	Reduction in Radial Clearance min.	max.	Axial Movement Taper 1 : 12 min.	max.	Taper 1 : 30 min.	max.	Minimum Permissible Residual Clearance CN	C3	C4
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

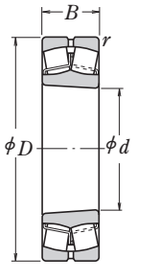
Remarks The values for reduction in radial internal clearance are for bearings with CN clearance.
For bearings with C3 or C4 Clearance, the maximum values listed should be used.

SPHERICAL ROLLER BEARINGS

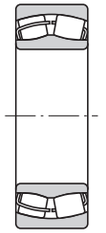
Bore Diameter 20 – 55 mm



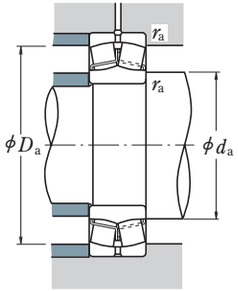
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

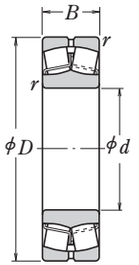
Boundary Dimensions (mm)				Basic Load Ratings (N)		Speeds (min^{-1}) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore[1]	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
20	52	15	1.1	29 300	26 900	10 000	—	6 300	8 200	**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	9 000	**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	6 700	**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	7 500	**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	6 000	**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	6 700	**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	5 300	**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	8 500	＊**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	7 500	＊**21308EAE4**	＊**21308EAKE4**	49	55	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	6 700	＊**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	7 500	＊**22209EAE4**	＊**22209EAKE4**	52	55	78	75	1	0.26	3.9	2.7	2.6	0.55
	100	25	1.5	149 000	144 000	6 000	9 000	5 000	6 300	＊**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	5 600	＊**22309EAE4**	＊**22309EAKE4**	54	60	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	7 100	＊**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	5 600	＊**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	5 300	＊**22310EAE4**	＊**22310EAKE4**	60	64	100	93	2	0.36	2.8	1.9	1.9	1.78
55	100	25	1.5	149 000	144 000	5 300	9 000	5 300	6 700	＊**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	5 600	＊**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	4 800	＊**22311EAE4**	＊**22311EAKE4**	65	73	110	103	2	0.34	2.9	2.0	1.9	2.3

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

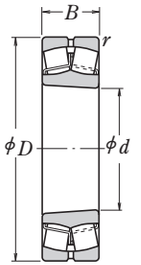
Remarks
1. Bearings denoted by an asterisk (＊) are NSKHPS bearings; they come standard with an oil groove and holes.
2. The recommended fits (shaft tolerances) on Page A164 are different for NSKHPS bearings, with light loads defined as $\leqq 0.05C_r$, normal loads as 0.05 to $0.10C_r$, and heavy loads as $> 0.10C_r$.
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C348 – C349 and C356.

SPHERICAL ROLLER BEARINGS

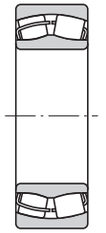
Bore Diameter 60 – 90 mm



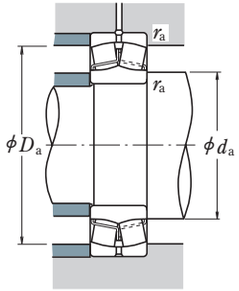
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

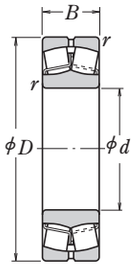
Boundary Dimensions (mm)				Basic Load Ratings (N)		Speeds (min^{-1}) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore[1]	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
60	95	26	1.1	98 500	141 000	4 800	—	3 600	4 500	**23012CE4**	**23012CKE4**	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	6 000	**＊22212EAE4**	**＊22212EAKE4**	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	4 800	**＊21312EAE4**	**＊21312EAKE4**	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	4 500	**＊22312EAE4**	**＊22312EAKE4**	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	5 300	**＊22213EAE4**	**＊22213EAKE4**	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	4 500	**＊21313EAE4**	**＊21313EAKE4**	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	4 000	**＊22313EAE4**	**＊22313EAKE4**	77	84	128	119	2	0.34	3.0	2.0	2.0	3.52
70	125	31	1.5	225 000	232 000	4 500	7 100	4 000	5 300	**＊22214EAE4**	**＊22214EAKE4**	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	4 000	**＊21314EAE4**	**＊21314EAKE4**	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	3 800	**＊22314EAE4**	**＊22314EAKE4**	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	5 000	**＊22215EAE4**	**＊22215EAKE4**	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	4 000	**＊21315EAE4**	**＊21315EAKE4**	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	3 600	**＊22315EAE4**	**＊22315EAKE4**	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	4 500	**＊22216EAE4**	**＊22216EAKE4**	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	3 800	**＊21316EAE4**	**＊21316EAKE4**	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	3 400	**＊22316EAE4**	**＊22316EAKE4**	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	4 300	**＊22217EAE4**	**＊22217EAKE4**	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	4 000	**＊21317EAE4**	**＊21317EAKE4**	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	3 200	**＊22317EAE4**	**＊22317EAKE4**	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	4 000	**＊22218EAE4**	**＊22218EAKE4**	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	2 400	**23218CE4**	**23218CKE4**	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	3 600	**＊21318EAE4**	**＊21318EAKE4**	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	3 000	**＊22318EAE4**	**＊22318EAKE4**	104	115	176	163	2.5	0.33	3.1	2.1	2.0	8.56

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

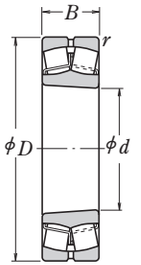
Remarks
1. Bearings denoted by an asterisk (＊) are NSKHPS bearings; they come standard with an oil groove and holes.
2. The recommended fits (shaft tolerances) on Page A164 are different for NSKHPS bearings, with light loads defined as $\leqq 0.05C_r$, normal loads as 0.05 to $0.10C_r$, and heavy loads as $> 0.10C_r$.
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C349 – C350 and C356.

SPHERICAL ROLLER BEARINGS

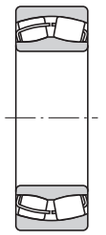
Bore Diameter 95 – 110 mm



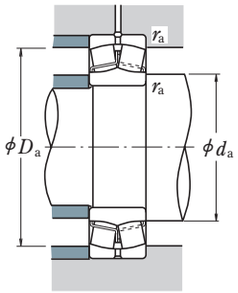
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

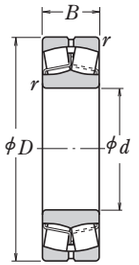
Boundary Dimensions (mm)				Basic Load Ratings (N)		Speeds (min^{-1}) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore[1]	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
95	170	43	2.1	415 000	450 000	3 800	4 500	3 000	3 800	＊**22219EAE4**	＊**22219EAKE4**	107	115	158	152	2	0.24	4.3	2.9	2.8	4.04
	170	55.6	2.1	370 000	525 000	2 600	—	1 700	2 200	**23219CAME4**	**23219CAMKE4**	107	—	158	146	2	0.32	3.1	2.1	2.0	5.33
	200	45	3	430 000	435 000	3 600	4 800	1 500	2 000	＊**21319CAME4**	＊**21319CAMKE4**	109	—	186	172	2.5	0.22	4.6	3.1	3.0	6.92
	200	45	3	430 000	435 000	3 600	4 800	1 500	2 000	＊**21319CE4**	＊**21319CKE4**	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	3 000	2 200	2 800	＊**22319EAE4**	＊**22319EAKE4**	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	—	2 200	2 800	**23020CDE4**	**23020CDKE4**	109	112	141	136	1.5	0.22	4.6	3.1	3.0	2.31
	150	50	1.5	276 000	470 000	2 800	—	1 800	2 400	**24020CE4**	**24020CK30E4**	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	—	1 700	2 200	**23120CE4**	**23120CKE4**	110	113	155	144	2	0.30	3.4	2.3	2.2	4.38
	165	65	2	345 000	535 000	2 400	—	1 700	2 200	**24120CAME4**	**24120CAMK30E4**	110	—	155	143	2	0.35	2.9	1.9	1.9	5.42
	180	46	2.1	455 000	490 000	3 600	4 300	2 800	3 600	＊**22220EAE4**	＊**22220EAKE4**	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	3 800	1 600	2 200	＊**23220CAME4**	＊**23220CAMKE4**	112	—	168	155	2	0.32	3.2	2.1	2.1	6.6
	180	60.3	2.1	525 000	605 000	2 800	3 800	1 600	2 200	＊**23220CE4**	＊**23220CKE4**	112	118	168	155	2	0.32	3.2	2.1	2.1	6.6
	215	47	3	495 000	485 000	3 400	4 500	1 400	1 900	＊**21320CAME4**	＊**21320CAMKE4**	114	—	201	184	2.5	0.23	4.4	3.0	2.9	8.46
	215	47	3	495 000	485 000	3 400	4 500	1 400	1 900	＊**21320CE4**	＊**21320CKE4**	114	133	201	184	2.5	0.21	4.7	3.2	3.1	8.46
	215	73	3	860 000	930 000	—	2 400	1 800	2 400	＊**22320EAE4**	＊**22320EAKE4**	114	130	201	184	2.5	0.33	2.9	1.9	1.9	12.7
110	170	45	2	293 000	465 000	3 200	—	2 000	2 400	**23022CDE4**	**23022CDKE4**	120	124	160	153	2	0.24	4.2	2.8	2.8	3.76
	170	60	2	380 000	645 000	2 600	—	1 600	2 200	**24022CE4**	**24022CK30E4**	120	121	160	148	2	0.32	3.1	2.1	2.1	4.96
	180	56	2	480 000	630 000	3 200	4 000	1 600	2 000	＊**23122CAME4**	＊**23122CAMKE4**	120	—	170	158	2	0.28	3.5	2.4	2.3	5.7
	180	56	2	480 000	630 000	3 200	4 000	1 600	2 000	＊**23122CE4**	＊**23122CKE4**	120	127	170	158	2	0.28	3.5	2.4	2.3	5.7
	180	69	2	575 000	750 000	2 200	3 400	1 600	2 000	＊**24122CAME4**	＊**24122CAMK30E4**	120	—	170	154	2	0.36	2.8	1.9	1.8	6.84
	180	69	2	575 000	750 000	2 200	3 400	1 600	2 000	＊**24122CE4**	＊**24122CK30E4**	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	3 400	2 600	3 200	＊**22222EAE4**	＊**22222EAKE4**	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	3 400	1 500	1 900	＊**23222CAME4**	＊**23222CAMKE4**	122	—	188	170	2	0.34	3.0	2.0	1.9	9.54
	200	69.8	2.1	645 000	760 000	2 600	3 400	1 500	1 900	＊**23222CE4**	＊**23222CKE4**	122	130	188	170	2	0.34	3.0	2.0	1.9	9.54
	240	50	3	565 000	545 000	3 000	4 300	1 300	1 700	＊**22322EAE4**	＊**22322EAE4**	124	145	226	206	2.5	0.35	2.9	1.9	1.9	17.6
	240	80	3	1 030 000	1 120 000	—	1 900	1 400	1 900	＊**22322EAE4**	＊**22322EAE4**	124	145	226	206	2.5	0.35	2.9	1.9	1.9	17.6

Note (1) Suffixes K and K30 represent bearings with tapered bores (taper 1:12 or 1:30).

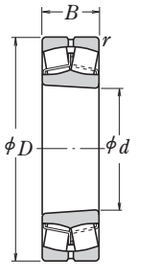
Remarks
1. Bearings denoted by an asterisk (＊) are NSKHPS bearings; they come standard with an oil groove and holes.
2. The recommended fits (shaft tolerances) on Page A164 are different for NSKHPS bearings, with light loads defined as $\leqq 0.05C_r$, normal loads as 0.05 to $0.10C_r$, and heavy loads as $> 0.10C_r$.
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C351 and C357.

■SPHERICAL ROLLER BEARINGS

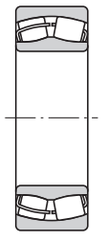
Bore Diameter 120 – 130 mm



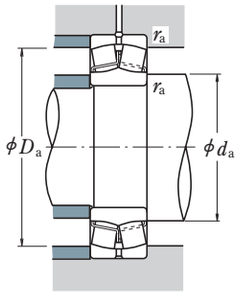
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

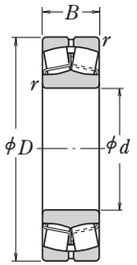
Boundary Dimensions (mm)				Basic Load Ratings (N)		Speeds (min^{-1}) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore[1]	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
120	180	46	2	395 000	525 000	3 200	4 500	1 800	2 200	**＊23024CAME4**	**＊23024CAMKE4**	130	—	170	163	2	0.22	4.5	3.0	2.9	4.11
	180	46	2	395 000	525 000	3 200	4 500	1 800	2 200	**＊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	2 000	**＊24024CAME4**	**＊24024CAMK30E4**	130	—	170	158	2	0.32	3.2	2.1	2.1	5.33
	180	60	2	495 000	705 000	2 600	3 600	1 500	2 000	**＊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	1 800	**＊23124CAME4**	**＊23124CAMKE4**	130	—	190	175	2	0.29	3.5	2.4	2.3	7.85
	200	62	2	580 000	720 000	2 800	3 600	1 400	1 800	**＊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	1 800	**＊24124CAME4**	**＊24124CAMK30E4**	130	—	190	171	2	0.37	2.7	1.8	1.8	10
	200	80	2	720 000	950 000	2 000	3 000	1 400	1 800	**＊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	3 000	**＊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	1 700	**＊23224CAME4**	**＊23224CAMKE4**	132	—	203	182	2	0.34	2.9	2.0	1.9	12.1
	215	76	2.1	790 000	970 000	2 200	3 000	1 300	1 700	**＊23224CE4**	**＊23224CKE4**	132	140	203	182	2	0.34	2.9	2.0	1.9	12.1
	260	86	3	1 190 000	1 320 000	—	1 400	1 100	1 400	**＊22324EAE4**	**＊22324EAKE4**	134	157	246	222	2.5	0.35	2.9	1.9	1.9	22.2
130	200	52	2	500 000	655 000	3 000	3 800	1 700	2 000	**＊23026CAME4**	**＊23026CAMKE4**	140	—	190	180	2	0.23	4.3	2.9	2.8	5.98
	200	52	2	500 000	655 000	3 000	3 800	1 700	2 000	**＊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	1 800	**＊24026CAME4**	**＊24026CAMK30E4**	140	—	190	175	2	0.31	3.2	2.2	2.1	7.84
	200	69	2	620 000	865 000	2 200	3 200	1 400	1 800	**＊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	1 700	**＊23126CAME4**	**＊23126CAMKE4**	140	—	200	184	2	0.28	3.6	2.4	2.4	8.69
	210	64	2	630 000	825 000	2 600	3 400	1 300	1 700	**＊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	1 700	**＊24126CAME4**	**＊24126CAMK30E4**	140	—	200	180	2	0.37	2.7	1.8	1.8	10.7
	210	80	2	735 000	1 010 000	1 800	2 800	1 300	1 700	**＊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	2 600	**＊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	1 600	**＊23226CAME4**	**＊23226CAMKE4**	144	—	216	196	2.5	0.34	2.9	2.0	1.9	14.3
	230	80	3	875 000	1 080 000	2 000	2 800	1 200	1 600	**＊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	1 600	**＊22326CAME4**	**＊22326CAMKE4**	148	—	262	236	3	0.34	2.9	2.0	1.9	28.1
	280	93	4	1 240 000	1 350 000	1 900	2 600	1 300	1 600	**＊22326CE4**	**＊22326CKE4**	148	166	262	236	3	0.34	2.9	2.0	1.9	28.1

Note (1) Suffixes K and K30 represent bearings with tapered bores (taper 1:12 or 1:30).

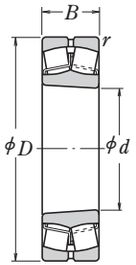
Remarks
1. Bearings denoted by an asterisk (＊) are NSKHPS bearings; they come standard with an oil groove and holes.
2. The recommended fits (shaft tolerances) on Page A164 are different for NSKHPS bearings, with light loads defined as $\leqq 0.05C_r$, normal loads as 0.05 to $0.10C_r$, and heavy loads as $> 0.10C_r$.
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C351 and C357.

SPHERICAL ROLLER BEARINGS

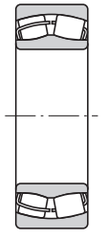
Bore Diameter 140 – 150 mm



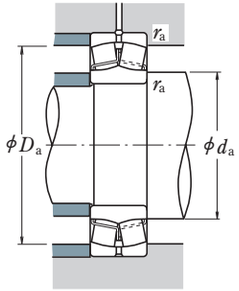
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

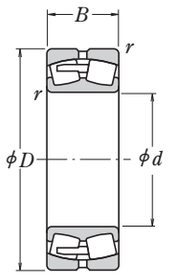
Boundary Dimensions (mm)				Basic Load Ratings (N)		Speeds (min^{-1}) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore[1]	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
140	210	53	2	525 000	715 000	2 800	3 800	1 600	1 900	＊**23028CAME4**	＊**23028CAMKE4**	150	—	200	190	2	0.22	4.5	3.0	2.9	6.49
	210	53	2	525 000	715 000	2 800	3 800	1 600	1 900	＊**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	1 700	＊**24028CAME4**	＊**24028CAMK30E4**	150	—	200	186	2	0.31	3.4	2.3	2.2	8.37
	210	69	2	655 000	945 000	2 200	3 000	1 300	1 700	＊**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	1 600	＊**23128CAME4**	＊**23128CAMKE4**	152	—	213	198	2	0.28	3.6	2.4	2.3	10.5
	225	68	2.1	725 000	945 000	2 400	3 200	1 200	1 600	＊**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	1 600	＊**24128CAME4**	＊**24128CAMK30E4**	152	—	213	193	2	0.37	2.7	1.8	1.8	13
	225	85	2.1	840 000	1 160 000	1 600	2 600	1 200	1 600	＊**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	1 700	＊**22228CAME4**	＊**22228CAMKE4**	154	—	236	221	2.5	0.26	3.9	2.6	2.5	14.5
	250	68	3	645 000	930 000	2 400	—	1 400	1 700	**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	1 500	＊**23228CAME4**	＊**23228CAMKE4**	154	—	236	213	2.5	0.35	2.9	1.9	1.9	18.8
	250	88	3	1 040 000	1 300 000	1 800	2 600	1 100	1 500	＊**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	1 500	＊**22328CAME4**	＊**22328CAMKE4**	158	—	282	253	3	0.35	2.9	1.9	1.9	35.4
	300	102	4	1 450 000	1 590 000	1 700	2 400	1 200	1 500	＊**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	1 800	＊**23030CAME4**	＊**23030CAMKE4**	162	—	213	203	2	0.22	4.6	3.1	3.0	7.9
	225	56	2.1	590 000	815 000	2 600	3 600	1 400	1 800	＊**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	1 500	＊**24030CAME4**	＊**24030CAMK30E4**	162	—	213	198	2	0.30	3.4	2.3	2.2	10.5
	225	75	2.1	740 000	1 090 000	1 900	3 000	1 200	1 500	＊**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	1 400	＊**23130CAME4**	＊**23130CAMKE4**	162	—	238	218	2	0.30	3.4	2.3	2.2	15.8
	250	80	2.1	905 000	1 180 000	2 200	2 800	1 100	1 400	＊**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	1 400	＊**24130CAME4**	＊**24130CAMK30E4**	162	—	238	212	2	0.38	2.6	1.8	1.7	19.8
	250	100	2.1	1 110 000	1 530 000	1 400	2 400	1 100	1 400	＊**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	1 600	＊**22230CAME4**	＊**22230CAMKE4**	164	—	256	236	2.5	0.26	3.9	2.6	2.5	18.4
	270	73	3	955 000	1 120 000	2 400	3 000	1 300	1 600	＊**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	1 400	＊**23230CAME4**	＊**23230CAMKE4**	164	—	256	230	2.5	0.35	2.9	1.9	1.9	24.2
	270	96	3	1 220 000	1 560 000	1 700	2 400	1 100	1 400	＊**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	1 400	＊**22330CAME4**	＊**22330CAMKE4**	168	—	302	270	3	0.35	2.9	1.9	1.9	41.5

Note (1) Suffixes K and K30 represent bearings with tapered bores (taper 1:12 or 1:30).

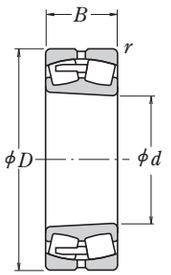
Remarks
1. Bearings denoted by an asterisk (＊) are NSKHPS bearings; they come standard with an oil groove and holes.
2. The recommended fits (shaft tolerances) on Page A164 are different for NSKHPS bearings, with light loads defined as $\leqq 0.05C_r$, normal loads as 0.05 to $0.10C_r$, and heavy loads as $> 0.10C_r$.
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C352 and C357 – C358.

SPHERICAL ROLLER BEARINGS

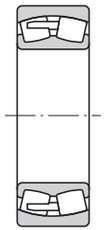
Bore Diameter 160 – 170 mm



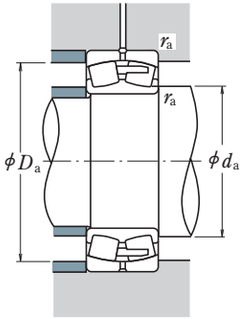
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0F_a$

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

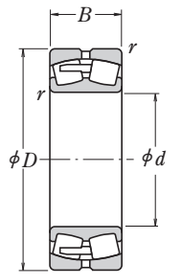
Boundary Dimensions (mm)				Basic Load Ratings (N)		Speeds (min^{-1}) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore[1]	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
160	220	45	2	450 000	675 000	3 000	3 200	1 400	1 800	＊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	1 700	＊23032CAME4	＊23032CAMKE4	172	—	228	216	2	0.22	4.5	3.0	2.9	9.66
	240	60	2.1	675 000	955 000	2 400	3 200	1 300	1 700	＊23032CDE4	＊23032CDKE4	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	1 400	＊24032CAME4	＊24032CAMK30E4	172	—	228	212	2	0.30	3.4	2.3	2.2	12.7
	240	80	2.1	845 000	1 260 000	1 800	2 800	1 100	1 400	＊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	1 300	＊23132CAME4	＊23132CAMKE4	172	—	258	234	2	0.30	3.4	2.3	2.2	20.3
	270	86	2.1	1 070 000	1 400 000	2 000	2 600	1 000	1 300	＊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	1 300	＊24132CAME4	＊24132CAMK30E4	172	—	258	229	2	0.39	2.6	1.7	1.7	25.4
	270	109	2.1	1 300 000	1 760 000	1 300	2 200	1 000	1 300	＊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	1 500	＊22232CAME4	＊22232CAMKE4	174	—	276	255	2.5	0.26	3.8	2.6	2.5	23.1
	290	80	3	1 140 000	1 320 000	2 200	2 800	1 200	1 500	＊22232CDE4	＊22232CDKE4	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	1 300	＊23232CAME4	＊23232CAMKE4	174	—	276	245	2.5	0.34	2.9	2.0	1.9	30.5
	290	104	3	1 370 000	1 770 000	1 500	2 200	1 000	1 300	＊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	1 300	＊22332CAME4	＊22332CAMKE4	178	—	322	287	3	0.35	2.9	1.9	1.9	49.3
170	230	45	2	450 000	680 000	3 000	3 600	1 400	1 800	＊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	1 600	＊23034CAME4	＊23034CAMKE4	182	—	248	233	2	0.23	4.3	2.9	2.8	13
	260	67	2.1	795 000	1 090 000	2 200	3 000	1 200	1 600	＊23034CDE4	＊23034CDKE4	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	1 300	＊24034CAME4	＊24034CAMK30E4	182	—	248	228	2	0.31	3.2	2.2	2.1	17.3
	260	90	2.1	1 030 000	1 520 000	1 600	2 400	1 000	1 300	＊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	1 300	＊23134CAME4	＊23134CAMKE4	182	—	268	245	2	0.29	3.5	2.3	2.3	21.8
	280	88	2.1	1 180 000	1 570 000	1 800	2 600	1 000	1 300	＊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	1 300	＊24134CAME4	＊24134CAMK30E4	182	—	268	239	2	0.38	2.7	1.8	1.7	26.6
	280	109	2.1	1 340 000	1 860 000	1 200	2 200	1 000	1 300	＊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	1 400	＊22234CAME4	＊22234CAMKE4	188	—	292	270	3	0.26	3.8	2.6	2.5	28.8
	310	86	4	1 240 000	1 500 000	2 000	2 600	1 100	1 400	＊22234CDE4	＊22234CDKE4	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	1 200	＊23234CAME4	＊23234CAMKE4	188	—	292	261	3	0.35	2.9	1.9	1.9	36.4
	310	110	4	1 500 000	1 910 000	1 400	2 200	900	1 200	＊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	1 200	＊22334CAME4	＊22334CAMKE4	188	—	342	304	3	0.35	2.9	1.9	1.9	57.9

Note (1) Suffixes K and K30 represent bearings with tapered bores (taper 1:12 or 1:30).

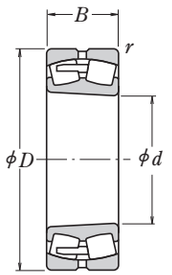
Remarks
1. Bearings denoted by an asterisk (＊) are NSKHPS bearings; they come standard with an oil groove and holes.
2. The recommended fits (shaft tolerances) on Page A164 are different for NSKHPS bearings, with light loads defined as $\leqq 0.05C_r$, normal loads as 0.05 to $0.10C_r$, and heavy loads as $> 0.10C_r$.
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C352 and C358.

SPHERICAL ROLLER BEARINGS

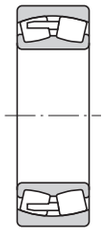
Bore Diameter 180 – 190 mm



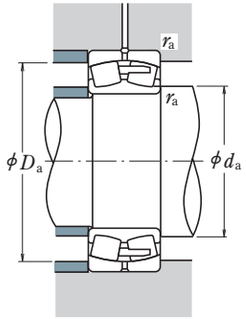
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0F_a$

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

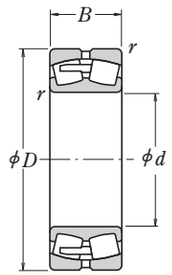
Boundary Dimensions (mm)				Basic Load Ratings (N)		Speeds (min^{-1}) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore[1]	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
180	250	52	2	590 000	890 000	2 600	3 000	1 200	1 600	＊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	1 400	＊23036CAME4	＊23036CAMKE4	192	—	268	249	2	0.24	4.2	2.8	2.8	17.1
	280	74	2.1	935 000	1 270 000	2 000	2 800	1 200	1 400	＊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	1 200	＊24036CAME4	＊24036CAMK30E4	192	—	268	245	2	0.32	3.1	2.1	2.0	22.7
	280	100	2.1	1 210 000	1 750 000	1 500	2 200	950	1 200	＊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	1 200	＊23136CAME4	＊23136CAMKE4	194	—	286	260	2.5	0.31	3.3	2.2	2.2	27.5
	300	96	3	1 320 000	1 760 000	1 700	2 200	900	1 200	＊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	1 200	＊24136CAME4	＊24136CAMK30E4	194	—	286	255	2.5	0.37	2.7	1.8	1.8	33.1
	300	118	3	1 490 000	2 040 000	1 100	2 000	900	1 200	＊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	1 300	＊22236CAME4	＊22236CAMKE4	198	—	302	278	3	0.26	3.9	2.6	2.6	30.2
	320	86	4	1 280 000	1 540 000	2 000	2 600	1 100	1 300	＊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	1 100	＊23236CAME4	＊23236CAMKE4	198	—	302	274	3	0.35	2.9	1.9	1.9	38.9
	320	112	4	1 630 000	2 110 000	1 300	2 000	850	1 100	＊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	1 200	＊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	1 500	＊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	1 400	＊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	1 200	＊24038CAME4	＊24038CAMK30E4	202	—	278	253	2	0.32	3.1	2.1	2.0	24
	290	100	2.1	1 220 000	1 840 000	1 400	2 200	900	1 200	＊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	1 100	＊23138CAME4	＊23138CAMKE4	204	—	306	276	2.5	0.31	3.2	2.2	2.1	34.5
	320	104	3	1 480 000	2 020 000	1 600	2 200	850	1 100	＊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	1 100	＊24138CAME4	＊24138CAMK30E4	204	—	306	269	2.5	0.40	2.5	1.7	1.6	41.5
	320	128	3	1 710 000	2 330 000	1 000	1 900	850	1 100	＊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	1 200	＊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	1 100	＊23238CAME4	＊23238CAMKE4	208	—	322	288	3	0.35	2.8	1.9	1.9	47.6
	340	120	4	1 800 000	2 350 000	1 200	1 900	800	1 100	＊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	1 100	＊22338CAME4	＊22338CAMKE4	212	—	378	338	4	0.34	2.9	2.0	1.9	77.6

Note (1) Suffixes K and K30 represent bearings with tapered bores (taper 1:12 or 1:30).

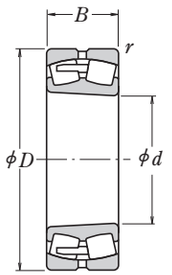
Remarks
1. Bearings denoted by an asterisk (＊) are NSKHPS bearings; they come standard with an oil groove and holes.
2. The recommended fits (shaft tolerances) on Page A164 are different for NSKHPS bearings, with light loads defined as $\leqq 0.05C_r$, normal loads as 0.05 to $0.10C_r$, and heavy loads as $> 0.10C_r$.
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C352 and C358.

SPHERICAL ROLLER BEARINGS

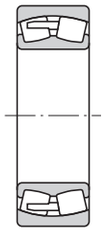
Bore Diameter 200 – 220 mm



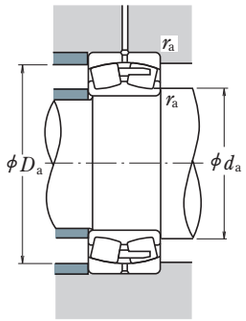
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0F_a$

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

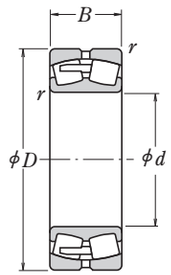
Boundary Dimensions (mm)				Basic Load Ratings (N)		Speeds (min^{-1}) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore[1]	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
200	280	60	2.1	710 000	1 060 000	2 400	2 600	1 100	1 400	**＊23940CAME4**	**＊23940CAMKE4**	212	—	268	258	2	0.20	5.1	3.4	3.3	11
	310	82	2.1	1 180 000	1 700 000	1 800	2 400	1 000	1 300	**＊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	1 100	**＊24040CAME4**	**＊24040CAMK30E4**	212	—	298	271	2	0.33	3.0	2.0	2.0	30.4
	310	109	2.1	1 430 000	2 120 000	1 300	2 000	850	1 100	**＊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	1 000	**＊23140CAME4**	**＊23140CAMKE4**	214	—	326	293	2.5	0.32	3.2	2.1	2.1	42.7
	340	112	3	1 700 000	2 330 000	1 500	2 000	800	1 000	**＊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	1 000	**＊24140CAME4**	**＊24140CAMK30E4**	214	—	326	290	2.5	0.39	2.5	1.7	1.7	51.3
	340	140	3	1 960 000	2 670 000	950	1 800	800	1 000	**＊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	1 200	**＊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	1 000	**＊23240CAME4**	**＊23240CAMKE4**	218	—	342	307	3	0.35	2.9	1.9	1.9	57.1
	360	128	4	2 070 000	2 750 000	1 100	1 800	750	1 000	**＊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	1 100	1 700	850	1 000	**＊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	1 300	**＊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	1 200	**＊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	1 000	**＊24044CAME4**	**＊24044CAMK30E4**	234	—	326	296	2.5	0.32	3.2	2.1	2.1	40.5
	340	118	3	1 700 000	2 600 000	1 200	1 900	750	1 000	**＊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	950	**＊23144CAME4**	**＊23144CAMKE4**	238	—	352	320	3	0.31	3.3	2.2	2.2	53
	370	120	4	1 960 000	2 710 000	1 300	1 800	710	950	**＊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	950	**＊24144CAME4**	**＊24144CAMK30E4**	238	—	352	313	3	0.39	2.6	1.7	1.7	66.7
	370	150	4	2 250 000	3 200 000	850	1 600	710	950	**＊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	1 000	**＊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	900	**＊23244CAME4**	**＊23244CAMKE4**	238	—	382	337	3	0.36	2.8	1.9	1.8	80.4
	400	144	4	2 520 000	3 400 000	1 000	1 600	670	900	**＊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	950	**＊22344CAME4**	**＊22344CAMKE4**	242	—	438	391	4	0.33	3.0	2.0	2.0	116

Note (1) Suffixes K and K30 represent bearings with tapered bores (taper 1:12 or 1:30).

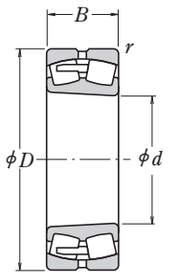
Remarks
1. Bearings denoted by an asterisk (＊) are NSKHPS bearings; they come standard with an oil groove and holes.
2. The recommended fits (shaft tolerances) on Page A164 are different for NSKHPS bearings, with light loads defined as $\leqq 0.05C_r$, normal loads as 0.05 to $0.10C_r$, and heavy loads as $> 0.10C_r$.
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C353 and C359.

SPHERICAL ROLLER BEARINGS

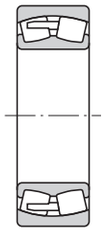
Bore Diameter 240 – 280 mm



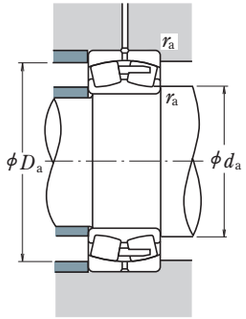
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0F_a$

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

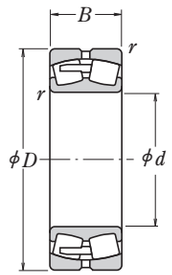
Boundary Dimensions (mm)				Basic Load Ratings (N)		Speeds (min^{-1}) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore[1]	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
240	320	60	2.1	795 000	1 300 000	1 900	2 600	950	1 200	＊23948CAME4	＊23948CAMKE4	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	1 100	＊23048CAME4	＊23048CAMKE4	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	950	＊24048CAME4	＊24048CAMK30E4	254	—	346	317	2.5	0.30	3.4	2.3	2.2	43.4
	360	118	3	1 730 000	2 730 000	1 100	1 800	710	950	＊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	850	＊23148CAME4	＊23148CAMKE4	258	—	382	347	3	0.31	3.3	2.2	2.2	66.9
	400	128	4	2 230 000	3 100 000	1 200	1 700	670	850	＊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	850	＊24148CAME4	＊24148CAMK30E4	258	—	382	341	3	0.38	2.7	1.8	1.8	79.5
	400	160	4	2 660 000	3 800 000	750	1 500	670	850	＊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	950	＊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	800	＊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	850	＊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	1 000	＊23952CAME4	＊23952CAMKE4	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	950	＊23052CAME4	＊23052CAMKE4	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	850	＊24052CAME4	＊24052CAMK30E4	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	800	＊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	800	＊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	850	＊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	750	＊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	800	＊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	950	＊23956CAME4	＊23956CAMKE4	292	—	368	351	2	0.18	5.7	3.8	3.8	24.5
	420	106	4	1 930 000	2 950 000	1 200	1 800	710	900	＊23056CAME4	＊23056CAMKE4	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	800	＊24056CAME4	＊24056CAMK30E4	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	750	＊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	750	＊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	800	＊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	670	＊23256CAME4	＊23256CAMKE4	302	—	478	425	4	0.35	2.9	1.9	1.9	147
	580	175	6	4 350 000	5 150 000	670	1 300	560	710	＊22356CAME4	＊22356CAMKE4	308	—	552	496	5	0.31	3.2	2.1	2.1	221

Note (1) Suffixes K and K30 represent bearings with tapered bores (taper 1:12 or 1:30).

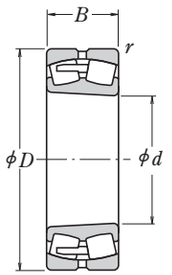
Remarks
1. Bearings denoted by an asterisk (＊) are NSKHPS bearings; they come standard with an oil groove and holes.
2. The recommended fits (shaft tolerances) on Page A164 are different for NSKHPS bearings, with light loads defined as $\leqq 0.05C_r$, normal loads as 0.05 to $0.10C_r$, and heavy loads as $> 0.10C_r$.
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C353 and C359.

SPHERICAL ROLLER BEARINGS

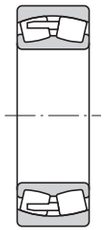
Bore Diameter 300 – 380 mm



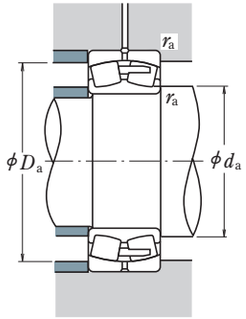
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0F_a$

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

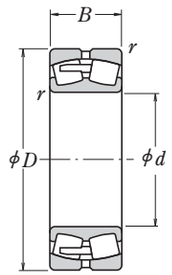
Boundary Dimensions (mm)				Basic Load Ratings (N)		Speeds (min^{-1}) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore[1]	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
300	420	90	3	1 540 000	2 490 000	1 500	1 800	710	900	＊**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	850	＊**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	710	＊**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	670	＊**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	670	＊**24160CAME4**	＊**24160CAMK30E4**	322	—	478	423	4	0.38	2.6	1.8	1.7	152
	540	140	5	3 250 000	4 250 000	1 000	1 500	600	750	＊**22260CAME4**	＊**22260CAMKE4**	322	—	518	473	4	0.25	4.0	2.7	2.6	139
	540	192	5	4 250 000	5 900 000	670	1 200	480	630	＊**23260CAME4**	＊**23260CAMKE4**	322	—	518	458	4	0.35	2.9	1.9	1.9	189
320	440	90	3	1 620 000	2 750 000	1 400	1 700	670	850	＊**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	800	＊**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	670	＊**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	600	＊**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	600	＊**24164CAME4**	＊**24164CAMK30E4**	342	—	518	456	4	0.39	2.6	1.7	1.7	196
	580	150	5	3 750 000	4 850 000	950	1 400	530	670	＊**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	600	＊**23264CAME4**	＊**23264CAMKE4**	342	—	558	488	4	0.36	2.8	1.9	1.8	239
340	460	90	3	1 670 000	2 840 000	1 300	1 700	630	800	＊**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	710	＊**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	600	＊**24068CAME4**	＊**24068CAMK30E4**	362	—	498	454	4	0.32	3.2	2.1	2.1	135
	580	190	5	4 500 000	6 600 000	710	1 200	430	560	＊**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	560	＊**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	530	**23268CAME4**	**23268CAMKE4**	368	—	592	521	5	0.36	2.8	1.9	1.8	295
360	480	90	3	1 730 000	3 050 000	1 200	1 700	600	750	＊**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	670	＊**23072CAME4**	＊**23072CAMKE4**	382	—	518	485	4	0.24	4.2	2.8	2.8	106
	540	180	5	3 650 000	6 100 000	630	1 200	450	600	＊**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	530	＊**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	530	＊**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	500	**23272CAME4**	**23272CAMKE4**	388	—	622	549	5	0.36	2.8	1.9	1.8	342
380	520	106	4	2 340 000	4 100 000	1 100	1 500	530	670	＊**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	630	＊**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	560	＊**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	500	**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	500	**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	480	**23276CAME4**	**23276CAMKE4**	408	—	652	578	5	0.35	2.9	1.9	1.9	372

Note (1) Suffixes K and K30 represent bearings with tapered bores (taper 1:12 or 1:30).

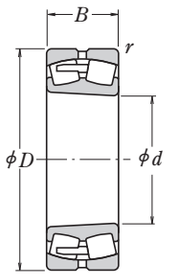
Remarks
1. Bearings denoted by an asterisk (＊) are NSKHPS bearings; they come standard with an oil groove and holes.
2. The recommended fits (shaft tolerances) on Page A164 are different for NSKHPS bearings, with light loads defined as $\leqq 0.05C_r$, normal loads as 0.05 to $0.10C_r$, and heavy loads as $> 0.10C_r$.
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C354 and C360.

SPHERICAL ROLLER BEARINGS

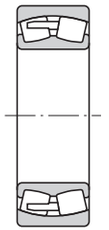
Bore Diameter 400 – 460 mm



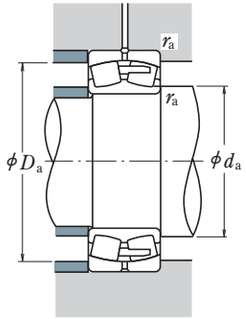
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0F_a$

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

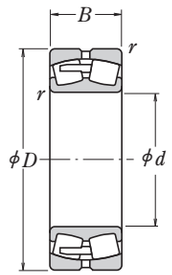
Boundary Dimensions (mm)				Basic Load Ratings (N)		Speeds(min⁻¹) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore(1)	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
400	540	106	4	2 370 000	4 250 000	1 000	1 400	530	630	＊**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	600	＊**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	500	＊**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	480	**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	480	**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	450	**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	600	＊**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	560	**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	480	**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	450	**23184CAME4**	**23184CAMKE4**	448	—	672	607	5	0.31	3.3	2.2	2.2	341
	700	280	6	6 000 000	12 000 000	280	—	340	450	**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	430	**23284CAME4**	**23284CAMKE4**	456	—	724	644	6	0.35	2.9	1.9	1.9	534
440	600	118	4	2 190 000	4 800 000	630	—	450	560	**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	530	**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	450	**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	430	**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	430	**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	400	**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	530	**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	500	**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	430	**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	400	**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	400	**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	380	**23292CAME4**	**23292CAMKE4**	496	—	794	702	6	0.37	2.8	1.9	1.8	691

Note (1) Suffixes K and K30 represent bearings with tapered bores (taper 1:12 or 1:30).

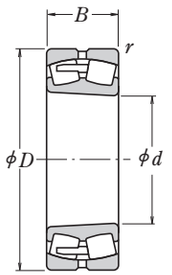
Remarks
1. Bearings denoted by an asterisk (＊) are NSKHPS bearings; they come standard with an oil groove and holes.
2. The recommended fits (shaft tolerances) on Page A164 are different for NSKHPS bearings, with light loads defined as $\leqq 0.05C_r$, normal loads as 0.05 to $0.10C_r$, and heavy loads as $> 0.10C_r$.
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages C354 – C355 and C360 – C361.

SPHERICAL ROLLER BEARINGS

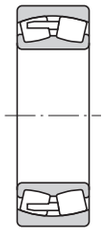
Bore Diameter 480 – 560 mm



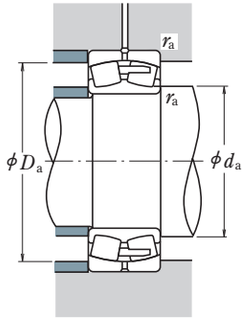
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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.

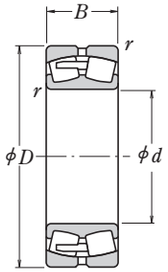
Boundary Dimensions (mm)				Basic Load Ratings (N)		Speeds (min^{-1}) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore(1)	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
480	650	128	5	2 580 000	5 850 000	560	—	400	500	**23996CAME4**	**23996CAMKE4**	502	—	628	602	4	0.18	5.7	3.8	3.7	121
	700	165	6	3 800 000	7 950 000	560	—	400	480	**23096CAME4**	**23096CAMKE4**	508	—	672	633	5	0.22	4.6	3.1	3.0	211
	700	218	6	4 600 000	10 200 000	400	—	320	430	**24096CAME4**	**24096CAMK30E4**	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	380	**23196CAME4**	**23196CAMKE4**	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	380	**24196CAME4**	**24196CAMK30E4**	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	360	**23296CAME4**	**23296CAMKE4**	516	—	834	733	6	0.37	2.8	1.9	1.8	795
500	670	128	5	2 460 000	5 550 000	560	—	400	500	**239/500CAME4**	**239/500CAMKE4**	522	—	648	622	4	0.17	6.0	4.0	3.9	124
	720	167	6	3 750 000	8 100 000	530	—	380	480	**230/500CAME4**	**230/500CAMKE4**	528	—	692	655	5	0.21	4.8	3.2	3.1	220
	720	218	6	4 450 000	9 900 000	400	—	300	400	**240/500CAME4**	**240/500CAMK30E4**	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	360	**231/500CAME4**	**231/500CAMKE4**	536	—	794	720	6	0.31	3.2	2.2	2.1	567
	830	325	7.5	8 000 000	16 000 000	220	—	280	360	**241/500CAME4**	**241/500CAMK30E4**	536	—	794	703	6	0.39	2.6	1.7	1.7	666
	920	336	7.5	9 000 000	16 600 000	280	—	260	320	**232/500CAME4**	**232/500CAMKE4**	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	450	**239/530CAME4**	**239/530CAMKE4**	552	—	688	659	4	0.17	6.0	4.0	3.9	149
	780	185	6	4 400 000	9 200 000	500	—	340	430	**230/530CAME4**	**230/530CAMKE4**	558	—	752	706	5	0.22	4.6	3.1	3.0	298
	780	250	6	5 400 000	11 800 000	360	—	280	360	**240/530CAME4**	**240/530CAMK30E4**	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	340	**231/530CAME4**	**231/530CAMKE4**	566	—	834	758	6	0.30	3.3	2.2	2.2	628
	870	335	7.5	8 500 000	17 500 000	200	—	260	340	**241/530CAME4**	**241/530CAMK30E4**	566	—	834	740	6	0.38	2.6	1.8	1.7	773
	980	355	9.5	10 100 000	18 800 000	260	—	240	300	**232/530CAME4**	**232/530CAMKE4**	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	430	**239/560CAME4**	**239/560CAMKE4**	582	—	728	697	4	0.16	6.1	4.1	4.0	172
	820	195	6	5 000 000	10 700 000	450	—	320	400	**230/560CAME4**	**230/560CAMKE4**	588	—	792	742	5	0.22	4.5	3.0	2.9	344
	820	258	6	5 950 000	13 300 000	340	—	260	340	**240/560CAME4**	**240/560CAMK30E4**	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	320	**231/560CAME4**	**231/560CAMKE4**	596	—	884	804	6	0.30	3.4	2.3	2.2	727
	920	355	7.5	9 400 000	19 600 000	190	—	240	320	**241/560CAME4**	**241/560CAMK30E4**	596	—	884	782	6	0.39	2.6	1.8	1.7	886
	1 030	365	9.5	10 900 000	20 500 000	240	—	220	280	**232/560CAME4**	**232/560CAMKE4**	604	—	986	870	8	0.36	2.8	1.9	1.8	1 320

Note (1) Suffixes K and K30 represent bearings with tapered bores (taper 1:12 or 1:30).

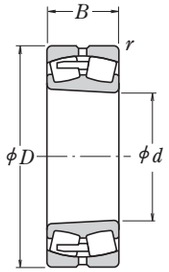
Remark For the dimensions of adapters and withdrawal sleeves, refer to Pages C355 and C361.

SPHERICAL ROLLER BEARINGS

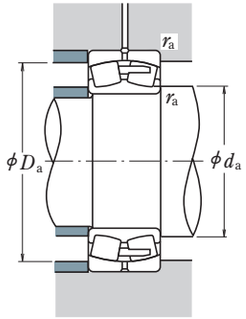
Bore Diameter 600 – 750 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$

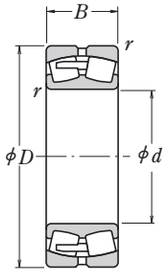
The values of e, Y_2, Y_3, and Y_0 are given in the table below.

Boundary Dimensions (mm)				Basic Load Ratings (N)		Speeds (min^{-1}) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore(1)	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
600	800	150	5	3 450 000	8 100 000	450	—	320	400	**239/600CAME4**	**239/600CAMKE4**	622	—	778	745	4	0.17	5.9	3.9	3.9	205
	870	200	6	5 450 000	12 200 000	400	—	300	360	**230/600CAME4**	**230/600CAMKE4**	628	—	842	794	5	0.21	4.8	3.3	3.2	389
	870	272	6	6 600 000	15 100 000	300	—	240	320	**240/600CAME4**	**240/600CAMK30E4**	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	280	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	280	**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	260	**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	360	**239/630CAME4**	**239/630CAMKE4**	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	340	**230/630CAME4**	**230/630CAMKE4**	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	300	**240/630CAME4**	**240/630CAMK30E4**	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	260	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	260	**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	240	**232/630CAME4**	**232/630CAMKE4**	684	—	1 096	970	10	0.37	2.8	1.9	1.8	1 850
670	900	170	6	4 350 000	10 300 000	380	—	260	340	**239/670CAME4**	**239/670CAMKE4**	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	320	**230/670CAME4**	**230/670CAMKE4**	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	260	**240/670CAME4**	**240/670CAMK30E4**	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	240	**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	240	**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	220	**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	300	**239/710CAME4**	**239/710CAMKE4**	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	280	**230/710CAME4**	**230/710CAMKE4**	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	240	**240/710CAME4**	**240/710CAMK30E4**	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	220	**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	200	**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	280	**239/750CAME4**	**239/750CAMKE4**	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	260	**230/750CAME4**	**230/750CAMKE4**	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	220	**240/750CAME4**	**240/750CAMK30E4**	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	190	**232/750CAME4**	**232/750CAMKE4**	814	—	1 296	1 148	12	0.36	2.8	1.9	1.8	2 980

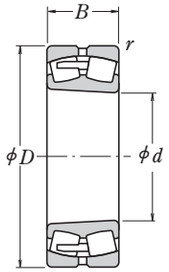
Note (1) Suffixes K and K30 represent bearings with tapered bores (taper 1:12 or 1:30).

SPHERICAL ROLLER BEARINGS

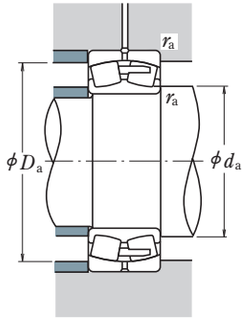
Bore Diameter 800 – 1320 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
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)		Speeds (min^{-1}) Limiting Speeds				Bearing Desginations		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	Cylindrical Bore	Tapered Bore(1)	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
800	1 060	195	6	5 600 000	13 700 000	300	—	220	260	**239/800CAME4**	**239/800CAMKE4**	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	240	**230/800CAME4**	**230/800CAMKE4**	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	200	**240/800CAME4**	**240/800CAMK30E4**	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	190	231/800CAME4	231/800CAMKE4	844	—	1 236	1 127	8	0.28	3.6	2.4	2.3	1 870
850	1 120	200	6	6 100 000	15 200 000	280	—	190	240	**239/850CAME4**	**239/850CAMKE4**	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	220	**230/850CAME4**	**230/850CAMKE4**	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	190	**240/850CAME4**	**240/850CAMK30E4**	886	—	1 184	1 093	6	0.28	3.6	2.4	2.4	1 350
900	1 180	206	6	6 600 000	16 700 000	260	—	180	220	**239/900CAME4**	**239/900CAMKE4**	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	200	230/900CAME4	230/900CAMKE4	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	180	**240/900CAME4**	**240/900CAMK30E4**	936	—	1 244	1 147	6	0.28	3.6	2.4	2.4	1 520
950	1 250	224	7.5	7 600 000	19 900 000	240	—	160	200	**239/950CAME4**	**239/950CAMKE4**	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	190	**230/950CAME4**	**230/950CAMKE4**	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	160	**240/950CAME4**	**240/950CAMK30E4**	986	—	1 324	1 219	6	0.28	3.6	2.4	2.3	1 880
1 000	1 320	236	7.5	8 200 000	21 700 000	220	—	150	190	239/1000CAME4	239/1000CAMKE4	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	170	230/1000CAME4	230/1000CAMKE4	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	150	**240/1000CAME4**	**240/1000CAMK30E4**	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	170	**239/1060CAME4**	**239/1060CAMKE4**	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	160	**230/1060CAME4**	**230/1060CAMKE4**	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	130	240/1060CAME4	240/1060CAMK30E4	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	140	230/1120CAME4	230/1120CAMKE4	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	120	**240/1120CAME4**	**240/1120CAMK30E4**	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	110	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	100	**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	85	**240/1320CAME4**	**240/1320CAMK30E4**	1 374	—	1 796	1 656	10	0.26	3.9	2.6	2.6	4 400

Note (1) Suffixes K and K30 represent bearings with tapered bores (taper 1:12 or 1:30).



8. THRUST BALL BEARINGS

INTRODUCTION ..... C 296

BEARING TABLES

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.

Available 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 cases, the load rating will differ from that listed in the bearing tables.

Table1 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 51200 – 51236X 51305 – 51336X	51156X – 51172X 51238X – 51272X 51338X – 51340X
51405 – 51418X 53200 – 53236X 53305 – 53336X 53405 – 53418X	51420X – 51436X 53238X – 53272X 53338X – 53340X 53420X – 53436X

TOLERANCES AND RUNNING ACCURACY

THRUST BALL BEARINGS ..... Table 7.6 (Pages A140 to A142)

RECOMMENDED FITS

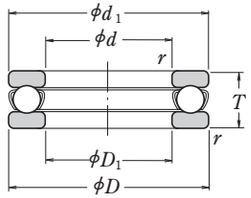
THRUST BALL BEARINGS .....Table 8.4 (Pages A164)
Table 8.6 (Pages A165)

MINIMUM AXIAL LOAD

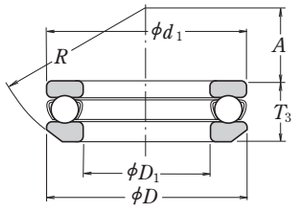
Be sure to apply some axial load to thrust bearings to prevent slippage between the rolling elements and raceways. For more details, please refer to Page A198.

■SINGLE-DIRECTION THRUST BALL BEARINGS

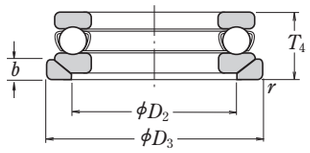
Bore Diameter 10 – 50 mm



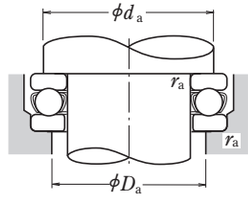
With Flat Seat

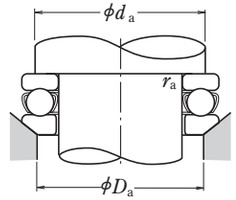


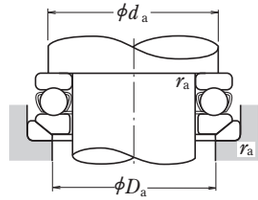
With Aligning Seat



With Aligning Seat Washer



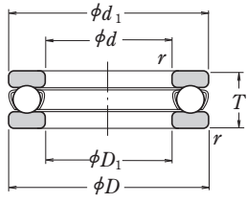




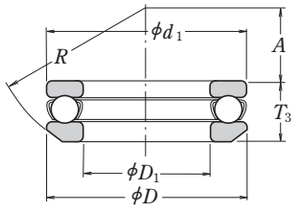
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing	Designations		Dimensions (mm)							Abutment and Fillet Dimensions (mm)			Mass (kg) approx.		
d	D	T	T_3	T_4	r min.	C_a	C_{0a}	Grease	Oil	With Flat Seat	With Aligning Seat	With Aligning Seat Washer	d_1	D_1	D_2	D_3	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

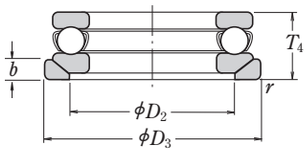
Bore Diameter 55 – 100 mm



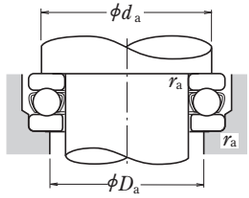
With Flat Seat

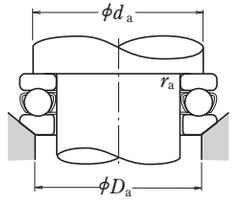


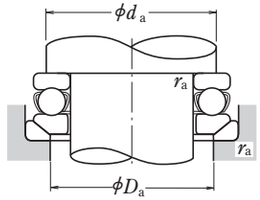
With Aligning Seat



With Aligning Seat Washer





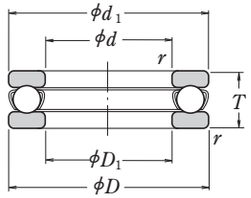


Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing	Designations[1]		Dimensions (mm)							Abutment and Fillet Dimensions (mm)			Mass (kg) approx.		
d	D	T	T_3	T_4	r min.	C_a	C_{0a}	Grease	Oil	With Flat Seat	With Aligning Seat	With Aligning Seat Washer	d_1	D_1	D_2	D_3	b	A	R	d_a min.	D_a max.	r_a max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer
55	78	16	—	—	0.6	35 000	93 000	2 800	4 300	**51111**	—	—	78	57	—	—	—	—	—	69	64	0.6	0.227	—	—
	90	25	27.3	30	1	70 000	159 000	2 200	3 200	**51211**	**53211 U**	**53211 U**	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 U**	**53311 U**	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 U**	**53411 U**	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 U**	**53212 U**	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 U**	**53312 U**	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 U**	**53412 U**	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 U**	**53213 U**	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 U**	**53313 U**	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 U**	**53413 U**	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 U**	**53214 U**	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 U**	**53314 U**	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 U**	**53414 U**	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 U**	**53215 U**	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 U**	**53315 U**	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 U**	**53415 U**	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 U**	**53216 U**	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 U**	**53316 U**	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 U**	**53416 U**	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 U**	**53217 U**	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 U**	**53317 U**	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 U**	**53218 U**	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 U**	**53318 U**	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 U**	**53220 U**	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 U**	**53320 U**	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

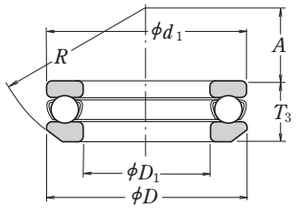
Note (1) The outside diameter d_1 of shaft washers for bearing designations with an X is smaller than the outside diameter D of the housing washers.

SINGLE-DIRECTION THRUST BALL BEARINGS

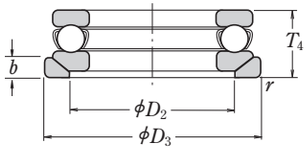
Bore Diameter 110 – 190 mm



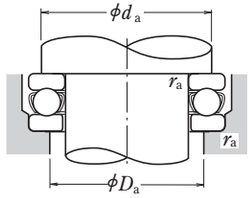
With Flat Seat

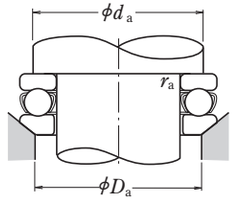


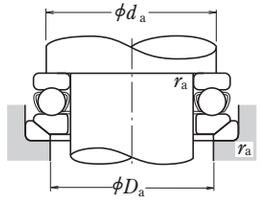
With Aligning Seat



With Aligning Seat Washer





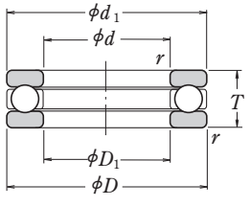


Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing	Designations[1]		Dimensions (mm)							Abutment and Fillet Dimensions (mm)			Mass (kg) approx.		
d	D	T	T_3	T_4	r min.	C_a	C_{0a}	Grease	Oil	With Flat Seat	With Aligning Seat	With Aligning Seat Washer	d_1	D_1	D_2	D_3	b	A	R	d_a min.	D_a max.	r_a max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer
110	145	25	—	—	1	88 000	288 000	1 700	2 400	**51122**	—	—	145	112	—	—	—	—	—	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

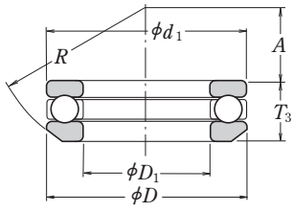
Note (1) The outside diameter d_1 of shaft washers for bearing designations with an X is smaller than the outside diameter D of the housing washers.

SINGLE-DIRECTION THRUST BALL BEARINGS

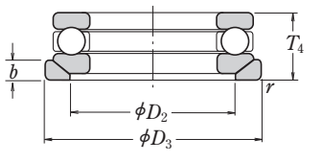
Bore Diameter 200 – 360 mm



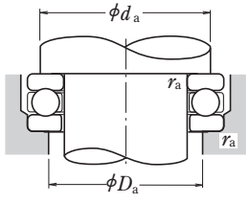
With Flat Seat

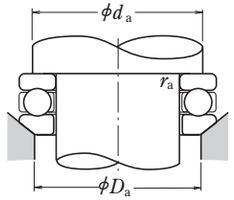


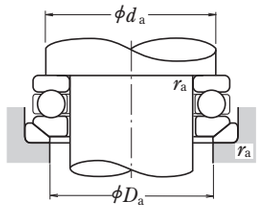
With Aligning Seat



With Aligning Seat Washer





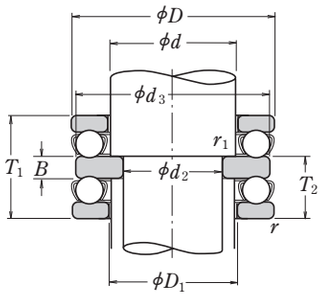


Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing	Designations[1]		Dimensions (mm)							Abutment and Fillet Dimensions (mm)			Mass (kg) approx.		
d	D	T	T_3	T_4	r min.	C_a	C_{0a}	Grease	Oil	With Flat Seat	With Aligning Seat	With Aligning Seat Washer	d_1	D_1	D_2	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**	**53240 XU**	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**	**53340 XU**	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**	**53244 XU**	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**	**53248 XU**	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**	**53252 XU**	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**	**53256 XU**	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**	**53260 XU**	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**	**53264 XU**	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**	**53268 XU**	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**	**53272 XU**	495	365	430	510	43	172	360	442	418	3	68.8	76.3	90.9

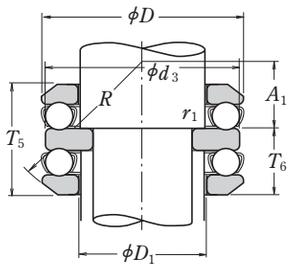
Note (1) The outside diameter d_1 of shaft washers for bearing designations with an X is smaller than the outside diameter D of the housing washers.

DOUBLE-DIRECTION THRUST BALL BEARINGS

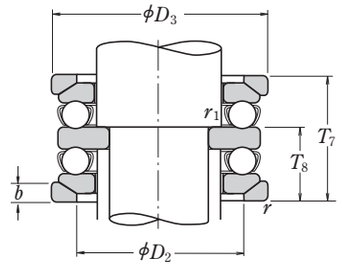
Bore Diameter 10 – 55 mm



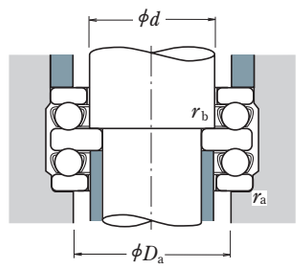
With Flat Seat

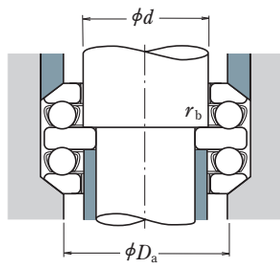


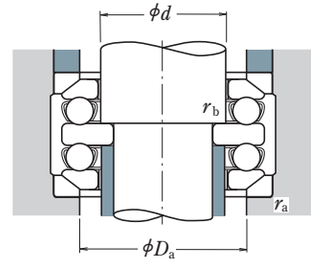
With Aligning Seat



With Aligning Seat Washer



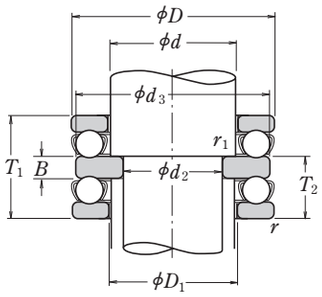




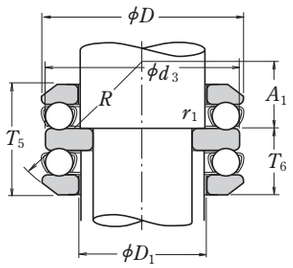
Boundary Dimensions (mm)								Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing		Designations	Dimensions (mm)										Abutment and Fillet Dimensions (mm)			Mass (kg) approx.		
d_2	d	D	T_1	T_5	T_7	r min.	r_1 min.	C_a	C_{0a}	Grease	Oil	With Flat Seat	With Aligning Seat	With Aligning Seat Washer	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	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
35	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	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

DOUBLE-DIRECTION THRUST BALL BEARINGS

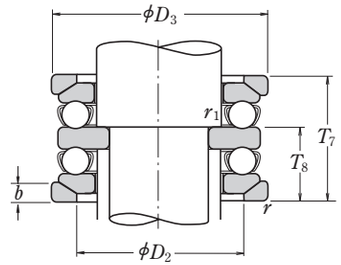
Bore Diameter 60 – 130 mm



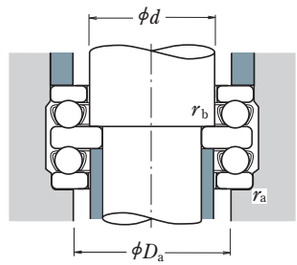
With Flat Seat

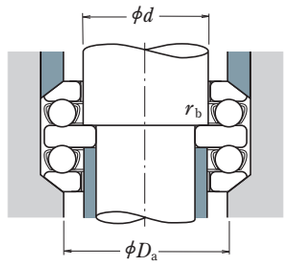


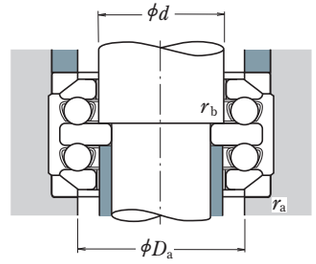
With Aligning Seat



With Aligning Seat Washer





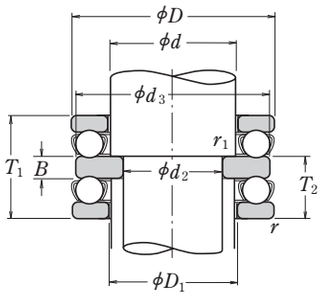


Boundary Dimensions (mm)								Basic Load Ratings (N)		Limiting Speeds (min⁻¹)		Bearing Designations(1)			Dimensions (mm)								Abutment and Fillet Dimensions (mm)			Mass (kg) approx.		
d_2	d	D	T_1	T_5	T_7	r min.	r_1 min.	C_a	C_{0a}	Grease	Oil	With Flat Seat	With Aligning Seat	With Aligning Seat Washer	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
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
85	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
	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
90	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	—	—

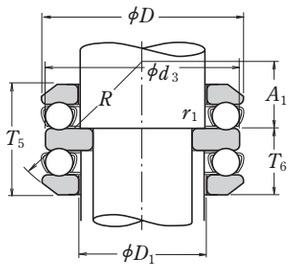
Note (1) The outside diameter d_3 of central washers for bearing designations with an X is smaller than the outside diameter D of the housing washers.

■DOUBLE-DIRECTION THRUST BALL BEARINGS

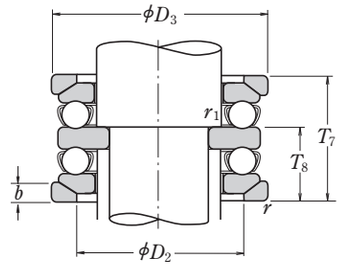
Bore Diameter 135 – 190 mm



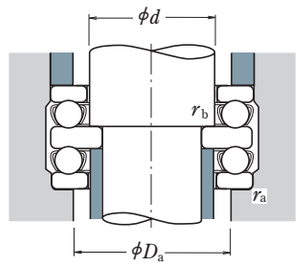
With Flat Seat

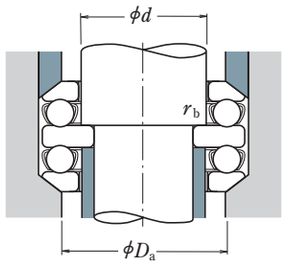


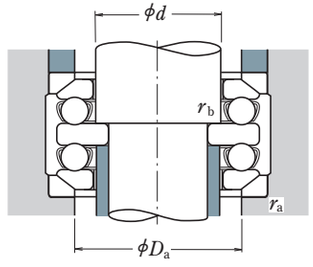
With Aligning Seat



With Aligning Seat Washer







Boundary Dimensions (mm)								Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designations[1]		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
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 central washers for bearing designations with an X is smaller than the outside diameter D of the housing washers.

9. THRUST CYLINDRICAL ROLLER BEARINGS

INTRODUCTION ..... C 314

BEARING TABLES

THRUST CYLINDRICAL ROLLER BEARINGS

Bore Diameter 35mm – 320mm ..... C 316



DESIGN, TYPES, AND FEATURES

THRUST CYLINDRICAL ROLLER BEARINGS

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

Machined brass cages are used with this bearing type.

TOLERANCES AND RUNNING ACCURACY

THRUST CYLINDRICAL ROLLER BEARINGS ..... According to Table 7.6 (Pages A140 to A142)

RECOMMENDED FITS

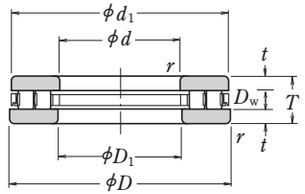
THRUST CYLINDRICAL ROLLER BEARINGS ..... Table 8.4 (Pages A164)
Table 8.6 (Pages A165)

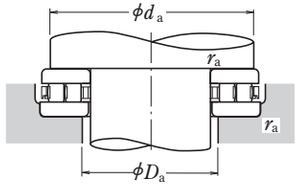
MINIMUM AXIAL LOAD

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

THRUST CYLINDRICAL ROLLER BEARINGS

Bore Diameter 35 – 130 mm



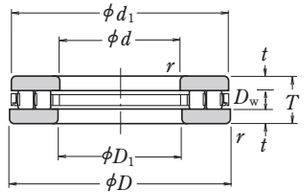


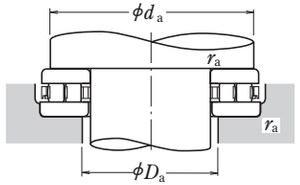
Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	Dimensions (mm)				Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	T	r min.	C_a	C_{0a}	Grease	Oil		d_1	D_1	D_w	t	d_a min.	D_a max.	r_a max.	approx.
35	80	32	1.1	95 500	247 000	1 000	3 000	**35 TMP 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 adove, please contact NSK.

THRUST CYLINDRICAL ROLLER BEARINGS

Bore Diameter 140 – 320 mm





Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	Dimensions (mm)				Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	T	r min.	C_a	C_{0a}	Grease	Oil		d_1	D_1	D_w	t	d_a min.	D_a max.	r_a max.	approx.
140	200	46	2	285 000	1 120 000	500	1 500	**140 TMP 12**	197	143	17	14.5	188	153	2	4.85
	240	60	2.1	610 000	2 360 000	400	1 200	**140 TMP 93**	240	143	25	17.5	226	154	2	12.2
	280	85	4	990 000	3 800 000	300	900	**140 TMP 94**	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**	215	153	19	15.5	202	163	2	6.15
	250	60	2.1	635 000	2 510 000	400	1 200	**150 TMP 93**	250	153	25	17.5	236	165	2	12.8
160	200	31	1	173 000	815 000	630	1 900	**160 TMP 11**	200	162	11	10	191	168	1	2.21
	270	67	3	745 000	3 150 000	360	1 100	**160 TMP 93**	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**	237	173	22	16.5	227	182	1.5	8.2
	280	67	3	800 000	3 500 000	340	1 000	**170 TMP 93**	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**	300	185	32	20.5	284	194	2.5	22.5
	360	109	5	1 640 000	6 200 000	240	710	**180 TMP 94**	354	189	45	32	335	205	4	58.2
190	270	62	3	705 000	2 630 000	360	1 100	**190 TMP 12**	266	195	30	16	255	200	2.5	11.8
	320	78	4	1 080 000	4 500 000	300	900	**190 TMP 93**	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**	247	203	17	10	242	207	1	4.1
	340	85	4	1 180 000	5 150 000	280	800	**200 TMP 93**	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**	267	223	17	10	262	227	1	4.5
	300	63	2	770 000	3 100 000	340	1 000	**220 TMP 12**	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**	297	243	18	13.5	288	251	1.5	7.2
	340	78	2.1	965 000	4 100 000	280	850	**240 TMP 12**	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**	317	263	18	13.5	308	272	1.5	7.75
	360	79	2.1	995 000	4 350 000	280	850	**260 TMP 12**	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**	347	283	20	16.5	335	294	1.5	11.6
	380	80	2.1	1 050 000	4 750 000	260	800	**280 TMP 12**	375	284	32	24	362	296	2	27.2
300	380	62	2	795 000	4 000 000	300	900	**300 TMP 11**	376	304	25	18.5	365	315	2	16.7
	420	95	3	1 390 000	6 250 000	220	670	**300 TMP 12**	415	304	38	28.5	398	322	2.5	42
320	400	63	2	820 000	4 250 000	300	900	**320 TMP 11**	396	324	25	19	385	335	2	18
	440	95	3	1 420 000	6 550 000	220	670	**320 TMP 12**	435	325	38	28.5	418	340	2.5	44.5

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



10. THRUST TAPERED ROLLER BEARINGS

INTRODUCTION ..... C 322

BEARING TABLES

THRUST TAPERED ROLLER BEARINGS

Bore Diameter 101.600mm – 600mm ..... C 324

DESIGN, TYPES, AND FEATURES

THRUST TAPERED ROLLER BEARINGS

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



Fig. 1 TT and 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 Series tapered roller thrust bearings, please contact NSK.

MINIMUM AXIAL LOAD

Be sure 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

A typical structure of a heavy-duty Extruder is shown in Figure 2.

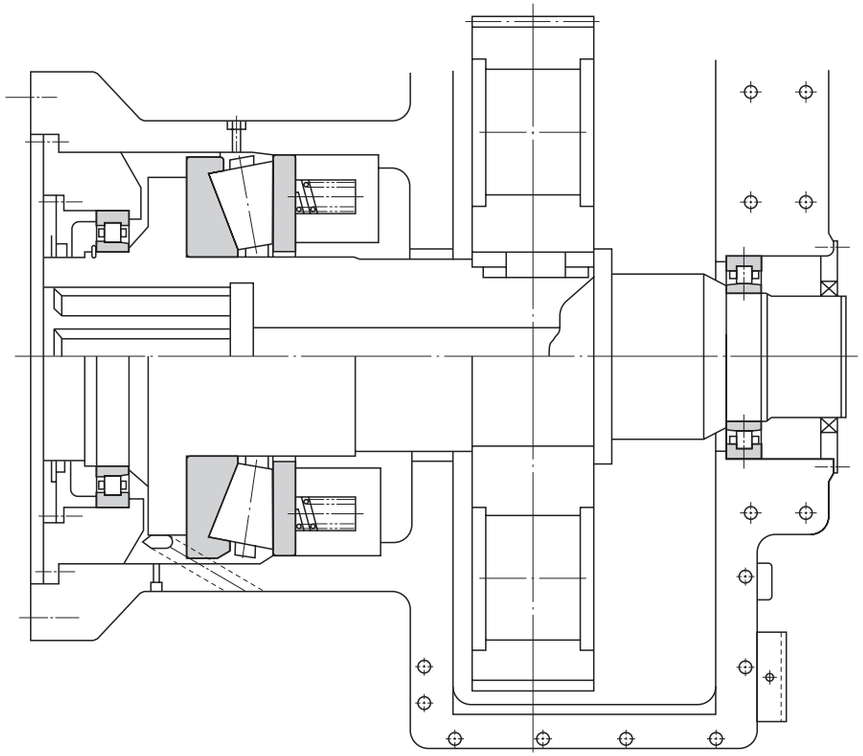
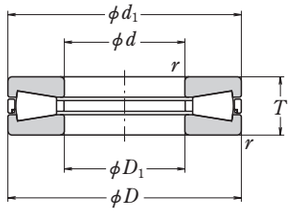


Fig. 2 Thrust Tapered Roller Bearings in a Heavy-Duty Extruder

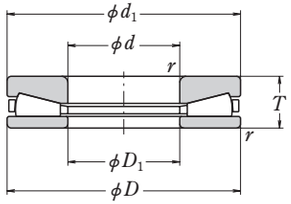
THRUST TAPERED ROLLER BEARINGS

TT, TTF Types

Bore Diameter 101.600 – 168.275 mm



TT



TTF

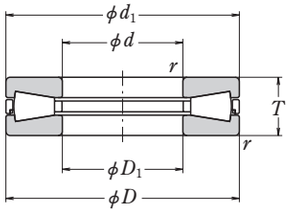
Boundary Dimensions (mm/inch)				Basic Load Ratings (kN)		Bearing Designation	Dimensions (mm)		Corner Radius of Shaft or Housing	Mass (kg)
d	D	T	r min.	C_a	C_{0a}		D_1	d_1	r_a max.	approx.
101.600 4.0000	215.900 8.5000	46.038 1.8125	3.3	710	2 900	∗**101TT2151**	103.200	214.300	3.3	8.9
111.760 4.4000	223.520 8.8000	55.880 2.2000	3.3	790	2 920	∗**111TT2251**	113.300	221.900	3.3	11.2
114.300 4.5000	250.825 9.8750	53.975 2.1250	4.0	970	4 100	∗**114TT2551**	114.500	250.825	4.0	14.4
127.000 5.0000	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 **150**	245 300	65 90	2.1 5	855 1 470	3 100 6 300	**135TT2401** **150TTF3001**	135.3 152	245 306	2 4	14.5 34.2
152.400 6.0000	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 6.5000	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 with ∗ are Inch Series bearings.

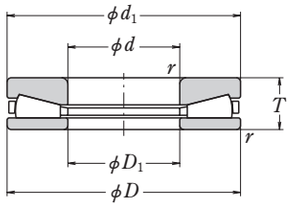
THRUST TAPERED ROLLER BEARINGS

TT, TTF Types

Bore Diameter 170 – 241.300 mm



TT



TTF

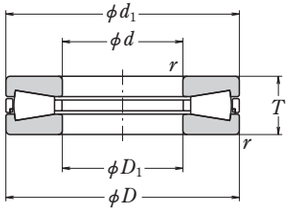
Boundary Dimensions (mm/inch)				Basic Load Ratings (kN)		Bearing Designation	Dimensions (mm)		Corner Radius of Shaft or Housing	Mass (kg)
d	D	T	r min.	C_a	C_{0a}		D_1	d_1	r_a max.	approx.
170	320	100	5	1 650	5 550	**170TT3201**	170.5	320	4	39.3
174.625 6.8750	358.775 14.1250	82.550 3.2500	6.4	1 740	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 with ∗ are Inch Series bearings.

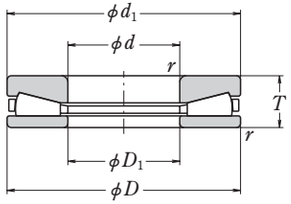
THRUST TAPERED ROLLER BEARINGS

TT, TTF Types

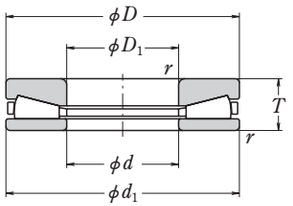
Bore Diameter 254.000 – 600 mm



TT



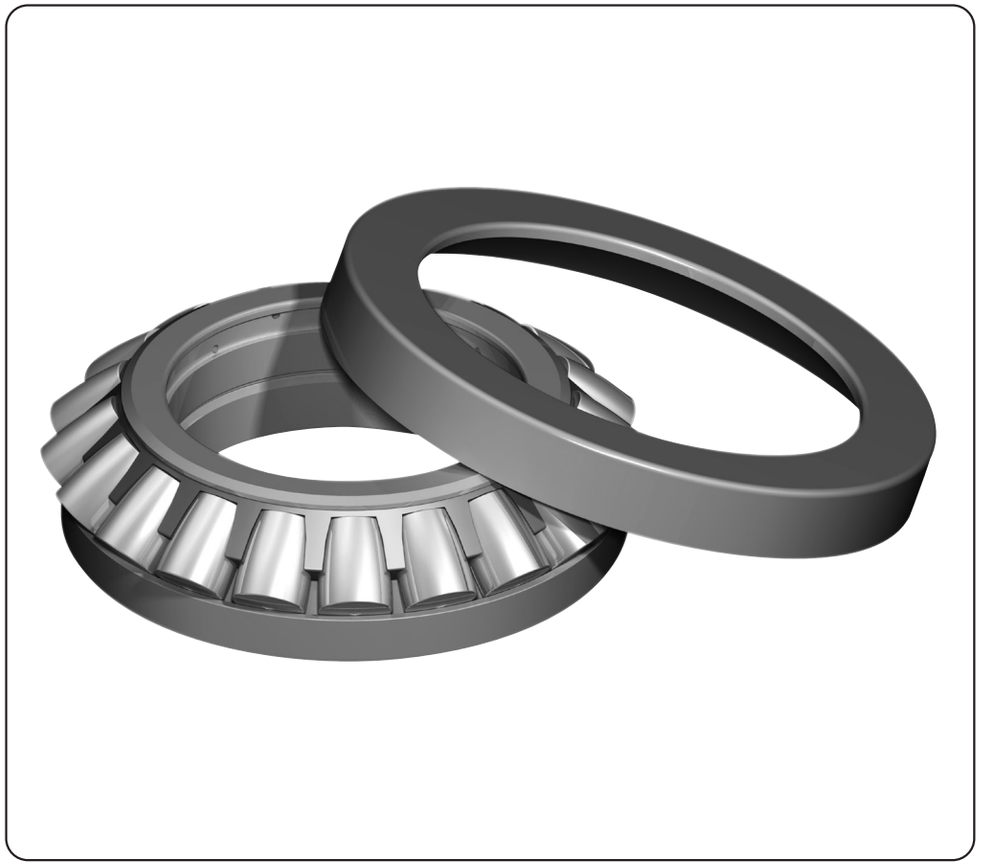
TTF



TTF-1

Boundary Dimensions (mm/inch)				Basic Load Ratings (kN)		Bearing Designation	Dimensions (mm)		Corner Radius of Shaft or Housing	Mass (kg)
d	D	T	r min.	C_a	C_{0a}		D_1	d_1	r_a max.	approx.
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 with * are Inch Series bearings.
(1) For this bearing, dimensional designations are defined by Figure TTF-1.



11. THRUST SPHERICAL ROLLER BEARINGS

INTRODUCTION ..... C 332

BEARING TABLES

THRUST SPHERICAL ROLLER BEARINGS

Bore Diameter 60mm – 500mm ..... C 334

DESIGN, TYPES, AND FEATURES

THRUST SPHERICAL ROLLER BEARINGS

These thrust bearings containing convex rollers have self-aligning capabilities and are free of any influence from mounting error or shaft deflection. E-type bearings (suffixed with E in the bearing tables) with pressed cages are available for high load applications.

Machined-brass cages are recommended for horizontal shafts or high-speed applications; please contact NSK for details.

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 speeds.

Machined-brass cages are used in standard bearings of this type.

TOLERANCES AND RUNNING ACCURACY

THRUST SPHERICAL ROLLER BEARINGS ..... Table 7.8 (Pages A145)

RECOMMENDED FITS

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

DIMENSIONS RELATED TO MOUNTING

Dimensions related to mounting of thrust spherical roller bearings are listed in the bearing tables.

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

PERMISSIBLE MISALIGNMENT

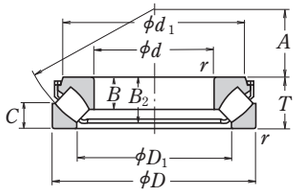
The permissible misalignment of thrust spherical roller bearings varies depending on size, but it is approximately 0.018 to 0.036 radian (1° to 2°) with average loads.

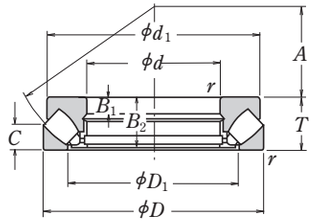
MINIMUM AXIAL LOAD

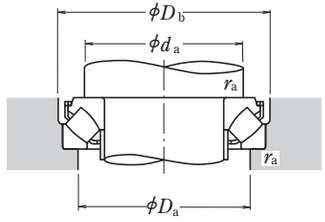
Be sure to apply some axial load to thrust bearings to prevent slippage between the rolling elements and raceways. For more details, please refer to Page A198.

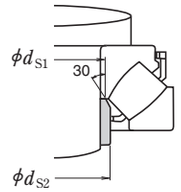
THRUST SPHERICAL ROLLER BEARINGS

Bore Diameter 60 – 200 mm









Dynamic Equivalent Load

$P = 1.2F_r + F_a$

Static Equivalent Load

$P_0 = 2.8F_r + F_a$

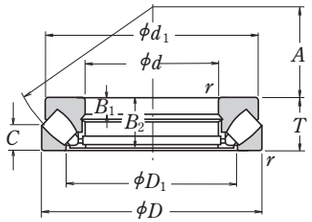
However, $F_r/F_a \leqq 0.55$ must be satisfied.

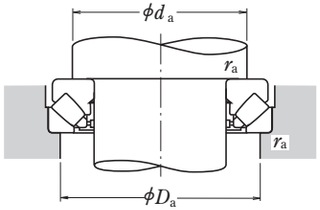
Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min^{-1}) Oil	Bearing Designation	Dimensions (mm)						Spacer Sleeve Dimensions (mm)		Abutment and Fillet Dimensions (mm)				Mass (kg)
d	D	T	r min.	C_a	C_{0a}			d_1	D_1	B, B_1	B_2	C	A	d_{S1} max.	d_{S2} max.	d_a(1) min.	D_a max.	D_b min.	r_a max.	approx.
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**	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**	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**	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, ensure that the d_a value chosen 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

$P_0 = 2.8F_r + F_a$

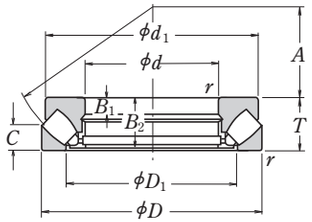
However, $F_r/F_a \leqq 0.55$ must be satisfied.

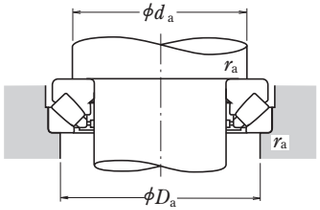
Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min^{-1}) Oil	Bearing Designation	Dimensions (mm)						Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	T	r min.	C_a	C_{0a}			d_1	D_1	B_1	B_2	C	A	d_a(1) min.	D_a max.	r_a max.	approx.
220	300	48	2	560 000	2 500 000	1 400	**29244**	285	254	15	46	24	117	260	275	2	9.2
	360	85	4	1 340 000	5 200 000	950	**29344**	335	280	29	81	41	125	285	315	3	33
	420	122	6	2 350 000	8 650 000	800	**29444**	385	308	43	117	58	132	310	355	5	74
240	340	60	2.1	800 000	3 450 000	1 200	**29248**	325	283	19	57	30	130	285	305	2	16.5
	380	85	4	1 360 000	5 400 000	950	**29348**	355	300	29	81	41	135	300	330	3	35.5
	440	122	6	2 420 000	9 100 000	750	**29448**	405	326	43	117	59	142	330	375	5	79
260	360	60	2.1	855 000	3 850 000	1 200	**29252**	345	302	19	57	30	139	305	325	2	18
	420	95	5	1 700 000	6 800 000	800	**29352**	390	329	32	91	45	148	330	365	4	48.5
	480	132	6	2 820 000	10 700 000	710	**29452**	445	357	48	127	64	154	360	405	5	105
280	380	60	2.1	885 000	4 100 000	1 100	**29256**	365	323	19	57	30	150	325	345	2	19
	440	95	5	1 830 000	7 650 000	800	**29356**	410	348	32	91	46	158	350	390	4	52.5
	520	145	6	3 400 000	13 100 000	630	**29456**	480	384	52	140	68	166	390	440	5	132
	520	145	6	3 950 000	14 900 000	630	**29456 EM**	480	380	52	140	70	166	410	445	5	134
300	420	73	3	1 160 000	5 150 000	950	**29260**	400	353	21	69	38	162	355	380	2.5	30
	480	109	5	2 190 000	9 100 000	710	**29360**	450	379	37	105	50	168	380	420	4	74
	540	145	6	3 500 000	13 700 000	630	**29460**	500	402	52	140	70	175	410	460	5	140
320	440	73	3	1 190 000	5 450 000	950	**29264**	420	372	21	69	38	172	375	400	2.5	32.5
	500	109	5	2 230 000	9 400 000	670	**29364**	470	399	37	105	53	180	400	440	4	77
	580	155	7.5	3 650 000	14 600 000	560	**29464**	555	436	55	149	75	191	435	495	6	175
340	460	73	3	1 230 000	5 750 000	900	**29268**	440	395	21	69	37	183	395	420	2.5	33.5
	540	122	5	2 640 000	11 200 000	630	**29368**	510	428	41	117	59	192	430	470	4	103
	620	170	7.5	4 400 000	17 400 000	530	**29468**	590	462	61	164	82	201	465	530	6	218
360	500	85	4	1 550 000	7 300 000	800	**29272**	480	423	25	81	44	194	420	455	3	51
	560	122	5	2 670 000	11 500 000	600	**29372**	525	448	41	117	59	202	450	495	4	107
	640	170	7.5	4 200 000	17 200 000	500	**29472**	610	480	61	164	82	210	485	550	6	228
	640	170	7.5	5 450 000	20 400 000	500	**29472 EM**	580	474	61	164	83	210	495	550	6	220
380	520	85	4	1 620 000	7 800 000	800	**29276**	496	441	27	81	42	202	440	475	3	52
	600	132	6	3 300 000	14 500 000	560	**29376**	568	477	44	127	63	216	480	525	5	140
	670	175	7.5	4 800 000	19 500 000	480	**29476**	640	504	63	168	85	230	510	575	6	254
400	540	85	4	1 640 000	8 000 000	750	**29280**	517	460	27	81	42	212	460	490	3	55
	620	132	6	3 250 000	14 500 000	530	**29380**	590	494	44	127	64	225	500	550	5	150
	710	185	7.5	5 400 000	22 100 000	450	**29480**	680	536	67	178	89	236	540	610	6	306
420	580	95	5	2 010 000	9 800 000	670	**29284**	553	489	30	91	46	225	490	525	4	72
	650	140	6	3 500 000	15 700 000	500	**29384**	620	520	48	135	68	235	525	575	5	170
	730	185	7.5	5 650 000	23 500 000	450	**29484**	700	556	67	178	89	244	560	630	6	323

Note (1) For heavy load applications, ensure that the d_a value chosen 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, $F_r/F_a \leqq 0.55$ must be satisfied.

Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min^{-1}) Oil	Bearing Designation	Dimensions (mm)						Abutment and Fillet Dimensions (mm)			Mass (kg)
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.	approx.
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, ensure that the d_a value chosen is large enough to support the shaft washer rib.

12. NEEDLE ROLLER BEARINGS

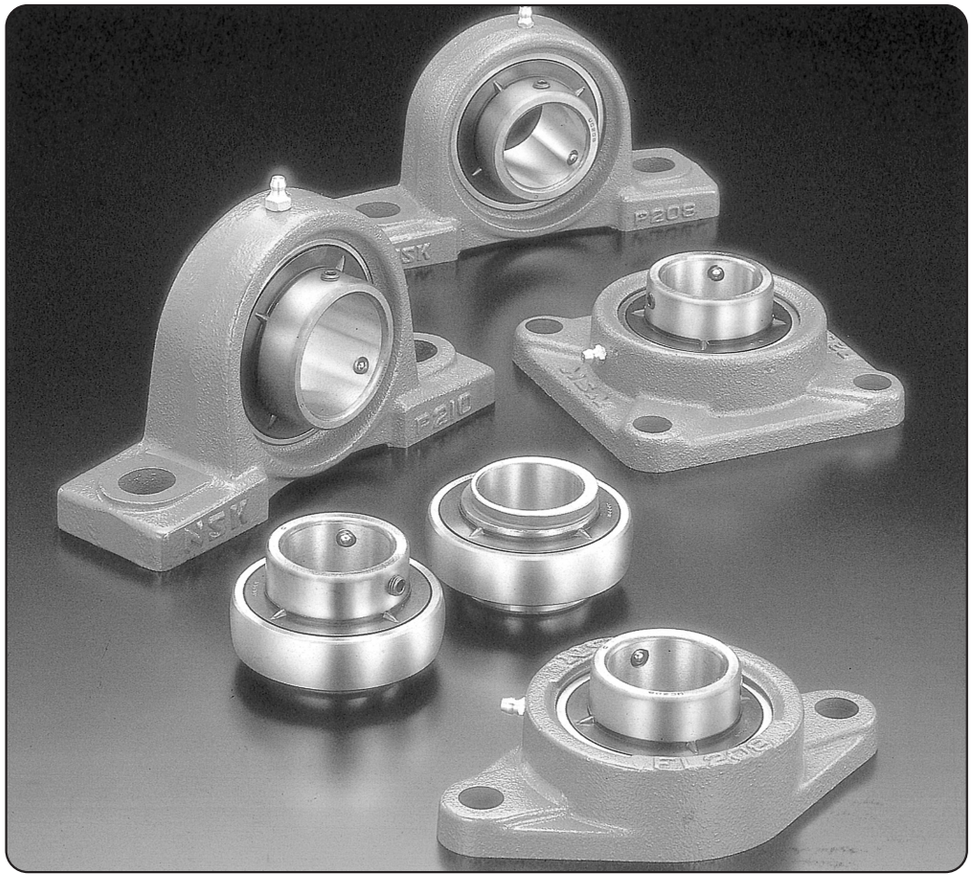
DESIGN AND TYPES

Needle roller bearings come in various types and designs.
NSK Needle Roller Bearings CAT. No. E1419 lists bearings shown in Table 1. Please refer to this catalog and contact NSK regarding bearing selection.



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, FJL, J,JH; MFJ, MFJH, MFJL, MJ, MJH; F, FH, B, BH; MF, MFH, M, MH; Y, YH; FJT, FJTT, MFJT, FJLT, FJLTT, MFJLT; FJP, JP; FIR, IR
Solid Needle Roller Bearings	RNA 48, RNA 49, RNA 59, RNA 69, HJ; RLM; RNAF; RNA···TT; Cone
Thrust Needle Roller Bearings Thrust Raceway Washers	FNTA, NTA; FB; FTRA, TRA; FTRB, TRB; FTRC, TRC; FTRD, TRD; FTRE, TRE
Needle Rollers	A Type, F Type, P Type (Pleas refer to B350 page), T Type, C Type, M Type
Cam Followers Roller Followers	FCR, FCJ, CR; FCRS, FCJS, CRS; FYCR, FYCJ, YCR; FYCRS, FYCJS, YCRS
Needle Roller Bearings for Universal Joints	ZY; NSA
Drawn Cup Roller Clutches	RC; FC; RCB; FCB



13. BALL BEARING UNITS

DESIGN AND TYPES

Ball bearing units come in various designs and types.
Please refer to the catalogs below for more detailed information:

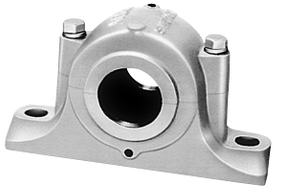
Ball Bearing Units CAT.No. E1154
Steel Series Ball Bearing Units CAT.No. E1232
Ball Bearing Units With Ductile Cast Iron Housings CAT.No. E1233
Triple-Sealed Bearings for Ball Bearing Units CAT.No. E1234
Stainless Series Ball Bearings Units CAT.No. E1235
Ball Bearing Units Handbook CAT.No. E1155



14. PLUMMER BLOCKS

DESIGN, TYPES, AND FEATURES

Plummer blocks come in numerous types and sizes.



SN 5
SN 6
SN 30
SN 31
SN 2
SN 3
SN 2C
SN 3C

These types are the most common. Models SN30 and SN31 are for medium loads.

Types SN2C and SN3C have different bore diameters on both sides.



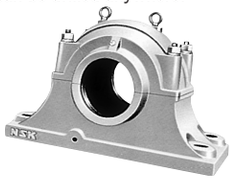
SN 5B
SN 6B
SN 30B
SN 31B
SN 2B
SN 3B
SN 2BC
SN 3BC

These types have the same dimensions as 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.



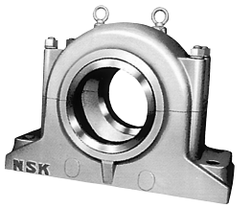
SG 5

Dustproof plummer blocks have a combination of oil seals, labyrinth seals, and oil groove seals; therefore, they are suitable for environments with dust or other foreign matter.



SD 30S
SD 31S
SD 5
SD 6
SD 2
SD 3
SD 2C
SD 3C

These types are large and made for heavy loads. Standard models have double seals and four mounting bolt holes. Types SD2C and SD3C feature different bore diameters on both sides.



SD31TS
SD32TS

These types feature labyrinth seals, making them suitable for high-speed applications.



V · C

Single-piece plummer blocks (integrated roller bearing units) have higher rigidity and precision than split 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

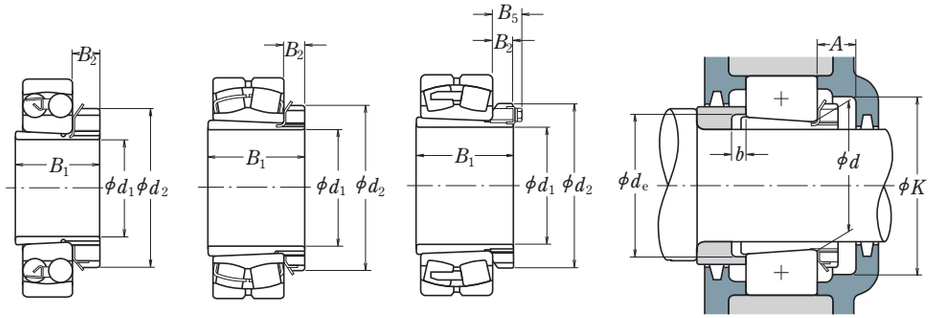
NUTS FOR ROLLING BEARINGS ..... C 362

STOPPERS FOR ROLLING BEARINGS ..... C 367

LOCK-WASHERS FOR ROLLING BEARINGS ..... C 368

■ADAPTERS FOR ROLLING BEARINGS

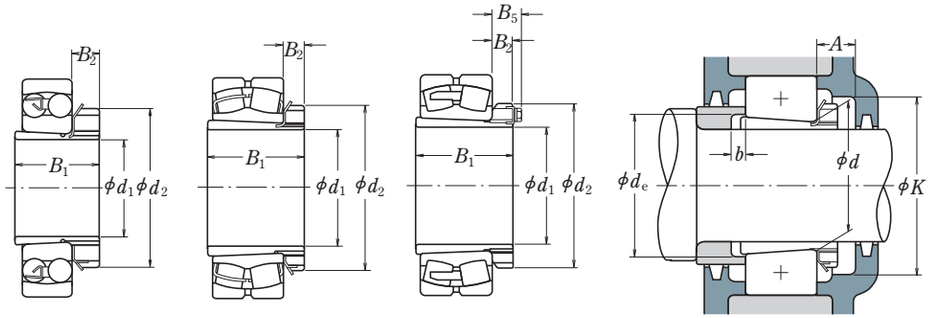
Shaft Diameter 17 – 40 mm



Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings		Dimensions (mm) B_1	d_2	B_2	B_5	Adapter Sleeve Designation	Abutment Dimensions (mm) A min.	K min.	d_e min.	b min.	Mass (kg) approx.
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 Suffix X represents adapter sleeves with narrow slits for which washers with straight tabs should be used.

Shaft Diameter 45 – 60 mm

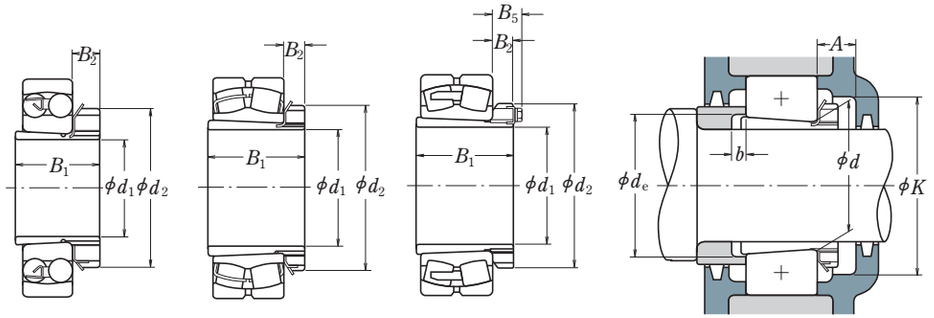


Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings		Dimensions (mm) B_1	d_2	B_2	B_5	Adapter Sleeve Designation	Abutment Dimensions (mm) A min.	K min.	d_e min.	b min.	Mass (kg) approx.
45	50	1210K	+ **H 210X**	35	70	12	—	A 210X	19	76	53	5	0.275
	50	2210K	+ **H 310X**	42	70	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 Suffix X represents adapter sleeves with narrow slits for which washers with straight tabs should be used.

■ADAPTERS FOR ROLLING BEARINGS

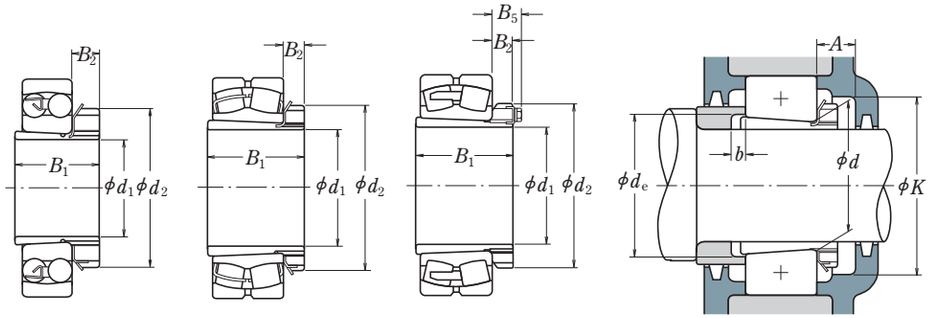
Shaft Diameter 65 – 80 mm



Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings		Dimensions (mm) B_1	d_2	B_2	B_5	Adapter Sleeve Designation	Abutment Dimensions (mm) A min.	K min.	d_e min.	b min.	Mass (kg) approx.
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 Suffix X represents adapter sleeves with narrow slits for which washers with straight tabs should be used.

Shaft Diameter 85 – 115 mm

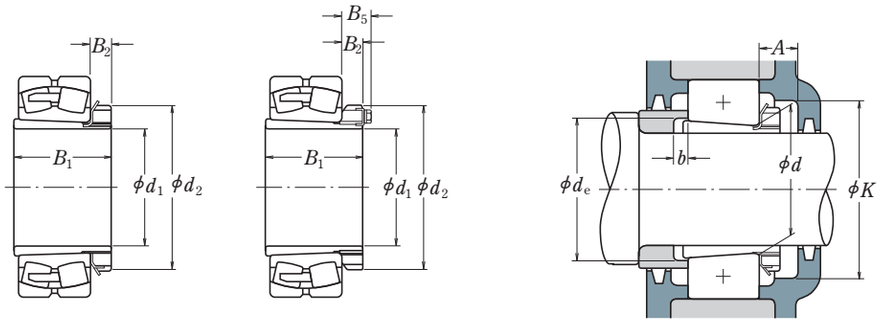


Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings		Dimensions (mm) B_1	d_2	B_2	B_5	Adapter Sleeve Designation	Abutment Dimensions (mm) A min.	K min.	d_e min.	b min.	Mass (kg) approx.
85	95	1219K	+ **H 219X**	55	125	19	—	A 219X	29	145	101	7	1.35
	95	2219K	+ **H 319X**	68	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 Suffix X represents adapter sleeves with narrow slits for which washers with straight tabs should be used.

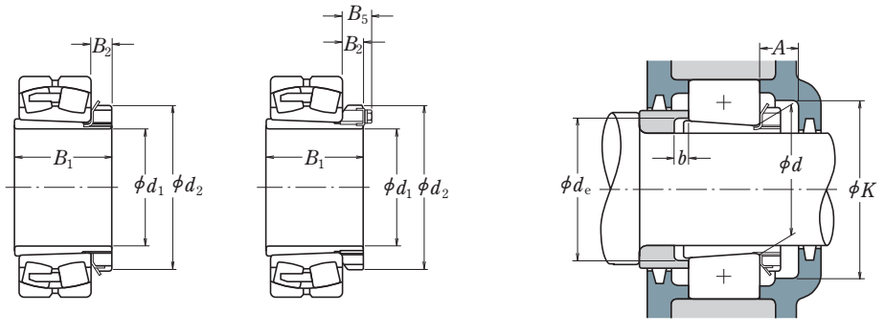
■ADAPTERS FOR ROLLING BEARINGS

Shaft Diameter 125 – 170 mm



Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings		Dimensions (mm) B_1	d_2	B_2	B_5	Adapter Sleeve Designation	Abutment Dimensions (mm) A min.	K min.	d_e min.	b min.	Mass (kg) approx.
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	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	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	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	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	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	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

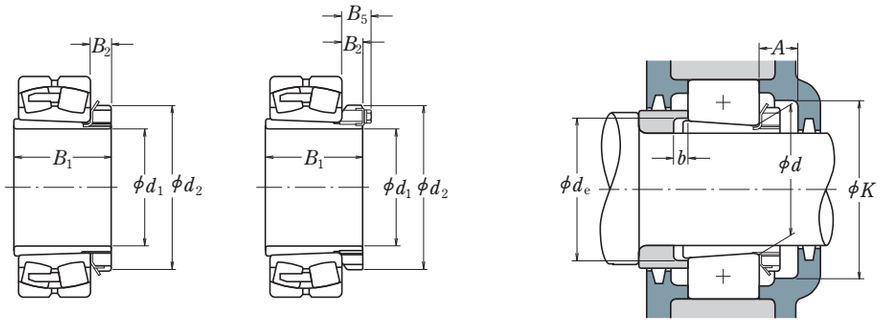
Shaft Diameter 180 – 260 mm



Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings		Dimensions (mm) B_1	d_2	B_2	B_5	Adapter Sleeve Designation	Abutment Dimensions (mm) A min.	K min.	d_e min.	b min.	Mass (kg) approx.
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	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**	126	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
	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
	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**	145	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
	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
	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

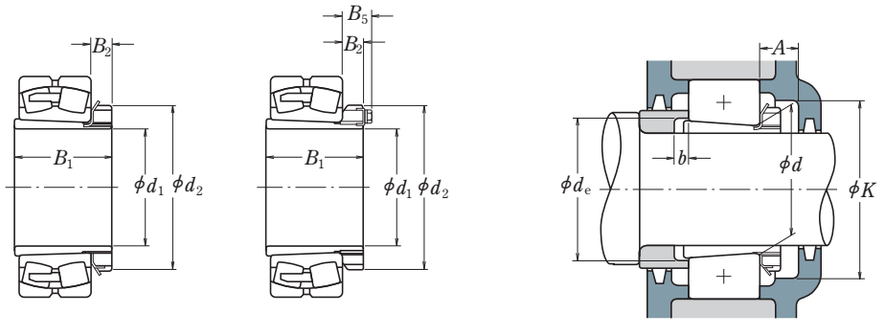
ADAPTERS FOR ROLLING BEARINGS

Shaft Diameter 280 – 410 mm



Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings	Dimensions (mm) B_1	d_2	B_2	B_5	Adapter Sleeve Designation	Abutment Dimensions (mm) A min.	K min.	d_e min.	b min.	Mass (kg) approx.
280	300	23960C AKE4 + **H3960**	140	360	42	54	A3960	69	380	313	12	20.7
	300	23060C AKE4 + **H3060**	168	360	42	54	A3060	69	430	313	12	23
	300	23160C AKE4 + **H3160**	208	380	40	53	A3160	69	430	317	12	30
	300	22260C AKE4 + **H3160**	208	380	40	53	A3160	69	430	317	32	30
	300	23260C AKE4 + **H3260**	240	380	40	53	A3260	69	430	321	12	34
300	320	23964C AKE4 + **H3964**	140	380	42	55	A3964	72	400	334	13	21.8
	320	23064C AKE4 + **H3064**	171	380	42	55	A3064	72	450	334	13	24.5
	320	23164C AKE4 + **H3164**	226	400	42	56	A3164	72	450	339	13	35
	320	22264C AKE4 + **H3164**	226	400	42	56	A3164	72	450	339	39	35
	320	23264C AKE4 + **H3264**	258	400	42	56	A3264	72	450	343	13	39.5
320	340	23968C AKE4 + **H3968**	144	400	45	58	A3968	75	430	354	14	24.6
	340	23068C AKE4 + **H3068**	187	400	45	58	A3068	75	490	355	14	28.5
	340	23168C AKE4 + **H3168**	254	440	55	72	A3168	75	490	360	14	49.5
	340	23268C AKE4 + **H3268**	288	440	55	72	A3268	75	490	364	14	54.5
340	360	23972C AKE4 + **H3972**	144	420	45	58	A3972	75	450	374	14	25.7
	360	23072C AKE4 + **H3072**	188	420	45	58	A3072	75	510	375	14	30.5
	360	23172C AKE4 + **H3172**	259	460	58	75	A3172	75	510	380	14	54
	360	23272C AKE4 + **H3272**	299	460	58	75	A3272	75	510	385	14	60.5
360	380	23976C AKE4 + **H3976**	164	450	48	62	A3976	82	480	396	15	31.9
	380	23076C AKE4 + **H3076**	193	450	48	62	A3076	82	540	396	15	36
	380	23176C AKE4 + **H3176**	264	490	60	77	A3176	82	540	401	15	61.5
	380	23276C AKE4 + **H3276**	310	490	60	77	A3276	82	540	405	15	69.5
380	400	23980C AKE4 + **H3980**	168	470	52	66	A3980	86	500	417	15	35.2
	400	23080C AKE4 + **H3080**	210	470	52	66	A3080	86	580	417	15	41.5
	400	23180C AKE4 + **H3180**	272	520	62	82	A3180	86	580	421	15	70.5
	400	23280C AKE4 + **H3280**	328	520	62	82	A3280	86	580	427	15	81
400	420	23984C AKE4 + **H3984**	168	490	52	66	A3984	86	520	437	16	36.6
	420	23084C AKE4 + **H3084**	212	490	52	66	A3084	86	600	437	16	43.5
	420	23184C AKE4 + **H3184**	304	540	70	90	A3184	86	600	443	16	84
	420	23284C AKE4 + **H3284**	352	540	70	90	A3284	86	600	448	16	94
410	440	23988C AKE4 + **H3988**	189	520	60	77	A3988	99	550	458	17	58.6
	440	23088C AKE4 + **H3088**	228	520	60	77	A3088	99	620	458	17	65
	440	23188C AKE4 + **H3188**	307	560	70	90	A3188	99	620	464	17	104
	440	23288C AKE4 + **H3288**	361	560	70	90	A3288	99	620	469	17	118

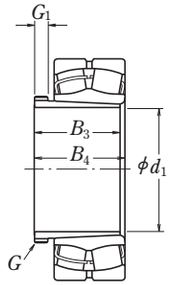
Shaft Diameter 430 – 470 mm



Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings	Dimensions (mm) B_1	d_2	B_2	B_5	Adapter Sleeve Designation	Abutment Dimensions (mm) A min.	K min.	d_e min.	b min.	Mass (kg) approx.
430	460	23992C AKE4 + **H3992**	189	540	60	77	A3992	99	570	478	17	62
	460	23092C AKE4 + **H3092**	234	540	60	77	A3092	99	650	478	17	69.5
	460	23192C AKE4 + **H3192**	326	580	75	95	A3192	99	650	485	17	116
	460	23292C AKE4 + **H3292**	382	580	75	95	A3292	99	650	491	17	132
450	480	23996C AKE4 + **H3996**	200	560	60	77	A3996	99	600	499	18	67.5
	480	23096C AKE4 + **H3096**	237	560	60	77	A3096	99	690	499	18	73.5
	480	23196C AKE4 + **H3196**	335	620	75	95	A3196	99	690	505	18	133
	480	23296C AKE4 + **H3296**	397	620	75	95	A3296	99	690	512	18	152
470	500	239/500C AKE4 + **H39/500**	208	580	68	85	A39/500	109	620	519	18	74.6
	500	230/500C AKE4 + **H30/500**	247	580	68	85	A30/500	109	700	519	18	82
	500	231/500C AKE4 + **H31/500**	356	630	80	100	A31/500	109	700	527	18	143
	500	232/500C AKE4 + **H32/500**	428	630	80	100	A32/500	109	700	534	18	166

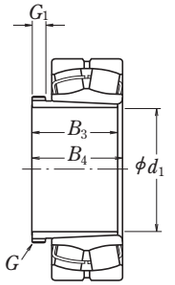
WITHDRAWAL SLEEVES FOR ROLLING BEARINGS

Shaft Diameter 35 – 85 mm



Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings	Screw Threads G	Dimensions (mm) B_3	G_1	B_4	Mass (kg) approx.
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

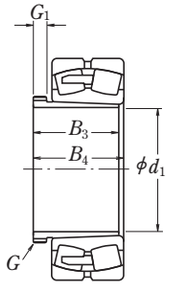
Shaft Diameter 90 – 135 mm



Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings	Screw Threads G	Dimensions (mm) B_3	G_1	B_4	Mass (kg) approx.
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
	110	23222CKE4 + **AHX 3222**	M 125 × 2	82	11	86	1.04
	110	22322EAKE4 + **AHX 2322**	M 125 × 2	98	16	102	1.35
115	120	23024CDKE4 + **AHX 3024**	M 130 × 2	60	13	64	0.75
	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
	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
125	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
	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
135	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	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

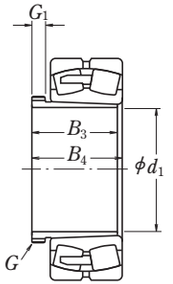
WITHDRAWAL SLEEVES FOR ROLLING BEARINGS

Shaft Diameter 145 – 180 mm



Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings	Screw Threads G	Dimensions (mm) B_3	G_1	B_4	Mass (kg) approx.
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

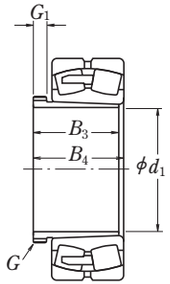
Shaft Diameter 190 – 260 mm



Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings	Screw Threads G	Dimensions (mm) B_3	G_1	B_4	Mass (kg) approx.
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 2344**	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	23248CAKE4 + **AH 2348**	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 2352**	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 2356**	Tr 310 × 5	212	30	220	21.5
	280	22356CAKE4 + **AH 2356**	Tr 310 × 5	212	30	220	21.5

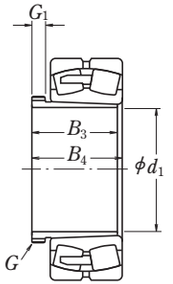
WITHDRAWAL SLEEVES FOR ROLLING BEARINGS

Shaft Diameter 280 – 380 mm



Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings	Screw Threads G	Dimensions (mm) B_3	G_1	B_4	Mass (kg) approx.
280	300	23060CAKE4 + **AH 3060**	Tr 320 × 5	145	26	153	14.5
	300	24060CAK30E4 + **AH 24060**	Tr 310 × 5	184	24	202	15.5
	300	23160CAKE4 + **AH 3160**	Tr 330 × 5	192	30	200	21
	300	24160CAK30E4 + **AH 24160**	Tr 320 × 5	224	24	242	20.3
	300	22260CAKE4 + **AH 2260**	Tr 330 × 5	170	26	178	18
	300	23260CAKE4 + **AH 3260**	Tr 330 × 5	228	34	236	20
300	320	23064CAKE4 + **AH 3064**	Tr 345 × 5	149	27	157	16
	320	24064CAK30E4 + **AH 24064**	Tr 330 × 5	184	24	202	16.4
	320	23164CAKE4 + **AH 3164**	Tr 350 × 5	209	31	217	24.5
	320	24164CAK30E4 + **AH 24164**	Tr 340 × 5	242	24	260	23.5
	320	23264CAKE4 + **AH 3264**	Tr 350 × 5	246	36	254	25
320	340	23068CAKE4 + **AH 3068**	Tr 365 × 5	162	28	171	19.5
	340	24068CAK30E4 + **AH 24068**	Tr 360 × 5	206	26	225	21.2
	340	23168CAKE4 + **AH 3168**	Tr 370 × 5	225	33	234	29
	340	24168CAK30E4 + **AH 24168**	Tr 360 × 5	269	26	288	28.3
	340	23268CAKE4 + **AH 3268**	Tr 370 × 5	264	38	273	35.5
340	360	23072CAKE4 + **AH 3072**	Tr 385 × 5	167	30	176	21
	360	24072CAK30E4 + **AH 24072**	Tr 380 × 5	206	26	226	22.5
	360	23172CAKE4 + **AH 3172**	Tr 400 × 5	229	35	238	33
	360	24172CAK30E4 + **AH 24172**	Tr 380 × 5	269	26	289	30
	360	23272CAKE4 + **AH 3272**	Tr 400 × 5	274	40	283	41.5
360	380	23076CAKE4 + **AH 3076**	Tr 410 × 5	170	31	180	23.5
	380	24076CAK30E4 + **AH 24076**	Tr 400 × 5	208	28	228	24.1
	380	23176CAKE4 + **AH 3176**	Tr 420 × 5	232	36	242	35.5
	380	24176CAK30E4 + **AH 24176**	Tr 400 × 5	271	28	291	32.1
	380	23276CAKE4 + **AH 3276**	Tr 420 × 5	284	42	294	45.5
380	400	23080CAKE4 + **AH 3080**	Tr 430 × 5	183	33	193	27.5
	400	24080CAK30E4 + **AH 24080**	Tr 420 × 5	228	28	248	28
	400	23180CAKE4 + **AH 3180**	Tr 440 × 5	240	38	250	39.5
	400	24180CAK30E4 + **AH 24180**	Tr 420 × 5	278	28	298	34.8
	400	23280CAKE4 + **AH 3280**	Tr 440 × 5	302	44	312	51.5

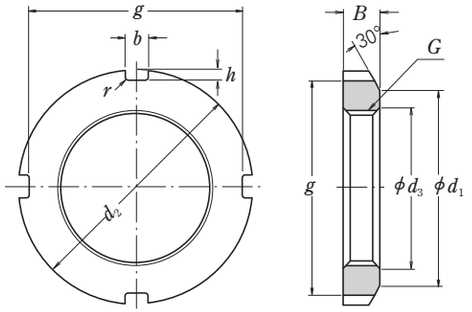
Shaft Diameter 400 – 480 mm



Shaft Diameter (mm) d_1	Nominal Bore Dia. (mm) d	Designation Applicable Bearings	Screw Threads G	Dimensions (mm) B_3	G_1	B_4	Mass (kg) approx.
400	420	23084CAKE4 + **AH 3084**	Tr 450 × 5	186	34	196	29
	420	24084CAK30E4 + **AH 24084**	Tr 440 × 5	230	30	252	29.8
	420	23184CAKE4 + **AH 3184**	Tr 460 × 5	266	40	276	46.5
	420	24184CAK30E4 + **AH 24184**	Tr 440 × 5	310	30	332	41.4
	420	23284CAKE4 + **AH 3284**	Tr 460 × 5	321	46	331	59
420	440	23088CAKE4 + **AHX 3088**	Tr 470 × 5	194	35	205	42
	440	24088CAK30E4 + **AH 24088**	Tr 460 × 5	242	30	264	33
	440	23188CAKE4 + **AHX 3188**	Tr 480 × 5	270	42	281	50
	440	24188CAK30E4 + **AH 24188**	Tr 460 × 5	310	30	332	43.5
	440	23288CAKE4 + **AHX 3288**	Tr 480 × 5	330	48	341	64
440	460	23092CAKE4 + **AHX 3092**	Tr 490 × 5	202	37	213	46
	460	24092CAK30E4 + **AH 24092**	Tr 480 × 5	250	32	273	35.9
	460	23192CAKE4 + **AHX 3192**	Tr 510 × 6	285	43	296	58
	460	24192CAK30E4 + **AH 24192**	Tr 480 × 5	332	32	355	49.7
	460	23292CAKE4 + **AHX 3292**	Tr 510 × 6	349	50	360	74.5
460	480	23096CAKE4 + **AHX 3096**	Tr 520 × 6	205	38	217	51
	480	24096CAK30E4 + **AH 24096**	Tr 500 × 5	250	32	273	37.5
	480	23196CAKE4 + **AHX 3196**	Tr 530 × 6	295	45	307	63
	480	24196CAK30E4 + **AH 24196**	Tr 500 × 5	340	32	363	53
	480	23296CAKE4 + **AHX 3296**	Tr 530 × 6	364	52	376	82
480	500	230/500CAKE4 + **AHX 30/500**	Tr 540 × 6	209	40	221	54.5
	500	240/500CAK30E4 + **AH 240/500**	Tr 530 × 6	253	35	276	41.9
	500	231/500CAKE4 + **AHX 31/500**	Tr 550 × 6	313	47	325	71
	500	241/500CAK30E4 + **AH 241/500**	Tr 530 × 6	360	35	383	61.2
	500	232/500CAKE4 + **AHX 32/500**	Tr 550 × 6	393	54	405	94.5

NUTS FOR ROLLING BEARINGS

(For Adapters and Shafts)



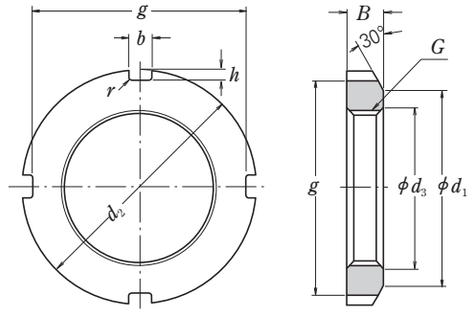
Nut with Washer

Units : mm

Designation	Nut Series AN											Reference	
	Screw Threads	Basic Dimensions								Mass (kg) approx.	Adapter (1) Sleeve Bore Dia. Numbers	Washer Designation	Shaft Dia.
	G	d_2	d_1	g	b	h	d_3	B	r max.				
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 sleeves in Series A31, A2, A3, or A23.

Remark The basic design and dimensions of screw threads are in accordance with JIS B 0205.



Nut with Washer

Units : mm

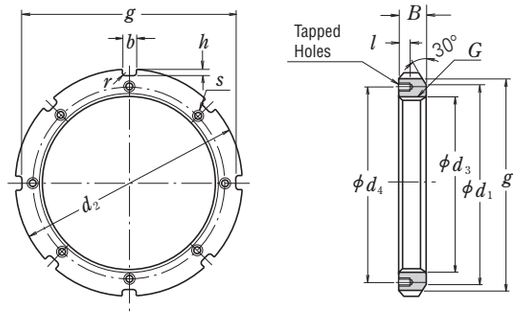
Designation	Nut Series AN											Reference	
	Screw Threads	Basic Dimensions								Mass (kg) approx.	Adapter (1) Sleeve Bore Dia. Numbers	Washer Designation	Shaft Dia.
	G	d_2	d_1	g	b	h	d_3	B	r max.				
AN 26	M 130×2	165	149	155	12	5	131	21	0.7	1.25	26	**AW 26**	130
AN 27	M 135×2	175	160	163	14	6	136	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 sleeves in Series A31 or A23.
Series ANL is applicable to adapter sleeves in 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

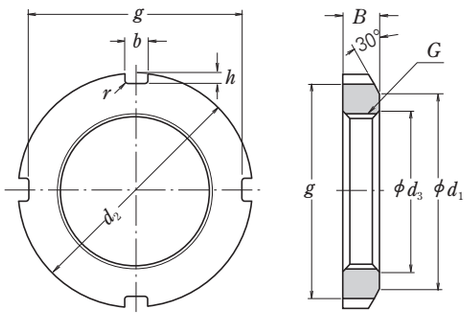
Units : mm

Designation	Nut Series AN														Reference		
	Screw Threads G	Basic Dimensions d_2	d_1	g	b	h	d_3	B	r max.	Tapped Holes l	Screw Threads (S)	d_4	Mass (kg) approx.	Adapter (1) Sleeve Bore Dia. Numbers	Stopper Designation	Shaft Dia.
AN 44	Tr 220×4	280	250	260	20	10	222	32	0.8	15	M 8×1.25	238	5.2	44	**AL 44**	220
AN 48	Tr 240×4	300	270	280	20	10	242	34	0.8	15	M 8×1.25	258	5.95	48	**AL 44**	240
AN 52	Tr 260×4	330	300	306	24	12	262	36	0.8	18	M 10×1.5	281	8.05	52	**AL 52**	260
AN 56	Tr 280×4	350	320	326	24	12	282	38	0.8	18	M 10×1.5	301	9.05	56	**AL 52**	280
AN 60	Tr 300×4	380	340	356	24	12	302	40	0.8	18	M 10×1.5	326	11.8	60	**AL 60**	300
AN 64	Tr 320×5	400	360	376	24	12	322.5	42	0.8	18	M 10×1.5	345	13.1	64	**AL 64**	320
AN 68	Tr 340×5	440	400	410	28	15	342.5	55	1	21	M 12×1.75	372	23.1	68	**AL 68**	340
AN 72	Tr 360×5	460	420	430	28	15	362.5	58	1	21	M 12×1.75	392	25.1	72	**AL 68**	360
AN 76	Tr 380×5	490	450	454	32	18	382.5	60	1	21	M 12×1.75	414	31	76	**AL 76**	380
AN 80	Tr 400×5	520	470	484	32	18	402.5	62	1	27	M 16×2	439	37	80	**AL 80**	400
AN 84	Tr 420×5	540	490	504	32	18	422.5	70	1	27	M 16×2	459	43.5	84	**AL 80**	420
AN 88	Tr 440×5	560	510	520	36	20	442.5	70	1	27	M 16×2	477	45	88	**AL 88**	440
AN 92	Tr 460×5	580	540	540	36	20	462.5	75	1	27	M 16×2	497	50.5	92	**AL 88**	460
AN 96	Tr 480×5	620	560	580	36	20	482.5	75	1	27	M 16×2	527	62	96	**AL 96**	480
AN 100	Tr 500×5	630	580	584	40	23	502.5	80	1	27	M 16×2	539	63.5	/500	**AL 100**	500
	Nut Series ANL																
ANL 44	Tr 220×4	260	242	242	20	9	222	30	0.8	12	M 6×1	229	3.1	44	**ALL 44**	220
ANL 48	Tr 240×4	290	270	270	20	10	242	34	0.8	15	M 8×1.25	253	5.15	48	**ALL 48**	240
ANL 52	Tr 260×4	310	290	290	20	10	262	34	0.8	15	M 8×1.25	273	5.65	52	**ALL 48**	260
ANL 56	Tr 280×4	330	310	310	24	10	282	38	0.8	15	M 8×1.25	293	6.8	56	**ALL 56**	280
ANL 60	Tr 300×4	360	336	336	24	12	302	42	0.8	15	M 8×1.25	316	9.6	60	**ALL 60**	300
ANL 64	Tr 320×5	380	356	356	24	12	322.5	42	0.8	15	M 8×1.25	335	9.95	64	**ALL 64**	320
ANL 68	Tr 340×5	400	376	376	24	12	342.5	45	1	15	M 8×1.25	355	11.7	68	**ALL 64**	340
ANL 72	Tr 360×5	420	394	394	28	13	362.5	45	1	15	M 8×1.25	374	12	72	**ALL 72**	360
ANL 76	Tr 380×5	450	422	422	28	14	382.5	48	1	18	M 10×1.5	398	14.9	76	**ALL 76**	380
ANL 80	Tr 400×5	470	442	442	28	14	402.5	52	1	18	M 10×1.5	418	16.9	80	**ALL 76**	400
ANL 84	Tr 420×5	490	462	462	32	14	422.5	52	1	18	M 10×1.5	438	17.4	84	**ALL 84**	420
ANL 88	Tr 440×5	520	490	490	32	15	442.5	60	1	21	M 12×1.75	462	26.2	88	**ALL 88**	440
ANL 92	Tr 460×5	540	510	510	32	15	462.5	60	1	21	M 12×1.75	482	28	92	**ALL 88**	460
ANL 96	Tr 480×5	560	530	530	36	15	482.5	60	1	21	M 12×1.75	502	29.5	96	**ALL 96**	480
ANL 100	Tr 500×5	580	550	550	36	15	502.5	68	1	21	M 12×1.75	522	33.5	/500	**ALL 96**	500

Note (1) Series AN is applicable to adapter sleeves in Series A31, A32, and A23. Series ANL is applicable to adapter sleeves in Series A30.

Remarks 1. The basic design and dimensions of screw threads are in accordance with JIS B 0216.
2. The basic design and dimensions of threads in tapped holes are in accordance with JIS B 0205.

(For Withdrawal Sleeves)



Units : mm

Designation	Nut Series HN										Reference			
	Screw Threads G	Basic Dimensions d_2	d_1	g	b	h	d_3	B	r max.	Mass (kg) approx.	Withdrawal Sleeve Designations AH 31	AH 22	AH 32	AH 23
HN 42	Tr 210×4	270	238	250	20	10	212	30	0.8	4.75	**AH 3138**	**AH 2238**	**AH 3238**	**AH 2338**
HN 44	Tr 220×4	280	250	260	20	10	222	32	0.8	5.35	**AH 3140**	**AH 2240**	**AH 3240**	**AH 2340**
HN 48	Tr 240×4	300	270	280	20	10	242	34	0.8	6.2	**AH 3144**	**AH 2244**	—	**AH 2344**
HN 52	Tr 260×4	330	300	306	24	12	262	36	0.8	8.55	**AH 3148**	**AH 2248**	—	**AH 2348**
HN 58	Tr 290×4	370	330	346	24	12	292	40	0.8	11.8	**AH 3152**	**AH 2252**	—	**AH 2352**
HN 62	Tr 310×5	390	350	366	24	12	312.5	42	0.8	13.4	**AH 3156**	**AH 2256**	—	**AH 2356**
HN 66	Tr 330×5	420	380	390	28	15	332.5	52	1	20.4	**AH 3160**	**AH 2260**	**AH 3260**	—
HN 70	Tr 350×5	450	410	420	28	15	352.5	55	1	25.2	**AH 3164**	**AH 2264**	**AH 3264**	—
HN 74	Tr 370×5	470	430	440	28	15	372.5	58	1	28.2	**AH 3168**	—	**AH 3268**	—
HN 80	Tr 400×5	520	470	484	32	18	402.5	62	1	40	**AH 3172**	—	**AH 3272**	—
HN 84	Tr 420×5	540	490	504	32	18	422.5	70	1	46.9	**AH 3176**	—	**AH 3276**	—
HN 88	Tr 440×5	560	510	520	36	20	442.5	70	1	48.5	**AH 3180**	—	**AH 3280**	—
HN 92	Tr 460×5	580	540	540	36	20	462.5	75	1	55	**AH 3184**	—	**AH 3284**	—
HN 96	Tr 480×5	620	560	580	36	20	482.5	75	1	67	**AHX 3188**	—	**AHX 3288**	—
HN 102	Tr 510×6	650	590	604	40	23	513	80	1	75	**AHX 3192**	—	**AHX 3292**	—
HN 106	Tr 530×6	670	610	624	40	23	533	80	1	78	**AHX 3196**	—	**AHX 3296**	—
HN 110	Tr 550×6	700	640	654	40	23	553	80	1	92.5	**AHX 31/500**	—	**AHX 32/500**	—
	Nut Series HNL										AH 30	AH 2		
HNL41	Tr 205×4	250	232	234	18	8	207	30	0.8	3.45	**AH 3038**	**AH 238**		
HNL43	Tr 215×4	260	242	242	20	9	217	30	0.8	3.7	**AH 3040**	**AH 240**		
HNL47	Tr 235×4	280	262	262	20	9	237	34	0.8	4.6	**AH 3044**	**AH 244**		
HNL52	Tr 260×4	310	290	290	20	10	262	34	0.8	5.8	**AH 3048**	**AH 248**		
HNL56	Tr 280×4	330	310	310	24	10	282	38	0.8	6.7	**AH 3052**	**AH 252**		
HNL60	Tr 300×4	360	336	336	24	12	302	42	0.8	9.6	**AH 3056**	**AH 256**		
HNL64	Tr 320×5	380	356	356	24	12	322.5	42	1	10.3	**AH 3060**	—		
HNL69	Tr 345×5	410	384	384	28	13	347.5	45	1	11.5	**AH 3064**	—		
HNL73	Tr 365×5	430	404	404	28	13	367.5	48	1	14.2	**AH 3068**	—		
HNL77	Tr 385×5	450	422	422	28	14	387.5	48	1	15	**AH 3072**	—		
HNL82	Tr 410×5	480	452	452	32	14	412.5	52	1	19	**AH 3076**	—		
HNL86	Tr 430×5	500	472	472	32	14	432.5	52	1	19.8	**AH 3080**	—		
HNL90	Tr 450×5	520	490	490	32	15	452.5	60	1	23.8	**AH 3084**	—		
HNL94	Tr 470×5	540	510	510	32	15	472.5	60	1	25	**AHX 3088**	—		
HNL98	Tr 490×5	580	550	550	36	15	492.5	60	1	34	**AHX 3092**	—		
HNL 104	Tr 520×6	600	570	570	36	15	523	68	1	37	**AHX 3096**	—		
HNL 108	Tr 540×6	630	590	590	40	20	543	68	1	43.5	**AHX 30/500**			

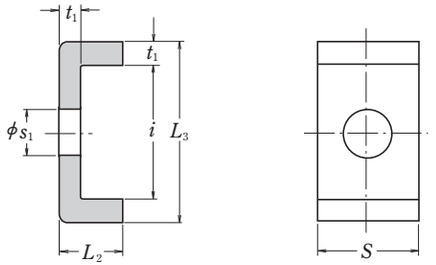
Remarks 1. The basic design and dimensions of screw threads are in accordance with JIS B 0216.
2. There may be more notches in the nut than shown in the above figure.

■NUTS FOR ROLLING BEARINGS

(Combination of Withdrawal Sleeves and Nuts)

Designation	Reference						
	Withdrawal Sleeve Designations						
	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

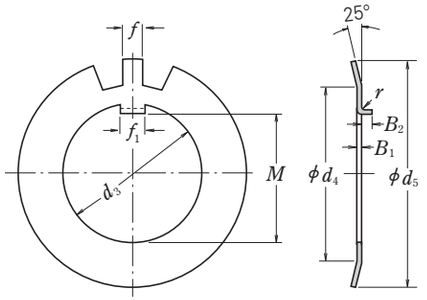
■STOPPERS FOR ROLLING BEARINGS



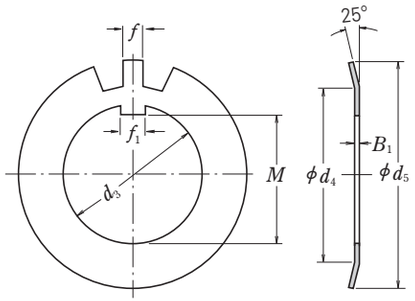
Units : mm

Designation	Stopper Series AL							Reference
	Basic Dimensions						Mass (kg) per 100 pcs approx.	Nut Designations
	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
AL 52	4	24	12	12	25.5	33.5	3.4	AN 52, AN 56
AL 60	4	24	12	12	30.5	38.5	3.8	AN 60
AL 64	5	24	15	12	31	41	5.35	AN 64
AL 68	5	28	15	14	38	48	6.65	AN 68, AN 72
AL 76	5	32	15	14	40	50	7.95	AN 76
AL 80	5	32	15	18	45	55	8.2	AN 80, AN 84
AL 88	5	36	15	18	43	53	9.0	AN 88, AN 92
AL 96	5	36	15	18	53	63	10.4	AN 96
AL 100	5	40	15	18	45	55	10.5	AN 100
Stopper Series ALL								
ALL 44	4	20	12	7	13.5	21.5	2.12	ANL 44
ALL 48	4	20	12	9	17.5	25.5	2.29	ANL 48, ANL 52
ALL 56	4	24	12	9	17.5	25.5	2.92	ANL 56
ALL 60	4	24	12	9	20.5	28.5	3.15	ANL 60
ALL 64	5	24	15	9	21	31	4.55	ANL 64, ANL 68
ALL 72	5	28	15	9	20	30	5.05	ANL 72
ALL 76	5	28	15	12	24	34	5.3	ANL 76, ANL 80
ALL 84	5	32	15	12	24	34	6.1	ANL 84
ALL 88	5	32	15	14	28	38	6.45	ANL 88, ANL 92
ALL 96	5	36	15	14	28	38	7.3	ANL 96, ANL 100

■LOCK-WASHERS FOR ROLLING BEARINGS



Bent-Tab



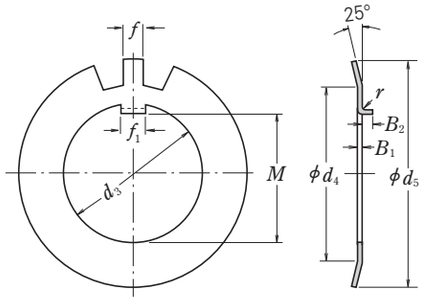
Straight-Tab

Units : mm

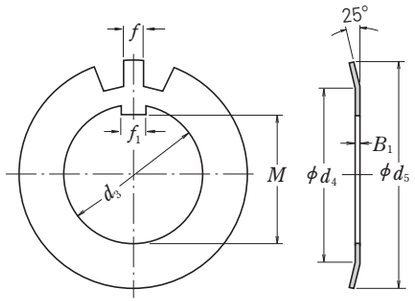
Designation		Lock-Washer Series AW											Reference		
		Basic Dimensions									No. of Teeth	Mass (kg) per 100 pcs approx.	Adapter (1) Sleeve Bore Dia. Numbers	Nut Designation	Shaft Dia.
Bent-Tab	Straight-Tab	d_3	M	f_1	B_1	f	d_4	d_5	Bent-Tab r	Bent-Tab B_2					
AW 02	**AW 02 X**	15	13.5	4	1	4	21	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	1.5	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 sleeves in Series A31, A2, A3, and A23.

Remark Lock-washers with straight tabs must be used for adapter sleeves with narrow slits, while either type of lock-washer may be used for those with wide slits.



Bent-Tab



Straight-Tab

Units : mm

Designation		Lock-Washer Series AW											Reference		
		Basic Dimensions									No. of Teeth	Mass (kg) per 100 pcs approx.	Adapter (1) Sleeve Bore Dia. Numbers	Nut Designation	Shaft Dia.
Bent-Tab	Straight-Tab	d_3	M	f_1	B_1	f	d_4	d_5	Bent-Tab r	Bent-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	171	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 sleeves in Series A31 and A23.
Series AWL is applicable to adapter sleeves in Series A30.

Remark Lock-washers with straight tabs must be used for adapter sleeves with narrow slits, while either type of lock-washer may be used for those with wide slits.