1. DEEP GROOVE BALL BEARINGS

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BEARINGS TABLE

SINGLE-ROW DEEP GROOVE BALL BEARINGS

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DESIGN, TYPES, AND FEATURES

SINGLE-ROW DEEP GROOVE BALL BEARINGS

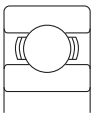
Single-Row Deep Groove Ball Bearings are classified into the types shown below.

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.

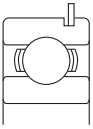
Table 1 Features of Sealed Ball Bearings

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

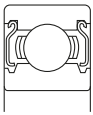
Note (1) The above temperature range applies to standard bearings. By using cold or heat resistant grease and changing the type of rubber, the operating temperature range can be extended. For such applications, please contact NSK.



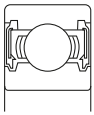
Open Type



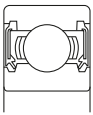
With Snap Ring



Shielded Type (ZZ Type)



Non-Contact Rubber Sealed Type (VV Type)



Contact Rubber Sealed Type (DDU Type)

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

Table 2 Standard Cages for Deep Groove Ball Bearings

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

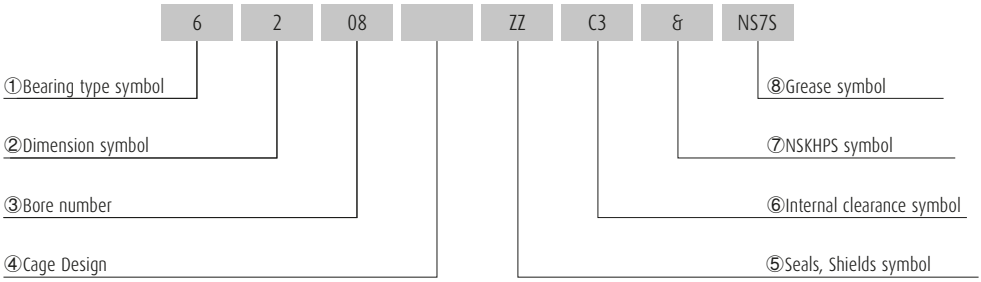
Table 3 Standard Cages for Double Row Deep Grove Ball Bearings

Series	Polyamid Cages
42xxB	4200B - 4218B
43xxB	4302B - 4315B

☐ Formulation of Bearing Numbers

Single-Row Deep Groove Ball Bearings

Bearing number example:



①Bearing type symbol	6 : Single-Row Deep Groove Ball Bearings : 4 Double Row Deep Groove Ball Bearing
②Dimension symbol	2 : 02 Series, 3 : 03 Series, 9 : 19 Series, 0 : 10 Series
③Bore number	Less than 03, Bearing bore 00 : 10mm, 01 : 12mm, 02 : 15mm, 03 : 17mm Over 04, Bearing bore Bore number X 5 (mm)
④Cage Design	BTNG = Polyiamid Cage
⑤Seals, Shields symbol	ZZ : Shield on Both Side , DDU : Contact Rubber Seal on Both Side, VV: Non-Contact Rubber Sealed on Both Side
⑥Internal clearance symbol	Omitted : CN clearance*1, C3 : Clearance greater than CN, C4 : Clearance greater than C3, CM : For Electric Motors*1
⑦NSKHPS symbol	& : NSKHPS Bearings
⑧Grease symbol	NS7 : NS HI-LUBE

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

Creep-Free Bearings

Creep-Free Bearings, which come with two O-rings mounted in the outer ring, help to prevent the occurrence of creep by restricting the amount of clearance between the outer ring and housing.
No special machining is required; bearings can be used with the same housing as standard bearings.
In creep limit load tests, the more housing clearance is reduced, the greater the improvement in creep prevention, due to the tension of the O-ring mounted in the outer ring.

Features

› **Prevents creep**

O-rings help prevent creep.

› **Reusable housing**

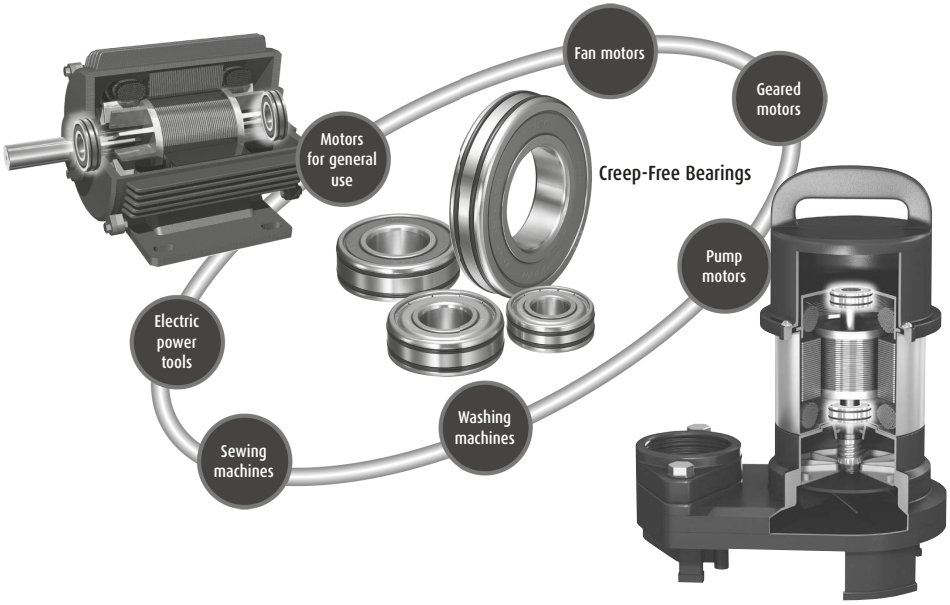
Very little abrasion occurs on the bore surface of the housing, making reuse possible.

› **Easy to assemble**

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

› **No special machining of the housing is required**

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



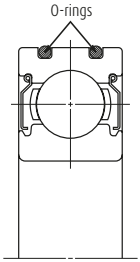


Fig. 1 Structure of Creep-Free Bearings

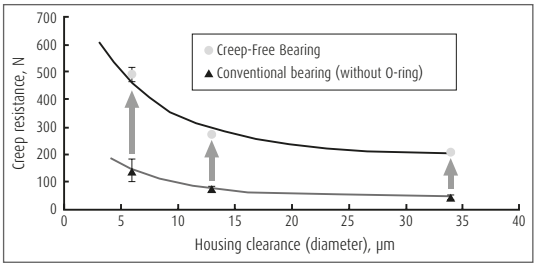


Fig. 2 Creep limit load test (example: 6204)

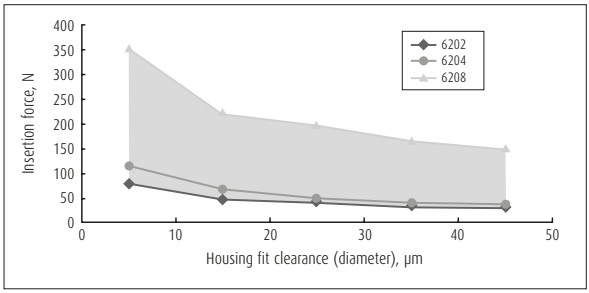


Fig. 3 Fit and insertion force

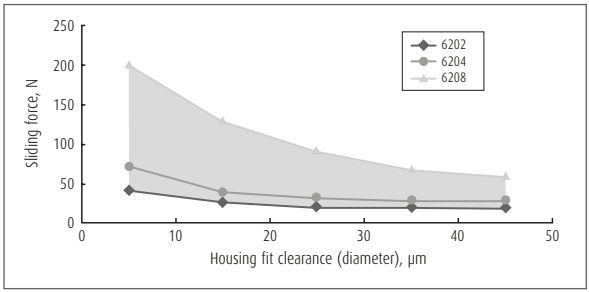


Fig. 4 Fit and sliding force

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.).

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

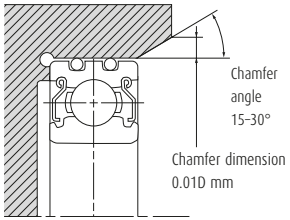
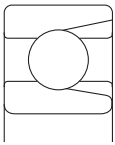


Fig. 5 Housing shape and dimension

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



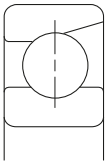
MAXIMUM TYPE BALL BEARINGS

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

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

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

Their cages are pressed steel.



MAGNETO BEARINGS

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

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

PRECAUTIONS FOR USE OF DEEP GROOVE BALL BEARINGS

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

TOLERANCES AND RUNNING ACCURACY

	Table	Pages
Single-Row Deep Groove Ball Bearings	7.2	A128 to A131
Maximum Type Ball Bearings	7.2	A128 to A131
Magneto Bearings	7.5	A138 and A139

RECOMMENDED FITS

	Table	Page
Single-Row Deep Groove Ball Bearings	8.3	A164
	8.5	A165
Maximum Type Ball Bearings	8.3	A164
	8.5	A165
Magneto Bearings	8.3	A164
	8.5	A165

INTERNAL CLEARANCE

	Table	Page
Single-Row Deep Groove Ball Bearings	8.10	A169
Maximum Type Ball Bearings	8.11	A169
Magneto Bearings	8.12	A169

LIMITING SPEEDS (GREASE/OIL)

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

TECHNICAL DATA

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

(1) Radial and Axial Internal Clearances

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

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

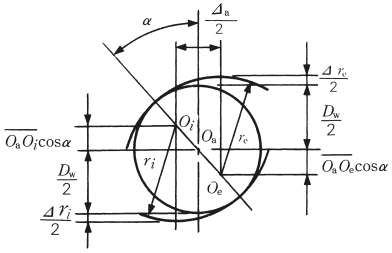


Fig. 1 Relationship Between Δr and Δa

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)
a:	Contact angle (°)
Δ_r:	Radial clearance (mm)
Δ_a:	Axial clearance (mm)

It is apparent from Fig. 1 that $\Delta_r = \Delta r_e + \Delta r_i$.

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

$$\Delta r = 2(1-\cos a)(r_e + r_i - D_w) \quad \cdots (1)$$

$$\Delta a = 2 \sin a (r_e + r_i - D_w) \quad \cdots (2)$$

$$\frac{\Delta a}{\Delta r} = \cot \frac{a}{2} \quad \cdots (3)$$

$$\Delta \fallingdotseq 2 (r_e + r_i - D_w)^{1/2} \Delta r^{1/2} \quad \cdots (4)$$

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

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

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

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

$$\Delta a \fallingdotseq K \Delta r^{1/2} \quad \cdots (7)$$

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 a 6312 bearing, for a sample calculation, which has a radial clearance of 0.017 mm. From Table 1, K=2.09. Therefore, the axial clearance Δa is:

$\Delta = 2.09 \times \sqrt{0.017} = 2.09 \times 0.13 = 0.27$ (mm)

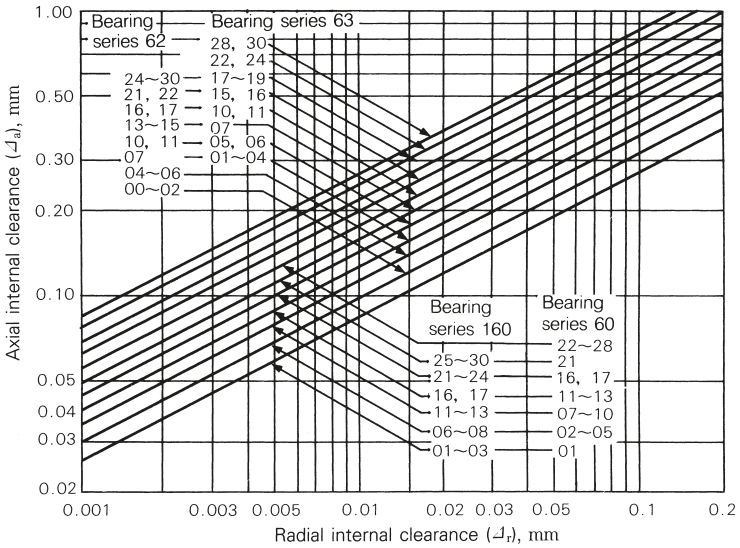


Fig. 2 Radial Clearance, Δ_r and Axial Clearance, Δ_a of Deep Groove Ball Bearings

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

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

(2) Relation between Radial Clearance and Contact Angle

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

The contact angle for ball bearings is determined by the geometric relationship between the radial clearance and the radii of the inner and outer grooves. Using Equations (1) to (6), Fig. 3 shows the particular relationship between the radial clearance and contact angle of 62 and 63 series bearings. The initial contact angle, a_0, is the initial contact angle when the axial load is zero. Application of any load to the bearing will change this contact angle.

If the initial contact angle a_0 exceeds 20°, it is necessary to check whether or not the contact area of the ball and raceway touch the edge of raceway shoulder. (Refer to Section 8.1.2)

For applications when an axial load alone is applied, the radial clearance for deep groove ball bearings is normally greater than the normal clearance in order to ensure that the contact anlgle 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, a_0, with C3 and C4 Clearances

Bearing No.	a_0 with C3	a_0 with C4
6205	12.5° to 18°	16.5° to 22°
6210	11.5° to 16.5°	13.5° to 19.5°
6215	11.5° to 16°	15.5° to 19.5°
6220	10.5° to 14.5°	14° to 17.5°
6305	11° to 16°	14.5° to 19.5°
6310	9.5° to 13.5°	12° to 16°
6315	9.5° to 13.5°	12.5° to 15.5°
6320	9° to 12.5°	12° to 15°

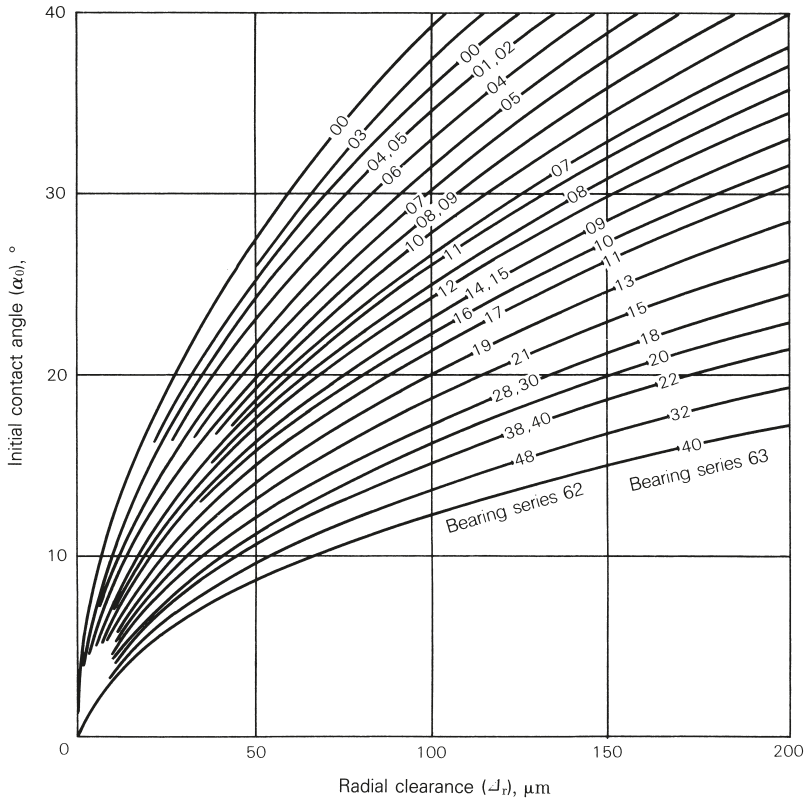


Fig. 3 Radial Clearance and Contact Angle

Features and Operating Temperature Range of Ball Bearing Seal Material

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

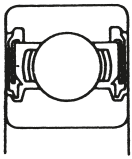
These rubbers have their own unique nature and appropriate rubber must be selected by considering the particular application environment and running conditions.

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

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

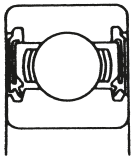
But there are some disadvantages. The contact seal has a problem with wear occurring at the seal lip due to friction, thermal plastic deformation, and hardening. When friction or plastic deformation occurs, the contact pressure between the lip and slide surface decreases, resulting in a clearance. This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

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



Non-contact rubber seal (VV)

Fig. 1



Contact rubber seal (DDU)

Fig. 2

Table 1 Features and Operating Temperature Range of Rubber Materials

Material		Nitrile rubber	Polyacrylic rubber	Silicon rubber	Fluorine rubber
Key features		○Most popular seal material ○Superior in oil and wear resistances and mechanical properties ○Readily ages under direct sunrays ○Less expensive than other rubbers	○Superior in heat and oil resistances ○Large compression causes permanent deformation ○Inferior in cold resistance ○One of the less expensive materials among the high temperature materials ○Attention is necessary because it swells the ester oil based grease	○High heat and cold resistances ○Inferior in mechanical properties other than permanent deformation by compression. Pay attention to tear strength ○Pay attention so as to avoid swell caused by low aniline point mineral oil, silicone grease, and silicone oil	○High heat resistance ○Superior in oil and chemical resistances ○Cold resistance similar to nitrile rubber ○Attention is necessary because it deteriorates the urea grease
Operating temperature range (1) (°C)	Non-contact seal	−50 to +130	−30 to +170	−100 to +250	−50 to +220
	Contact seal	−30 to +110	−15 to +150	−70 to +200	−30 to +200

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

Free Space and Grease Filling Amount for Deep Groove Ball Bearings

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

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

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

1/3 to 1/2..... when the bearing speed is 50% or more.

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

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

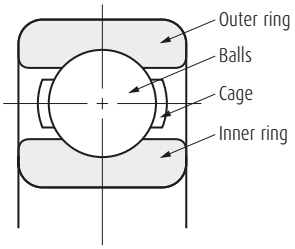


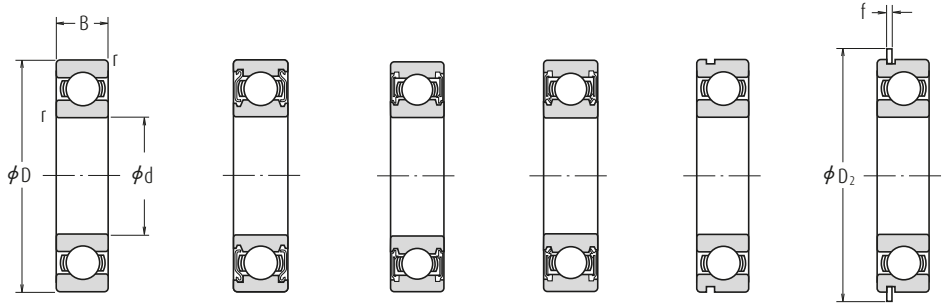
Table 1 Free Space of Open Type Deep Groove Ball Bearing

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

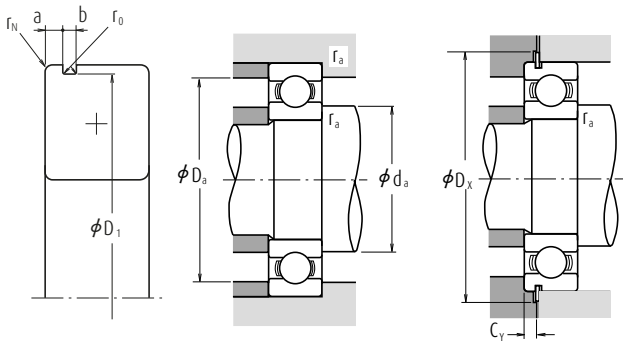
Bore Diameter 10 – 17 mm



Open Type | Shielded Type ZZ | Non-Contact Sealed Type VV | Contact Sealed Type DD · DDU | With Snap Ring Groove N | With Snap Ring NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Numbers			
							Grease		Oil				
d	D	B	r min.	C_r	C_{or}	f_o	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
10	19	5	0.3	1 720	840	14.8	34 000	24 000	40 000	**6800**	**ZZ**	**VV**	**DD**
	22	6	0.3	2 700	1 270	14.0	32 000	22 000	38 000	**6900**	**ZZ**	**VV**	**DD**
	26	8	0.3	4 550	1 970	12.4	30 000	22 000	36 000	**6000**	**ZZ**	**VV**	**DDU**
	30	9	0.6	5 100	2 390	13.2	24 000	18 000	30 000	**6200**	**ZZ**	**VV**	**DDU**
	30	9	0.6	5 350	2 390	13.2	28 000	18 000	34 000	**6200***	**ZZ**	**VV**	**DDU**
	35	11	0.6	8 100	3 450	11.2	22 000	17 000	26 000	**6300**	**ZZ**	**VV**	**DDU**
	35	11	0.6	8 500	3 450	11.2	26 000	17 000	30 000	**6300***	**ZZ**	**VV**	**DDU**
12	21	5	0.3	1 920	1 040	15.3	32 000	20 000	38 000	**6801**	**ZZ**	**VV**	**DD**
	24	6	0.3	2 890	1 460	14.5	30 000	20 000	36 000	**6901**	**ZZ**	**VV**	**DD**
	28	7	0.3	5 100	2 370	13.0	28 000	–	32 000	**16001**	–	–	–
	28	8	0.3	5 100	2 370	13.0	28 000	18 000	32 000	**6001**	**ZZ**	**VV**	**DDU**
	28	8	0.3	5 350	2 370	13.0	32 000	18 000	38 000	**6001***	**ZZ**	**VV**	**DDU**
	32	10	0.6	6 800	3 050	12.3	22 000	17 000	28 000	**6201**	**ZZ**	**VV**	**DDU**
	32	10	0.6	7 150	3 050	12.3	26 000	17 000	32 000	**6201***	**ZZ**	**VV**	**DDU**
	37	12	1	9 700	4 200	11.1	20 000	16 000	24 000	**6301**	**ZZ**	**VV**	**DDU**
	37	12	1.0	10 200	4 200	11.1	24 000	16 000	28 000	**6301***	**ZZ**	**VV**	**DDU**
15	24	5	0.3	2 070	1 260	15.8	28 000	17 000	34 000	**6802**	**ZZ**	**VV**	**DD**
	28	7	0.3	4 350	2 260	14.3	26 000	17 000	30 000	**6902**	**ZZ**	**VV**	**DD**
	32	8	0.3	5 600	2 830	13.9	24 000	–	28 000	**16002**	–	–	–
	32	9	0.3	5 600	2 830	13.9	24 000	15 000	28 000	**6002**	**ZZ**	**VV**	**DDU**
	32	9	0.3	5 850	2 830	13.9	26 000	15 000	32 000	**6002***	**ZZ**	**VV**	**DDU**
	35	11	0.6	7 650	3 750	13.2	20 000	14 000	24 000	**6202**	**ZZ**	**VV**	**DDU**
	35	11	0.6	8 000	3 750	13.2	22 000	14 000	28 000	**6202***	**ZZ**	**VV**	**DDU**
	42	13	1	11 400	5 450	12.3	17 000	13 000	20 000	**6302**	**ZZ**	**VV**	**DDU**
	42	13	1.0	12 000	5 450	12.3	19 000	13 000	24 000	**6302***	**ZZ**	**VV**	**DDU**
17	26	5	0.3	2 630	1 570	15.7	26 000	15 000	30 000	**6803**	**ZZ**	**VV**	**DD**
	30	7	0.3	4 600	2 550	14.7	24 000	15 000	28 000	**6903**	**ZZ**	**VV**	**DDU**
	35	8	0.3	6 000	3 250	14.4	22 000	–	26 000	**16003**	–	–	–
	35	10	0.3	6 000	3 250	14.4	22 000	13 000	26 000	**6003**	**ZZ**	**VV**	**DDU**
	35	10	0.3	6 300	3 250	14.4	24 000	13 000	28 000	**6003***	**ZZ**	**VV**	**DDU**
	40	12	0.6	9 550	4 800	13.2	17 000	12 000	20 000	**6203**	**ZZ**	**VV**	**DDU**
	40	12	0.6	10 100	4 800	13.2	20 000	12 000	24 000	**6203***	**ZZ**	**VV**	**DDU**
	47	14	1	13 600	6 650	12.4	15 000	11 000	18 000	**6303**	**ZZ**	**VV**	**DDU**
	47	14	1.0	14 300	6 650	12.4	17 000	11 000	20 000	**6303***	**ZZ**	**VV**	**DDU**

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



Dynamic Equivalent Load

$P=XF_r+YF_a$

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

Static Equivalent Load

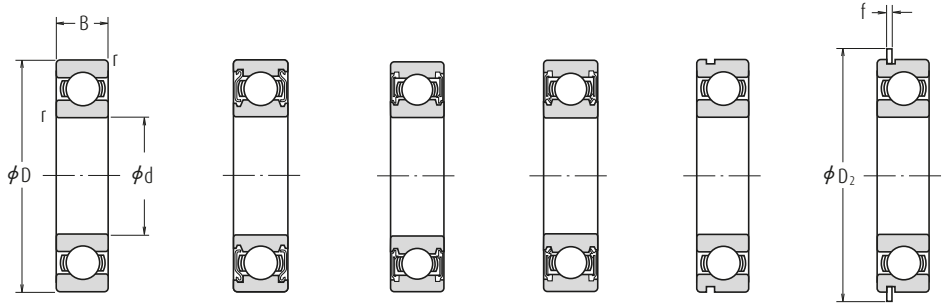
$\frac{F_a}{F_r}>0.8$, $P_0=0.6F_r+0.5F_a$

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

With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm) a max.	b min.	D_1 max.	r_0 max.	r_N min.	Snap Ring (1) Dimensions (mm) D_2 max.	f max.	Abutment and Fillet Dimensions (mm) d_a(2) min.	d_a(2) max.	D_a(2) max.	r_a max.	D_x min.	C_y max.	Mass (kg) approx.
—	—	—	—	—	—	—	—	—	12	12	17	0.3	—	—	0.005
N(3)	NR(3)	1.05	0.80	20.80	0.20	0.2	24.8	0.70	12	12.5	20	0.3	25.5	1.5	0.009
N(4)	NR(4)	1.35	0.87	24.50	0.20	0.3	28.7	0.84	12	13	24	0.3	29.4	1.9	0.018
N	NR	2.06	1.35	28.17	0.40	0.5	34.7	1.12	14	16	26	0.6	35.5	2.9	0.032
N	NR	2.06	1.35	28.17	0.40	0.5	34.7	1.12	14	16	26	0.6	35.5	2.9	0.032
N	NR	2.06	1.35	33.17	0.40	0.5	39.7	1.12	14	16.5	31	0.6	40.5	2.9	0.052
N	NR	2.06	1.35	33.17	0.40	0.5	39.7	1.12	14	16.5	31	0.6	40.5	2.9	0.052
—	—	—	—	—	—	—	—	—	14	14	19	0.3	—	—	0.006
N	NR	1.05	0.80	22.80	0.20	0.2	26.8	0.70	14	14.5	22	0.3	27.5	1.5	0.010
—	—	—	—	—	—	—	—	—	14	—	26	0.3	—	—	0.019
N(4)	NR(4)	1.35	0.87	26.50	0.20	0.3	30.7	0.84	14	15.5	26	0.3	31.4	1.9	0.022
N(4)	NR(4)	1.35	0.87	26.50	0.20	0.3	30.7	0.84	14	15.5	26	0.3	31.4	1.9	0.022
N	NR	2.06	1.35	30.15	0.40	0.5	36.7	1.12	16	17	28	0.6	37.5	2.9	0.037
N	NR	2.06	1.35	30.15	0.40	0.5	36.7	1.12	16	17	28	0.6	37.5	2.9	0.037
N	NR	2.06	1.35	34.77	0.40	0.5	41.3	1.12	17	18	32	1	42	2.9	0.060
N	NR	2.06	1.35	34.77	0.40	0.5	41.3	1.12	17	18	32	1	42	2.9	0.060
—	—	—	—	—	—	—	—	—	17	17	22	0.3	—	—	0.007
N	NR	1.30	0.95	26.70	0.25	0.3	30.8	0.85	17	17	26	0.3	31.5	1.8	0.015
—	—	—	—	—	—	—	—	—	17	—	30	0.3	—	—	0.027
N	NR	2.06	1.35	30.15	0.40	0.3	36.7	1.12	17	19	30	0.3	37.5	2.9	0.031
N	NR	2.06	1.35	30.15	0.40	0.3	36.7	1.12	17	19	30	0.3	37.5	2.9	0.031
N	NR	2.06	1.35	33.17	0.40	0.5	39.7	1.12	19	20.5	31	0.6	40.5	2.9	0.045
N	NR	2.06	1.35	33.17	0.40	0.5	39.7	1.12	19	20.5	31	0.6	40.5	2.9	0.045
N	NR	2.06	1.35	39.75	0.40	0.5	46.3	1.12	20	22.5	37	1	47	2.9	0.083
N	NR	2.06	1.35	39.75	0.40	0.5	46.3	1.12	20	22.5	37	1	47	2.9	0.083
—	—	—	—	—	—	—	—	—	19	19	24	0.3	—	—	0.007
N	NR	1.30	0.95	28.70	0.25	0.3	32.8	0.85	19	19.5	28	0.3	33.5	1.8	0.017
—	—	—	—	—	—	—	—	—	19	—	33	0.3	—	—	0.033
N	NR	2.06	1.35	33.17	0.40	0.3	39.7	1.12	19	21.5	33	0.3	40.5	2.9	0.041
N	NR	2.06	1.35	33.17	0.40	0.3	39.7	1.12	19	21.5	33	0.3	40.5	2.9	0.041
N	NR	2.06	1.35	38.10	0.40	0.5	44.6	1.12	21	23.5	36	0.6	45.5	2.9	0.067
N	NR	2.06	1.35	38.10	0.40	0.5	44.6	1.12	21	23.5	36	0.6	45.5	2.9	0.067
N	NR	2.46	1.35	44.60	0.40	0.5	52.7	1.12	22	25.5	42	1	53.5	3.3	0.113
N	NR	2.46	1.35	44.60	0.40	0.5	52.7	1.12	22	25.5	42	1	53.5	3.3	0.113

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

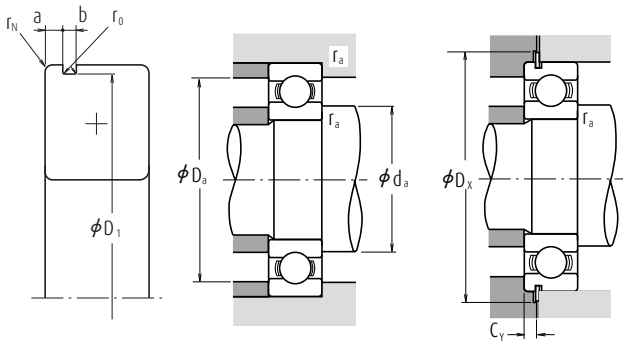
Bore Diameter 20 – 30 mm



Open Type | Shielded Type ZZ | Non-Contact Sealed Type VV | Contact Sealed Type DD · DDU | With Snap Ring Groove N | With Snap Ring NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Numbers			
							Grease		Oil				
d	D	B	r min.	C_r	C_{or}	f_o	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
20	32	7	0.3	4 000	2 470	15.5	22 000	13 000	26 000	**6804**	**ZZ**	**VV**	**DD**
	37	9	0.3	6 400	3 700	14.7	19 000	12 000	22 000	**6904**	**ZZ**	**VV**	**DDU**
	42	8	0.3	7 900	4 450	14.5	18 000	–	20 000	**16004**	–	–	–
	42	12	0.6	9 400	5 000	13.8	18 000	11 000	20 000	**6004**	**ZZ**	**VV**	**DDU**
	42	12	0.6	9 850	5 000	13.8	20 000	11 000	24 000	**6004***	**ZZ**	**VV**	**DDU**
	47	14	1	12 800	6 600	13.1	15 000	11 000	18 000	**6204**	**ZZ**	**VV**	**DDU**
	47	14	1.0	13 400	6 600	13.1	17 000	11 000	20 000	**6204***	**ZZ**	**VV**	**DDU**
	52	15	1.1	15 900	7 900	12.4	14 000	10 000	17 000	**6304**	**ZZ**	**VV**	**DDU**
	52	15	1.1	16 700	7 900	12.4	16 000	10 000	19 000	**6304***	**ZZ**	**VV**	**DDU**
22	44	12	0.6	9 400	5 050	14.0	17 000	11 000	20 000	**60/22**	**ZZ**	**VV**	**DDU**
	50	14	1	12 900	6 800	13.5	14 000	9 500	16 000	**62/22**	**ZZ**	**VV**	**DDU**
	56	16	1.1	18 400	9 250	12.4	13 000	9 500	16 000	**63/22**	**ZZ**	**VV**	**DDU**
25	37	7	0.3	4 500	3 150	16.1	18 000	10 000	22 000	**6805**	**ZZ**	**VV**	**DD**
	42	9	0.3	7 050	4 550	15.4	16 000	10 000	19 000	**6905**	**ZZ**	**VV**	**DDU**
	47	8	0.3	8 850	5 600	15.1	15 000	–	18 000	**16005**	–	–	–
	47	12	0.6	10 100	5 850	14.5	15 000	9 500	18 000	**6005**	**ZZ**	**VV**	**DDU**
	47	12	0.6	10 600	5 850	14.5	18 000	9 500	22 000	**6005***	**ZZ**	**VV**	**DDU**
	52	15	1	14 000	7 850	13.9	13 000	9 000	15 000	**6205**	**ZZ**	**VV**	**DDU**
	52	15	1.0	14 700	7 850	13.9	15 000	9 000	18 000	**6205***	**ZZ**	**VV**	**DDU**
	62	17	1.1	20 600	11 200	13.2	11 000	8 000	13 000	**6305**	**ZZ**	**VV**	**DDU**
	62	17	1.1	21 600	11 200	13.2	13 000	8 000	16 000	**6305***	**ZZ**	**VV**	**DDU**
28	52	12	0.6	12 500	7 400	14.5	14 000	8 500	16 000	**60/28**	**ZZ**	**VV**	**DDU**
	58	16	1	16 600	9 500	13.9	12 000	8 000	14 000	**62/28**	**ZZ**	**VV**	**DDU**
	68	18	1.1	26 700	14 000	12.4	10 000	7 500	13 000	**63/28**	**ZZ**	**VV**	**DDU**
30	42	7	0.3	4 700	3 650	16.4	15 000	9 000	18 000	**6806**	**ZZ**	**VV**	**DD**
	47	9	0.3	7 250	5 000	15.8	14 000	8 500	17 000	**6906**	**ZZ**	**VV**	**DDU**
	55	9	0.3	11 200	7 350	15.2	13 000	–	15 000	**16006**	–	–	–
	55	13	1	13 200	8 300	14.7	13 000	8 000	15 000	**6006**	**ZZ**	**VV**	**DDU**
	55	13	1.0	13 900	8 300	14.7	15 000	8 000	18 000	**6006***	**ZZ**	**VV**	**DDU**
	62	16	1	19 500	11 300	13.8	11 000	7 500	13 000	**6206**	**ZZ**	**VV**	**DDU**
	62	16	1.0	20 400	11 300	13.8	12 000	7 500	15 000	**6206***	**ZZ**	**VV**	**DDU**
	72	19	1.1	26 700	15 000	13.3	9 500	6 700	12 000	**6306**	**ZZ**	**VV**	**DDU**
	72	19	1.1	28 000	15 000	13.3	11 000	6 700	13 000	**6306***	**ZZ**	**VV**	**DDU**

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



Dynamic Equivalent Load

$P=XF_r+YF_a$

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

Static Equivalent Load

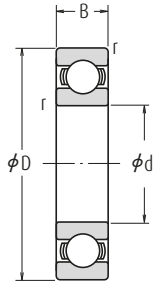
$\frac{F_a}{F_r}>0.8$, $P_0=0.6F_r+0.5F_a$

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

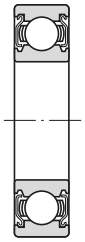
With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
		a max.	b min.	D_1 max.	r_0 max.	r_N min.	D_2 max.	f max.	d_a(2) min.	d_a(2) max.	D_a(2) max.	r_a max.	D_x min.	C_y max.	approx.
N	NR	1.30	0.95	30.70	0.25	0.3	34.8	0.85	22	22	30	0.3	35.5	1.8	0.017
N	NR	1.70	0.95	35.70	0.25	0.3	39.8	0.85	22	24	35	0.3	40.5	2.3	0.037
—	—	—	—	—	—	—	—	—	22	—	40	0.3	—	—	0.048
N	NR	2.06	1.35	39.75	0.40	0.5	46.3	1.12	24	25.5	38	0.6	47	2.9	0.068
N	NR	2.06	1.35	39.75	0.40	0.5	46.3	1.12	24	25.5	38	0.6	47	2.9	0.068
N	NR	2.46	1.35	44.60	0.40	0.5	52.7	1.12	25	26.5	42	1	53.5	3.3	0.107
N	NR	2.46	1.35	44.60	0.40	0.5	52.7	1.12	25	26.5	42	1	53.5	3.3	0.107
N	NR	2.46	1.35	49.73	0.40	0.5	57.9	1.12	26.5	28	45.5	1	58.5	3.3	0.145
N	NR	2.46	1.35	49.73	0.40	0.5	57.9	1.12	26.5	28	45.5	1	58.5	3.3	0.145
N	NR	2.06	1.35	41.75	0.40	0.5	48.3	1.12	26	26.5	40	0.6	49	2.9	0.074
N	NR	2.46	1.35	47.60	0.40	0.5	55.7	1.12	27	29.5	45	1	56.5	3.3	0.119
N	NR	2.46	1.35	53.60	0.40	0.5	61.7	1.12	28.5	30.5	49.5	1	62.5	3.3	0.179
N	NR	1.30	0.95	35.70	0.25	0.3	39.8	0.85	27	27	35	0.3	40.5	1.8	0.021
N	NR	1.70	0.95	40.70	0.25	0.3	44.8	0.85	27	28.5	40	0.3	45.5	2.3	0.042
—	—	—	—	—	—	—	—	—	27	—	45	0.3	—	—	0.059
N	NR	2.06	1.35	44.60	0.40	0.5	52.7	1.12	29	30	43	0.6	53.5	2.9	0.079
N	NR	2.06	1.35	44.60	0.40	0.5	52.7	1.12	29	30	43	0.6	53.5	2.9	0.079
N	NR	2.46	1.35	49.73	0.40	0.5	57.9	1.12	30	32	47	1	58.5	3.3	0.129
N	NR	2.46	1.35	49.73	0.40	0.5	57.9	1.12	30	32	47	1	58.5	3.3	0.129
N	NR	3.28	1.90	59.61	0.60	0.5	67.7	1.70	31.5	36	55.5	1	68.5	4.6	0.235
N	NR	3.28	1.90	59.61	0.60	0.5	67.7	1.70	31.5	36	55.5	1	68.5	4.6	0.235
N	NR	2.06	1.35	49.73	0.40	0.5	57.9	1.12	32	34	48	0.6	58.5	2.9	0.096
N	NR	2.46	1.35	55.60	0.40	0.5	63.7	1.12	33	35.5	53	1	64.5	3.3	0.175
N	NR	3.28	1.90	64.82	0.60	0.5	74.6	1.70	34.5	38	61.5	1	76	4.6	0.287
N	NR	1.30	0.95	40.70	0.25	0.3	44.8	0.85	32	32	40	0.3	45.5	1.8	0.024
N	NR	1.70	0.95	45.70	0.25	0.3	49.8	0.85	32	34	45	0.3	50.5	2.3	0.052
—	—	—	—	—	—	—	—	—	32	—	53	0.3	—	—	0.087
N	NR	2.08	1.35	52.60	0.40	0.5	60.7	1.12	35	36.5	50	1	61.5	2.9	0.116
N	NR	2.08	1.35	52.60	0.40	0.5	60.7	1.12	35	36.5	50	1	61.5	2.9	0.116
N	NR	3.28	1.90	59.61	0.60	0.5	67.7	1.70	35	38.5	57	1	68.5	4.6	0.199
N	NR	3.28	1.90	59.61	0.60	0.5	67.7	1.70	35	38.5	57	1	68.5	4.6	0.199
N	NR	3.28	1.90	68.81	0.60	0.5	78.6	1.70	36.5	42.5	65.5	1	80	4.6	0.345
N	NR	3.28	1.90	68.81	0.60	0.5	78.6	1.70	36.5	42.5	65.5	1	80	4.6	0.345

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

Bore Diameter 32 – 45 mm

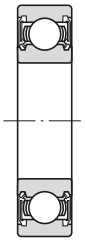


Open Type

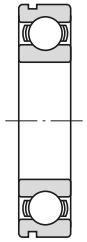


Shielded Type
ZZ

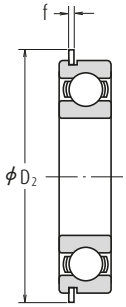
Non-Contact
Sealed Type
VV



Contact
Sealed Type
DD · DDU



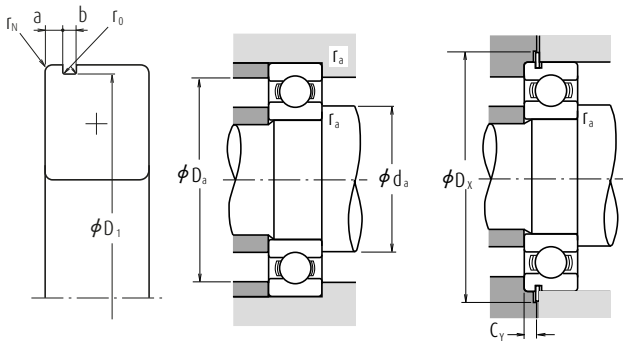
With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Numbers			
							Grease		Oil				
d	D	B	r min.	C_r	C_{or}	f_o	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
32	58	13	1	15 100	9 150	14.5	12 000	7 500	14 000	**60/32**	**ZZ**	**VV**	**DDU**
	65	17	1	20 700	11 600	13.6	10 000	7 100	12 000	**62/32**	**ZZ**	**VV**	**DDU**
	75	20	1.1	29 900	17 000	13.2	9 000	6 300	11 000	**63/32**	**ZZ**	**VV**	**DDU**
35	47	7	0.3	4 900	4 100	16.7	14 000	7 500	16 000	**6807**	**ZZ**	**VV**	**DD**
	55	10	0.6	10 600	7 250	15.5	12 000	7 500	15 000	**6907**	**ZZ**	**VV**	**DDU**
	62	9	0.3	11 700	8 200	15.6	11 000	—	13 000	**16007**	—	—	—
	62	14	1	16 000	10 300	14.8	11 000	6 700	13 000	**6007**	**ZZ**	**VV**	**DDU**
	62	14	1.0	16 800	10 300	14.8	13 000	6 700	15 000	**6007***	**ZZ**	**VV**	**DDU**
	72	17	1.1	25 700	15 300	13.8	9 500	6 300	11 000	**6207**	**ZZ**	**VV**	**DDU**
	72	17	1.1	27 000	15 300	13.8	11 000	6 300	13 000	**6207***	**ZZ**	**VV**	**DDU**
	80	21	1.5	33 500	19 200	13.2	8 500	6 000	10 000	**6307**	**ZZ**	**VV**	**DDU**
	80	21	1.5	35 000	19 200	13.2	10 000	6 000	12 000	**6307***	**ZZ**	**VV**	**DDU**
40	52	7	0.3	6 350	5 550	17.0	12 000	6 700	14 000	**6808**	**ZZ**	**VV**	**DD**
	62	12	0.6	13 700	10 000	15.7	11 000	6 300	13 000	**6908**	**ZZ**	**VV**	**DDU**
	68	9	0.3	12 600	9 650	16.0	10 000	—	12 000	**16008**	—	—	—
	68	15	1	16 800	11 500	15.3	10 000	6 000	12 000	**6008**	**ZZ**	**VV**	**DDU**
	68	15	1.0	17 600	11 500	15.3	12 000	6 000	14 000	**6008***	**ZZ**	**VV**	**DDU**
	80	18	1.1	29 100	17 900	14.0	8 500	5 600	10 000	**6208**	**ZZ**	**VV**	**DDU**
	80	18	1.1	30 500	17 900	14.0	9 500	5 600	12 000	**6208***	**ZZ**	**VV**	**DDU**
	90	23	1.5	40 500	24 000	13.2	7 500	5 300	9 000	**6308**	**ZZ**	**VV**	**DDU**
	90	23	1.5	43 000	24 000	13.2	9 000	5 300	11 000	**6308***	**ZZ**	**VV**	**DDU**
45	58	7	0.3	6 600	6 150	17.2	11 000	6 000	13 000	**6809**	**ZZ**	**VV**	**DD**
	68	12	0.6	14 100	10 900	15.9	9 500	5 600	12 000	**6909**	**ZZ**	**VV**	**DDU**
	75	10	0.6	14 900	11 400	15.9	9 000	—	11 000	**16009**	—	—	—
	75	16	1	20 900	15 200	15.3	9 000	5 300	11 000	**6009**	**ZZ**	**VV**	**DDU**
	75	16	1.0	22 000	15 200	15.3	10 000	5 300	12 000	**6009***	**ZZ**	**VV**	**DDU**
	85	19	1.1	31 500	20 400	14.4	7 500	5 300	9 000	**6209**	**ZZ**	**VV**	**DDU**
	85	19	1.1	33 000	20 400	14.4	9 000	5 300	11 000	**6209***	**ZZ**	**VV**	**DDU**
	100	25	1.5	53 000	32 000	13.1	6 700	4 800	8 000	**6309**	**ZZ**	**VV**	**DDU**
	100	25	1.5	55 500	32 000	13.1	7 500	4 800	9 500	**6309***	**ZZ**	**VV**	**DDU**

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



Dynamic Equivalent Load $P=XF_r+YF_a$

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

Static Equivalent Load

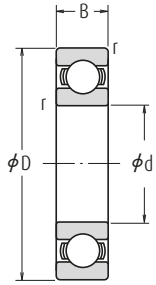
$\frac{F_a}{F_r} > 0.8$, $P_0=0.6F_r+0.5F_a$

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

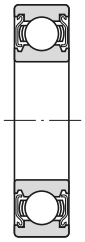
With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
		a max.	b min.	D_1 max.	r_0 max.	r_N min.	D_2 max.	f max.	d_a(2) min.	d_a(2) max.	D_a(2) max.	r_a max.	D_x min.	C_y max.	approx.
N	NR	2.08	1.35	55.60	0.40	0.5	63.7	1.12	37	38.5	53	1	64.5	2.9	0.122
N	NR	3.28	1.90	62.60	0.60	0.5	70.7	1.70	37	40	60	1	71.5	4.6	0.225
N	NR	3.28	1.90	71.83	0.60	0.5	81.6	1.70	38.5	44.5	68.5	1	83	4.6	0.389
N	NR	1.30	0.95	45.70	0.25	0.3	49.8	0.85	37	37	45	0.3	50.5	1.8	0.027
N	NR	1.70	0.95	53.70	0.25	0.5	57.8	0.85	39	39	51	0.6	58.5	2.3	0.075
—	—	—	—	—	—	—	—	—	37	—	60	0.3	—	—	0.107
N	NR	2.08	1.90	59.61	0.60	0.5	67.7	1.70	40	41.5	57	1	68.5	3.4	0.151
N	NR	2.08	1.90	59.61	0.60	0.5	67.7	1.70	40	41.5	57	1	68.5	3.4	0.151
N	NR	3.28	1.90	68.81	0.60	0.5	78.6	1.70	41.5	44.5	65.5	1	80	4.6	0.284
N	NR	3.28	1.90	68.81	0.60	0.5	78.6	1.70	41.5	44.5	65.5	1	80	4.6	0.284
N	NR	3.28	1.90	76.81	0.60	0.5	86.6	1.70	43	47	72	1.5	88	4.6	0.464
N	NR	3.28	1.90	76.81	0.60	0.5	86.6	1.70	43	47	72	1.5	88	4.6	0.464
N	NR	1.30	0.95	50.70	0.25	0.3	54.8	0.85	42	42	50	0.3	55.5	1.8	0.031
N	NR	1.70	0.95	60.70	0.25	0.5	64.8	0.85	44	46	58	0.6	65.5	2.3	0.112
—	—	—	—	—	—	—	—	—	42	—	66	0.3	—	—	0.13
N	NR	2.49	1.90	64.82	0.60	0.5	74.6	1.70	45	47.5	63	1	76	3.8	0.19
N	NR	2.49	1.90	64.82	0.60	0.5	74.6	1.70	45	47.5	63	1	76	3.8	0.19
N	NR	3.28	1.90	76.81	0.60	0.5	86.6	1.70	46.5	50.5	73.5	1	88	4.6	0.366
N	NR	3.28	1.90	76.81	0.60	0.5	86.6	1.70	46.5	50.5	73.5	1	88	4.6	0.366
N	NR	3.28	2.70	86.79	0.60	0.5	96.5	2.46	48	53	82	1.5	98	5.4	0.636
N	NR	3.28	2.70	86.79	0.60	0.5	96.5	2.46	48	53	82	1.5	98	5.4	0.636
N	NR	1.30	0.95	56.70	0.25	0.3	60.8	0.85	47	47.5	56	0.3	61.5	1.8	0.038
N	NR	1.70	0.95	66.70	0.25	0.5	70.8	0.85	49	50	64	0.6	72	2.3	0.126
—	—	—	—	—	—	—	—	—	49	—	71	0.6	—	—	0.167
N	NR	2.49	1.90	71.83	0.60	0.5	81.6	1.70	50	53.5	70	1	83	3.8	0.241
N	NR	2.49	1.90	71.83	0.60	0.5	81.6	1.70	50	53.5	70	1	83	3.8	0.241
N	NR	3.28	1.90	81.81	0.60	0.5	91.6	1.70	51.5	55.5	78.5	1	93	4.6	0.42
N	NR	3.28	1.90	81.81	0.60	0.5	91.6	1.70	51.5	55.5	78.5	1	93	4.6	0.42
N	NR	3.28	2.70	96.80	0.60	0.5	106.50	2.46	53	61.5	92	1.5	108	5.4	0.829
N	NR	3.28	2.70	96.80	0.60	0.5	106.50	2.46	53	61.5	92	1.5	108	5.4	0.829

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

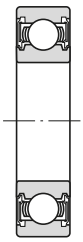
Bore Diameter 50 – 60 mm



Open Type

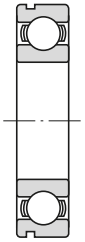


Shielded Type
ZZ

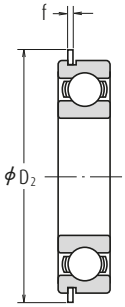


Non-Contact
Sealed Type
VV

Contact
Sealed Type
DD · DDU



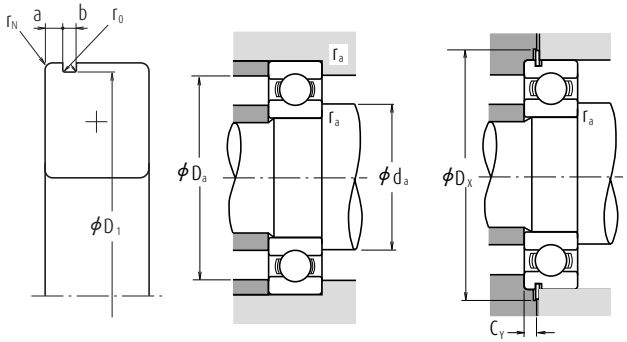
With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Numbers			
							Grease		Oil				
d	D	B	r min.	C_r	C_{or}	f_o	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
50	65	7	0.3	6 400	6 200	17.2	9 500	5 300	11 000	**6810**	**ZZ**	**VV**	**DDU**
	72	12	0.6	14 500	11 700	16.1	9 000	5 300	11 000	**6910**	**ZZ**	**VV**	**DDU**
	80	10	0.6	15 400	12 400	16.1	8 500	–	10 000	**16010**	–	–	–
	80	16	1	21 800	16 600	15.6	8 500	4 800	10 000	**6010**	**ZZ**	**VV**	**DDU**
	80	16	1.0	22 900	16 600	15.6	9 500	4 800	11 000	**6010***	**ZZ**	**VV**	**DDU**
	90	20	1.1	35 000	23 200	14.4	7 100	4 800	8 500	**6210**	**ZZ**	**VV**	**DDU**
	90	20	1.1	37 000	23 200	14.4	8 500	4 800	10 000	**6210***	**ZZ**	**VV**	**DDU**
	110	27	2	62 000	38 500	13.2	6 000	4 300	7 500	**6310**	**ZZ**	**VV**	**DDU**
	110	27	2.0	65 000	38 500	13.2	7 100	4 300	8 500	**6310***	**ZZ**	**VV**	**DDU**
55	72	9	0.3	8 800	8 500	17.0	8 500	4 800	10 000	**6811**	**ZZ**	**VV**	**DDU**
	80	13	1	16 000	13 300	16.2	8 000	4 500	9 500	**6911**	**ZZ**	**VV**	**DDU**
	90	11	0.6	19 400	16 300	16.2	7 500	–	9 000	**16011**	–	–	–
	90	18	1.1	28 300	21 200	15.3	7 500	4 500	9 000	**6011**	**ZZ**	**VV**	**DDU**
	90	18	1.1	29 700	21 200	15.3	8 500	4 500	10 000	**6011***	**ZZ**	**VV**	**DDU**
	100	21	1.5	43 500	29 300	14.3	6 300	4 300	7 500	**6211**	**ZZ**	**VV**	**DDU**
	100	21	1.5	45 500	29 300	14.3	7 500	4 300	9 000	**6211***	**ZZ**	**VV**	**DDU**
	120	29	2	71 500	44 500	13.1	5 600	4 000	6 700	**6311**	**ZZ**	**VV**	**DDU**
	120	29	2.0	75 000	44 500	13.1	6 700	4 000	8 000	**6311***	**ZZ**	**VV**	**DDU**
60	78	10	0.3	11 500	10 900	16.9	8 000	4 500	9 500	**6812**	**ZZ**	**VV**	**DD**
	85	13	1	19 400	16 300	16.2	7 500	4 300	9 000	**6912**	**ZZ**	**VV**	**DDU**
	95	11	0.6	20 000	17 500	16.3	7 100	–	8 500	**16012**	–	–	–
	95	18	1.1	29 500	23 200	15.6	7 100	4 000	8 500	**6012**	**ZZ**	**VV**	**DDU**
	95	18	1.1	31 000	23 200	15.6	8 000	4 000	9 500	**6012***	**ZZ**	**VV**	**DDU**
	110	22	1.5	52 500	36 000	14.3	5 600	3 800	7 100	**6212**	**ZZ**	**VV**	**DDU**
	110	22	1.5	55 000	36 000	14.3	6 700	3 800	8 000	**6212***	**ZZ**	**VV**	**DDU**
	130	31	2.1	82 000	52 000	13.1	5 300	3 600	6 300	**6312**	**ZZ**	**VV**	**DDU**
	130	31	2.1	86 000	52 000	13.1	6 000	3 600	7 100	**6312***	**ZZ**	**VV**	**DDU**

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



Dynamic Equivalent Load

$P=XF_r+YF_a$

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

Static Equivalent Load

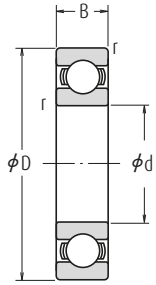
$\frac{F_a}{F_r}>0.8,\ P_0=0.6F_r+0.5F_a$

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

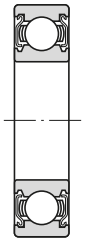
With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
		a max.	b min.	D_1 max.	r_0 max.	r_N min.	D_2 max.	f max.	d_a(2) min.	d_a(2) max.	D_a(2) max.	r_a max.	D_x min.	C_y max.	approx.
N	NR	1.30	0.95	63.7	0.25	0.3	67.8	0.85	52	52.5	63	0.3	68.5	1.8	0.050
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
—	—	—	—	—	—	—	—	—	54	—	76	0.6	—	—	0.175
N	NR	2.49	1.90	76.81	0.60	0.5	86.6	1.70	55	58.5	75	1	88	3.8	0.261
N	NR	2.49	1.90	76.81	0.60	0.5	86.6	1.70	55	58.5	75	1	88	3.8	0.261
N	NR	3.28	2.70	86.79	0.60	0.5	96.5	2.46	56.5	60	83.5	1	98	5.4	0.459
N	NR	3.28	2.70	86.79	0.60	0.5	96.5	2.46	56.5	60	83.5	1	98	5.4	0.459
N	NR	3.28	2.70	106.81	0.60	0.5	116.6	2.46	59	68	101	2	118	5.4	1.06
N	NR	3.28	2.70	106.81	0.60	0.5	116.6	2.46	59	68	101	2	118	5.4	1.06
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
N	NR	2.10	1.30	77.9	0.40	0.5	84.4	1.12	60	61.5	75	1	86	2.9	0.189
—	—	—	—	—	—	—	—	—	59	—	86	0.6	—	—	0.257
N	NR	2.87	2.70	86.79	0.60	0.5	96.5	2.46	61.5	64	83.5	1	98	5.0	0.381
N	NR	2.87	2.70	86.79	0.60	0.5	96.5	2.46	61.5	64	83.5	1	98	5.0	0.381
N	NR	3.28	2.70	96.8	0.60	0.5	106.5	2.46	63	66.5	92	1.5	108	5.4	0.619
N	NR	3.28	2.70	96.8	0.60	0.5	106.5	2.46	63	66.5	92	1.5	108	5.4	0.619
N	NR	4.06	3.10	115.21	0.60	0.5	129.7	2.82	64	72.5	111	2	131.5	6.5	1.37
N	NR	4.06	3.10	115.21	0.60	0.5	129.7	2.82	64	72.5	111	2	131.5	6.5	1.37
N	NR	1.70	1.30	76.2	0.40	0.3	82.7	1.12	62	64	76	0.3	84	2.5	0.103
N	NR	2.10	1.30	82.9	0.40	0.5	89.4	1.12	65	66	80	1	91	2.9	0.192
—	—	—	—	—	—	—	—	—	64	—	91	0.6	—	—	0.281
N	NR	2.87	2.70	91.82	0.60	0.5	101.6	2.46	66.5	69	88.5	1	103	5.0	0.412
N	NR	2.87	2.70	91.82	0.60	0.5	101.6	2.46	66.5	69	88.5	1	103	5.0	0.412
N	NR	3.28	2.70	106.81	0.60	0.5	116.6	2.46	68	74.5	102	1.5	118	5.4	0.783
N	NR	3.28	2.70	106.81	0.60	0.5	116.6	2.46	68	74.5	102	1.5	118	5.4	0.783
N	NR	4.06	3.10	125.22	0.60	0.5	139.7	2.82	71	79	119	2	141.5	6.5	1.72
N	NR	4.06	3.10	125.22	0.60	0.5	139.7	2.82	71	79	119	2	141.5	6.5	1.72

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

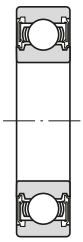
Bore Diameter 65 – 75 mm



Open Type

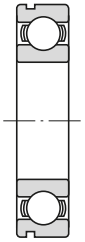


Shielded Type
ZZ

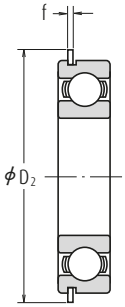


Non-Contact
Sealed Type
VV

Contact
Sealed Type
DD · DDU



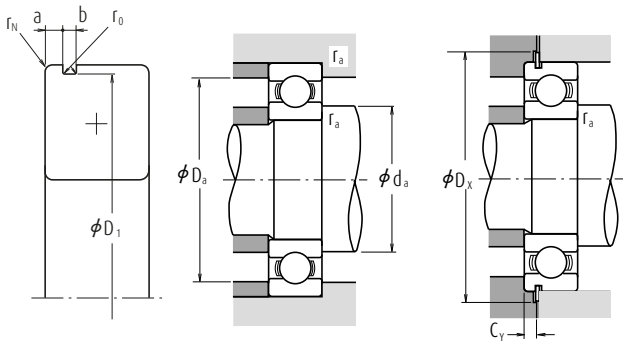
With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Numbers			
							Grease		Oil				
d	D	B	r min.	C_r	C_{or}	f_o	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
65	85	10	0.6	11 900	12 100	17.0	7 500	4 000	8 500	**6813**	**ZZ**	**VV**	**DD**
	90	13	1	17 400	16 100	16.6	7 100	4 000	8 500	**6913**	**ZZ**	**VV**	**DDU**
	100	11	0.6	20 500	18 700	16.5	6 700	–	8 000	**16013**	–	–	–
	100	18	1.1	30 500	25 200	15.8	6 700	4 000	8 000	**6013**	**ZZ**	**VV**	**DDU**
	100	18	1.1	32 000	25 200	15.8	7 500	4 000	9 000	**6013***	**ZZ**	**VV**	**DDU**
	120	23	1.5	57 500	40 000	14.4	5 300	3 600	6 300	**6213**	**ZZ**	**VV**	**DDU**
	120	23	1.5	60 000	40 000	14.4	6 300	3 600	7 500	**6213***	**ZZ**	**VV**	**DDU**
	140	33	2.1	92 500	60 000	13.2	4 800	3 400	6 000	**6313**	**ZZ**	**VV**	**DDU**
	140	33	2.1	97 500	60 000	13.2	5 600	3 400	6 700	**6313***	**ZZ**	**VV**	**DDU**
70	90	10	0.6	12 100	12 700	17.2	6 700	3 800	8 000	**6814**	**ZZ**	**VV**	**DD**
	100	16	1	23 700	21 200	16.3	6 300	3 600	7 500	**6914**	**ZZ**	**VV**	**DDU**
	110	13	0.6	26 800	23 600	16.3	6 000	–	7 100	**16014**	–	–	–
	110	20	1.1	38 000	31 000	15.6	6 000	3 600	7 100	**6014**	**ZZ**	**VV**	**DDU**
	110	20	1.1	40 000	31 000	15.6	7 100	3 600	8 500	**6014***	**ZZ**	**VV**	**DDU**
	125	24	1.5	62 000	44 000	14.5	5 000	3 400	6 300	**6214**	**ZZ**	**VV**	**DDU**
	125	24	1.5	65 500	44 000	14.5	6 000	3 400	7 100	**6214***	**ZZ**	**VV**	**DDU**
	150	35	2.1	104 000	68 000	13.2	4 500	3 200	5 300	**6314**	**ZZ**	**VV**	**DDU**
	150	35	2.1	109 000	68 000	13.2	5 300	3 200	6 300	**6314***	**ZZ**	**VV**	**DDU**
75	95	10	0.6	12 500	13 900	17.3	6 300	3 600	7 500	**6815**	**ZZ**	**VV**	**DDU**
	105	16	1	24 400	22 600	16.5	6 000	3 400	7 100	**6915**	**ZZ**	**VV**	**DDU**
	115	13	0.6	27 600	25 300	16.4	5 600	–	6 700	**16015**	–	–	–
	115	20	1.1	39 500	33 500	15.8	5 600	3 400	6 700	**6015**	**ZZ**	**VV**	**DDU**
	115	20	1.1	41 500	33 500	15.8	6 700	3 400	8 000	**6015***	**ZZ**	**VV**	**DDU**
	130	25	1.5	66 000	49 500	14.7	4 800	3 200	5 600	**6215**	**ZZ**	**VV**	**DDU**
	130	25	1.5	69 500	49 500	14.7	5 600	3 200	6 700	**6215***	**ZZ**	**VV**	**DDU**
	160	37	2.1	113 000	77 000	13.2	4 300	2 800	5 000	**6315**	**ZZ**	**VV**	**DDU**
	160	37	2.1	119 000	77 000	13.2	4 800	2 800	6 000	**6315***	**ZZ**	**VV**	**DDU**

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



Dynamic Equivalent Load

$P=XF_r+YF_a$

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

Static Equivalent Load

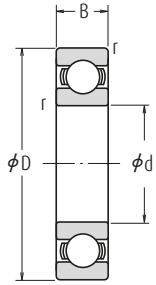
$\frac{F_a}{F_r}>0.8,\ P_0=0.6F_r+0.5F_a$

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

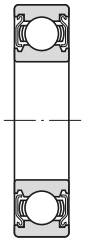
With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
		a max.	b min.	D_1 max.	r_0 max.	r_N min.	D_2 max.	f max.	d_a(2) min.	d_a(2) max.	D_a(2) max.	r_a max.	D_x min.	C_y max.	approx.
N	NR	1.70	1.30	82.9	0.40	0.5	89.4	1.12	69	69	81	0.6	91	2.5	0.128
N	NR	2.10	1.30	87.9	0.40	0.5	94.4	1.12	70	71.5	85	1	96	2.9	0.218
—	—	—	—	—	—	—	—	—	69	—	96	0.6	—	—	0.30
N	NR	2.87	2.70	96.8	0.60	0.5	106.5	2.46	71.5	73	93.5	1	108	5.0	0.439
N	NR	2.87	2.70	96.8	0.60	0.5	106.5	2.46	71.5	73	93.5	1	108	5.0	0.439
N	NR	4.06	3.10	115.21	0.60	0.5	129.7	2.82	73	80	112	1.5	131.5	6.5	1.0
N	NR	4.06	3.10	115.21	0.60	0.5	129.7	2.82	73	80	112	1.5	131.5	6.5	1.0
N	NR	4.90	3.10	135.23	0.60	0.5	149.7	2.82	76	85.5	129	2	152	7.3	2.11
N	NR	4.90	3.10	135.23	0.60	0.5	149.7	2.82	76	85.5	129	2	152	7.3	2.11
N	NR	1.70	1.30	87.9	0.40	0.5	94.4	1.12	74	74.5	86	0.6	96	2.5	0.134
N	NR	2.50	1.30	97.9	0.40	0.5	104.4	1.12	75	77.5	95	1	106	3.3	0.349
—	—	—	—	—	—	—	—	—	74	—	106	0.6	—	—	0.441
N	NR	2.87	2.70	106.81	0.60	0.5	116.6	2.46	76.5	80.5	103.5	1	118	5.0	0.608
N	NR	2.87	2.70	106.81	0.60	0.5	116.6	2.46	76.5	80.5	103.5	1	118	5.0	0.608
N	NR	4.06	3.10	120.22	0.60	0.5	134.7	2.82	78	84	117	1.5	136.5	6.5	1.09
N	NR	4.06	3.10	120.22	0.60	0.5	134.7	2.82	78	84	117	1.5	136.5	6.5	1.09
N	NR	4.90	3.10	145.24	0.60	0.5	159.7	2.82	81	92	139	2	162	7.3	2.57
N	NR	4.90	3.10	145.24	0.60	0.5	159.7	2.82	81	92	139	2	162	7.3	2.57
N	NR	1.70	1.30	92.9	0.40	0.5	99.4	1.12	79	79.5	91	0.6	101	2.5	0.149
N	NR	2.50	1.30	102.60	0.40	0.5	110.7	1.12	80	82	100	1	112	3.3	0.364
—	—	—	—	—	—	—	—	—	79	—	111	0.6	—	—	0.463
N	NR	2.87	2.70	111.81	0.60	0.5	121.6	2.46	81.5	85.5	108.5	1	123	5.0	0.649
N	NR	2.87	2.70	111.81	0.60	0.5	121.6	2.46	81.5	85.5	108.5	1	123	5.0	0.649
N	NR	4.06	3.10	125.22	0.60	0.5	139.7	2.82	83	90	122	1.5	141.5	6.5	1.19
N	NR	4.06	3.10	125.22	0.60	0.5	139.7	2.82	83	90	122	1.5	141.5	6.5	1.19
N	NR	4.90	3.10	155.22	0.60	0.5	169.7	2.82	86	98.5	149	2	172	7.3	3.08
N	NR	4.90	3.10	155.22	0.60	0.5	169.7	2.82	86	98.5	149	2	172	7.3	3.08

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

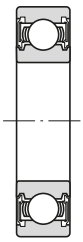
Bore Diameter 80 – 90 mm



Open Type

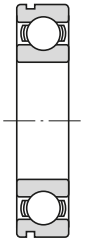


Shielded Type
ZZ

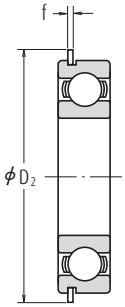


Non-Contact
Sealed Type
VV

Contact
Sealed Type
DD · DDU



With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Numbers			
							Grease		Oil				
d	D	B	r min.	C_r	C_{or}	f_o	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
80	100	10	0.6	12 700	14 500	17.4	6 000	3 400	7 100	**6816**	**ZZ**	**VV**	**DDU**
	110	16	1	25 000	24 000	16.6	5 600	3 200	6 700	**6916**	**ZZ**	**VV**	**DDU**
	125	14	0.6	32 000	29 600	16.4	5 300	–	6 300	**16016**	–	–	–
	125	22	1.1	47 500	40 000	15.6	5 300	3 200	6 300	**6016**	**ZZ**	**VV**	**DDU**
	125	22	1.1	50 000	40 000	15.6	6 300	3 200	7 100	**6016***	**ZZ**	**VV**	**DDU**
	140	26	2	72 500	53 000	14.6	4 500	3 000	5 300	**6216**	**ZZ**	**VV**	**DDU**
	140	26	2.0	76 500	53 000	14.6	5 300	3 000	6 300	**6216***	**ZZ**	**VV**	**DDU**
	170	39	2.1	123 000	86 500	13.3	4 000	2 800	4 800	**6316**	**ZZ**	**VV**	**DDU**
	170	39	2.1	129 000	86 500	13.3	4 500	2 800	5 600	**6316***	**ZZ**	**VV**	**DDU**
85	110	13	1	18 700	20 000	17.1	5 600	3 200	6 700	**6817**	**ZZ**	**VV**	**DDU**
	120	18	1.1	32 000	29 600	16.4	5 300	3 000	6 300	**6917**	**ZZ**	**VV**	**DDU**
	130	14	0.6	33 000	31 500	16.5	5 000	–	6 000	**16017**	–	–	–
	130	22	1.1	49 500	43 000	15.8	5 000	3 000	6 000	**6017**	**ZZ**	**VV**	**DDU**
	130	22	1.1	52 000	43 000	15.8	6 000	3 000	7 100	**6017***	**ZZ**	**VV**	**DDU**
	150	28	2	84 000	62 000	14.5	4 300	2 800	5 000	**6217**	**ZZ**	**VV**	**DDU**
	150	28	2.0	88 000	62 000	14.5	4 800	2 800	6 000	**6217***	**ZZ**	**VV**	**DDU**
	180	41	3	133 000	97 000	13.3	3 800	2 600	4 500	**6317**	**ZZ**	**VV**	**DDU**
	180	41	3.0	139 000	97 000	13.3	4 300	2 600	5 000	**6317***	**ZZ**	**VV**	**DDU**
90	115	13	1	19 000	21 000	17.2	5 300	3 000	6 300	**6818**	**ZZ**	**VV**	**DDU**
	125	18	1.1	33 000	31 500	16.5	5 000	2 800	6 000	**6918**	**ZZ**	**VV**	**DDU**
	140	16	1	41 500	39 500	16.3	4 800	–	5 600	**16018**	–	–	–
	140	24	1.5	58 000	50 000	15.6	4 800	2 800	5 600	**6018**	**ZZ**	**VV**	**DDU**
	140	24	1.5	61 000	50 000	15.6	5 600	2 800	6 300	**6018***	**ZZ**	**VV**	**DDU**
	160	30	2	96 000	71 500	14.5	4 000	2 600	4 800	**6218**	**ZZ**	**VV**	**DDU**
	160	30	2.0	101 000	71 500	14.5	4 500	2 600	5 600	**6218***	**ZZ**	**VV**	**DDU**
	190	43	3	143 000	107 000	13.3	3 600	2 400	4 300	**6318**	**ZZ**	**VV**	**DDU**
	190	43	3.0	150 000	107 000	13.3	4 000	2 400	4 800	**6318***	**ZZ**	**VV**	**DDU**

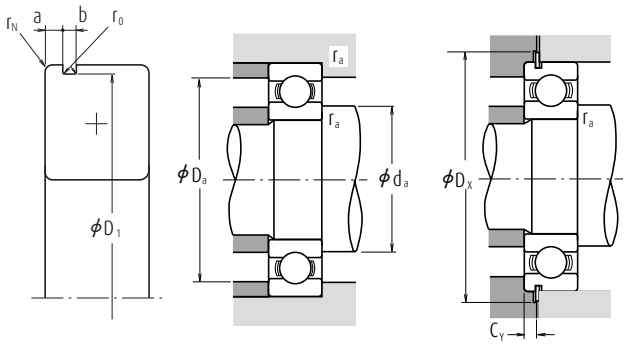
Notes

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

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

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

(4) Not conformed to ISO15.



Dynamic Equivalent Load

$P=XF_r+YF_a$

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

Static Equivalent Load

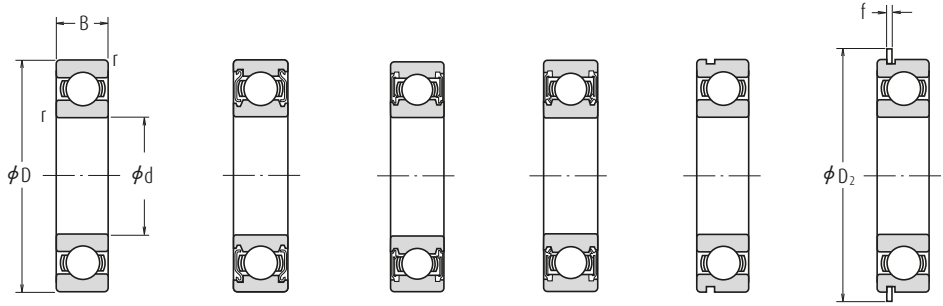
$\frac{F_a}{F_r}>0.8$, $P_0=0.6F_r+0.5F_a$

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

With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm) a max.	b min.	D_1 max.	r_0 max.	r_N min.	Snap Ring (1) Dimensions (mm) D_2 max.	f max.	Abutment and Fillet Dimensions (mm) d_a(2) min.	d_a(2) max.	D_a(2) max.	r_a max.	D_x min.	C_y max.	Mass (kg) approx.
N	NR	1.70	1.3	97.9	0.4	0.5	104.4	1.12	84	84.5	96	0.6	106	2.5	0.151
N	NR	2.50	1.3	107.60	0.4	0.5	115.7	1.12	85	87.5	105	1	117	3.3	0.391
—	—	—	—	—	—	—	—	—	84	—	121	0.6	—	—	0.621
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
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
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
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
N	NR	5.69	3.5	163.65	0.6	0.5	182.9	3.10	91	104.5	159	2	185	8.4	3.67
N	NR	5.69	3.5	163.65	0.6	0.5	182.9	3.10	91	104.5	159	2	185	8.4	3.67
N	NR	2.10	1.3	107.60	0.4	0.5	115.7	1.12	90	90.5	105	1	117	2.9	0.263
N	NR	3.30	1.3	117.60	0.4	0.5	125.7	1.12	91.5	94.5	113.5	1	127	4.1	0.55
—	—	—	—	—	—	—	—	—	89	—	126	0.6	—	—	0.652
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
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
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
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
N	NR	5.69	3.5	173.66	0.6	0.5	192.9	3.10	98	110.5	167	2.5	195	8.4	4.28
N	NR	5.69	3.5	173.66	0.6	0.5	192.9	3.10	98	110.5	167	2.5	195	8.4	4.28
N	NR	2.10	1.3	112.60	0.4	0.5	120.7	1.12	95	95.5	110	1	122	2.9	0.276
N	NR	3.30	1.3	122.60	0.4	0.5	130.7	1.12	96.5	98.5	118.5	1	132	4.1	0.585
—	—	—	—	—	—	—	—	—	95	—	135	1	—	—	0.873
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
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
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
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
N	NR	5.69	3.5	183.64	0.6	0.5	202.9	3.10	103	117	177	2.5	205	8.4	4.98
N	NR	5.69	3.5	183.64	0.6	0.5	202.9	3.10	103	117	177	2.5	205	8.4	4.98

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

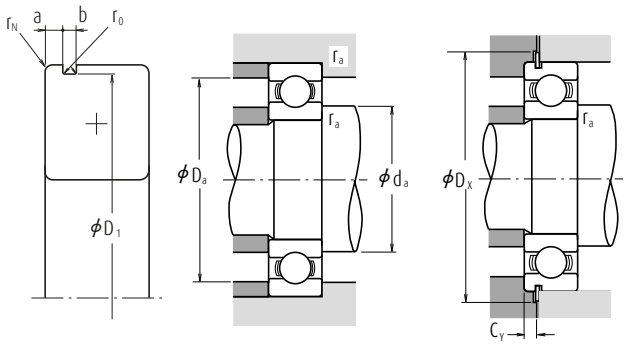
Bore Diameter 95 – 105 mm



Open Type | Shielded Type ZZ · ZZS | Non-Contact Sealed Type VV | Contact Sealed Type DD · DDU | With Snap Ring Groove N | With Snap Ring NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Numbers			
							Grease		Oil				
d	D	B	r min.	C_r	C_{or}	f_o	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
95	120	13	1	19 300	22 000	17.2	5 000	2 800	6 000	**6819**	**ZZ**	**VV**	**DD**
	130	18	1.1	33 500	33 500	16.6	4 800	2 800	5 600	**6919**	**ZZ**	**VV**	**DDU**
	145	16	1	43 000	42 000	16.4	4 500	—	5 300	**16019**	—	—	—
	145	24	1.5	60 500	54 000	15.8	4 500	2 600	5 300	**6019**	**ZZ**	**VV**	**DDU**
	145	24	1.5	63 500	54 000	15.8	5 300	2 600	6 000	**6019***	**ZZ**	**VV**	**DDU**
	170	32	2.1	109 000	82 000	14.4	3 800	2 600	4 500	**6219**	**ZZ**	**VV**	**DDU**
	170	32	2.1	114 000	82 000	14.4	4 300	2 600	5 000	**6219***	**ZZ**	**VV**	**DDU**
	200	45	3	153 000	119 000	13.3	3 000	2 400	3 600	**6319**	**ZZ**	**VV**	**DDU**
	200	45	3.0	160 000	119 000	13.3	3 400	2 400	4 300	**6319***	**ZZ**	**VV**	**DDU**
100	125	13	1	19 600	23 000	17.3	4 800	2 800	5 600	**6820**	**ZZ**	**VV**	**DD**
	140	20	1.1	43 000	42 000	16.4	4 500	2 600	5 300	**6920**	**ZZ**	**VV**	**DDU**
	150	16	1	42 500	42 000	16.5	4 300	—	5 300	**16020**	—	—	—
	150	24	1.5	60 000	54 000	15.9	4 300	2 600	5 300	**6020**	**ZZ**	**VV**	**DDU**
	150	24	1.5	63 000	54 000	15.9	5 000	2 600	6 000	**6020***	**ZZ**	**VV**	**DDU**
	180	34	2.1	122 000	93 000	14.4	3 600	2 400	4 300	**6220**	**ZZ**	**VV**	**DDU**
	180	34	2.1	128 000	93 000	14.4	4 000	2 400	4 800	**6220***	**ZZ**	**VV**	**DDU**
	215	47	3	173 000	141 000	13.2	2 800	2 200	3 400	**6320**	**ZZ**	**VV**	**DDU**
105	130	13	1	19 800	23 900	17.4	4 800	2 600	5 600	**6821**	**ZZ**	**VV**	**DDU**
	145	20	1.1	42 500	42 000	16.5	4 300	—	5 300	**6921**	**ZZ**	**VV**	—
	160	18	1	52 000	50 500	16.3	4 000	—	4 800	**16021**	—	—	—
	160	26	2	72 500	66 000	15.8	4 000	2 400	4 800	**6021**	**ZZ**	**VV**	**DDU**
	160	26	2.0	76 000	66 000	15.8	4 500	2 400	5 600	**6021***	**ZZ**	**VV**	**DDU**
	190	36	2.1	133 000	105 000	14.4	3 400	2 200	4 000	**6221**	**ZZ**	**VV**	**DDU**
	190	36	2.1	140 000	105 000	14.4	3 800	2 200	4 500	**6221***	**ZZ**	**VV**	**DDU**
	225	49	3	184 000	154 000	13.2	2 600	2 000	3 200	**6321**	**ZZ**	—	**DDU**

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



Dynamic Equivalent Load

$P=XF_r+YF_a$

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

Static Equivalent Load

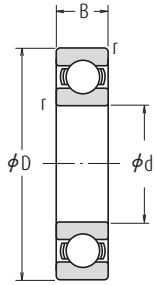
$\frac{F_a}{F_r} > 0.8$, $P_0=0.6F_r+0.5F_a$

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

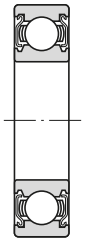
With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
		a max.	b min.	D_1 max.	r_0 max.	r_N min.	D_2 max.	f max.	d_a(2) min.	d_a(2) max.	D_a(2) max.	r_a max.	D_x min.	C_y max.	approx.
N	NR	2.10	1.3	117.60	0.4	0.5	125.7	1.12	100	101.5	115	1	127	2.9	0.297
N	NR	3.30	1.3	127.60	0.4	0.5	135.7	1.12	101.5	103.5	123.5	1	137	4.1	0.601
—	—	—	—	—	—	—	—	—	100	—	140	1	—	—	0.904
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
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
N	NR	5.69	3.5	163.65	0.6	0.5	182.9	3.10	106	114	159	2	185	8.4	2.64
N	NR	5.69	3.5	163.65	0.6	0.5	182.9	3.10	106	114	159	2	185	8.4	2.64
N	NR	5.69	3.5	193.65	0.6	0.5	212.9	3.10	108	123.5	187	2.5	215	8.4	5.76
N	NR	5.69	3.5	193.65	0.6	0.5	212.9	3.10	108	123.5	187	2.5	215	8.4	5.76
N	NR	2.10	1.3	122.60	0.4	0.5	130.7	1.12	105	105.5	120	1	132	2.9	0.31
N	NR	3.30	1.9	137.60	0.6	0.5	145.7	1.70	106.5	111	133.5	1	147	4.7	0.828
—	—	—	—	—	—	—	—	—	105	—	145	1	—	—	0.945
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
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
N	NR	5.69	3.5	173.66	0.6	0.5	192.9	3.10	111	121.5	169	2	195	8.4	3.17
N	NR	5.69	3.5	173.66	0.6	0.5	192.9	3.10	111	121.5	169	2	195	8.4	3.17
—	—	—	—	—	—	—	—	—	113	133	202	2.5	—	—	7.04
N	NR	2.10	1.3	127.60	0.4	0.5	135.7	1.12	110	110.5	125	1	137	2.9	0.324
N	NR	3.30	1.9	142.60	0.6	0.5	150.7	1.70	111.5	116	138.5	1	152	4.7	0.856
—	—	—	—	—	—	—	—	—	110	—	155	1	—	—	1.24
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
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
N	NR	5.69	3.5	183.64	0.6	0.5	202.9	3.10	116	127.5	179	2	205	8.4	3.79
N	NR	5.69	3.5	183.64	0.6	0.5	202.9	3.10	116	127.5	179	2	205	8.4	3.79
—	—	—	—	—	—	—	—	—	118	138	212	2.5	—	—	8.09

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

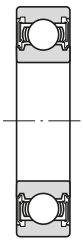
Bore Diameter 110 – 150 mm



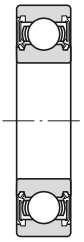
Open Type



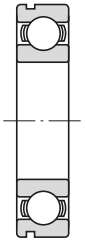
Shielded Type
ZZ · ZZS



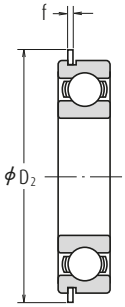
Non-Contact
Sealed Type
VV



Contact
Sealed Type
DD · DDU



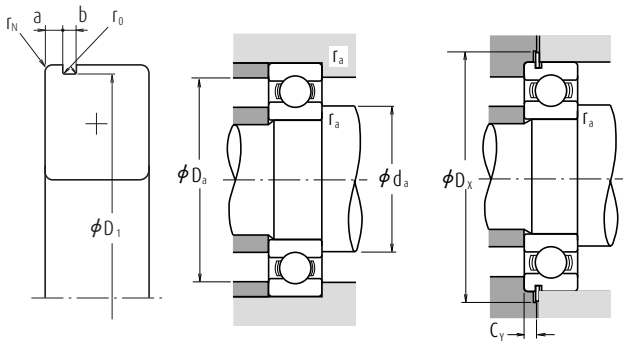
With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Numbers			
							Grease		Oil				
d	D	B	r min.	C_r	C_{or}	f_o	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
110	140	16	1	28 100	32 500	17.1	4 300	2 400	5 300	**6822**	**ZZ**	**VV**	**DDU**
	150	20	1.1	43 500	44 500	16.6	4 300	2 400	5 000	**6922**	**ZZ**	**VV**	**DDU**
	170	19	1	57 500	56 500	16.3	3 800	–	4 500	**16022**	–	–	–
	170	28	2	85 000	73 000	15.5	3 800	2 200	4 500	**6022**	**ZZ**	**VV**	**DDU**
	170	28	2.0	89 000	73 000	15.5	4 500	2 200	5 300	**6022***	**ZZ**	**VV**	**DDU**
	200	38	2.1	144 000	117 000	14.3	2 800	2 200	3 400	**6222**	**ZZ**	**VV**	**DDU**
	240	50	3	205 000	179 000	13.2	2 400	–	3 000	**6322**	**ZZ**	–	–
120	150	16	1	28 900	35 500	17.3	4 000	2 200	4 800	**6824**	**ZZ**	**VV**	**DD**
	165	22	1.1	53 000	54 000	16.5	3 800	–	4 500	**6924**	**ZZ**	–	–
	180	19	1	56 500	57 500	16.5	3 600	–	4 300	**16024**	–	–	–
	180	28	2	88 000	80 000	15.7	3 600	2 200	4 300	**6024**	**ZZ**	**VV**	**DDU**
	180	28	2.0	92 500	80 000	15.7	4 000	2 200	4 800	**6024***	**ZZ**	**VV**	**DDU**
	215	40	2.1	155 000	131 000	14.4	2 600	2 000	3 200	**6224**	**ZZ**	**VV**	**DDU**
	260	55	3	207 000	185 000	13.5	2 200	1 800	2 800	**6324**	**ZZS**	–	**DDU**
130	165	18	1.1	37 000	44 000	17.1	3 600	2 000	4 300	**6826**	**ZZS**	**VV**	**DD**
	180	24	1.5	65 000	67 500	16.5	3 400	–	4 000	**6926**	**ZZ**	–	–
	200	22	1.1	75 500	77 500	16.4	3 000	–	3 600	**16026**	–	–	–
	200	33	2	106 000	101 000	15.8	3 000	1 900	3 600	**6026**	**ZZ**	–	**DDU**
	230	40	3	167 000	146 000	14.5	2 400	–	3 000	**6226**	**ZZ**	–	–
	280	58	4	229 000	214 000	13.6	2 200	–	2 600	**6326**	**ZZS**	–	–
140	175	18	1.1	38 500	48 000	17.3	3 400	1 900	4 000	**6828**	**ZZ**	**VV**	**DDU**
	190	24	1.5	66 500	72 000	16.6	3 200	–	3 800	**6928**	**ZZS**	**VV**	–
	210	22	1.1	77 500	82 500	16.5	2 800	–	3 400	**16028**	–	–	–
	210	33	2	110 000	109 000	16.0	2 800	1 800	3 400	**6028**	**ZZ**	–	**DDU**
	250	42	3	166 000	150 000	14.9	2 200	1 700	2 800	**6228**	**ZZS**	–	**DDU**
	300	62	4	253 000	246 000	13.6	2 000	–	2 400	**6328**	**ZZS**	–	–
150	190	20	1.1	47 500	58 500	17.1	3 200	1 800	3 800	**6830**	**ZZ**	**VV**	**DDU**
	210	28	2	85 000	90 500	16.5	2 600	1 700	3 200	**6930**	**ZZS**	–	**DDU**
	225	24	1.1	84 000	91 000	16.6	2 600	–	3 000	**16030**	–	–	–
	225	35	2.1	126 000	126 000	15.9	2 600	1 700	3 000	**6030**	**ZZ**	**VV**	**DDU**
	270	45	3	176 000	168 000	15.1	2 000	–	2 600	**6230**	**ZZS**	–	–
	320	65	4	274 000	284 000	13.9	1 800	–	2 200	**6330**	**ZZS**	–	–

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



Dynamic Equivalent Load

$P=XF_r+YF_a$

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

Static Equivalent Load

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

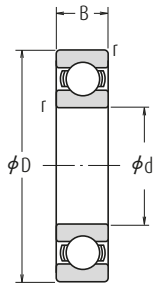
$\frac{F_a}{F_r}\leq 0.8$, $P_0=F_r$

With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm) a max.	b min.	D_1 max.	r_0 max.	r_N min.	Snap Ring (1) Dimensions (mm) D_2 max.	f max.	Abutment and Fillet Dimensions (mm) d_a(2) min.	d_a(2) max.	D_a(2) max.	r_a max.	D_x min.	C_y max.	Mass (kg) approx.
N	NR	2.50	1.9	137.60	0.6	0.5	145.7	1.7	115	117	135	1	147	3.9	0.497
N	NR	3.30	1.9	147.60	0.6	0.5	155.7	1.7	116.5	121	143.5	1	157	4.7	0.893
—	—	—	—	—	—	—	—	—	115	—	165	1	—	—	1.51
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
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
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
—	—	—	—	—	—	—	—	—	123	147	227	2.5	—	—	9.51
N	NR	2.50	1.9	147.60	0.6	0.5	155.7	1.7	125	127	145	1	157	3.9	0.537
N	NR	3.70	1.9	161.80	0.6	0.5	171.5	1.7	126.5	132	158.5	1	173	5.1	1.21
—	—	—	—	—	—	—	—	—	125	—	175	1	—	—	1.6
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
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
—	—	—	—	—	—	—	—	—	131	146	204	2	—	—	5.29
—	—	—	—	—	—	—	—	—	133	161	247	2.5	—	—	12.5
N	NR	3.30	1.9	161.80	0.6	0.5	171.5	1.7	136.5	138	158.5	1	173	4.7	0.758
N	NR	3.70	1.9	176.80	0.6	0.5	186.5	1.7	138	144	172	1.5	188	5.1	1.57
—	—	—	—	—	—	—	—	—	136.5	—	193.5	1	—	—	2.4
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
—	—	—	—	—	—	—	—	—	143	157	217	2.5	—	—	5.96
—	—	—	—	—	—	—	—	—	146	175	264	3	—	—	15.2
N	NR	3.30	1.9	171.80	0.6	0.5	181.5	1.7	146.5	148.5	168.5	1	183	4.7	0.832
N	NR	3.70	1.9	186.80	0.6	0.5	196.5	1.7	148	153.5	182	1.5	198	5.1	1.67
—	—	—	—	—	—	—	—	—	146.5	—	203.5	1	—	—	2.84
—	—	—	—	—	—	—	—	—	149	158.5	201	2	—	—	3.48
—	—	—	—	—	—	—	—	—	153	171.5	237	2.5	—	—	7.68
—	—	—	—	—	—	—	—	—	156	187	284	3	—	—	18.5
N	NR	3.30	1.9	186.80	0.6	0.5	196.5	1.7	156.5	160	183.5	1	198	4.7	1.15
—	—	—	—	—	—	—	—	—	159	166	201	2	—	—	3.01
—	—	—	—	—	—	—	—	—	156.5	—	218.5	1	—	—	3.62
—	—	—	—	—	—	—	—	—	161	170	214	2	—	—	4.24
—	—	—	—	—	—	—	—	—	163	186	257	2.5	—	—	10
—	—	—	—	—	—	—	—	—	166	203	304	3	—	—	22.7

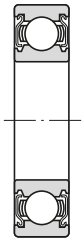
Remarks

1. When using bearings with rotating outer rings, contact NSK if they are sealed, shielded, or have snap rings.
2. Please consult NSK about the snap ring groove dimensions of sealed and shielded bearings when the diameter of dimension series 18 and 19 is 50 mm or more.
3. The bearings denoted by an asterisk(*) are NSKHPS Deep groove ball bearings.

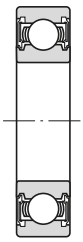
Bore Diameter 160 mm



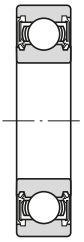
Open Type



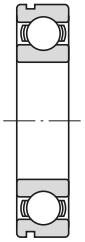
Shielded Type
ZZ · ZZS



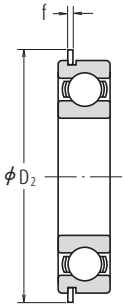
Non-Contact
Sealed Type
VV



Contact
Sealed Type
DD · DDU



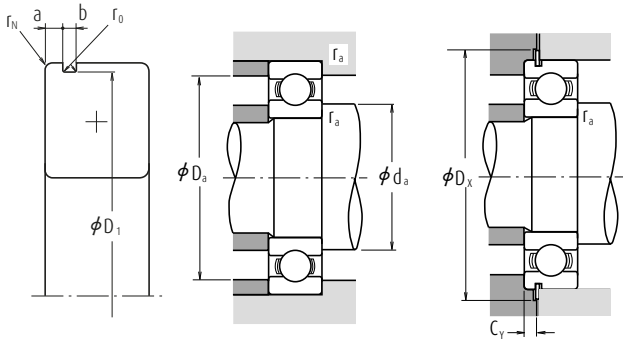
With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Numbers			
							Grease		Oil				
d	D	B	r min.	C_r	C_{or}	f_o	Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
160	200	20	1.1	48 500	61 000	17.2	2 600	1 700	3 200	**6832**	**ZZS**	**VV**	**DDU**
	220	28	2	87 000	96 000	16.6	2 600	1 600	3 000	**6932**	**ZZS**	—	**DDU**
	240	25	1.5	99 000	108 000	16.5	2 400	—	2 800	**16032**	—	—	—
	240	38	2.1	137 000	135 000	15.9	2 400	1 600	2 800	**6032**	**ZZ**	—	**DDU**
	290	48	3	185 000	186 000	15.4	1 900	—	2 400	**6232**	**ZZS**	—	—
	340	68	4	278 000	287 000	13.9	1 700	—	2 000	**6332**	**ZZS**	—	—

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



Dynamic Equivalent Load

$P=XF_r+YF_a$

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

Static Equivalent Load

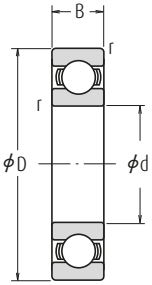
$\frac{F_a}{F_r} > 0.8$, $P_0=0.6F_r+0.5F_a$

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

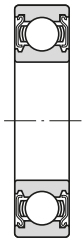
With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
		a max.	b min.	D_1 max.	r_0 max.	r_N min.	D_2 max.	f max.	d_a(2) min.	d_a(2) max.	D_a(2) max.	r_a max.	D_x min.	C_y max.	approx.
N	NR	3.30	1.9	196.80	0.6	0.5	206.5	1.7	166.5	170.5	193.5	1	208	4.7	1.23
—	—	—	—	—	—	—	—	—	169	176	211	2	—	—	2.71
—	—	—	—	—	—	—	—	—	168	—	232	1.5	—	—	4.2
—	—	—	—	—	—	—	—	—	171	181.5	229	2	—	—	5.15
—	—	—	—	—	—	—	—	—	173	202	277	2.5	—	—	12.8
—	—	—	—	—	—	—	—	—	176	215.5	324	3	—	—	26.2

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

Bore Diameter 170 – 240 mm



Open Type



Shielded Type
ZZS

Non-Contact
Sealed Type
VV

Contact
Sealed Type
DDU

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min⁻¹)			Bearing Numbers			
							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	
170	215	22	1.1	60 000	75 000	17.1	2 600	1 600	3 000	**6834**	**ZZS**	**VV**	**DDU**
	230	28	2	86 000	97 000	16.7	2 400	—	2 800	**6934**	**ZZS**	—	—
	260	28	1.5	114 000	126 000	16.5	2 200	—	2 600	**16034**	—	—	—
	260	42	2.1	161 000	161 000	15.8	2 200	—	2 600	**6034**	**ZZS**	**VV**	—
	310	52	4	212 000	224 000	15.3	1 800	—	2 200	**6234**	**ZZS**	—	—
	360	72	4	325 000	355 000	13.6	1 600	—	2 000	**6334**	—	—	—
180	225	22	1.1	60 500	78 500	17.2	2 400	—	2 800	**6836**	—	**VV**	—
	250	33	2	119 000	128 000	16.4	2 200	—	2 600	**6936**	**ZZS**	—	—
	280	31	2	145 000	157 000	16.3	2 000	—	2 400	**16036**	—	—	—
	280	46	2.1	180 000	185 000	15.6	2 000	—	2 400	**6036**	**ZZS**	**VV**	—
	320	52	4	227 000	241 000	15.1	1 700	—	2 000	**6236**	**ZZS**	—	—
	380	75	4	355 000	405 000	13.9	1 500	—	1 800	**6336**	—	—	—
190	240	24	1.5	73 000	93 500	17.1	2 200	—	2 600	**6838**	—	**VV**	—
	260	33	2	113 000	127 000	16.6	2 200	—	2 600	**6938**	—	—	—
	290	31	2	149 000	168 000	16.4	2 000	—	2 400	**16038**	—	—	—
	290	46	2.1	188 000	201 000	15.8	2 000	—	2 400	**6038**	**ZZS**	—	—
	340	55	4	255 000	282 000	15.0	1 600	—	2 000	**6238**	**ZZS**	—	—
	400	78	5	355 000	415 000	14.1	1 400	—	1 700	**6338**	—	—	—
200	250	24	1.5	74 000	98 000	17.2	2 200	—	2 600	**6840**	—	—	—
	280	38	2.1	143 000	158 000	16.4	2 000	—	2 400	**6940**	**ZZS**	—	—
	310	34	2	161 000	180 000	16.4	1 900	—	2 200	**16040**	—	—	—
	310	51	2.1	207 000	226 000	15.6	1 900	—	2 200	**6040**	**ZZS**	—	—
	360	58	4	269 000	310 000	15.2	1 500	—	1 800	**6240**	**ZZS**	—	—
	420	80	5	380 000	445 000	13.8	1 300	—	1 600	**6340**	—	—	—
220	270	24	1.5	76 500	107 000	17.4	1 900	—	2 400	**6844**	**ZZS**	—	—
	300	38	2.1	146 000	169 000	16.6	1 800	—	2 200	**6944**	**ZZS**	—	—
	340	37	2.1	180 000	217 000	16.5	1 600	—	2 000	**16044**	—	—	—
	340	56	3	235 000	271 000	15.6	1 700	—	2 000	**6044**	**ZZS**	—	—
	400	65	4	310 000	375 000	15.1	1 300	—	1 600	**6244**	—	—	—
	460	88	5	410 000	520 000	14.3	1 200	—	1 500	**6344**	—	—	—
240	300	28	2	98 500	137 000	17.3	1 700	—	2 000	**6848**	—	—	—
	320	38	2.1	154 000	190 000	16.8	1 700	—	2 000	**6948**	**ZZS**	—	—
	360	37	2.1	196 000	243 000	16.5	1 500	—	1 900	**16048**	—	—	—
	360	56	3	244 000	296 000	15.9	1 500	—	1 900	**6048**	—	—	—
	440	72	4	340 000	430 000	15.2	1 200	—	1 500	**6248**	—	—	—
	500	95	5	470 000	625 000	14.2	1 100	—	1 300	**6348**	—	—	—

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

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

Dynamic Equivalent Load

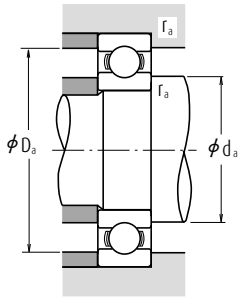
$P=XF_r+YF_a$

$\frac{f_o F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \le e$		$\frac{F_a}{F_r} > e$	
		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

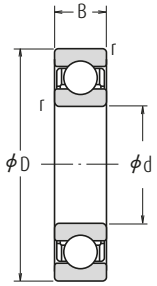
$\frac{F_a}{F_r} > 0.8,\ P_0=0.6F_r+0.5F_a$

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



Abutment and Fillet Dimensions (mm)				Mass (kg)
d_a(1) min.	d_a(1) max.	D_a(1) max.	r_a max.	approx.
176.5	182.0	208.5	1	1.86
179	186.0	221	2	3.34
178	—	252	1.5	5.71
181	194.5	249	2	6.89
186	215.0	294	3	15.8
186	—	344	3	36.6
186.5	192.0	218.5	1	1.98
189	198.5	241	2	4.16
189	—	271	2	7.5
191	208.0	269	2	8.88
196	223.0	304	3	15.9
196	—	364	3	43.1
198	202.5	232	1.5	2.53
199	—	251	2	5.18
199	—	281	2	7.78
201	218.0	279	2	9.39
206	236.0	324	3	22.3
210	—	380	4	49.7
208	—	242	1.5	2.67
211	222.0	269	2	7.28
209	—	301	2	10
211	231.5	299	2	12
216	252.0	344	3	26.7
220	—	400	4	55.3
228	233.5	262	1.5	2.9
231	242.0	289	2	7.88
231	—	329	2	13.1
233	254.5	327	2.5	18.6
236	—	384	3	37.4
240	—	440	4	73.9
249	—	291	2	4.48
251	262.0	309	2	8.49
251	—	349	2	13.9
253	—	347	2.5	19.9
256	—	424	3	50.5
260	—	480	4	94.4

Bore Diameter 260 – 360 mm



Open Type

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min^{-1})		Bearing Numbers
d	D	B	r min.	C_r	C_{0r}	f_0	Grease	Oil	Open
260	320	28	2	101 000	148 000	17.4	1 600	1 900	**6852**
	360	46	2.1	204 000	255 000	16.5	1 500	1 800	**6952**
	400	44	3	237 000	310 000	16.4	1 400	1 700	**16052**
	400	65	4	291 000	375 000	15.8	1 400	1 700	**6052**
	480	80	5	400 000	540 000	15.1	1 100	1 300	**6252**
	540	102	6	505 000	710 000	14.6	1 000	1 200	**6352**
280	350	33	2	133 000	191 000	17.3	1 500	1 700	**6856**
	380	46	2.1	209 000	272 000	16.6	1 400	1 700	**6956**
	420	44	3	243 000	330 000	16.5	1 300	1 600	**16056**
	420	65	4	300 000	410 000	16.0	1 300	1 600	**6056**
	500	80	5	400 000	550 000	15.2	1 000	1 300	**6256**
	580	108	6	570 000	840 000	14.5	900	1 100	**6356**
300	380	38	2.1	166 000	233 000	17.1	1 300	1 600	**6860**
	420	56	3	269 000	370 000	16.4	1 300	1 500	**6960**
	460	50	4	285 000	405 000	16.4	1 200	1 400	**16060**
	460	74	4	355 000	500 000	15.8	1 200	1 400	**6060**
	540	85	5	465 000	670 000	15.1	950	1 200	**6260**
320	400	38	2.1	168 000	244 000	17.2	1 300	1 500	**6864**
	440	56	3	266 000	375 000	16.5	1 200	1 400	**6964**
	480	50	4	293 000	430 000	16.5	1 100	1 300	**16064**
	480	74	4	390 000	570 000	15.7	1 100	1 300	**6064**
	580	92	5	530 000	805 000	15.0	850	1 100	**6264**
340	420	38	2.1	175 000	265 000	17.3	1 200	1 400	**6868**
	460	56	3	273 000	400 000	16.6	1 100	1 300	**6968**
	520	82	5	440 000	660 000	15.6	1 000	1 200	**6068**
	620	92	6	530 000	820 000	15.3	800	1 000	**6268**
360	440	38	2.1	192 000	290 000	17.3	1 100	1 300	**6872**
	480	56	3	280 000	425 000	16.7	1 100	1 300	**6972**
	540	82	5	460 000	720 000	15.7	950	1 200	**6072**
	650	95	6	555 000	905 000	15.4	750	950	**6272**

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

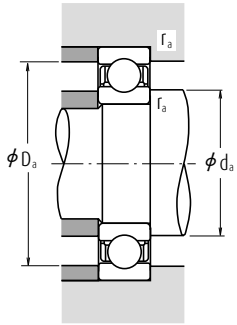
Dynamic Equivalent Load $P=XF_r+YF_a$

$\frac{f_o F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \le e$		$\frac{F_a}{F_r} > e$	
		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

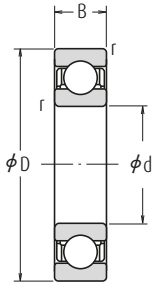
$\frac{F_a}{F_r} > 0.8$, $P_0=0.6F_r+0.5F_a$

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



Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a(1) min.	D_a(1) max.	r_a max.	approx.
269	311	2	4.84
271	349	2	14
273	387	2.5	21.1
276	384	3	29.4
280	460	4	67
286	514	5	118
289	341	2	7.2
291	369	2	15.1
293	407	2.5	22.7
296	404	3	31.2
300	480	4	70.4
306	554	5	144
311	369	2	10.3
313	407	2.5	23.9
316	444	3	31.5
316	444	3	44.2
320	520	4	87.8
331	389	2	10.8
333	427	2.5	25.3
336	464	3	33.2
336	464	3	46.5
340	560	4	111
351	409	2	11.5
353	447	2.5	26.6
360	500	4	62.3
366	594	5	129
371	429	2	11.8
373	467	2.5	27.9
380	520	4	65.3
386	624	5	145

Bore Diameter 380 – 600 mm



Open Type

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min^{-1})		Bearing Numbers
d	D	B	r min.	C_r	C_{0r}	f_0	Grease	Oil	Open
380	480	46	2.1	238 000	375 000	17.1	1 000	1 200	**6876**
	520	65	4	325 000	510 000	16.6	950	1 200	**6976**
	560	82	5	455 000	725 000	15.9	900	1 100	**6076**
400	500	46	2.1	241 000	390 000	17.2	950	1 200	**6880**
	540	65	4	335 000	540 000	16.7	900	1 100	**6980**
	600	90	5	510 000	825 000	15.7	850	1 000	**6080**
420	520	46	2.1	245 000	410 000	17.3	900	1 100	**6884**
	560	65	4	340 000	570 000	16.8	900	1 100	**6984**
	620	90	5	530 000	895 000	15.8	800	1 000	**6084**
440	540	46	2.1	248 000	425 000	17.4	900	1 100	**6888**
	600	74	4	395 000	680 000	16.6	800	1 000	**6988**
	650	94	6	550 000	965 000	16.0	750	900	**6088**
460	580	56	3	310 000	550 000	17.1	800	1 000	**6892**
	620	74	4	405 000	720 000	16.7	800	950	**6992**
	680	100	6	605 000	1 080 000	15.8	710	850	**6092**
480	600	56	3	315 000	575 000	17.2	800	950	**6896**
	650	78	5	450 000	815 000	16.6	750	900	**6996**
	700	100	6	605 000	1 090 000	15.9	710	850	**6096**
500	620	56	3	320 000	600 000	17.3	750	900	**68/500**
	670	78	5	460 000	865 000	16.7	710	850	**69/500**
	720	100	6	630 000	1 170 000	16.0	670	800	**60/500**
530	650	56	3	325 000	625 000	17.4	710	850	**68/530**
	710	82	5	455 000	870 000	16.8	670	800	**69/530**
	780	112	6	680 000	1 300 000	16.0	600	750	**60/530**
560	680	56	3	330 000	650 000	17.4	670	800	**68/560**
	750	85	5	525 000	1 040 000	16.7	600	750	**69/560**
	820	115	6	735 000	1 500 000	16.2	560	670	**60/560**
600	730	60	3	355 000	735 000	17.5	600	710	**68/600**
	800	90	5	550 000	1 160 000	16.9	560	670	**69/600**
	870	118	6	790 000	1 640 000	16.1	530	630	**60/600**

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

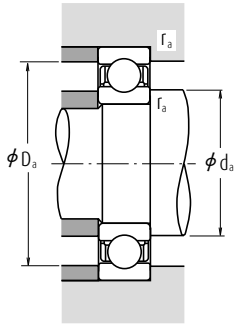
Dynamic Equivalent Load $P=XF_r+YF_a$

$\frac{f_o F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \le e$		$\frac{F_a}{F_r} > e$	
		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

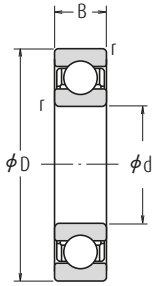
$\frac{F_a}{F_r} > 0.8$, $P_0=0.6F_r+0.5F_a$

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



Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a(1) min.	D_a(1) max.	r_a max.	approx.
391	469	2	19.5
396	504	3	40
400	540	4	68
411	489	2	20.5
416	524	3	42
420	580	4	88.4
431	509	2	21.4
436	544	3	43.6
440	600	4	92.2
451	529	2	22.3
456	584	3	60.2
466	624	5	106
473	567	2.5	34.3
476	604	3	62.6
486	654	5	123
493	587	2.5	35.4
500	630	4	73.5
506	674	5	127
513	607	2.5	37.2
520	650	4	82
526	694	5	131
543	637	2.5	39.8
550	690	4	89.8
556	754	5	184
573	667	2.5	41.5
580	730	4	105
586	793.5	5	203
613	717	2.5	50.9
620	780	4	120
626	844	5	236

Bore Diameter 630 – 800 mm



Open Type

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min^{-1})		Bearing Numbers
d	D	B	r min.	C_r	C_{0r}	f_0	Grease	Oil	Open
630	780	69	4	420 000	890 000	17.3	560	670	**68/630**
	850	100	6	625 000	1 350 000	16.7	530	630	**69/630**
	920	128	7.5	750 000	1 620 000	16.4	480	600	**60/630**
670	820	69	4	435 000	965 000	17.4	500	630	**68/670**
	900	103	6	675 000	1 460 000	16.7	480	560	**69/670**
	980	136	7.5	765 000	1 730 000	16.6	450	530	**60/670**
710	870	74	4	480 000	1 100 000	17.4	480	560	**68/710**
	950	106	6	715 000	1 640 000	16.8	450	530	**69/710**
750	920	78	5	525 000	1 260 000	17.4	430	530	**68/750**
	1 000	112	6	785 000	1 840 000	16.7	400	500	**69/750**
800	980	82	5	530 000	1 310 000	17.5	400	480	**68/800**
	1 060	115	6	825 000	2 050 000	16.8	380	450	**69/800**

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

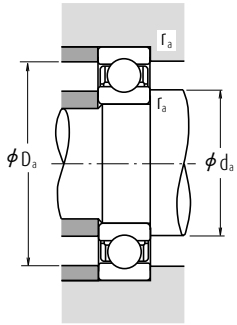
Dynamic Equivalent Load $P=XF_r+YF_a$

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

Static Equivalent Load

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

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



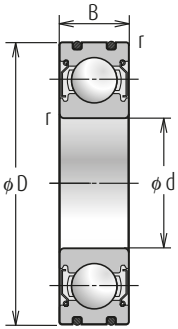
Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a(1) min.	D_a(1) max.	r_a max.	approx.
646	764	3	71.3
656	824	5	163
662	888	6	285
686	804	3	75.4
696	874	5	181
702	948	6	351
726	854	3	92.6
736	924	5	208
770	900	4	110
776	974	5	245
820	960	4	132
826	1034	5	275

Bore Diameter 10 – 100 mm

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

Notes (1) Although recommended fits are H7 or G6. G6 is recommended when used under conditions that prioritize insertion under light preload.
(2) Low-contact seal available for seal type bearings. Contact NSK for details.

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



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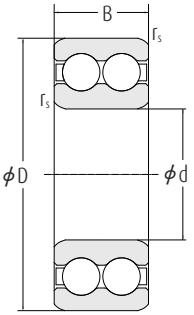
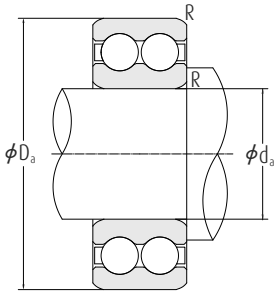
Double Row | Bore 10 - 90 mm

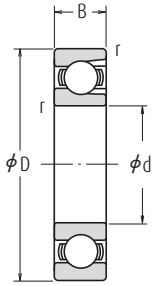




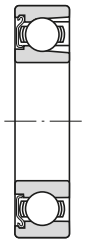
Dimensions				Abbreviation	Load ratings	
d	D	B	r_s min		dyn. C	stat. C_o
	mm				kN	
10	30	14	0.6	4200BTNG	9.15	5.2
12	32	14	0.6	4201BTNG	9.30	5.5
15	35	14	0.6	4202BTNG	10.4	6.7
	42	17	1.0	4302BTNG	14.6	9.2
17	40	16	0.6	4203BTNG	14.6	9.5
	47	19	1.0	4303BTNG	19.6	13.2
20	47	18	1.0	4204BTNG	18.0	12.7
	52	21	1,1	4304BTNG	23.2	16.0
25	52	18	1.0	4205BTNG	19.3	14.6
	62	24	1.1	4305BTNG	31.5	22.4
30	62	20	1.0	4206BTNG	26.0	20.8
	72	27	1.1	4306BTNG	40.0	30.5
35	72	23	1.1	4207BTNG	32.0	26.0
	80	31	1.5	4307BTNG	51.0	38.0
40	80	23	1.1	4208BTNG	34.0	30.0
	90	33	1.5	4308BTNG	63.0	48.0
45	85	23	1.1	4209BTNG	36.0	33.5
	100	36	1.5	4309BTNG	72.0	60.0
50	90	23	1.1	4210BTNG	37.5	36.5
	110	40	2.0	4310BTNG	90.0	75.0
55	100	25	1.5	4211BTNG	43.0	43.0
	120	43	2.0	4311BTNG	104.0	90.0
60	110	28	1.5	4212BTNG	57.0	58.5
	130	46	2.1	4312BTNG	120.0	106.0
65	120	31	1.5	4213BTNG	67.0	67.0
	140	48	2.1	4313BTNG	129.0	98.0
70	125	31	1.5	4214BTNG	69.5	73.5
	150	51	2.1	4314BTNG	146.0	114.0
75	130	31	1.5	4215BTNG	73.5	80.0
	160	55	2.1	4315BTNG	170.0	134.0
80	140	33	2.0	4216BTNG	80.0	90.0
85	150	36	2.0	4217BTNG	93.0	106.0
90	160	40	2.0	4218BTNG	112.0	122.0

Speed limits		Abutment dimensions			Weight
Grease	Oil	d_a min	D_a max	R min	
min^{-1}					kg
18 000	24 000	14.0	26.0	0.6	0.049
16 000	20 000	16.0	28.0	0.6	0.053
14 000	18 000	19.0	31.0	0.6	0.059
13 000	17 000	20.0	37.0	1.0	0.120
13 000	18 000	21.0	36.0	1.0	0.090
11 000	17 000	22.0	42.0	1.0	0.160
10 000	14 000	25.0	42.0	1.0	0.140
9 500	13 000	26.5	45.5	1.0	0.210
9 000	12 000	30.0	47.0	1.0	0.160
8 000	10 000	31.5	55.5	1.0	0.340
7 500	9 500	35.0	57.0	1.0	0.260
6 700	8 500	36.5	65.5	1.0	0.500
6 700	8 500	41.5	65.5	1.0	0.400
6 300	8 000	43.0	72.0	1.5	0.690
6 000	7 500	46.5	73.5	1.0	0.500
5 600	7 000	48.0	82.0	1.5	0.950
5 600	7 000	51.5	78.5	1.0	0.540
4 800	6 000	53.0	92.0	1.5	1.250
5 000	6 300	56.5	83.5	1.0	0.580
4 300	5 300	59.0	101.0	2.0	1.700
4 500	5 600	63.0	92.0	1.5	0.800
4 000	5 000	64.0	111.0	2.0	2.150
4 000	5 000	68.0	102.0	1.5	1.100
3 600	4 500	71.0	119.0	2.0	2.650
3 800	4 800	73.0	112.0	1.5	1.450
3 600	4 500	76.0	129.0	2.0	3.250
3 600	4 500	78.0	117.0	1.5	1.500
3 200	4 000	81.0	139.0	2.0	3.950
3 400	4 300	83.0	122.0	1.5	1.600
3 000	3 800	86.0	149.0	2.0	5.380
3 200	4 000	89.0	131.0	2.0	2.000
3 000	3 800	94.0	141.0	2.0	2.550
2 800	3 600	99.0	151.0	2.0	3.200

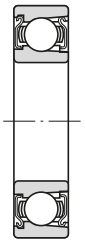
Bore Diameter 25 – 110 mm



Open Type



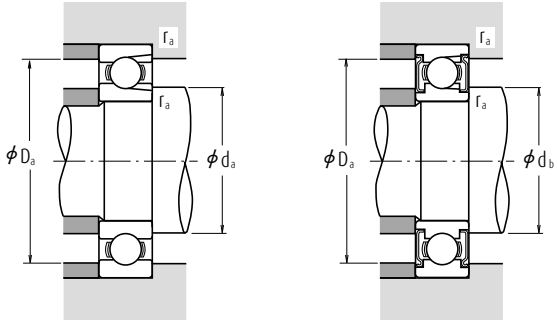
Shielded Type
(One Shield) Z



Shielded Type
(Two Shields) ZZ

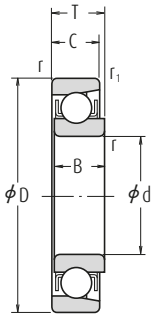
Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min⁻¹)		
						Grease	Oil	
d	D	B	r min.	C_r	C_{0r}	Open Z · ZZ	Open Z	Open
25	52	15	1	14 400	10 500	12 000	15 000	**BL 205**
	62	17	1.1	21 500	15 500	11 000	13 000	**BL 305**
30	62	16	1	21 000	16 300	10 000	12 000	**BL 206**
	72	19	1.1	27 900	20 700	9 000	11 000	**BL 306**
35	72	17	1.1	27 800	22 100	9 000	11 000	**BL 207**
	80	21	1.5	37 000	29 100	8 000	9 500	**BL 307**
40	80	18	1.1	35 500	28 800	8 000	9 500	**BL 208**
	90	23	1.5	46 500	36 000	7 500	9 000	**BL 308**
45	85	19	1.1	37 000	32 000	7 500	9 000	**BL 209**
	100	25	1.5	55 500	44 000	6 300	8 000	**BL 309**
50	90	20	1.1	39 000	35 000	6 700	8 500	**BL 210**
	110	27	2	65 000	52 500	6 000	7 100	**BL 310**
55	100	21	1.5	48 000	44 000	6 300	7 500	**BL 211**
	120	29	2	75 000	61 500	5 600	6 700	**BL 311**
60	110	22	1.5	58 000	54 000	5 600	6 700	**BL 212**
	130	31	2.1	85 500	71 500	5 000	6 000	**BL 312**
65	120	23	1.5	63 500	60 000	5 300	6 300	**BL 213**
	140	33	2.1	103 000	89 500	4 800	5 600	**BL 313**
70	125	24	1.5	69 000	66 000	5 000	6 000	**BL 214**
	150	35	2.1	115 000	102 000	4 300	5 300	**BL 314**
75	130	25	1.5	72 000	72 000	4 500	5 600	**BL 215**
	160	37	2.1	126 000	116 000	4 000	5 000	**BL 315**
80	140	26	2	84 000	85 000	4 300	5 300	**BL 216**
	170	39	2.1	136 000	130 000	3 800	4 500	**BL 316**
85	150	28	2	93 000	93 000	4 000	5 000	**BL 217**
	180	41	3	147 000	145 000	3 600	4 300	**BL 317**
90	160	30	2	107 000	107 000	3 800	4 500	**BL 218**
	190	43	3	158 000	161 000	3 400	4 000	**BL 318**
95	170	32	2.1	121 000	123 000	3 600	4 300	**BL 219**
	200	45	3	169 000	178 000	2 800	3 600	**BL 319**
100	180	34	2.1	136 000	140 000	3 400	4 000	**BL 220**
105	190	36	2.1	148 000	157 000	3 200	3 800	**BL 221**
110	200	38	2.1	160 000	176 000	2 800	3 400	**BL 222**

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



Bearing Numbers		Abutment and Fillet Dimensions (mm)				Mass (kg)
With One Shielded	With Two Shields	d_a min.	d_b max.	D_a max.	r_a max.	approx.
BL 205 Z	BL 205 ZZ	30	32	47	1	0.133
BL 305 Z	BL 305 ZZ	31.5	36	55.5	1	0.246
BL 206 Z	BL 206 ZZ	35	38.5	57	1	0.215
BL 306 Z	BL 306 ZZ	36.5	42	65.5	1	0.364
BL 207 Z	BL 207 ZZ	41.5	44.5	65.5	1	0.307
BL 307 Z	BL 307 ZZ	43	44.5	72	1.5	0.486
BL 208 Z	BL 208 ZZ	46.5	50	73.5	1	0.394
BL 308 Z	BL 308 ZZ	48	52.5	82	1.5	0.685
BL 209 Z	BL 209 ZZ	51.5	55.5	78.5	1	0.449
BL 309 Z	BL 309 ZZ	53	61.5	92	1.5	0.883
BL 210 Z	BL 210 ZZ	56.5	60	83.5	1	0.504
BL 310 Z	BL 310 ZZ	59	68	101	2	1.16
BL 211 Z	BL 211 ZZ	63	66.5	92	1.5	0.667
BL 311 Z	BL 311 ZZ	64	72.5	111	2	1.49
BL 212 Z	BL 212 ZZ	68	74.5	102	1.5	0.856
BL 312 Z	BL 312 ZZ	71	79	119	2	1.88
BL 213 Z	BL 213 ZZ	73	80	112	1.5	1.09
BL 313 Z	BL 313 ZZ	76	85.5	129	2	2.36
BL 214 Z	BL 214 ZZ	78	84	117	1.5	1.19
BL 314 Z	BL 314 ZZ	81	92	139	2	2.87
BL 215 Z	BL 215 ZZ	83	90	122	1.5	1.29
BL 315 Z	BL 315 ZZ	86	98.5	149	2	3.43
BL 216 Z	BL 216 ZZ	89	95.5	131	2	1.61
BL 316 Z	BL 316 ZZ	91	104.5	159	2	4.08
BL 217 Z	BL 217 ZZ	94	102	141	2	1.97
BL 317 Z	BL 317 ZZ	98	110.5	167	2.5	4.77
BL 218 Z	BL 218 ZZ	99	107.5	151	2	2.43
BL 318 Z	BL 318 ZZ	103	117	177	2.5	5.45
BL 219 Z	BL 219 ZZ	106	114	159	2	2.95
BL 319 Z	BL 319 ZZ	108	124	187	2.5	6.4
BL 220 Z	BL 220 ZZ	111	121.5	169	2	3.54
BL 221 Z	BL 221 ZZ	116	127.5	179	2	4.23
—	—	121	—	189	2	4.84

Bore Diameter 4 – 20 mm



Outside Diameter Tolerance (Class N) Units: μm

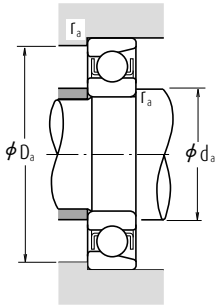
Nominal Outside Diameter D (mm)		Single Plane Mean Outside Diameter $\Delta_{D_{mp}}$			
		E Series		EN Series	
Over	Incl.	High	Low	High	Low
–	10	+8	0	0	–8
10	18	+8	0	0	–8
18	30	+9	0	0	–9
30	50	+11	0	0	–11

Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Numbers	
d	D	B,C,T	r min.	r_1 min.	C_r	C_{0r}	Grease	Oil	E Series	EN Series
4	16	5	0.15	0.1	1 650	288	34 000	40 000	**E 4**	**EN 4**
5	16	5	0.15	0.1	1 650	288	34 000	40 000	**E 5**	**EN 5**
6	21	7	0.3	0.15	2 490	445	30 000	36 000	**E 6**	**EN 6**
7	22	7	0.3	0.15	2 490	445	30 000	36 000	**E 7**	**EN 7**
8	24	7	0.3	0.15	3 450	650	28 000	34 000	**E 8**	**EN 8**
9	28	8	0.3	0.15	4 550	880	24 000	30 000	**E 9**	**EN 9**
10	28	8	0.3	0.15	4 550	880	24 000	30 000	**E 10**	**EN 10**
11	32	7	0.3	0.15	4 400	845	22 000	26 000	**E 11**	**EN 11**
12	32	7	0.3	0.15	4 400	845	22 000	26 000	**E 12**	**EN 12**
13	30	7	0.3	0.15	4 400	845	22 000	26 000	**E 13**	**EN 13**
14	35	8	0.3	0.15	5 800	1 150	19 000	22 000	–	**EN 14**
15	35	8	0.3	0.15	5 800	1 150	19 000	22 000	**E 15**	**EN 15**
	40	10	0.6	0.3	7 400	1 500	17 000	20 000	**B0 15**	–
16	38	10	0.6	0.2	6 900	1 380	17 000	22 000	–	**EN 16**
17	40	10	0.6	0.3	7 400	1 500	17 000	20 000	**L 17**	–
	44	11	0.6	0.3	7 350	1 500	16 000	19 000	–	**EN 17**
	44	11	0.6	0.3	7 350	1 500	16 000	19 000	**B0 17**	–
18	40	9	0.6	0.2	5 050	1 030	17 000	20 000	–	**EN 18**
19	40	9	0.6	0.2	5 050	1 030	17 000	20 000	**E 19**	**EN 19**
20	47	12	1	0.6	11 000	2 380	14 000	17 000	**E 20**	**EN 20**
	47	14	1	0.6	11 000	2 380	14 000	17 000	**L 20**	–

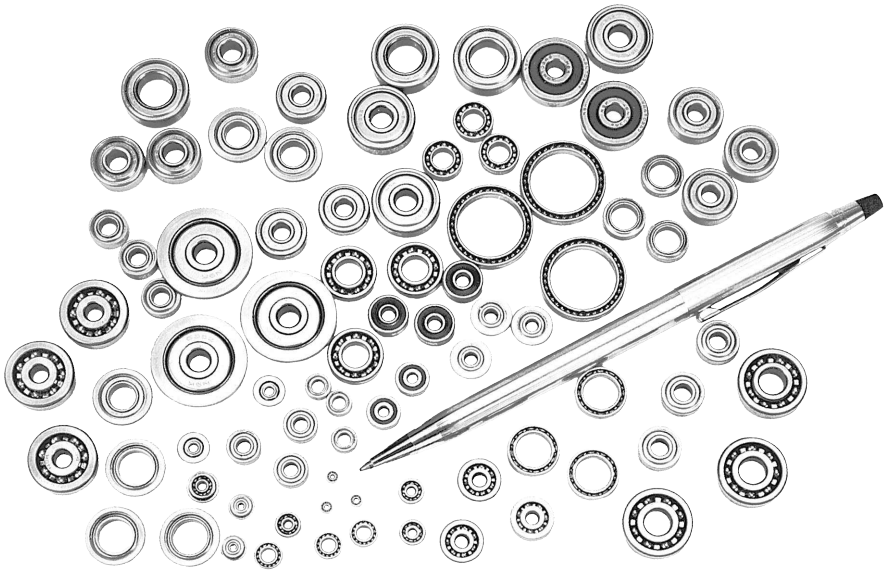
Remarks 1. The outside diameters of Magneto Bearings Series E always have plus tolerances.
2. When using Magneto Bearings other than E, please contact NSK.

Dynamic Equivalent Load $P=XF_r+YF_a$

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



Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a min.	D_a max.	r_a max.	approx.
5.2	14.8	0.15	0.005
6.2	14.8	0.15	0.004
8	19	0.3	0.011
9	20	0.3	0.013
10	22	0.3	0.014
11	26	0.3	0.022
12	26	0.3	0.021
13	30	0.3	0.029
14	30	0.3	0.028
15	28	0.3	0.021
16	33	0.3	0.035
17	33	0.3	0.034
19	36	0.6	0.055
20	34	0.6	0.049
21	36	0.6	0.051
21	40	0.6	0.080
21	40	0.6	0.080
22	36	0.6	0.051
23	36	0.6	0.049
25	42	1	0.089
25	42	1	0.101



2. EXTRA SMALL BALL BEARINGS AND MINIATURE BALL BEARINGS

INTRODUCTION ..... B 056
BEARINGS TABLE

EXTRA SMALL BALL BEARINGS · MINIATURE BALL BEARINGS

	Bore Dia.	Page
Metric Design	1 – 9 mm	B 060
With Flange	1 – 9 mm	B 064
Inch Design	1.016 – 9.525 mm	B 068
With Flange	1.191 – 9.525 mm	B 070

DESIGN AND TYPES

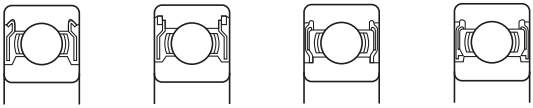
The size ranges of extra small and miniature ball bearings are shown in Table 1. The design, types, and type symbols are shown in Table 2. Those types among them that are listed in the bearing tables are indicated by the shading in Table 2.

Table 1 Size Ranges of Bearings

Units : mm

Design	Extra Small Ball Bearings	Miniature Ball Bearings
Metric	Outside diameter $D \geqq 9$ 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 Symbols

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

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

TOLERANCES AND RUNNING ACCURACY

	Table	Pages
Metric Design Bearings	7.3	A132 to A135

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

Table 3 Flange Tolerances for Metric Flanged Bearings

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

Nominal Flange Outside Diameter D_1(mm)		Deviation of Flange Outside Diameter Δ_{D1S}			
		①		②	
over	incl.	high	low	high	low
	10	+220	−36	0	−36
10	18	+270	−43	0	−43
18	30	+330	−52	0	−52

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

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

Nominal Bearing Outside Diameter D (mm)		Deviation of Flange Width Δ_{C1S}	Variation of Flange Width Δ_{C1S} VC_{1S}				Variation of Bearing Outside Surface Generatrix Inclination with Flange Backface S_{D1}			Flange Backface Runout with Raceway 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_{BS} tolerance for d of the same bearing of the same class	Use the Δ_{VBS} tolerance for d of the same bearing of the same class	5	2.5	1.5	8	4	1.5	11	7	3
6	18			5	2.5	1.5	8	4	1.5	11	7	3
18	30			5	2.5	1.5	8	4	1.5	11	7	3

Note (1) 2.5 mm is included

	Table	Pages
Inch Design Bearings	7.4	A136 to A137
Instrument Ball Bearings	7.9	A146 to A147

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

RECOMMENDED FITS

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

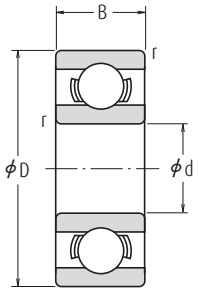
INTERNAL CLEARANCES

	Table	Page
	8.11	A169

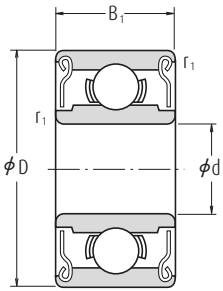
LIMITING SPEEDS

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

Metric Design
Bore Diameter 1 – 4 mm



Open Type



Shielded Type
ZZ · ZZ1

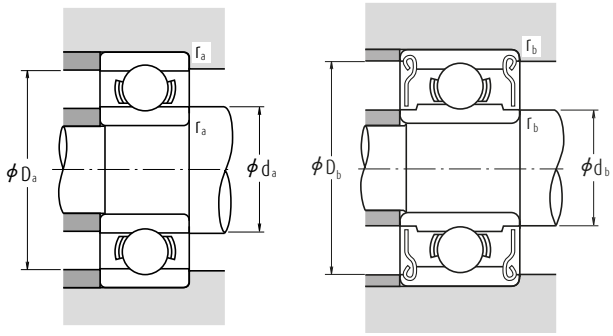
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min⁻¹)		
								Grease	Oil	
d	D	B	B_1	r(1) min.	r_1(1) min.	C_r	C_{0r}	Open Z · ZZ	Open Z	Open
1	3	1	—	0.05	—	80	23	130 000	150 000	681
	3	1.5	—	0.05	—	80	23	130 000	150 000	MR 31
	4	1.6	—	0.1	—	138	35	100 000	120 000	691
1.2	4	1.8	2.5	0.1	0.1	138	35	110 000	130 000	MR 41 X
1.5	4	1.2	2	0.05	0.05	112	33	100 000	120 000	681 X
	5	2	2.6	0.15	0.15	237	69	85 000	100 000	691 X
	6	2.5	3	0.15	0.15	330	98	75 000	90 000	601 X
2	5	1.5	2.3	0.08	0.08	169	50	85 000	100 000	682
	5	2	2.5	0.1	0.1	187	58	85 000	100 000	MR 52 B
	6	2.3	3	0.15	0.15	330	98	75 000	90 000	692
	6	2.5	2.5	0.15	0.15	330	98	75 000	90 000	MR 62
	7	2.5	3	0.15	0.15	385	127	63 000	75 000	MR 72
	7	2.8	3.5	0.15	0.15	385	127	63 000	75 000	602
2.5	6	1.8	2.6	0.08	0.08	208	74	71 000	80 000	682 X
	7	2.5	3.5	0.15	0.15	385	127	63 000	75 000	692 X
	8	2.5	—	0.2	—	560	179	60 000	67 000	MR 82 X
	8	2.8	4	0.15	0.15	550	175	60 000	71 000	602 X
3	6	2	2.5	0.1	0.1	208	74	71 000	80 000	MR 63
	7	2	3	0.1	0.1	390	130	63 000	75 000	683 A
	8	2.5	—	0.15	—	560	179	60 000	67 000	MR 83
	8	3	4	0.15	0.15	560	179	60 000	67 000	693
	9	2.5	4	0.2	0.15	570	187	56 000	67 000	MR 93
	9	3	5	0.15	0.15	570	187	56 000	67 000	603
	10	4	4	0.15	0.15	630	218	50 000	60 000	623
	13	5	5	0.2	0.2	1 300	485	40 000	48 000	633
4	7	2	—	0.1	—	310	115	60 000	67 000	MR 74
	7	—	2.5	—	0.1	255	107	60 000	71 000	—
	8	2	3	0.15	0.1	395	139	56 000	67 000	MR 84
	9	2.5	4	(0.15)	(0.15)	640	225	53 000	63 000	684 A
	10	3	4	0.2	0.15	710	270	50 000	60 000	MR 104 B
	11	4	4	0.15	0.15	960	345	48 000	56 000	694
	12	4	4	0.2	0.2	960	345	48 000	56 000	604
	13	5	5	0.2	0.2	1 300	485	40 000	48 000	624
	16	5	5	0.3	0.3	1 730	670	36 000	43 000	634

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

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

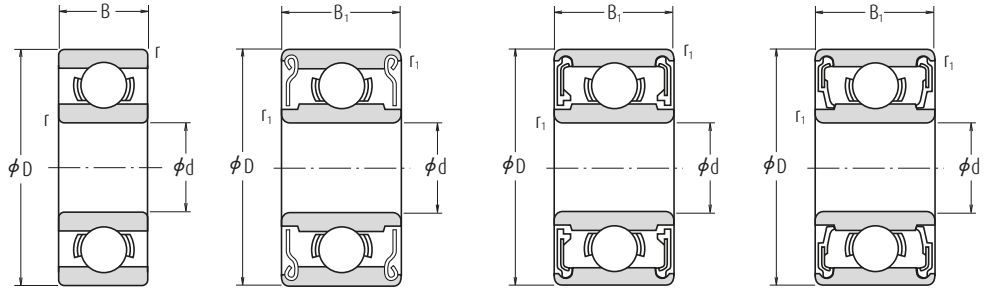
Radial and axial load factors

C_{or}/F_a	$F_a/F_r \leq e$		$F_a/F_r > e$		e
	X	Y	X	Y	
5	1	0	0.56	1.26	0.35
10	1	0	0.56	1.49	0.29
15	1	0	0.56	1.64	0.27
20	1	0	0.56	1.76	0.25
25	1	0	0.56	1.85	0.24
30	1	0	0.56	1.92	0.23
50	1	0	0.56	2.13	0.20



Bearing Numbers			Abutment and Fillet Dimensions (mm)						Mass (g) approx.	
Shielded	Sealed		d_a min.	d_b max.	D_a max.	D_b min.	r_a max.	r_b max.	Open	Shielded
—	—	—	1.4	—	2.6	—	0.05	—	0.03	—
—	—	—	1.4	—	2.6	—	0.05	—	0.04	—
—	—	—	1.8	—	3.2	—	0.1	—	0.09	—
MR 41 XZZ	—	—	2.0	1.9	3.2	3.5	0.1	0.1	0.10	0.14
681 XZZ	—	—	1.9	2.1	3.6	3.6	0.05	0.05	0.07	0.11
691 XZZ	—	—	2.7	2.5	3.8	4.3	0.15	0.15	0.17	0.20
601 XZZ	—	—	2.7	3.0	4.8	5.4	0.15	0.15	0.33	0.38
682 ZZ	—	—	2.6	2.7	4.4	4.2	0.08	0.08	0.12	0.17
MR 52 BZZ	—	—	2.8	2.7	4.2	4.4	0.1	0.1	0.16	0.23
692 ZZ	—	—	3.2	3.0	4.8	5.4	0.15	0.15	0.28	0.38
MR 62 ZZ	—	—	3.2	3.0	4.8	5.2	0.15	0.15	0.30	0.29
MR 72 ZZ	—	—	3.2	3.8	5.8	6.2	0.15	0.15	0.45	0.49
602 ZZ	—	—	3.2	3.8	5.8	6.2	0.15	0.15	0.51	0.58
682 XZZ	—	—	3.1	3.7	5.4	5.4	0.08	0.08	0.23	0.29
692 XZZ	—	—	3.7	3.8	5.8	6.2	0.15	0.15	0.41	0.55
—	—	—	4.1	—	6.4	—	0.2	—	0.56	—
602 XZZ	—	—	3.7	4.1	6.8	7.0	0.15	0.15	0.63	0.83
MR 63 ZZ	—	—	3.8	3.7	5.2	5.4	0.1	0.1	0.20	0.27
683 AZZ	—	—	3.8	4.0	6.2	6.4	0.1	0.1	0.32	0.45
—	—	—	4.2	—	6.8	—	0.15	—	0.54	—
693 ZZ	—	—	4.2	4.3	6.8	7.3	0.15	0.15	0.61	0.83
MR 93 ZZ	—	—	4.6	4.3	7.4	7.9	0.2	0.15	0.73	1.18
603 ZZ	—	—	4.2	4.3	7.8	7.9	0.15	0.15	0.87	1.45
623 ZZ	—	—	4.2	4.3	8.8	8.0	0.15	0.15	1.65	1.66
633 ZZ	—	—	4.6	6.0	11.4	11.3	0.2	0.2	3.38	3.33
—	—	—	4.8	—	6.2	—	0.1	—	0.22	—
MR 74 ZZ	—	—	—	4.8	—	6.3	—	0.1	—	0.29
MR 84 ZZ	—	—	5.2	5.0	6.8	7.4	0.15	0.1	0.36	0.56
684 AZZ	—	—	4.8	5.2	8.2	8.1	0.1	0.1	0.63	1.01
MR 104 BZZ	—	—	5.6	5.9	8.4	8.8	0.2	0.15	1.04	1.42
694 ZZ	—	—	5.2	5.6	9.8	9.9	0.15	0.15	1.7	1.75
604 ZZ	—	—	5.6	5.6	10.4	9.9	0.2	0.2	2.25	2.29
624 ZZ	—	—	5.6	6.0	11.4	11.3	0.2	0.2	3.03	3.04
634 ZZ1	—	—	6.0	7.5	14.0	13.8	0.3	0.3	5.24	5.21

Metric Design
Bore Diameter 5 – 9 mm

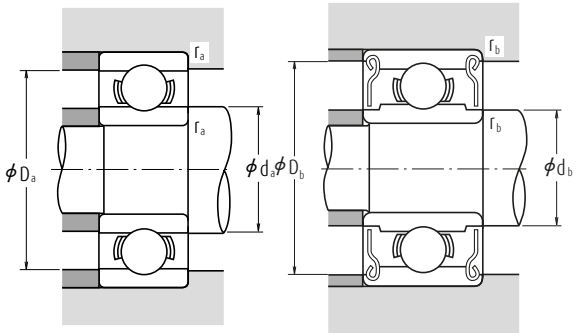


Open Type | Shielded Type ZZ · ZZ1 | Non-Contact Sealed Type VV | Contact Sealed Type DD

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min⁻¹)			
								Grease		Oil	
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
5	8	2	—	0.1	—	310	120	53 000	—	63 000	**MR 85**
	8	—	2.5	—	0.1	278	131	53 000	—	63 000	—
	9	2.5	3	0.15	0.15	430	168	50 000	—	60 000	**MR 95**
	10	3	4	0.15	0.15	430	168	50 000	—	60 000	**MR 105**
	11	—	4	—	0.15	715	276	48 000	—	56 000	—
	11	3	5	0.15	0.15	715	281	45 000	—	53 000	**685**
	13	4	4	0.2	0.2	1 080	430	43 000	40 000	50 000	**695**
	14	5	5	0.2	0.2	1 330	505	40 000	38 000	50 000	**605**
	16	5	5	0.3	0.3	1 730	670	36 000	32 000	43 000	**625**
	19	6	6	0.3	0.3	2 340	885	32 000	30 000	40 000	**635**
6	10	2.5	3	0.15	0.1	495	218	45 000	—	53 000	**MR 106**
	12	3	4	0.2	0.15	715	292	43 000	40 000	50 000	**MR 126**
	13	3.5	5	0.15	0.15	1 080	440	40 000	38 000	50 000	**686 A**
	15	5	5	0.2	0.2	1 730	670	40 000	36 000	45 000	**696**
	17	6	6	0.3	0.3	2 260	835	38 000	34 000	45 000	**606**
	19	6	6	0.3	0.3	2 340	885	32 000	30 000	40 000	**626**
	22	7	7	0.3	0.3	3 300	1 370	30 000	28 000	36 000	**636**
7	11	2.5	3	0.15	0.1	455	201	43 000	—	50 000	**MR 117**
	13	3	4	0.2	0.15	540	276	40 000	—	48 000	**MR 137**
	14	3.5	5	0.15	0.15	1 170	510	40 000	34 000	45 000	**687**
	17	5	5	0.3	0.3	1 610	710	36 000	28 000	43 000	**697**
	19	6	6	0.3	0.3	2 340	885	36 000	32 000	43 000	**607**
	22	7	7	0.3	0.3	3 300	1 370	30 000	28 000	36 000	**627**
	26	9	9	0.3	0.3	4 550	1 970	28 000	22 000	34 000	**637**
8	12	2.5	3.5	0.15	0.1	545	274	40 000	—	48 000	**MR 128**
	14	3.5	4	0.2	0.15	820	385	38 000	32 000	45 000	**MR 148**
	16	4	5	0.2	0.2	1 610	710	36 000	28 000	43 000	**688 A**
	19	6	6	0.3	0.3	2 240	910	36 000	28 000	43 000	**698**
	22	7	7	0.3	0.3	3 300	1 370	34 000	28 000	40 000	**608**
	24	8	8	0.3	0.3	3 350	1 430	28 000	24 000	34 000	**628**
	28	9	9	0.3	0.3	4 550	1 970	28 000	22 000	34 000	**638**
9	17	4	5	0.2	0.2	1 330	665	36 000	24 000	43 000	**689**
	20	6	6	0.3	0.3	1 720	840	34 000	24 000	40 000	**699**
	24	7	7	0.3	0.3	3 350	1 430	32 000	24 000	38 000	**609**
	26	8	8	(0.6)	(0.6)	4 550	1 970	28 000	22 000	34 000	**629**
	30	10	10	0.6	0.6	5 100	2 390	24 000	—	30 000	**639**

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

Remarks 1. When using bearings with a rotating outer ring, please contact NSK if they are sealed or shielded.
2. Bearings with snap rings are also available, please contact NSK.

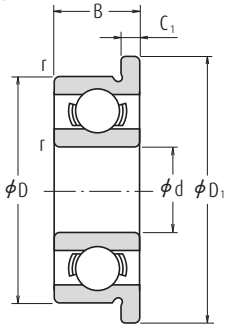


Radial and axial load factors

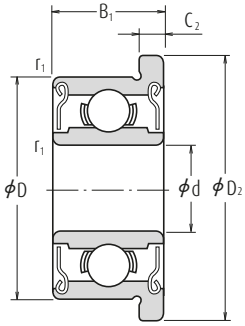
C_{or}/F_a	$F_a/F_r \leq e$		$F_a/F_r > e$		e
	X	Y	X	Y	
5	1	0	0.56	1.26	0.35
10	1	0	0.56	1.49	0.29
15	1	0	0.56	1.64	0.27
20	1	0	0.56	1.76	0.25
25	1	0	0.56	1.85	0.24
30	1	0	0.56	1.92	0.23
50	1	0	0.56	2.13	0.20

Bearing Numbers			Abutment and Fillet Dimensions (mm)						Mass (g)	
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	—	7.2	—	0.1	—	0.26	—
MR 85 ZZ	—	—	—	5.8	—	7.4	—	0.1	—	0.34
MR 95 ZZ1	—	—	6.2	6.0	7.8	8.2	0.15	0.15	0.50	0.58
MR 105 ZZ	—	—	6.2	6.0	8.8	8.4	0.15	0.15	0.95	1.29
MR 115 ZZ	VV	—	—	6.3	—	9.8	—	0.15	—	1.49
685 ZZ	—	—	6.2	6.2	9.8	9.9	0.15	0.15	1.2	1.96
695 ZZ	VV	DD	6.6	6.6	11.4	11.2	0.2	0.2	2.45	2.5
605 ZZ	—	DD	6.6	6.9	12.4	12.2	0.2	0.2	3.54	3.48
625 ZZ1	VV	DD	7.0	7.5	14.0	13.8	0.3	0.3	4.95	4.86
635 ZZ1	VV	DD	7.0	8.5	17.0	16.5	0.3	0.3	8.56	8.34
MR 106 ZZ1	—	—	7.2	7.0	8.8	9.3	0.15	0.1	0.56	0.68
MR 126 ZZ	—	DD	7.6	7.2	10.4	10.9	0.2	0.15	1.27	1.74
686 AZZ	VV	DD	7.2	7.4	11.8	11.7	0.15	0.15	1.91	2.69
696 ZZ1	VV	DD	7.6	7.9	13.4	13.3	0.2	0.2	3.88	3.72
606 ZZ	VV	DD	8.0	8.2	15.0	14.8	0.3	0.3	5.97	6.08
626 ZZ1	VV	DD	8.0	8.5	17.0	16.5	0.3	0.3	8.15	7.94
636 ZZ	VV	DD	8.0	10.5	20.0	19.0	0.3	0.3	14	14
MR 117 ZZ	—	—	8.2	8.0	9.8	10.5	0.15	0.1	0.62	0.72
MR 137 ZZ	—	—	8.6	9.0	11.4	11.6	0.2	0.15	1.58	2.02
687 ZZ1	VV	DD	8.2	8.5	12.8	12.7	0.15	0.15	2.13	2.97
697 ZZ1	VV	DD	9.0	10.2	15.0	14.8	0.3	0.3	5.26	5.12
607 ZZ1	VV	DD	9.0	9.1	17.0	16.5	0.3	0.3	7.67	7.51
627 ZZ	VV	DD	9.0	10.5	20.0	19.0	0.3	0.3	12.7	12.9
637 ZZ1	VV	DD	9.0	12.8	24.0	22.8	0.3	0.3	24	25
MR 128 ZZ1	—	—	9.2	9.0	10.8	11.3	0.15	0.1	0.71	0.97
MR 148 ZZ	VV	DD	9.6	9.2	12.4	12.8	0.2	0.15	1.86	2.16
688 AZZ1	VV	DD	9.6	10.2	14.4	14.2	0.2	0.2	3.12	4.02
698 ZZ	VV	DD	10.0	10.0	17.0	16.5	0.3	0.3	7.23	7.18
608 ZZ	VV	DD	10.0	10.5	20.0	19.0	0.3	0.3	12.1	12.2
628 ZZ	VV	DD	10.0	12.0	22.0	20.5	0.3	0.3	17.2	17.4
638 ZZ1	VV	DD	10.0	12.8	26.0	22.8	0.3	0.3	28.3	28.6
689 ZZ1	VV	DD	10.6	11.5	15.4	15.2	0.2	0.2	3.53	4.43
699 ZZ1	VV	DD	11.0	12.0	18.0	17.2	0.3	0.3	8.45	8.33
609 ZZ	VV	DD	11.0	12.0	22.8	20.5	0.3	0.3	14.5	14.7
629 ZZ	VV	DD	11.0	12.8	24.0	22.8	0.3	0.3	19.5	19.3
639 ZZ	VV	—	13.0	16.1	26.0	25.6	0.6	0.6	36.5	36

Metric Design With Flange
Bore Diameter 1 – 4 mm



Open Type

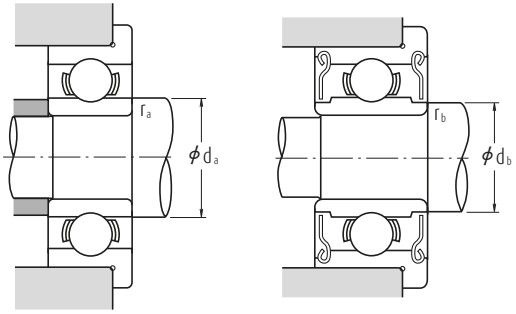


Shielded Type
ZZ · ZZ1

Boundary Dimensions (mm)										Basic Load Ratings (N)		Limiting Speeds (min⁻¹)	
												Grease	Oil
d	D	D_1	D_2	B	B_1	C_1	C_2	r(1) min.	r_1(1) min.	C_r	C_{0r}	Open Z · ZZ	Open Z
1	3	3.8	—	1	—	0.3	—	0.05	—	80	23	130 000	150 000
	4	5	—	1.6	—	0.5	—	0.1	—	140	36	100 000	120 000
1.2	4	4.8	—	1.8	—	0.4	—	0.1	—	138	35	110 000	130 000
1.5	4	5	5	1.2	2	0.4	0.6	0.05	0.05	112	33	100 000	120 000
	5	6.5	6.5	2	2.6	0.6	0.8	0.15	0.15	237	69	85 000	100 000
	6	7.5	7.5	2.5	3	0.6	0.8	0.15	0.15	330	98	75 000	90 000
2	5	6.1	6.1	1.5	2.3	0.5	0.6	0.08	0.08	169	50	85 000	100 000
	5	6.2	6.2	2	2.5	0.6	0.6	0.1	0.1	187	58	85 000	100 000
	6	7.5	7.5	2.3	3	0.6	0.8	0.15	0.15	330	98	75 000	90 000
	6	7.2	—	2.5	—	0.6	—	0.15	—	330	98	75 000	90 000
	7	8.2	8.2	2.5	3	0.6	0.6	0.15	0.15	385	127	63 000	75 000
	7	8.5	8.5	2.8	3.5	0.7	0.9	0.15	0.15	385	127	63 000	75 000
2.5	6	7.1	7.1	1.8	2.6	0.5	0.8	0.08	0.08	208	74	71 000	80 000
	7	8.5	8.5	2.5	3.5	0.7	0.9	0.15	0.15	385	127	63 000	75 000
	8	9.2	—	2.5	—	0.6	—	0.2	—	560	179	60 000	67 000
	8	9.5	9.5	2.8	4	0.7	0.9	0.15	0.15	550	175	60 000	71 000
3	6	7.2	7.2	2	2.5	0.6	0.6	0.1	0.1	208	74	71 000	80 000
	7	8.1	8.1	2	3	0.5	0.8	0.1	0.1	390	130	63 000	75 000
	8	9.2	—	2.5	—	0.6	—	0.15	—	560	179	60 000	67 000
	8	9.5	9.5	3	4	0.7	0.9	0.15	0.15	560	179	60 000	67 000
	9	10.2	10.6	2.5	4	0.6	0.8	0.2	0.15	570	187	56 000	67 000
	9	10.5	10.5	3	5	0.7	1	0.15	0.15	570	187	56 000	67 000
	10	11.5	11.5	4	4	1	1	0.15	0.15	630	218	50 000	60 000
	13	15	15	5	5	1	1	0.2	0.2	1 300	485	36 000	43 000
4	7	8.2	—	2	—	0.6	—	0.1	—	310	115	60 000	67 000
	7	—	8.2	—	2.5	—	0.6	—	0.1	255	107	60 000	71 000
	8	9.2	9.2	2	3	0.6	0.6	0.15	0.1	395	139	56 000	67 000
	9	10.3	10.3	2.5	4	0.6	1	(0.15)	(0.15)	640	225	53 000	63 000
	10	11.2	11.6	3	4	0.6	0.8	0.2	0.15	710	270	50 000	60 000
	11	12.5	12.5	4	4	1	1	0.15	0.15	960	345	48 000	56 000
	12	13.5	13.5	4	4	1	1	0.2	0.2	960	345	48 000	56 000
	13	15	15	5	5	1	1	0.2	0.2	1 300	485	40 000	48 000
	16	18	18	5	5	1	1	0.3	0.3	1 730	670	36 000	43 000

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

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

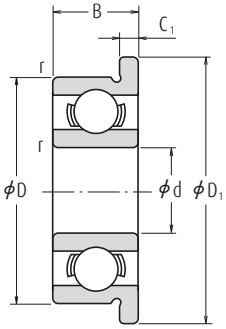


Radial and axial load factors

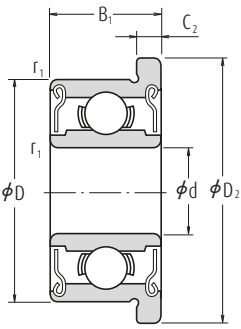
C_{or}/F_a	$F_a/F_r \leq e$		$F_a/F_r > e$		e
	X	Y	X	Y	
5	1	0	0.56	1.26	0.35
10	1	0	0.56	1.49	0.29
15	1	0	0.56	1.64	0.27
20	1	0	0.56	1.76	0.25
25	1	0	0.56	1.85	0.24
30	1	0	0.56	1.92	0.23
50	1	0	0.56	2.13	0.20

Bearing Numbers				Abutment and Fillet Dimensions (mm)				Mass (g) approx.	
Open	Shielded	Sealed		d_a min.	d_b max.	r_a max.	r_b max.	Open	Shielded
F 681	—	—	—	1.4	—	0.05	—	0.04	—
F 691	—	—	—	1.8	—	0.1	—	0.14	—
MF 41 X	—	—	—	2.0	—	0.1	—	0.12	—
F 681 X	F 681 XZZ	—	—	1.9	2.1	0.05	0.05	0.09	0.14
F 691 X	F 691 XZZ	—	—	2.7	2.5	0.15	0.15	0.23	0.28
F 601 X	F 601 XZZ	—	—	2.7	3.0	0.15	0.15	0.42	0.52
F 682	F 682 ZZ	—	—	2.6	2.7	0.08	0.08	0.16	0.22
MF 52 B	MF 52 BZZ	—	—	2.8	2.7	0.1	0.1	0.21	0.27
F 692	F 692 ZZ	—	—	3.2	3.0	0.15	0.15	0.35	0.48
MF 62	—	—	—	3.2	—	0.15	—	0.36	—
MF 72	MF 72 ZZ	—	—	3.2	3.8	0.15	0.15	0.52	0.56
F 602	F 602 ZZ	—	—	3.2	3.1	0.15	0.15	0.60	0.71
F 682 X	F 682 XZZ	—	—	3.1	3.7	0.08	0.08	0.25	0.36
F 692 X	F 692 XZZ	—	—	3.7	3.8	0.15	0.15	0.51	0.68
MF 82 X	—	—	—	4.1	—	0.2	—	0.62	—
F 602 X	F 602 XZZ	—	—	3.7	3.5	0.15	0.15	0.74	0.98
MF 63	MF 63 ZZ	—	—	3.8	3.7	0.1	0.1	0.27	0.33
F 683 A	F 683 AZZ	—	—	3.8	4.0	0.1	0.1	0.37	0.53
MF 83	—	—	—	4.2	—	0.15	—	0.56	—
F 693	F 693 ZZ	—	—	4.2	4.3	0.15	0.15	0.70	0.97
MF 93	MF 93 ZZ	—	—	4.6	4.3	0.2	0.15	0.81	1.34
F 603	F 603 ZZ	—	—	4.2	4.3	0.15	0.15	1.0	1.63
F 623	F 623 ZZ	—	—	4.2	4.3	0.15	0.15	1.85	1.86
F 633	F 633 ZZ	—	—	4.6	6.0	0.2	0.2	3.73	3.59
MF 74	—	—	—	4.8	—	0.1	—	0.29	—
—	MF 74 ZZ	—	—	—	4.8	—	0.1	—	0.35
MF 84	MF 84 ZZ	—	—	5.2	5.0	0.15	0.1	0.44	0.63
F 684	F 684 ZZ	—	—	4.8	5.2	0.1	0.1	0.70	1.14
MF 104 B	MF 104 BZZ	—	—	5.6	5.9	0.2	0.15	1.13	1.59
F 694	F 694 ZZ	—	—	5.2	5.6	0.15	0.15	1.91	1.96
F 604	F 604 ZZ	—	—	5.6	5.6	0.2	0.2	2.53	2.53
F 624	F 624 ZZ	—	—	5.6	6.0	0.2	0.2	3.38	3.53
F 634	F 634 ZZ1	—	—	6.0	7.5	0.3	0.3	5.73	5.62

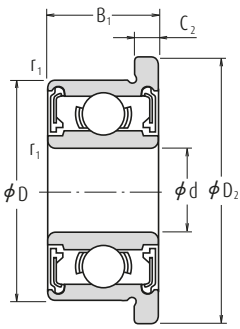
Metric Design With Flange
Bore Diameter 5 – 9 mm



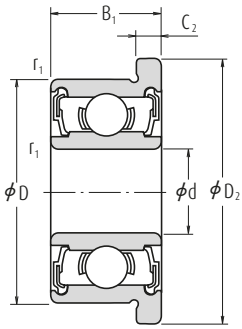
Open Type



Shielded Type
ZZ · ZZ1



Non-Contact
Sealed Type
VV



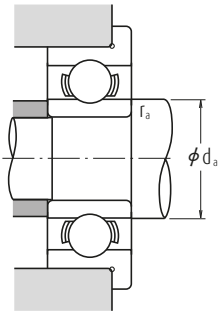
Contact
Sealed Type
DD

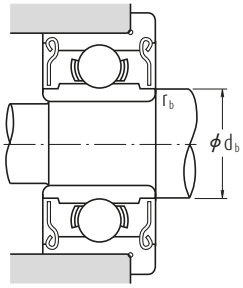
Boundary Dimensions (mm)										Basic Load Ratings (N)		Limiting Speeds (min⁻¹)		
												Grease		Oil
d	D	D_1	D_2	B	B_1	C_1	C_2	r min.	r_1 min.	C_r	C_{0r}	Open Z · ZZ V · VV	D · DD	Open Z
5	8	9.2	—	2	—	0.6	—	0.1	—	310	120	53 000	—	63 000
	8	—	9.2	—	2.5	—	0.6	—	0.1	278	131	53 000	—	63 000
	9	10.2	10.2	2.5	3	0.6	0.6	0.15	0.15	430	168	50 000	—	60 000
	10	11.2	11.6	3	4	0.6	0.8	0.15	0.15	430	168	50 000	—	60 000
	11	12.5	12.5	3	5	0.8	1	0.15	0.15	715	281	45 000	—	53 000
	13	15	15	4	4	1	1	0.2	0.2	1 080	430	43 000	40 000	50 000
	14	16	16	5	5	1	1	0.2	0.2	1 330	505	40 000	38 000	50 000
	16	18	18	5	5	1	1	0.3	0.3	1 730	670	36 000	32 000	43 000
	19	22	22	6	6	1.5	1.5	0.3	0.3	2 340	885	32 000	30 000	40 000
6	10	11.2	11.2	2.5	3	0.6	0.6	0.15	0.1	495	218	45 000	—	53 000
	12	13.2	13.6	3	4	0.6	0.8	0.2	0.15	715	292	43 000	40 000	50 000
	13	15	15	3.5	5	1	1.1	0.15	0.15	1 080	440	40 000	38 000	50 000
	15	17	17	5	5	1.2	1.2	0.2	0.2	1 730	670	40 000	36 000	45 000
	17	19	19	6	6	1.2	1.2	0.3	0.3	2 260	835	38 000	34 000	45 000
	19	22	22	6	6	1.5	1.5	0.3	0.3	2 340	885	32 000	30 000	40 000
	22	25	25	7	7	1.5	1.5	0.3	0.3	3 300	1 370	30 000	28 000	36 000
7	11	12.2	12.2	2.5	3	0.6	0.6	0.15	0.1	455	201	43 000	—	50 000
	13	14.2	14.6	3	4	0.6	0.8	0.2	0.15	540	276	40 000	—	48 000
	14	16	16	3.5	5	1	1.1	0.15	0.15	1 170	510	40 000	34 000	45 000
	17	19	19	5	5	1.2	1.2	0.3	0.3	1 610	715	36 000	28 000	43 000
	19	22	22	6	6	1.5	1.5	0.3	0.3	2 340	885	36 000	32 000	43 000
	22	25	25	7	7	1.5	1.5	0.3	0.3	3 300	1 370	30 000	28 000	36 000
8	12	13.2	13.6	2.5	3.5	0.6	0.8	0.15	0.1	545	274	40 000	—	48 000
	14	15.6	15.6	3.5	4	0.8	0.8	0.2	0.15	820	385	38 000	32 000	45 000
	16	18	18	4	5	1	1.1	0.2	0.2	1 610	710	36 000	30 000	43 000
	19	22	22	6	6	1.5	1.5	0.3	0.3	2 240	910	36 000	28 000	43 000
	22	25	25	7	7	1.5	1.5	0.3	0.3	3 300	1 370	34 000	28 000	40 000
9	17	19	19	4	5	1	1.1	0.2	0.2	1 330	665	36 000	24 000	43 000
	20	23	23	6	6	1.5	1.5	0.3	0.3	1 720	840	34 000	24 000	40 000

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

Radial and axial load factors

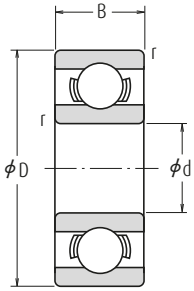
C_{or}/F_a	$F_a/F_r \leq e$		$F_a/F_r > e$		e
	X	Y	X	Y	
5	1	0	0.56	1.26	0.35
10	1	0	0.56	1.49	0.29
15	1	0	0.56	1.64	0.27
20	1	0	0.56	1.76	0.25
25	1	0	0.56	1.85	0.24
30	1	0	0.56	1.92	0.23
50	1	0	0.56	2.13	0.20



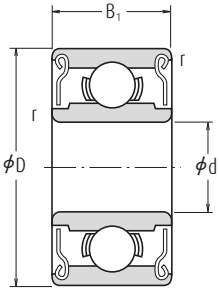


Bearing Numbers				Abutment and Fillet Dimensions (mm)				Mass (g)	
								approx.	
Open	Shielded	Sealed		d_a min.	d_b max.	r_a max.	r_b max.	Open	Shielded
MF 85	—	—	—	5.8	—	0.1	—	0.33	—
—	MF 85 ZZ	—	—	—	5.8	—	0.1	—	0.41
MF 95	MF 95 ZZ1	—	—	6.2	6.0	0.15	0.15	0.59	0.66
MF 105	MF 105 ZZ	—	—	6.2	6.0	0.15	0.15	1.05	1.46
F 685	F 685 ZZ	—	—	6.2	6.2	0.15	0.15	1.37	2.18
F 695	F 695 ZZ	VV	DD	6.6	6.6	0.2	0.2	2.79	2.84
F 605	F 605 ZZ	—	DD	6.6	6.9	0.2	0.2	3.9	3.85
F 625	F 625 ZZ1	VV	DD	7.0	7.5	0.3	0.3	5.37	5.27
F 635	F 635 ZZ1	VV	DD	7.0	8.5	0.3	0.3	9.49	9.49
MF 106	MF 106 ZZ1	—	—	7.2	7.0	0.15	0.1	0.65	0.77
MF 126	MF 126 ZZ	—	DD	7.6	7.2	0.2	0.15	1.38	1.94
F 686 A	F 686 AZZ	VV	DD	7.2	7.4	0.15	0.15	2.25	3.04
F 696	F 696 ZZ1	VV	DD	7.6	7.9	0.2	0.2	4.34	4.26
F 606	F 606 ZZ	VV	DD	8.0	8.2	0.3	0.3	6.58	6.61
F 626	F 626 ZZ1	VV	DD	8.0	8.5	0.3	0.3	9.09	9.09
F 636	F 636 ZZ	VV	DD	8.0	10.5	0.3	0.3	14.6	14.7
MF 117	MF 117 ZZ	—	—	8.2	8.0	0.15	0.1	0.72	0.82
MF 137	MF 137 ZZ	—	—	8.6	9.0	0.2	0.15	1.7	2.23
F 687	F 687 ZZ1	VV	DD	8.2	8.5	0.15	0.15	2.48	3.37
F 697	F 697 ZZ1	VV	DD	9.0	10.2	0.3	0.3	5.65	5.65
F 607	F 607 ZZ1	VV	DD	9.0	9.1	0.3	0.3	8.66	8.66
F 627	F 627 ZZ	VV	DD	9.0	10.5	0.3	0.3	14.2	14.2
MF 128	MF 128 ZZ1	—	—	9.2	9.0	0.15	0.1	0.82	1.15
MF 148	MF 148 ZZ	VV	DD	9.6	9.2	0.2	0.15	2.09	2.39
F 688 A	F 688 AZZ	VV	DD	9.6	10.2	0.2	0.2	3.54	4.47
F 698	F 698 ZZ	VV	DD	10.0	10.0	0.3	0.3	8.35	8.3
F 608	F 608 ZZ	VV	DD	10.0	10.5	0.3	0.3	13.4	13.5
F 689	F 689 ZZ1	VV	DD	10.6	11.5	0.2	0.2	3.97	4.91
F 699	F 699 ZZ1	VV	DD	11.0	12.0	0.3	0.3	9.51	9.51

Inch Design
Bore Diameter 1.016 – 9.525 mm



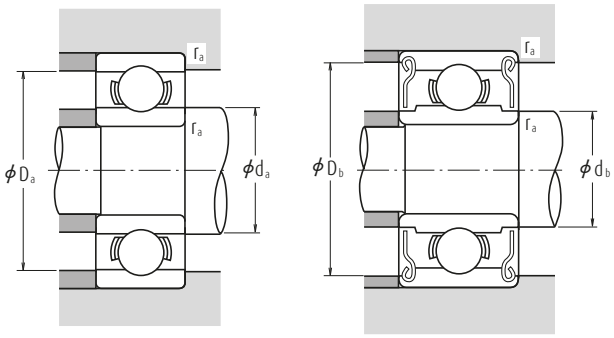
Open Type



Shielded Type
ZZ · ZZS

Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min⁻¹)		Bearing
							Grease	Oil	
d	D	B	B_1	r min.	C_r	C_{0r}	Open Z · ZZ	Open Z	Open
1.016	3.175	1.191	—	0.1	80	23	130 000	150 000	**R 09**
1.191	3.967	1.588	2.380	0.1	138	35	110 000	130 000	**R 0**
1.397	4.762	1.984	2.779	0.1	231	66	90 000	110 000	**R 1**
1.984	6.350	2.380	3.571	0.1	310	108	67 000	80 000	**R 1-4**
2.380	4.762	1.588	—	0.1	188	60	80 000	95 000	**R 133**
	4.762	—	2.380	0.1	143	52	80 000	95 000	—
	7.938	2.779	3.571	0.15	550	175	60 000	71 000	**R 1-5**
3.175	6.350	2.380	2.779	0.1	283	95	67 000	80 000	**R 144**
	7.938	2.779	3.571	0.1	560	179	60 000	67 000	**R 2-5**
	9.525	2.779	3.571	0.15	640	225	53 000	63 000	**R 2-6**
	9.525	3.967	3.967	0.3	630	218	56 000	67 000	**R 2**
	12.700	4.366	4.366	0.3	640	225	53 000	63 000	**R 2A**
3.967	7.938	2.779	3.175	0.1	360	149	53 000	63 000	**R 155**
4.762	7.938	2.779	3.175	0.1	360	149	53 000	63 000	**R 156**
	9.525	3.175	3.175	0.1	710	270	50 000	60 000	**R 166**
	12.700	3.967	4.978	0.3	1 300	485	43 000	53 000	**R 3**
6.350	9.525	3.175	3.175	0.1	420	204	48 000	56 000	**R 168B**
	12.700	3.175	4.762	0.15	1 080	440	40 000	50 000	**R 188**
	15.875	4.978	4.978	0.3	1 610	660	38 000	45 000	**R 4B**
	19.050	5.558	7.142	0.4	2 620	1 060	36 000	43 000	**R 4AA**
7.938	12.700	3.967	3.967	0.15	540	276	40 000	48 000	**R 1810**
9.525	22.225	5.558	7.142	0.4	3 350	1 410	32 000	38 000	**R 6**

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

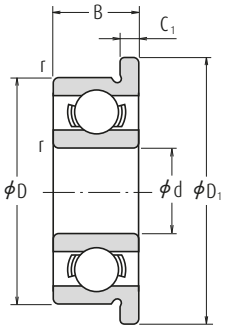


Radial and axial load factors

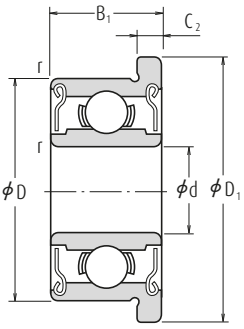
C_{or}/F_a	$F_a/F_r \leq e$		$F_a/F_r > e$		e
	X	Y	X	Y	
5	1	0	0.56	1.26	0.35
10	1	0	0.56	1.49	0.29
15	1	0	0.56	1.64	0.27
20	1	0	0.56	1.76	0.25
25	1	0	0.56	1.85	0.24
30	1	0	0.56	1.92	0.23
50	1	0	0.56	2.13	0.20

Numbers	Abutment and Fillet Dimensions (mm)					Mass (g)	
						approx.	
Shielded	d_a min.	d_b max.	D_a max.	D_b min.	r_a max.	Open	Shielded
—	1.9	—	2.3	—	0.1	0.04	—
R 0 ZZ	2.0	1.9	3.1	3.5	0.1	0.09	0.11
R 1 ZZ	2.2	2.3	3.9	4.1	0.1	0.15	0.19
R 1-4 ZZ	2.8	3.9	5.5	5.9	0.1	0.35	0.50
—	3.2	—	3.9	—	0.1	0.10	—
R 133 ZZS	—	3.0	—	4.2	0.1	—	0.13
R 1-5 ZZ	3.6	4.1	6.7	7.0	0.15	0.60	0.72
R 144 ZZ	4.0	3.9	5.5	5.9	0.1	0.25	0.27
R 2-5 ZZ	4.0	4.3	7.1	7.3	0.1	0.55	0.72
R 2-6 ZZS	4.4	4.6	8.3	8.2	0.15	0.96	1.13
R 2 ZZ	5.2	4.8	7.5	8.0	0.3	1.36	1.39
R 2A ZZ	5.2	4.6	10.7	8.2	0.3	3.3	3.23
R 155 ZZS	4.8	5.5	7.1	7.3	0.1	0.51	0.56
R 156 ZZS	5.6	5.5	7.1	7.3	0.1	0.39	0.42
R 166 ZZ	5.6	5.9	8.7	8.8	0.1	0.81	0.85
R 3 ZZ	6.8	6.5	10.7	11.2	0.3	2.21	2.79
R 168 BZZ	7.2	7.0	8.7	8.9	0.1	0.58	0.62
R 188 ZZ	7.6	7.4	11.5	11.6	0.15	1.53	2.21
R 4B ZZ	8.4	8.4	13.8	13.8	0.3	4.5	4.43
R 4AA ZZ	9.4	9.0	16.0	16.6	0.4	7.48	9.17
R 1810 ZZ	9.2	9.0	11.5	11.6	0.15	1.56	1.48
R 6 ZZ	12.6	11.9	19.2	20.0	0.4	9.02	11

Inch Design With Flange
Bore Diameter 1.191 – 9.525 mm



Open Type



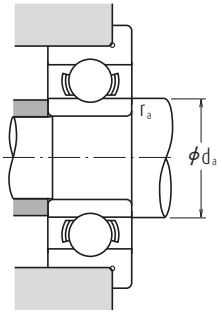
Shielded Type
ZZ · ZZS

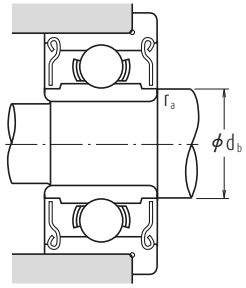
Boundary Dimensions (mm)								Basic Load Ratings (N)	
d	D	D_1	B	B_1	C_1	C_2	r min.	C_r	C_{0r}
1.191	3.967	5.156	1.588	2.380	0.330	0.790	0.1	138	35
1.397	4.762	5.944	1.984	2.779	0.580	0.790	0.1	231	66
1.984	6.350	7.518	2.380	3.571	0.580	0.790	0.1	310	108
2.380	4.762	5.944	1.588	—	0.460	—	0.1	188	60
	4.762	5.944	—	2.380	—	0.790	0.1	143	52
	7.938	9.119	2.779	3.571	0.580	0.790	0.15	550	175
3.175	6.350	7.518	2.380	2.779	0.580	0.790	0.1	283	95
	7.938	9.119	2.779	3.571	0.580	0.790	0.1	560	179
	9.525	10.719	2.779	3.571	0.580	0.790	0.15	640	225
	9.525	11.176	3.967	3.967	0.760	0.760	0.3	630	218
3.967	7.938	9.119	2.779	3.175	0.580	0.910	0.1	360	149
4.762	7.938	9.119	2.779	3.175	0.580	0.910	0.1	360	149
	9.525	10.719	3.175	3.175	0.580	0.790	0.1	710	270
	12.700	14.351	4.978	4.978	1.070	1.070	0.3	1 300	485
6.350	9.525	10.719	3.175	3.175	0.580	0.910	0.1	420	204
	12.700	13.894	3.175	4.762	0.580	1.140	0.15	1 080	440
	15.875	17.526	4.978	4.978	1.070	1.070	0.3	1 610	660
7.938	12.700	13.894	3.967	3.967	0.790	0.790	0.15	540	276
9.525	22.225	24.613	7.142	7.142	1.570	1.570	0.4	3 350	1 410

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

Radial and axial load factors

C_{or}/F_a	$F_a/F_r \leq e$		$F_a/F_r > e$		e
	X	Y	X	Y	
5	1	0	0.56	1.26	0.35
10	1	0	0.56	1.49	0.29
15	1	0	0.56	1.64	0.27
20	1	0	0.56	1.76	0.25
25	1	0	0.56	1.85	0.24
30	1	0	0.56	1.92	0.23
50	1	0	0.56	2.13	0.20





Limiting Speeds (min^{-1})		Bearing Numbers		Abutment and Fillet Dimensions (mm)			Mass (g)	
Grease	Oil						approx.	
Open Z · ZZ	Open Z	Open	Shielded	d_a min.	d_b max.	r_a max.	Open	Shielded
110 000	130 000	**FR 0**	**FR 0 ZZ**	2.0	1.9	0.1	0.11	0.16
90 000	110 000	**FR 1**	**FR 1 ZZ**	2.2	2.3	0.1	0.20	0.25
67 000	80 000	**FR 1-4**	**FR 1-4 ZZ**	2.8	3.9	0.1	0.41	0.58
80 000	95 000	**FR 133**	—	3.2	—	0.1	0.13	—
80 000	95 000	—	**FR 133 ZZS**	—	3.0	0.1	—	0.19
60 000	71 000	**FR 1-5**	**FR 1-5 ZZ**	3.6	4.1	0.15	0.68	0.82
67 000	80 000	**FR 144**	**FR 144 ZZ**	4.0	3.9	0.1	0.31	0.35
60 000	67 000	**FR 2-5**	**FR 2-5 ZZ**	4.0	4.3	0.1	0.62	0.81
53 000	63 000	**FR 2-6**	**FR 2-6 ZZS**	4.4	4.6	0.15	1.04	1.25
56 000	67 000	**FR 2**	**FR 2 ZZ**	5.2	4.8	0.3	1.51	1.55
53 000	63 000	**FR 155**	**FR 155 ZZS**	4.8	5.5	0.1	0.59	0.67
53 000	63 000	**FR 156**	**FR 156 ZZS**	5.6	5.5	0.1	0.47	0.53
50 000	60 000	**FR 166**	**FR 166 ZZ**	5.6	5.9	0.1	0.90	0.98
43 000	53 000	**FR 3**	**FR 3 ZZ**	6.8	6.5	0.3	2.97	3.09
48 000	56 000	**FR 168B**	**FR 168 BZZ**	7.2	7.0	0.1	0.66	0.75
40 000	50 000	**FR 188**	**FR 188 ZZ**	7.6	7.4	0.15	1.64	2.49
38 000	45 000	**FR 4B**	**FR 4B ZZ**	8.4	8.4	0.3	4.78	4.78
40 000	48 000	**FR 1810**	**FR 1810 ZZ**	9.2	9.0	0.15	1.71	1.63
32 000	38 000	**FR 6**	**FR 6 ZZ**	12.6	11.9	0.4	10.1	12.1