

For New Technology Network

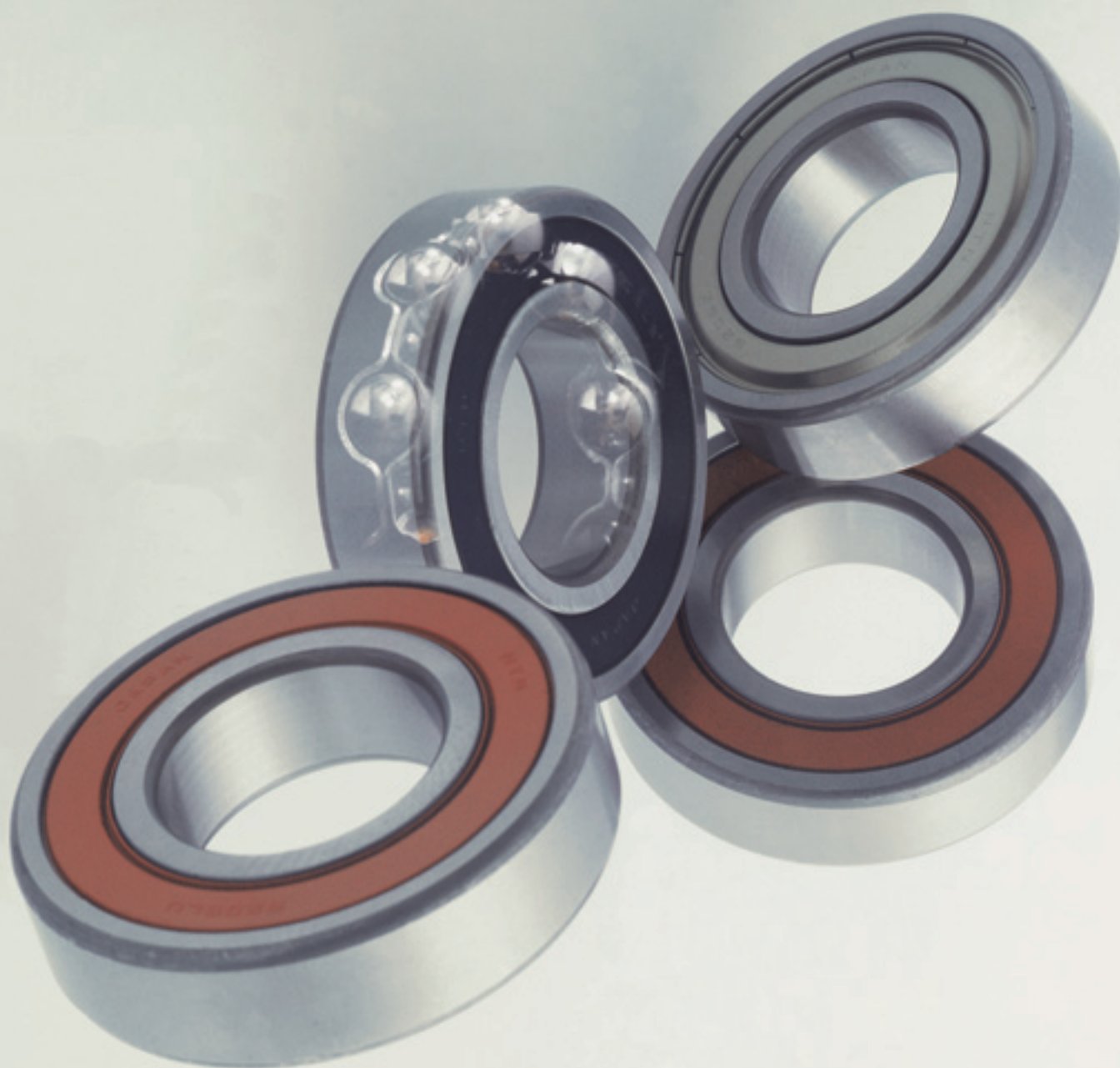
NTN®

NTNcorporation

Ball Bearings

Shield and Seal Types

CAT. No. 3015-III/E



Warranty

NTN warrants, to the original purchaser only, that the delivered product which is the subject of this sale (a) will conform to drawings and specifications mutually established in writing as applicable to the contract, and (b) be free from defects in material or fabrication. The duration of this warranty is one year from date of delivery. If the buyer discovers within this period a failure of the product to conform to drawings or specifications, or a defect in material or fabrication, it must promptly notify NTN in writing. In no event shall such notification be received by NTN later than 13 months from the date of delivery. Within a reasonable time after such notification, NTN will, at its option, (a) correct any failure of the product to conform to drawings, specifications or any defect in material or workmanship, with either replacement or repair of the product, or (b) refund, in part or in whole, the purchase price. Such replacement and repair, excluding charges for labor, is at NTN's expense. All warranty service will be performed at service centers designated by NTN. These remedies are the purchaser's exclusive remedies for breach of warranty.

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Any action for breach of warranty or any other legal theory must be commenced within 15 months following delivery of the goods.

Unless modified in a writing signed by both parties, this agreement is understood to be the complete and exclusive agreement between the parties, superceding all prior agreements, oral or written, and all other communications between the parties relating to the subject matter of this agreement. No employee of NTN or any other party is authorized to make any warranty in addition to those made in this agreement.

This agreement allocates the risks of product failure between NTN and the purchaser. This allocation is recognized by both parties and is reflected in the price of the goods. The purchaser acknowledges that it has read this agreement, understands it, and is bound by its terms.

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NTN Ball Bearings

Shield and Seal Types

Machinery is being made smaller and more compact; the same is demanded of bearings.

NTN seal and shield type ball bearings are built to meet these trends.

They simplify shaft design, are maintenance-free, and are the bearing of choice for an increasing number of applications.

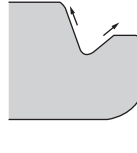


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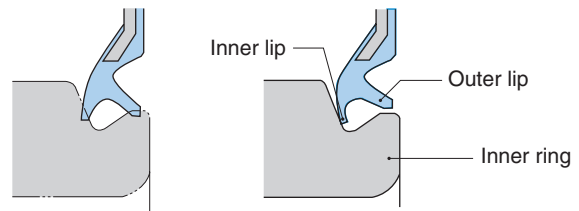
1 Grooved Type Sealing figure for Excellent Performance (all models)

A v-shaped groove is cut around the inner ring. Under centrifugal force, the outer surface of the v acts to keep out dirt; the inner surface of the v acts to seal in the grease.



3 Double-lip Seal Adjusts for Wear (LLU spec)

The inner lip of a double-lip seal is pressed against the inside surface of the V-groove; the outer lip is spread open by the elastic force of rubber to create a small gap between the outer lip and the inner ring. Should the inner lip wear, the contact pressure will decrease; however, the outer lip will get closer to the inner ring. In effect, a constant degree of sealing will be maintained; and, as a result, bearing service life will be noticeably lengthened.

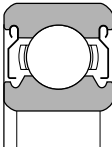
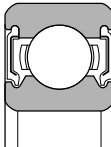
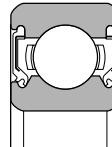
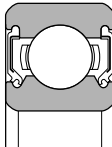


2 Rust Resistant Shield (ZZ spec)

In order to obtain rust resistant properties, the shield is made of a strip steel covered by a hard surface-coating. This assures long bearing service life and minimal noise levels.

1. Bearing Design and Features, Seal/Shield Bearing Types and Selection

Table 1 Bearing design and features

Type, code no.	Shield type	Seal type			
	Non-contact type ZZ	Non-contact type LLB	Contact type LLU	Low torque type LLH	
Construction					
	<ul style="list-style-type: none"> • Metal shield plate is affixed to outside ring; inner ring incorporates a V-groove and labyrinth clearance. 	<ul style="list-style-type: none"> • Outer ring incorporates synthetic rubber molded to a steel plate; seal edge is aligned with V-groove along inner ring surface with labyrinth clearance. 	<ul style="list-style-type: none"> • Outer ring incorporates synthetic rubber molded to a steel plate; seal edge contacts V-groove along inner ring surface. 	<ul style="list-style-type: none"> • Basic construction the same as LU type, but specially designed lip on edge of seal prevents penetration by foreign matter; low torque construction. 	
Performance comparison	Torque	Very Low	Very Low	Medium	Low
	Dust proofing	Good	Very Good	Best	Excellent
	Water proofing	Poor	Poor	Very good	Good
	High speed capacity	Same as open type	Same as open type	Limited by contact seals	Better than LLU-type
	Allowable temp.range ①	Depends on lubricant	-25 °C ~ 120 °C	-25 °C ~ 110 °C	-25 °C ~ 120 °C

① Please consult NTN Engineering about applications which exceed the allowable temperature range of products listed on this table.
 Note : This chart lists double shielded and double sealed bearings, but single shielded (Z) and single sealed (LB, LU, LH) are also available.
 Grease lubrication should be used with single shielded and single sealed bearings.

2. Test Data for Seal Performance

Friction torque and temperature rise test

Test Conditions

Bearings :6305
 Grease :Shell Alvania 3,3.5g packed
 Revolution :1800 r/min
 Time :20 minutes
 Load :radial load 29 N
 Quantity tested :5 pcs. each

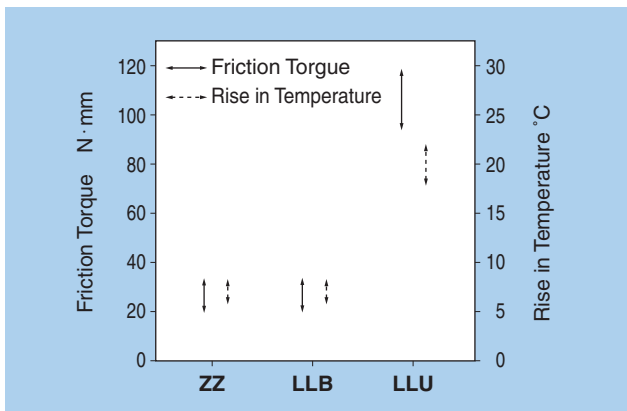
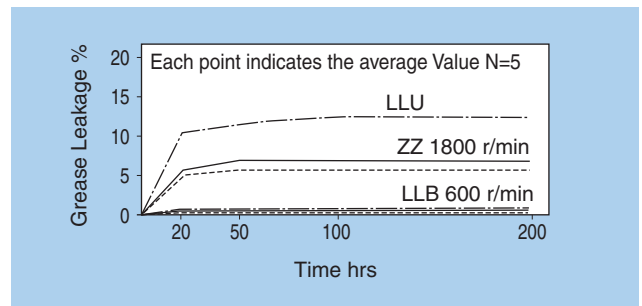


Figure 1. Friction torque and temperature rise test data

Grease leakage test

Test Conditions

Bearings :6305
 Grease :Shell Alvania 3,3.5g packed
 Revolution :1800 r/min, 600 r/min
 Atmospheric temperature :80°C
 Time :200 hrs
 Quantity tested :5 pcs. each



The larger grease leakage with the LLU at 1800 rpm is due to bearing temperature rise.

Figure 2. Grease leakage test data

Dust test

Test Conditions

Bearings :6305
 Grease :Shell Alvania 3,3.5g packed
 Revolution :1800 r/min
 Load :radial load 29 N
 Volume of testing machine :40 liter
 Dust :Oxidized ferrous powder (2kg) + lime (1.0kg) mixture
 Time :1 hour

Table 3 Dust resistance test data

Type	1	2	3	4	average
ZZ	2.5	2	2	2.5	2.25
LLB	2.5	3	2.5	2.5	2.62
LLU	3	3	3	3	3.00

Ratings 3 : Complete absence of dust
 2 : Slight presence of dust observed
 1 : Presence of dust clearly observed

Muddy water splash test

Test Conditions

Bearings :6304
 Grease :Shell Alvania 3,2g packed
 Revolution :3000 r/min
 Muddy water :5 wt% of class 8 of JIS Z 8901 Kanto loam powder
 Muddy water flow :30 cc/min
 Test time :10 cycles over 240 hrs (Each cycle consists of 3 hours of spraying and 21 hours of drying)

Table 4 Muddy water splash test data

Type	1	2	3	4	5	average
LLU	3	2	2	4	3	2.8
LLB	2	1	1	2	2	1.6

Ratings 4 : No penetration whatsoever
 3 : Very slight penetration of muddy water is apparent
 2 : Some penetration of muddy water is apparent
 1 : Considerable penetration of muddy water is apparent

3. Service Life of Prelubricating Grease

The service life of filled grease is influenced by many factors: operating conditions, temperature, atmosphere, etc. There is even a considerable difference by grease brands. Keeping this in mind, **Figure 3** presents a scale for determining grease service life. It is based on actual and experimental data; and applies to high-quality grease used in ball bearings under normal operating conditions. As the working temperature increases, the grease life, of course, becomes shorter. Although not accurate for all greases, **Figure 3** is valid, in general, for working temperatures up to 80°C; for working temperatures over 80°C, service life decreases to about two-thirds for every 10° over 80°C. (Please note that this does not apply to calcium-soap and aluminum-soap greases.)

Example

The following method is used to obtain the grease life of deep groove ball bearing 6206ZZ at a radial load of 1520 N and a operating speed, n , of 3600 r/min. From the appropriate Dimension Table we find that the standard load rating, C_r , for a 6206ZZ bearings is 19500 N and the

limiting speed is 11000 r/min. (Use the value for ZZ or LLB even if the bearings of LLU specifications). Divide C_r by the equivalent radial load, P_r . You will obtain 12.8 (19500/1520≈12.8). Next go to **Figure 4** to determine the value for f_L . (For $C_r/P_r=12.8$, $f_L=1$). Find $f_L \cdot n_o/n$. (1.0 · 11000/3600≈3.1). With your value of $f_L \cdot n_o/n$ (3.1 in this example) go to **Figure 3** and find this value on Scale II. Call this point B. The bore diameter, d , of the bearing is 30. Find this value on Scale I and call this point A. Draw a straight line between Points A and B. The line will intersect Scale III at some point which will be Called Point C. In this example, Point C is 17000 hours. This is the expected grease life of the bearing which is what we were looking for.

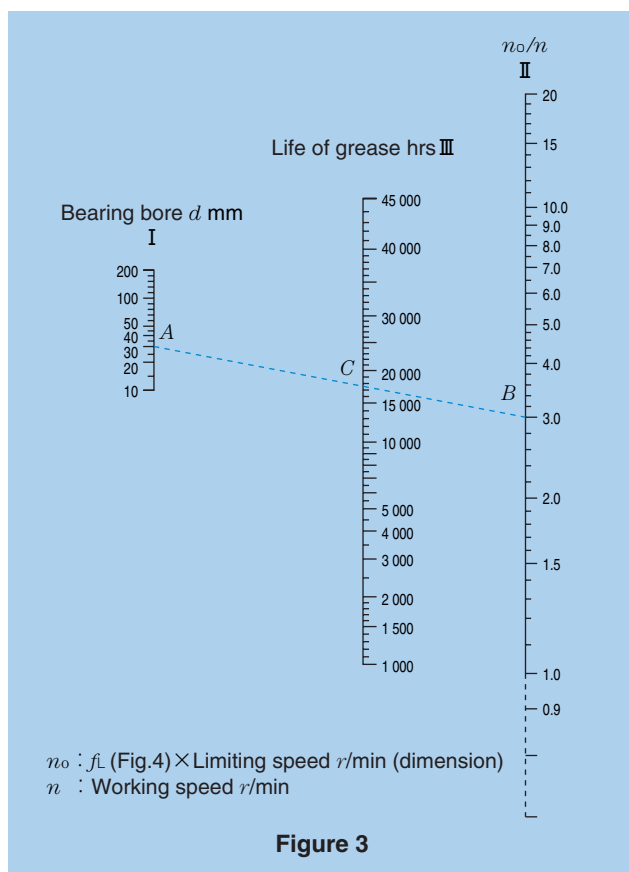


Figure 3

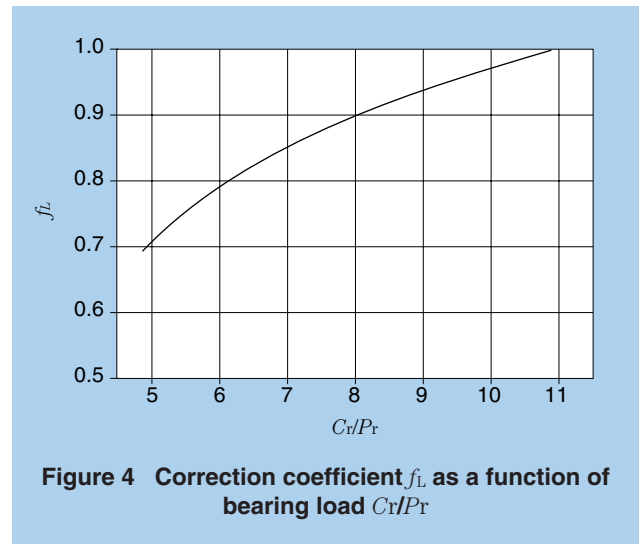


Figure 4 Correction coefficient f_L as a function of bearing load C_r/P_r

Note that NTN can also manufacture shield and seal type small diameter ball bearings of dimensions other than those shown on the subsequent dimension tables. Contact NTN for more information.

- Use under high or low temperature
- Low torque is required
- High speeds are required
- Grease leakage must be avoided
- Use under other special conditions

Also note that the performance of prelubricated ball bearings is affected by operating conditions and grease type. For information on performance under special conditions, please contact NTN.

4. Bearing Precision

Inner ring

- d = Nominal bore diameter
- Δd_{mp} = Single plane mean bore diameter deviation
- V_{dp} = Single radial plane bore diameter variation
- V_{dmp} = Mean single plane bore diameter variation
- K_{ia} = Inner ring radial runout
- S_d = Face runout with bore
- S_{ia} = Inner ring axial runout (with side)
- ΔB_s = Inner ring width deviation
- V_{Bs} = Inner ring width variation

Outer ring

- D = Nominal outside diameter
- ΔD_{mp} = Single plane mean outside diameter deviation
- V_{Dp} = Single radial plane outside diameter variation
- V_{Dmp} = Mean single plane outside diameter variation
- K_{ea} = Outer ring radial runout
- S_D = Outside surface inclination
- S_{ea} = Outside ring axial runout
- ΔC_s = Outer ring width deviation
- V_{Cs} = Outer ring width variation

(1) Inner ring tolerance

Unit μm

d (mm)	Δd_{mp}				V_{dp}												V_{dmp}	K_{ia}				S_d	S_{ia}				ΔB_s		V_{Bs}						
					Bearing series 68, 69				Bearing series 60				Bearing series 62, 63																						
	Class 0	Class 6	Class 5	Class 4	Class 0	Class 6	Class 5	Class 4	Class 0	Class 6	Class 5	Class 4	Class 0	Class 6	Class 5	Class 4		Class 0	Class 6	Class 5	Class 4		Class 0	Class 6	Class 5	Class 4	Class 0	Class 6	Class 5	Class 4	Class 0	Class 6	Class 5	Class 4	Class 0
over incl.	high low	high low	high low	high low	max				max				max				max	max				max	high low	high low	max										
2.5 10	0 - 8	0 - 7	0 - 5	0 - 4	10	9	5	4	8	7	4	3	6	5	4	3	6	5	3	2	10	6	4	2.5	7	3	7	3	0 - 120	0 - 40	15	15	5	2.5	
10 18	0 - 8	0 - 7	0 - 5	0 - 4	10	9	5	4	8	7	4	3	6	5	4	3	6	5	3	2	10	7	4	2.5	7	3	7	3	0 - 120	0 - 80	20	20	5	2.5	
18 30	0 - 10	0 - 8	0 - 6	0 - 5	13	10	6	5	10	8	5	4	8	6	5	4	8	6	3	2.5	13	8	4	3	8	4	8	4	0 - 120	0 - 120	20	20	5	2.5	
30 50	0 - 12	0 - 10	0 - 8	0 - 6	15	13	8	6	12	10	6	5	9	8	6	5	9	8	4	3	15	10	5	4	8	4	8	4	0 - 120	0 - 120	20	20	5	3	
50 80	0 - 15	0 - 12	0 - 9	0 - 7	19	15	9	7	19	15	7	5	11	9	7	5	11	9	5	3.5	20	10	5	4	8	5	8	5	0 - 150	0 - 150	25	25	6	4	
80 120	0 - 20	0 - 15	0 - 10	0 - 8	25	19	10	8	25	19	8	6	15	11	8	6	15	11	5	4	25	13	6	5	9	5	9	5	0 - 200	0 - 200	25	25	7	4	
120 180	0 - 25	0 - 18	0 - 13	0 - 10	31	23	13	10	31	23	10	8	19	14	10	8	19	14	7	5	30	18	8	6	10	6	10	7	0 - 250	0 - 250	30	30	8	5	

① The dimensional difference $\Delta_{i/s}$ of bore diameter to be applied for class 4 and 2 is the same as the tolerance of dimensional difference Δ_{imp} of average bore diameter. However, the dimensional difference is applied to diameter series 0, 1, 2, 3 and 4 against Class 4, and to all the diameter series against Class 2.

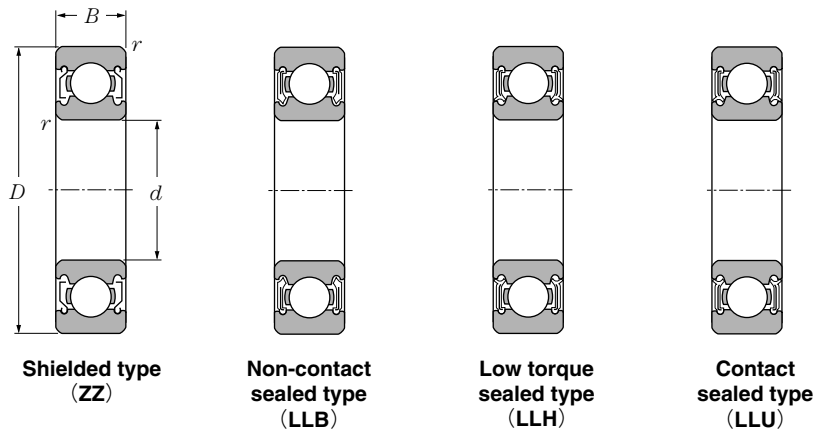
(2) Outer ring tolerance

Unit μm

D (mm)	ΔD_{mp}				V_{Dp}		V_{Dmp}				K_{ea}				S_D		S_{ea}		ΔC_s		V_{Cs}			
					Bearing series 62, 63	Bearing series 60, 62, 63																		
	Class 0	Class 6	Class 5	Class 4	Class 0	Class 6	Class 0	Class 6	Class 5	Class 4	Class 0	Class 6	Class 5	Class 4	Class 5	Class 4	Class 5	Class 4	all type	Class 0	Class 6	Class 5	Class 4	
over incl.	high low	high low	high low	high low	max		max				max				max		max		high low	max				
18 30	0 - 9	0 - 8	0 - 6	0 - 5	12	10	7	6	3	2.5	15	9	6	4	8	4	8	5	Identical to $\Delta_{i/s}$ of inner ring of same bearing	Identical to $\Delta_{i/s}$ and V_{Bs} of inner ring of same bearing	5	5	5	2.5
30 50	0 - 11	0 - 9	0 - 7	0 - 6	16	13	8	7	4	3	20	10	7	5	8	4	8	5			6	6	3	
50 80	0 - 13	0 - 11	0 - 9	0 - 7	20	16	10	8	5	3.5	25	13	8	5	8	4	10	5			8	8	4	
80 120	0 - 15	0 - 13	0 - 10	0 - 8	26	20	11	10	5	4	35	18	10	6	9	5	11	6			8	8	4	
120 150	0 - 18	0 - 15	0 - 11	0 - 9	30	25	14	11	6	5	40	20	11	7	10	5	13	7			8	8	5	
150 180	0 - 25	0 - 18	0 - 13	0 - 10	38	30	19	14	7	5	45	23	13	8	10	5	14	8			8	8	5	
180 250	0 - 30	0 - 20	0 - 15	0 - 11	45	35	23	15	8	6	50	25	15	10	11	7	15	10			10	10	7	

② Same as ① but $\Delta_{i/s} + \Delta_{imp}$ rather than $\Delta_{i/s} + \Delta_{imp}$

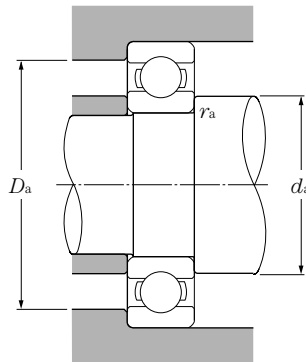
5. Dimension Tables



d 10~25mm

d	Boundary dimensions			Basic load ratings				Limiting speeds		
	mm			dynamic	static	dynamic	static	rpm		
	D	B	r's min ^①	C _r	C _{or}	C _r	C _{or}	grease ZZ LLB	LLH	LLU
10	19	5	0.3	1.83	0.925	187	94	32 000	—	24 000
	22	6	0.3	2.7	1.27	275	129	30 000	—	21 000
	26	8	0.3	4.55	1.96	465	200	29 000	25 000	21 000
	30	9	0.6	5.10	2.39	520	244	25 000	21 000	18 000
	35	11	0.6	8.20	3.50	835	355	23 000	20 000	16 000
12	21	5	0.3	1.92	1.04	195	106	29 000	—	20 000
	24	6	0.3	2.89	1.46	295	149	27 000	—	19 000
	28	8	0.3	5.10	2.39	520	244	26 000	21 000	18 000
	32	10	0.6	6.10	2.75	620	280	22 000	20 000	16 000
	37	12	1	9.70	4.20	990	425	20 000	19 000	15 000
15	24	5	0.3	2.08	1.26	212	128	26 000	—	17 000
	28	7	0.3	3.65	2.00	375	204	24 000	—	16 000
	32	9	0.3	5.60	2.84	570	289	22 000	18 000	15 000
	35	11	0.6	7.75	3.60	790	365	19 000	18 000	15 000
	42	13	1	11.4	5.45	1 170	555	17 000	15 000	12 000
17	26	5	0.3	2.23	1.46	227	149	24 000	—	15 000
	30	7	0.3	4.65	2.58	475	263	22 000	—	14 000
	35	10	0.3	6.80	3.35	695	345	20 000	16 000	14 000
	40	12	0.6	9.60	4.60	980	465	18 000	15 000	12 000
	47	14	1	13.5	6.55	1 380	665	16 000	14 000	11 000
20	32	7	0.3	4.00	2.47	410	252	21 000	—	13 000
	37	9	0.3	6.40	3.70	650	375	19 000	—	12 000
	42	12	0.6	9.40	5.05	955	515	18 000	13 000	11 000
	47	14	1	12.8	6.65	1 310	680	16 000	12 000	10 000
	52	15	1.1	15.9	7.90	1 620	805	14 000	12 000	10 000
22	44	12	0.6	9.40	5.05	955	515	17 000	13 000	10 000
	50	14	1	12.9	6.80	1 320	690	14 000	12 000	9 700
	56	16	1.1	18.4	9.25	1 880	945	13 000	11 000	9 200
25	37	7	0.3	4.30	2.95	435	300	18 000	—	10 000
	42	9	0.3	7.05	4.55	715	460	16 000	—	9 800
	47	12	0.6	10.1	5.85	1 030	595	15 000	11 000	9 400
	52	15	1	14.0	7.85	1 430	800	13 000	11 000	8 900
	62	17	1.1	21.2	10.9	2 160	1 110	12 000	9 700	8 100

① Smallest allowable dimension for chamfer dimension r.

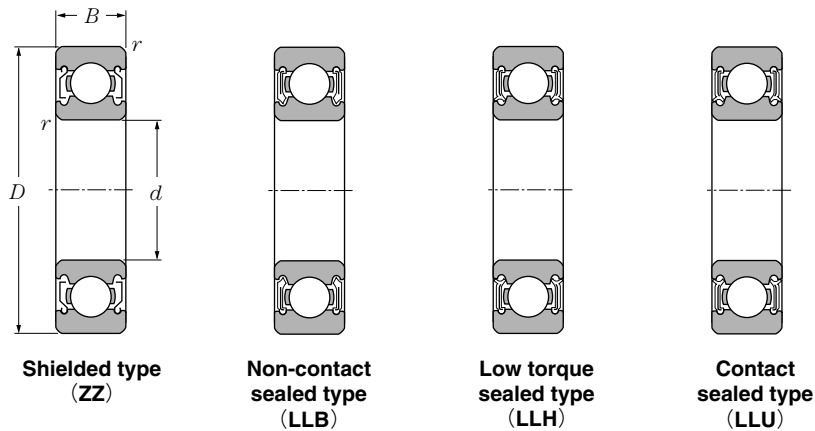


Bearing numbers ^②				Abutment and fillet dimensions				Mass
Sealed type	Non-contact type	Low torque type	Contact type	mm		D_a ^③	r_{as} max	kg (approx.)
				d_a ^③ min	d_a ^③ max			
6800ZZ	6800LLB	—	6800LLU	12	12.5	17	0.3	0.005
6900ZZ	6900LLB	—	6900LLU	12	13	20	0.3	0.009
6000ZZ	6000LLB	6000LLH	6000LLU	12	13.5	24	0.3	0.019
6200ZZ	6200LLB	6200LLH	6200LLU	14	16	26	0.6	0.032
6300ZZ	6300LLB	6300LLH	6300LLU	14	17	31	0.6	0.053
6801ZZ	6801LLB	—	6801LLU	14	14.5	19	0.3	0.006
6901ZZ	6901LLB	—	6901LLU	14	15	22	0.3	0.011
6001ZZ	6001LLB	6001LLH	6001LLU	14	16	26	0.3	0.021
6201ZZ	6201LLB	6201LLH	6201LLU	16	17	28	0.6	0.037
6301ZZ	6301LLB	6301LLH	6301LLU	17	18.5	32	1	0.06
6802ZZ	6802LLB	—	6802LLU	17	17.5	22	0.3	0.007
6902ZZ	6902LLB	—	6902LLU	17	17.5	26	0.3	0.016
6002ZZ	6002LLB	6002LLH	6002LLU	17	19	30	0.3	0.03
6202ZZ	6202LLB	6202LLH	6202LLU	19	20	31	0.6	0.045
6302ZZ	6302LLB	6302LLH	6302LLU	20	23	37	1	0.082
6803ZZ	6803LLB	—	6803LLU	19	19.5	24	0.3	0.008
6903ZZ	6903LLB	—	6903LLU	19	20	28	0.3	0.018
6003ZZ	6003LLB	6003LLH	6003LLU	19	21	33	0.3	0.039
6203ZZ	6203LLB	6203LLH	6203LLU	21	23	36	0.6	0.066
6303ZZ	6303LLB	6303LLH	6303LLU	22	25	42	1	0.115
6804ZZ	6804LLB	—	6804LLU	22	22.5	30	0.3	0.019
6904ZZ	6904LLB	—	6904LLU	22	24	35	0.3	0.036
6004ZZ	6004LLB	6004LLH	6004LLU	24	26	38	0.6	0.069
6204ZZ	6204LLB	6204LLH	6204LLU	25	28	42	1	0.106
6304ZZ	6304LLB	6304LLH	6304LLU	26.5	28.5	45.5	1	0.144
60/22ZZ	60/22LLB	60/22LLH	60/22LLU	26	26.5	40	0.6	0.074
62/22ZZ	62/22LLB	62/22LLH	62/22LLU	27	29.5	45	1	0.117
63/22ZZ	63/22LLB	63/22LLH	63/22LLU	28.5	31	49.5	1	0.176
6805ZZ	6805LLB	—	6805LLU	27	28	35	0.3	0.022
6905ZZ	6905LLB	—	6905LLU	27	29	40	0.3	0.042
6005ZZ	6005LLB	6005LLH	6005LLU	29	30.5	43	0.6	0.08
6205ZZ	6205LLB	6205LLH	6205LLU	30	32	47	1	0.128
6305ZZ	6305LLB	6305LLH	6305LLU	31.5	35	55.5	1	0.232

② Single sealed and shielded bearings are also available.

③ This dimension applies to sealed and shielded bearings.

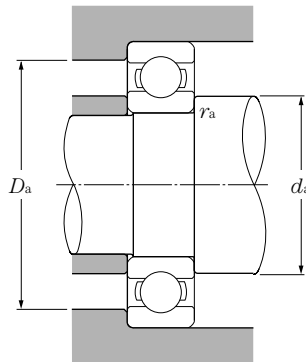
NTN Ball Bearings Shield and Seal Types



d 28~55mm

d	Boundary dimensions			Basic load ratings				Limiting speeds		
	mm			dynamic	static	dynamic	static	rpm		
	D	B	r's min ^①	C _r	C _{or}	C _r	C _{or}	grease ZZ LLB	LLH	LLU
28	52	12	0.6	12.5	7.40	1 270	755	14 000	10 000	8 400
	58	16	1	17.9	9.75	1 830	995	12 000	9 700	8 100
	68	18	1.1	26.7	14.0	2 730	1 430	11 000	8 900	7 400
30	42	7	0.3	4.70	3.65	480	370	15 000	—	8 800
	47	9	0.3	7.25	5.00	740	510	14 000	—	8 400
	55	13	1	13.2	8.3	1 350	845	13 000	9 200	7 700
	62	16	1	19.5	11.3	1 980	1 150	11 000	8 800	7 300
	72	19	1.1	26.7	15.0	2 720	1 530	10 000	7 900	6 600
32	58	13	1	11.8	8.05	1 200	820	12 000	8 700	7 200
	65	17	1	20.7	11.6	2 110	1 190	11 000	8 400	7 100
	75	20	1.1	29.8	16.9	3 050	1 730	9 500	7 700	6 500
35	47	7	0.3	4.90	4.05	500	410	13 000	—	7 600
	55	10	0.6	9.55	6.85	975	695	12 000	—	7 100
	62	14	1	16.0	10.3	1 630	1 050	12 000	8 200	6 800
	72	17	1.1	25.7	15.3	2 620	1 560	9 800	7 600	6 300
	80	21	1.5	33.5	19.1	3 400	1 950	8 800	7 300	6 000
40	52	7	0.3	5.10	4.40	520	445	12 000	—	6 700
	62	12	0.6	12.2	8.90	1 240	910	11 000	—	6 300
	68	15	1	16.8	11.5	1 710	1 170	10 000	7 300	6 100
	80	18	1.1	29.1	17.8	2 970	1 820	8 700	6 700	5 600
	90	23	1.5	40.5	24.0	4 150	2 450	7 800	6 400	5 300
45	58	7	0.3	5.35	4.95	550	500	11 000	—	5 900
	68	12	0.6	13.1	10.4	1 330	1 060	9 800	—	5 600
	75	16	1	21.0	15.1	2 140	1 540	9 200	6 500	5 400
	85	19	1.1	32.5	20.4	3 350	2 080	7 800	6 200	5 200
	100	25	1.5	53.0	32.0	5 400	3 250	7 000	5 600	4 700
50	65	7	0.3	6.60	6.10	670	620	9 600	—	5 300
	72	12	0.6	13.4	11.2	1 370	1 140	8 900	—	5 100
	80	16	1	21.8	16.6	2 230	1 690	8 400	6 000	5 000
	90	20	1.1	35.0	23.2	3 600	2 370	7 100	5 700	4 700
	110	27	2	62.0	38.5	6 300	3 900	6 400	5 000	4 200
55	72	9	0.3	8.80	8.10	900	825	8 700	—	4 800

① Smallest allowable dimension for chamfer dimension r.

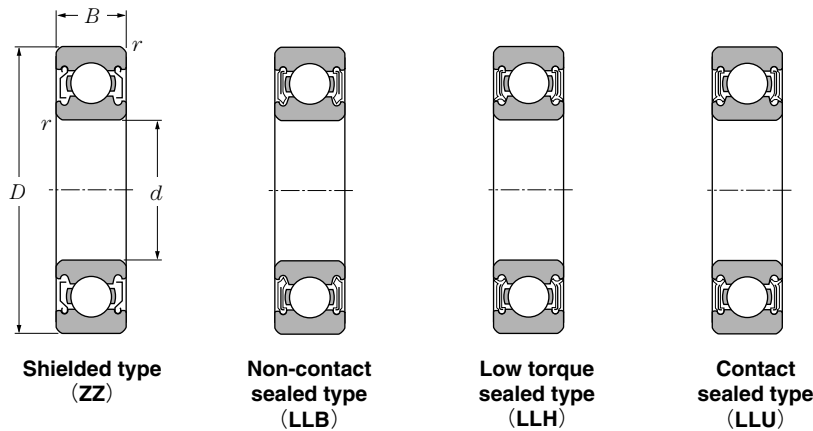


Bearing numbers ^②				Abutment and fillet dimensions				Mass
Sealed type	Non-contact type	Low torque type	Contact type	mm		D_a ^③	r_{as} max	kg (approx.)
				d_a ^③ min	d_a ^③ max			
60/28ZZ	60/28LLB	60/28LLH	60/28LLU	32	34	48	0.6	0.098
62/28ZZ	62/28LLB	62/28LLH	62/28LLU	33	35.5	53	1	0.171
63/28ZZ	63/28LLB	63/28LLH	63/28LLU	34.5	38.5	61.5	1	0.284
6806ZZ	6806LLB	—	6806LLU	32	33	40	0.3	0.026
6906ZZ	6906LLB	—	6906LLU	32	34	45	0.3	0.048
6006ZZ	6006LLB	6006LLH	6006LLU	35	37	50	1	0.116
6206ZZ	6206LLB	6206LLH	6206LLU	35	39	57	1	0.199
6306ZZ	6306LLB	6306LLH	6306LLU	36.5	43	65.5	1	0.36
60/32ZZ	60/32LLB	60/32LLH	60/32LLU	37	39	53	1	0.129
62/32ZZ	62/32LLB	62/32LLH	62/32LLU	37	40	60	1	0.226
63/32ZZ	63/32LLB	63/32LLH	63/32LLU	38.5	43.5	68.5	1	0.382
6807ZZ	6807LLB	—	6807LLU	37	38	45	0.3	0.029
6907ZZ	6907LLB	—	6907LLU	39	40	51	0.6	0.074
6007ZZ	6007LLB	6007LLH	6007LLU	40	42	57	1	0.155
6207ZZ	6207LLB	6207LLH	6207LLU	41.5	45	65.5	1	0.288
6307ZZ	6307LLB	6307LLH	6307LLU	43	47	72	1.5	0.457
6808ZZ	6808LLB	—	6808LLU	42	43	50	0.3	0.033
6908ZZ	6908LLB	—	6908LLU	44	45	58	0.6	0.11
6008ZZ	6008LLB	6008LLH	6008LLU	45	47	63	1	0.19
6208ZZ	6208LLB	6208LLH	6208LLU	46.5	51	73.5	1	0.366
6308ZZ	6308LLB	6308LLH	6308LLU	48	54	82	1.5	0.63
6809ZZ	6809LLB	—	6809LLU	47	48	56	0.3	0.04
6909ZZ	6909LLB	—	6909LLU	49	51	64	0.6	0.128
6009ZZ	6009LLB	6009LLH	6009LLU	50	52.5	70	1	0.237
6209ZZ	6209LLB	6209LLH	6209LLU	51.5	55.5	78.5	1	0.398
6309ZZ	6309LLB	6309LLH	6309LLU	53	61.5	92	1.5	0.814
6810ZZ	6810LLB	—	6810LLU	52	54	63	0.3	0.052
6910ZZ	6910LLB	—	6910LLU	54	55.5	68	0.6	0.132
6010ZZ	6010LLB	6010LLH	6010LLU	55	57.5	75	1	0.261
6210ZZ	6210LLB	6210LLH	6210LLU	56.5	60	83.5	1	0.454
6310ZZ	6310LLB	6310LLH	6310LLU	59	68.5	101	2	1.07
6811ZZ	6811LLB	—	6811LLU	57	59	70	0.3	0.083

^② Single sealed and shielded bearings are also available.

^③ This dimension applies to sealed and shielded bearings.

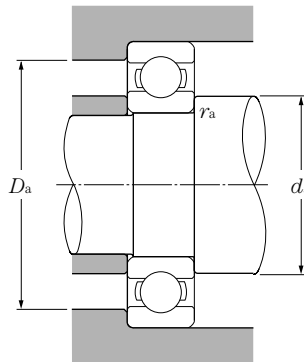
NTN Ball Bearings Shield and Seal Types



d 55~85mm

d	Boundary dimensions			Basic load ratings				Limiting speeds		
	mm			dynamic	static	dynamic	static	grease	rpm	
	D	B	r's min ^①	C _r	C _{or}	C _r	C _{or}	ZZ LLB	LLH	LLU
55	80	13	1	16.0	13.3	1 630	1 350	8 200	—	4 600
	90	18	1.1	28.3	21.2	2 880	2 170	7 700	—	4 500
	100	21	1.5	43.5	29.2	4 450	2 980	6 400	—	4 300
	120	29	2	71.5	45.0	7 300	4 600	5 800	—	3 900
60	78	10	0.3	11.5	10.6	1 170	1 080	8 000	—	4 400
	85	13	1	16.4	14.3	1 670	1 450	7 600	—	4 300
	95	18	1.1	29.5	23.2	3 000	2 370	7 000	—	4 100
	110	22	1.5	52.5	36.0	5 350	3 700	6 000	—	3 800
	130	31	2.1	82.0	52.0	8 350	5 300	5 400	—	3 600
65	85	10	0.6	11.6	11.0	1 180	1 120	7 400	—	4 100
	90	13	1	17.4	16.1	1 770	1 640	7 000	—	4 000
	100	18	1.1	30.5	25.2	3 100	2 570	6 500	—	3 900
	120	23	1.5	57.5	40.0	5 850	4 100	5 500	—	3 600
	140	33	2.1	92.5	60.0	9 450	6 100	4 900	—	3 300
70	90	10	0.6	12.1	11.9	1 230	1 220	6 900	—	3 800
	100	16	1	23.7	21.2	2 420	2 160	6 500	—	3 700
	110	20	1.1	38.0	31.0	3 900	3 150	6 100	—	3 600
	125	24	1.5	62.0	44.0	6 350	4 500	5 100	—	3 400
	150	35	2.1	104	68.0	10 600	6 950	4 600	—	3 100
75	95	10	0.6	12.5	12.9	1 280	1 310	6 400	—	3 600
	105	16	1	24.4	22.6	2 480	2 300	6 100	—	3 500
	115	20	1.1	39.5	33.5	4 050	3 400	5 700	—	3 300
	130	25	1.5	66.0	49.5	6 750	5 050	4 800	—	3 200
	160	37	2.1	113	77.0	11 600	7 850	4 300	—	2 900
80	100	10	0.6	12.7	13.3	1 290	1 360	6 000	—	3 400
	110	16	1	24.9	24.0	2 540	2 450	5 700	—	3 200
	125	22	1.1	47.5	40.0	4 850	4 050	5 300	—	3 100
	140	26	2	72.5	53.0	7 400	5 400	4 500	—	3 000
	170	39	2.1	123	86.5	12 500	8 850	4 000	—	2 700
85	110	13	1	18.7	19.0	1 910	1 940	5 700	—	3 100
	120	18	1.1	32.0	29.6	3 250	3 000	5 400	—	3 000
	130	22	1.1	49.5	43.0	5 050	4 400	5 000	—	2 900
	150	28	2	83.5	64.0	8 500	6 500	4 200	—	2 800

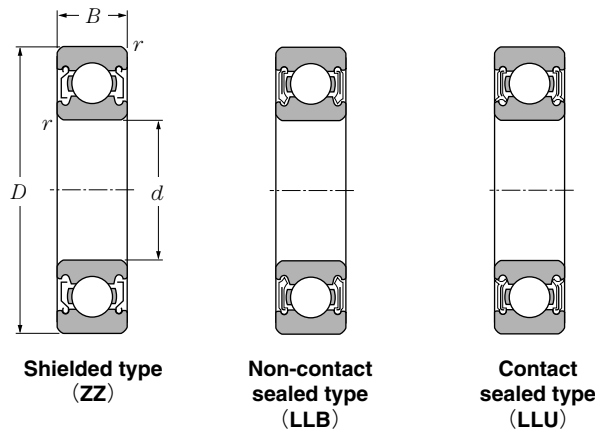
① Smallest allowable dimension for chamfer dimension r.



Bearing numbers ^②				Abutment and fillet dimensions				Mass
Sealed type	Non-contact type	Low torque type	Contact type	mm		D_a ^③	r_{as}	kg (approx.)
				d_a ^③ min	d_a ^③ max			
6911ZZ	6911LLB	—	6911LLU	60	61.5	75	1	0.18
6011ZZ	6011LLB	—	6011LLU	61.5	64	83.5	1	0.388
6211ZZ	6211LLB	—	6211LLU	63	67	92	1.5	0.601
6311ZZ	6311LLB	—	6311LLU	64	74	111	2	1.37
6812ZZ	6812LLB	—	6812LLU	62	64.5	76	0.3	0.106
6912ZZ	6912LLB	—	6912LLU	65	66.5	80	1	0.193
6012ZZ	6012LLB	—	6012LLU	66.5	69	88.5	1	0.414
6212ZZ	6212LLB	—	6212LLU	68	75	102	1.5	0.783
6312ZZ	6312LLB	—	6312LLU	71	80.5	119	2	1.73
6813ZZ	6813LLB	—	6813LLU	69	70	81	0.6	0.128
6913ZZ	6913LLB	—	6913LLU	70	71.5	85	1	0.206
6013ZZ	6013LLB	—	6013LLU	71.5	73	93.5	1	0.421
6213ZZ	6213LLB	—	6213LLU	73	80.5	112	1.5	0.99
6313ZZ	6313LLB	—	6313LLU	76	86	129	2	2.08
6814ZZ	6814LLB	—	6814LLU	74	75.5	86	0.6	0.137
6914ZZ	6914LLB	—	6914LLU	75	77.5	95	1	0.334
6014ZZ	6014LLB	—	6014LLU	76.5	80.5	103.5	1	0.604
6214ZZ	6214LLB	—	6214LLU	78	85	117	1.5	1.07
6314ZZ	6314LLB	—	6314LLU	81	92.5	139	2	2.52
6815ZZ	6815LLB	—	6815LLU	79	80	91	0.6	0.145
6915ZZ	6915LLB	—	6915LLU	80	82.5	100	1	0.353
6015ZZ	6015LLB	—	6015LLU	81.5	85.5	108.5	1	0.649
6215ZZ	6215LLB	—	6215LLU	83	90.5	122	1.5	1.18
6315ZZ	6315LLB	—	6315LLU	86	99	149	2	3.02
6816ZZ	6816LLB	—	6816LLU	84	85	96	0.6	0.154
6916ZZ	6916LLB	—	6916LLU	85	88	105	1	0.373
6016ZZ	6016LLB	—	6016LLU	86.5	91.5	118.5	1	0.854
6216ZZ	6216LLB	—	6216LLU	89	95.5	131	2	1.4
6316ZZ	6316LLB	—	6316LLU	91	105	159	2	3.59
6817ZZ	6817LLB	—	6817LLU	90	91	105	1	0.27
6917ZZ	6917LLB	—	6917LLU	91.5	94	113.5	1	0.536
6017ZZ	6017LLB	—	6017LLU	91.5	97	123.5	1	0.89
6217ZZ	6217LLB	—	6217LLU	94	103	141	2	1.79

^② Single sealed and shielded bearings are also available.
^③ This dimension applies to sealed and shielded bearings.

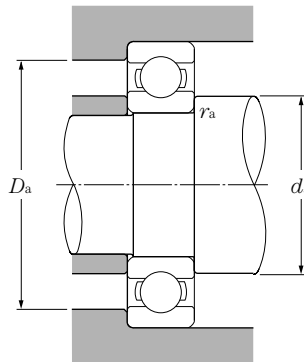
NTN Ball Bearings Shield and Seal Types



d 85~160mm

<i>d</i>	Boundary dimensions			Basic load ratings				Limiting speeds	
	<i>D</i>	<i>B</i>	<i>r</i> s min ^①	dynamic <i>C_r</i>	static <i>C_{0r}</i>	dynamic <i>C_r</i>	static <i>C_{0r}</i>	rpm grease ZZ LLB	rpm LLU
85	180	41	3	133	97.0	13 500	9 850	3 800	2 600
90	115	13	1	19.0	19.7	1 940	2 010	5 400	3 000
	125	18	1.1	33.0	31.5	3 350	3 200	5 100	2 900
	140	24	1.5	58.0	49.5	5 950	5 050	4 700	2 800
	160	30	2	96.0	71.5	9 800	7 300	4 000	2 600
	190	43	3	143	107	14 500	10 900	3 600	2 400
95	120	13	1	19.3	20.5	1 970	2 090	5 000	2 800
	130	18	1.1	33.5	33.5	3 450	3 400	4 800	2 800
	145	24	1.5	60.5	54.0	6 150	5 500	4 500	2 600
	170	32	2.1	109	82.0	11 100	8 350	3 700	2 500
	200	45	3	153	119	15 600	12 100	3 300	2 300
100	125	13	1	19.6	21.2	2 000	2 160	4 800	2 700
	140	20	1.1	41.0	39.5	4 200	4 050	4 500	2 600
	150	24	1.5	60.0	54.0	6 150	5 500	4 200	2 600
	180	34	2.1	122	93.0	12 500	9 450	3 500	2 300
	215	47	3	173	141	17 600	14 400	3 200	2 200
105	145	20	1.1	42.5	42.0	4 300	4 300	4 300	2 500
	160	26	2	72.5	65.5	7 400	6 700	4 000	2 400
	190	36	2.1	133	105	13 600	10 700	3 400	2 300
	225	49	3	184	153	18 700	15 700	3 000	2 100
110	150	20	1.1	43.5	44.5	4 450	4 550	4 100	2 400
	170	28	2	82.0	73.0	8 350	7 450	3 800	2 300
	200	38	2.1	144	117	14 700	11 900	3 200	2 200
	240	50	3	205	179	20 900	18 300	2 900	1 900
120	180	28	2	85.0	79.5	8 650	8 100	3 500	2 100
	215	40	2.1	155	131	15 900	13 400	2 900	2 000
130	200	33	2	106	101	10 800	10 300	3 200	1 900
140	210	33	2	110	109	11 200	11 100	3 000	1 800
150	225	35	2.1	126	126	12 800	12 800	2 800	1 700
160	240	38	2.1	143	144	14 500	14 700	2 600	1 600

① Smallest allowable dimension for chamfer dimension *r*.



Bearing numbers ^②			Abutment and fillet dimensions				Mass
Sealed type	Non-contact type	Contact type	mm				kg (approx.)
			d_a ^③ min	d_a ^③ max	D_a ^③ max	r_{as} max	
6317ZZ	6317LLB	6317LLU	98	112	167	2.5	4.23
6818ZZ	6818LLB	6818LLU	95	96	110	1	0.285
6918ZZ	6918LLB	6918LLU	96.5	99	118.5	1	0.554
6018ZZ	6018LLB	6018LLU	98	102	132	1.5	1.02
6218ZZ	6218LLB	6218LLU	99	109	151	2	2.15
6318ZZ	6318LLB	6318LLU	103	118	177	2.5	4.91
6819ZZ	6819LLB	6819LLU	100	101	115	1	0.3
6919ZZ	6919LLB	6919LLU	101.5	104	123.5	1	0.579
6019ZZ	6019LLB	6019LLU	103	109	137	1.5	1.08
6219ZZ	6219LLB	6219LLU	106	116	159	2	2.62
6319ZZ	—	6319LLU	108	125	187	2.5	5.67
6820ZZ	6820LLB	6820LLU	105	106	120	1	0.313
6920ZZ	6920LLB	6920LLU	106.5	110	133.5	1	0.785
6020ZZ	6020LLB	6020LLU	108	110	142	1.5	1.15
6220ZZ	6220LLB	6220LLU	111	122	169	2	3.14
6320ZZ	—	6320LLU	113	133	202	2.5	7
6921ZZ	6921LLB	6921LLU	111.5	115	138.5	1	0.816
6021ZZ	6021LLB	6021LLU	114	119	151	2	1.59
6221ZZ	—	6221LLU	116	125	179	2	3.7
6321ZZ	—	6321LLU	118	134	212	2.5	8.05
6922ZZ	6922LLB	6922LLU	116.5	120	143.5	1	0.849
6022ZZ	6022LLB	6022LLU	119	126	161	2	1.96
6222ZZ	—	6222LLU	121	132	189	2	4.36
6322ZZ	—	6322LLU	123	149	227	2.5	9.54
6024ZZ	6024LLB	6024LLU	129	136	171	2	2.07
6224ZZ	—	6224LLU	131	143	204	2	5.15
6026ZZ	—	6026LLU	139	148	191	2	3.16
6028ZZ	—	6028LLU	149	158	201	2	3.35
6030ZZ	—	6030LLU	161	169	214	2	4.08
6032ZZ	—	6032LLU	171	183	229	2	5.05

^② Single sealed and shielded bearings are also available.
^③ This dimension applies to sealed and shielded bearings.