

Bearings



Tolerance and Accuracy

Tolerance & Accuracy

According to dimensional tolerances and run out accuracy the deep groove ball bearing grades are: ABEC-1, ABEC-3, ABEC-5. ABEC-1 is standard grade, while ABEC-3 is higher and ABEC-5 being the highest.

These tolerance grades correspond to the precision adopted by the International Standard Organization (ISO492).

ABEC-1	Normal Class
ABEC-3	Class 6
ABEC-5	Class 5

Symbols

The following symbols are used to identify boundary dimensions, size variations and runout errors.

- d: Basic bore diameter
- Admp: Single plane mean bore diameter deviation in a single radial plane
- Vdp: Bore diameter variation in a single radial
- Vdmp: Mean bore diameter variation
- D: Basic outside diameter
- ADmp: Single plane means outside diameter deviation from basic
- VDp: Outside diameter variation a single radial
- VDmp: Mean outside diameter variation
- B: Basic inner ring width

- ABs: Single inner ring width deviation from basic
- VBs: Inner ring width variation
- C: Basic outer ring width
- Cs: Single outer ring width deviation from basic
- Vcs: Outer ring width variation
- Kia: Radial runout of assembled bearing inner ring
- Kea: Radial runout of assembled bearing outer ring
- Sd: Inner ring reference face runout with bore
- SD: Outside cylindrical surface runout with outer ring reference face
- Sia: Axial runout of assembled bearing inner ring
- Sea: Axial runout of assembled bearing outer ring

Inner ring of 0 grade tolerance

d mm		Δ dmp		V dp ²⁾			V dmp	Kia	Δ Bs		V Bs
				Diameter Series I					high	low	
				9	0,1	2,3,4					
over	incl.	high	low	max			max	max	high	low	max
0.6 ¹⁾	2.5	0	-8	10	8	6	6	10	0	-40	12
2.5	10	0	-8	10	8	6	6	10	0	-120	15
10	18	0	-8	10	8	6	6	10	0	-120	20
18	30	0	-10	13	10	8	8	13	0	-120	20
30	50	0	-12	15	12	9	9	15	0	-120	20
50	80	0	-15	19	19	11	11	20	0	-150	25

0.6 is included
No values for diameter series 7, 8.

Outer ring of 0 grade tolerance

D mm		Δ Dmp		V Dp ²⁾⁴⁾				V DMP ⁴⁾	Kea	Δ Cs		V cs
				Open Bearings		Capped Bearings ²⁾³⁾				high	low	
				Diameter Series								
9	0,1	2,3,4	2,3,4									
over	incl.	high	low	max				max	max	high	low	max
¹⁾ 2.5	6	0	-8	10	19	6	10	6	15	Identical to Δ Bs and V Bs of inner ring of same bearing.		
6	18	0	-8	10	13	6	10	6	15			
18	30	0	-9	12	11	7	12	7	15			
30	50	0	-11	14	9	8	16	8	20			
50	80	0	-13	16	8	10	20	10	25			
80	120	0	-15	19	8	11	26	11	35			

No values for diameter series 7,8.
No values for diameter series 9,0,1.

All dimensions in millimetres unless otherwise stated. Every effort has been taken to ensure that the data listed in this catalogue is correct. Challenge accepts no liability for any inaccuracies or damage caused.

Tolerance and Materials

Inner ring of 6 grade tolerance

d mm		Δ dmp		V dp ²⁾			V dmp	Kia	Δ Bs		V Bs
				Diameter Series I					high	low	
				9	0,1	2,3,4					
over	incl.	high	low	max			max	max	high	low	max
0.6 ¹⁾	2.5	0	-7	9	7	5	5	5	0	-40	12
2.5	10	0	-7	9	7	5	5	6	0	-120	15
10	18	0	-7	9	7	5	5	7	0	-120	20
18	30	0	-8	10	8	6	6	8	0	-120	20
30	50	0	-10	13	10	8	8	10	0	-120	20
50	80	0	-12	15	15	9	9	10	0	-150	25

0.6 is included
No values for diameter series 7, 8.

Outer ring of 6 grade tolerance

D mm		Δ Dmp		V Dp ²⁾⁴⁾				V DMP ⁴⁾	Kea	Δ Cs		V cs
				Open Bearings		Capped Bearings ²⁾³⁾				high	low	
				Diameter Series								
				9	0,1	2,3,4	2,3,4					
over	incl.	high	low	max				max	max	high	low	max
¹⁾ 2.5	6	0	-7	9	7	5	9	5	8	Identical to ΔBs and V Bs of inner ring of same bearing.		
6	18	0	-7	9	7	5	9	5	8			
18	30	0	-8	10	8	6	10	6	9			
30	50	0	-19	11	9	7	13	7	10			
50	80	0	-11	14	11	8	16	8	13			
80	120	0	-13	16	16	10	20	10	18			

2.5 is included
No values for diameter series 7,8.
No values for diameter series 9,0,1.

Materials

Rings & Balls

Gcr15 high carbon chromium bearing steel is the standard material for precision bearing rings and balls.

The chemical composition of the material is shown in table one and the contrast of Bearing Steel No. of each country in table two.

Table one

Steel No.	Chemical Composition						
	C	Si	Mn	P	S	Cr	Mo
SAE 52100	0.98-1.1	0.15-0.3	0.25-0.45	<0.025	<0.025	1.3-1.1	-

Table two

Country	China	ISO	U.S.A.	Germany	Japan	Sweden
Bearing Steel No.	Gcr15	683/XVII1	(AISI)52100	(Din)0100Cr6	(Jis)SUJ2	SKF3

Retainers

The retainer is normally made of H62 copper sheet or 08F cold rolled steel belt, however, in cases of corrosive environment, misalignment, or high speed operation, stainless steel, nylon, or phenolic resins will be used upon request.

Shields & Seals

Shields are made of steel as standard, and the optional AISI-300 stainless available when required. A variety of sealing materials are used to meet the requirements of high temperature operation and compatibility with greases.

Buna Nitryl is the standard material used, while fluorocarbon, silicone, and Teflon seals are commonly specified for high temperature.

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Vibration and Noise

Vibration & Noise

Vibration and noise in bearings have three classifications Z_1, Z_2, Z_3 . It is measured by the instrument of SO910-II. For special requirements, it is measured by BVT-1 and classified as V_1, V_2, V_3 . The data is shown below:

Maximum vibration acceleration of single bearing

d mm	(0) Diameter Series				(2) Diameter Series				(3) Diameter Series			
	Z	Z ₁	Z ₂	Z ₃	Z	Z ₁	Z ₂	Z ₃	Z	Z ₁	Z ₂	Z ₃
5	37	36	34	30	38	37	34	32	39	37	35	33
6	37	36	34	30	38	37	34	32	39	37	35	33
7	39	38	35	31	40	38	36	34	42	39	37	35
8	39	38	35	31	40	38	36	34	44	41	38	36
9	41	40	36	32	42	40	37	35	45	42	39	37
10	43	42	38	33	44	42	39	35	46	44	40	37
12	44	43	39	34	45	43	39	35	47	45	40	37
15	45	44	40	35	46	44	41	36	48	46	42	38
17	46	44	40	35	47	45	41	36	49	47	42	38
20	47	45	41	36	48	46	42	38	50	48	43	39
22	47	45	41	36	48	46	42	38	50	48	43	39
25	48	46	42	38	49	47	43	40	51	49	44	41
30	49	47	43	39	50	48	44	41	52	50	45	42
35	51	49	45	41	52	50	46	43	54	52	47	44
40	53	51	46	42	54	52	47	44	56	54	49	45

Tolerance data for vibration speed of single bearing

D mm	V ₁			V ₂			V ₃		
	Low Brand	Medium Brand	High Brand	Low Brand	Medium Brand	High Brand	Low Brand	Medium Brand	High Brand
5	90	60	50	58	36	30	35	21	18
6	90	60	50	58	36	30	35	21	18
7	110	80	65	72	48	40	44	28	24
8	110	80	65	72	48	40	44	28	24
9	110	80	65	72	48	40	44	28	24
10	140	100	85	90	60	50	55	35	30
12	140	100	85	90	60	50	55	35	30
15	180	130	100	110	78	60	65	46	35
17	180	130	100	110	78	60	65	46	35
20	220	160	125	130	100	75	80	60	45
22	220	160	125	130	100	75	80	60	45
25	220	160	125	130	100	75	80	60	45
30	250	200	160	150	120	100	90	75	60
35	250	200	160	150	120	100	90	75	60
40	300	250	220	180	150	130	110	90	80

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Lubrication and Packing

Clearance

In accordance with the ISO 5753 standard, The radial clearance can be classified into C₂, standard, C₃, C₄ and C₅ groups. Different specification will be required depending on customers bearing application.

Data of standard radial clearance for bearings under no load as follows:

Bore		Group		Standard Group		Group		Group		Group	
Over	To	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
2.5	6	0	7	2	13	8	23	11	26	16	30
6	10	0	7	2	13	8	23	14	29	20	37
10	18	0	9	3	18	11	25	18	33	25	45
18	24	0	10	5	20	13	28	20	36	28	48
24	30	1	11	5	20	13	28	23	41	30	53
30	40	1	11	6	20	15	33	28	46	40	64
40	50	1	11	6	23	18	36	30	51	45	73

Grease & Oil

Open bearings are lubricated with shell A12 or WINSORL 245X. ball bearings with two shields(ZZ)or two seals(2RS) are greased with Chevron SR#2 or Mobil #28 grease as standard and are ready to use. Upon request ball bearings can be lubricated with other greases or oil, Contact: technicalsupport@challengeproduction.com for specific application.

Lubricant type & specification

Brand Name	CSR Code	Basic Type Grease	Operating Temp. °C	Uses
Exxon	Beacon 325	Synthetic grease	-55 to 120	General purpose grease
	Andok C	Channeling petroleum grease	-30 to 120	Smooth running, long life
	Andok 260	Channeling Petroleum grease	-30 to 95	Excillent high speed, low torque, low mass
Mobil	Hp	Lithium complex	-30 to 110	Vibration moderate speeds and good corrosion resistance
	28 (mil-G-81322)	Synthetic hydrocarbon	-55 to 180	Wide temperature range, good low temperature
Shell	Shell Dolium R	petroleum grease	-40 to 150	Good corrosion resistance and water resistance
	Alvania 2	Mineral grease	-35 to 120	Long life and wide range of applications
	Alvania RIQ2	Mineral grease	-25 to 120	Good water resistance and low noise, good low temperature resistance
	Jvania R Grease 2 (EP)	Mineral grease	-10 to 110	Good water resistance
Dupont	Krytox 240 AC (Mill-G 277617)	Fiuorinated grease	-35 to 290	High temperature stability with good lubrication properties
KYODO	Multemp SB-M	Diester	-40 to 170	High temperature and speed, good low temperature resistance
	SRL	Synthetic grease	-40 to 150	Low noise, low torque and special requirements
	Multemp PSI	Diester	-40 to 130	Good low temperature resistance and low noise
NIPPGK	MpOX-2	Diester	-30 to 200	High temperature and loading
Motor	Motor No.2	Mineral grease	-30 to 110	Wide application, general purpose

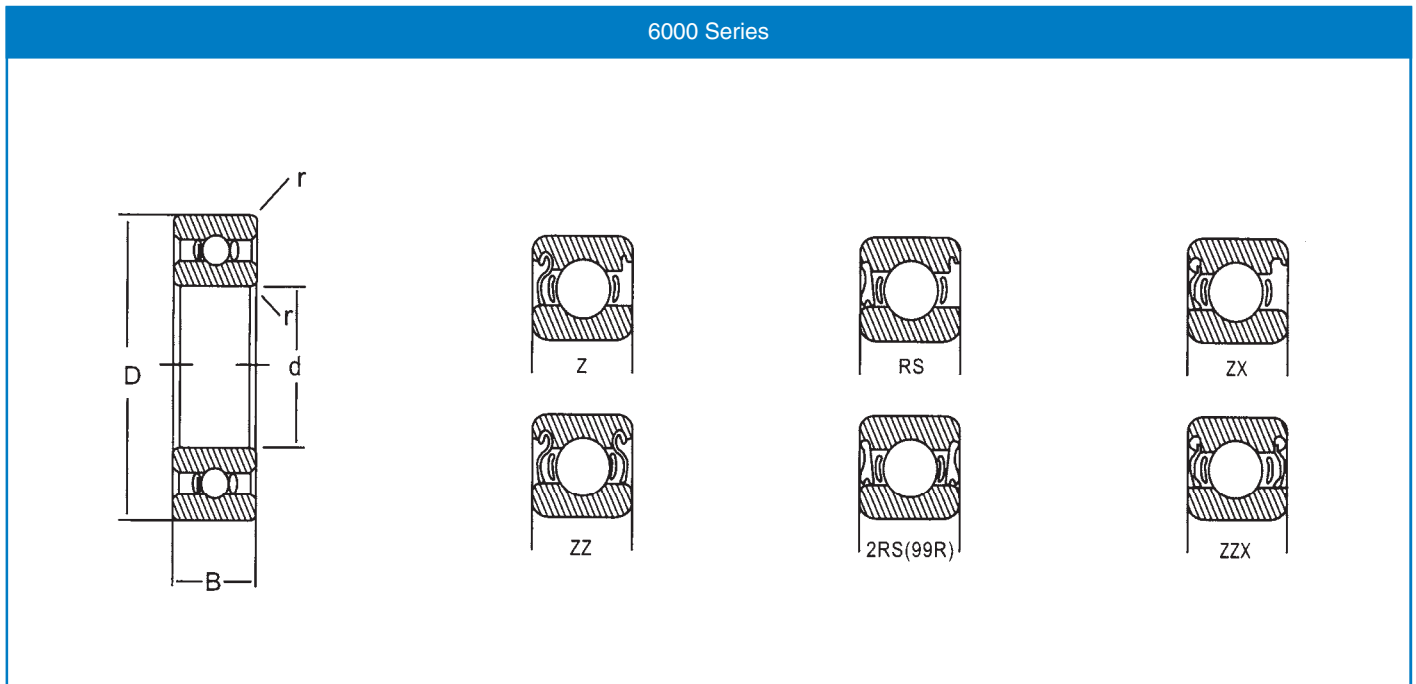
Packing

Generally the bearings are packed in plastic pipes or small boxes. Then packed into a carton. Special packing arrangements can be arranged prior to order.

Rust resisting

Under normal storage conditions the rust resisting period is six months, after this period the product should be checked and rust resisted again according to guidelines to prevent rust from occurring.

6000 Series

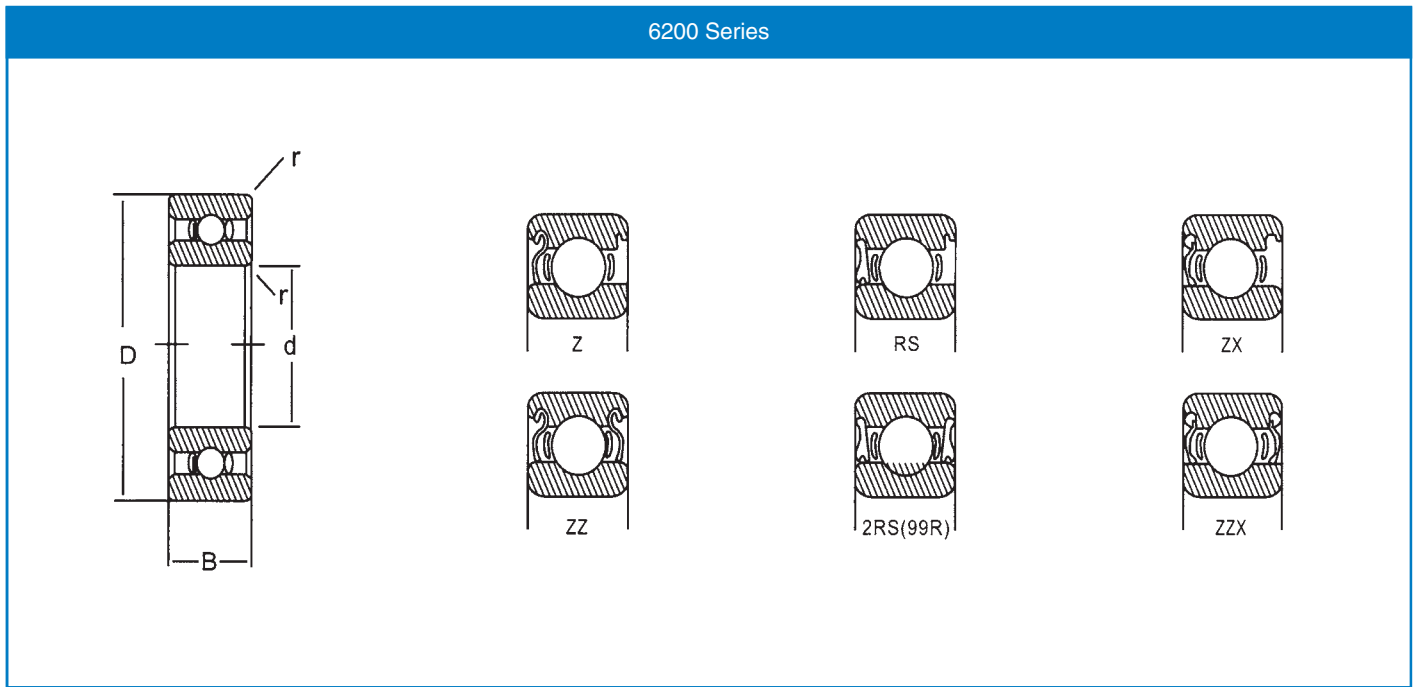


6000 Series

Bearing Number	Shape Dimension				Basic Load Rating kN		Max Runout Speed rev/min		Ball Complement		Weight kg
	Bore d	O.d D	Width B	Chamfer r min	Dynamic cr	Static Cor	Grease	Oil	Quantity	Size	
6000 Series											
605	5	14	5	0.2	1.05	0.50	32000	40000	7	2.381	0.0045
606	6	17	6	0.3	1.95	0.72	30000	38000	6	3.175	0.0057
607	7	19	6	0.3	2.88	1.08	28000	36000	6	3.969	0.0071
608	8	22	7	0.3	3.32	1.38	26000	34000	7	3.969	0.011
609	9	24	7	0.3	3.35	1.40	22000	30000	7	3.969	0.014
6000	10	26	8	0.3	4.58	1.98	20000	28000	7	4.763	0.018
6001	12	28	8	0.3	5.10	2.38	19000	26000	8	4.763	0.021
6002	15	32	9	0.3	5.58	2.85	18000	24000	9	4.763	0.026
6003	17	35	10	0.3	6.00	3.25	17000	22000	10	4.763	0.036
6004	20	42	12	0.6	9.38	5.02	15000	19000	9	6.350	0.069
6005	25	47	12	0.6	10.1	5.85	13000	17000	10	6.350	0.075
6006	30	55	13	1.0	10.18	6.91	10000	14000	11	7.144	0.116
6007	35	62	14	1.0	12.46	8.65	9000	12000	11	7.938	0.155
6008	40	68	15	1.0	13.09	9.44	8500	11000	12	7.938	0.185
6009	45	75	16	1.0	21.0	15.1	7200	9000	12	8.731	0.231
6010	50	80	16	1.0	21.8	16.6	6400	7800	13	8.731	0.250
6011	55	90	18	1.1	28.3	21.2	5700	7000	11	11.112	0.362
6012	60	95	18	1.1	29.5	23.2	5000	6300	12	11.112	0.385
6013	65	100	18	1.1	30.5	25.2	5300	6300			0.421
6014	70	110	20	1.1	38.1	30.9	5000	5900			0.604
6015	75	115	20	1.1	39.7	33.5	4700	5600			0.649

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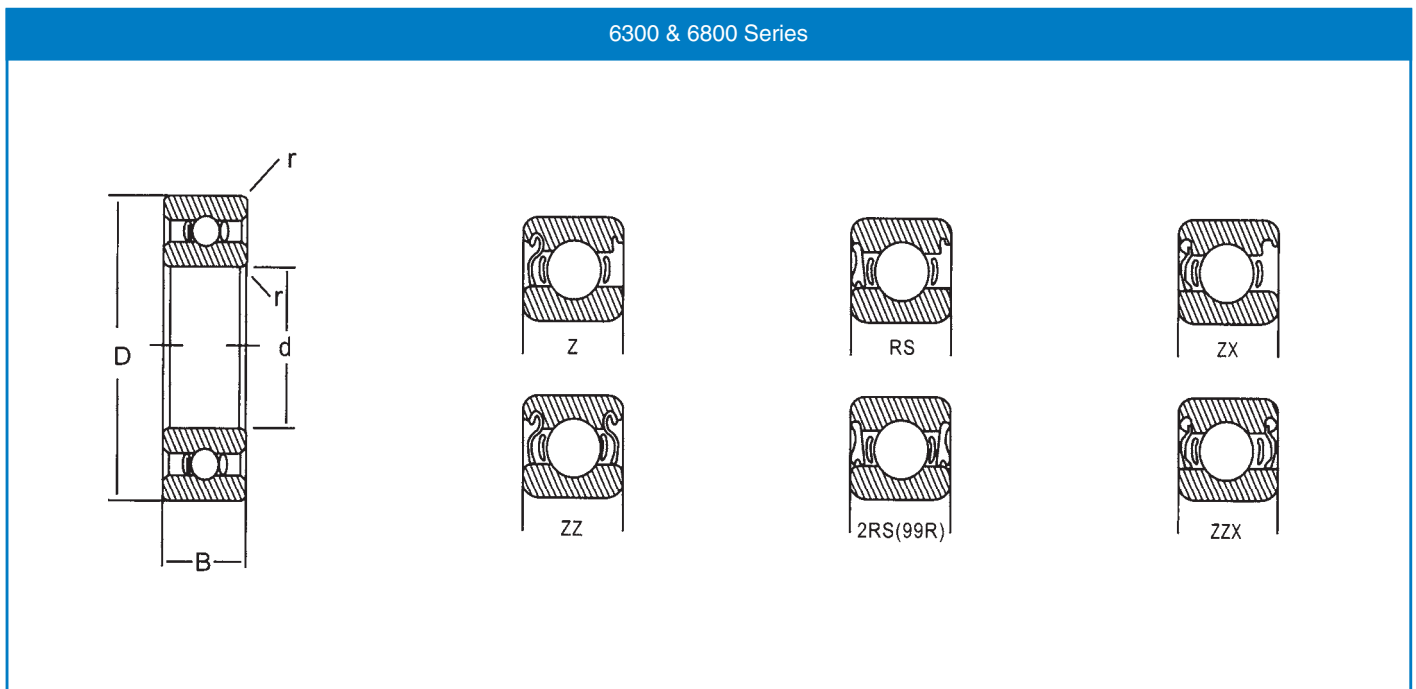
6200 Series



6200 Series

Bearing Number	Shape Dimension				Basic Load Rating kN		Max Runout Speed rev/min		Ball Complement		Weight kg
	Bore d	O.d D	Width B	Chamfer r min	Dynamic cr	Static Cor	Grease	Oil	Quantity	Size	
6200 series											
623	3	10	4	0.15	0.50	0.22	38000	48000	-	-	0.0015
624	4	13	5	0.2	1.15	0.45	36000	45000	6	2.381	0.0032
625	5	16	5	0.3	1.88	0.68	32000	40000	6	3.175	0.0048
626	6	19	6	0.3	2.80	1.05	28000	36000	6	3.969	0.0075
627	7	22	7	0.3	3.28	1.35	26000	34000	7	3.969	0.012
628	8	24	8	0.3	3.35	1.40	24000	32000	7	3.969	0.017
629	9	26	8	0.3	4.45	1.95	22000	30000	7	4.763	0.019
6200	10	30	9	0.6	5.10	2.38	19000	26000	8	4.763	0.028
6201	12	32	10	0.6	6.82	3.05	18000	24000	7	5.953	0.034
6202	15	35	11	0.6	7.65	3.72	17000	22000	8	5.953	0.043
6203	17	40	12	0.6	9.58	4.47	16000	20000	8	6.747	0.062
6204	20	47	14	1.0	9.87	6.18	14000	18000	8	7.938	0.102
6205	25	52	15	1.0	10.75	10.02	12000	16000	9	7.938	0.120
6206	30	62	16	1.0	14.96	13.65	9500	13000	9	9.525	0.190
6207	35	72	17	1.1	19.74	15.92	8500	11000	9	11.1125	0.270
6208	40	80	18	1.1	22.70	17.70	8000	10000	9	12.000	0.370
6209	45	85	19	1.1	32.5	20.4	7800	9200	10	12.000	0.416
6210	50	90	20	1.1	35	23.2	7100	8300	10	12.700	0.462
6211	55	100	21	1.5	43.5	29.2	6400	7600	10	14.288	0.602
6212	60	110	22	1.5	52.5	36.0	6000	7000	10	15.081	0.789
6213	65	120	23	1.5	57.2	40.0	4400	5300			0.990
6214	60	125	24	1.5	62.2	44.1	4200	5000			1.070
6215	75	130	25	1.5	67.4	49.3	4000	4600			1.180

6300 & 6800 Series

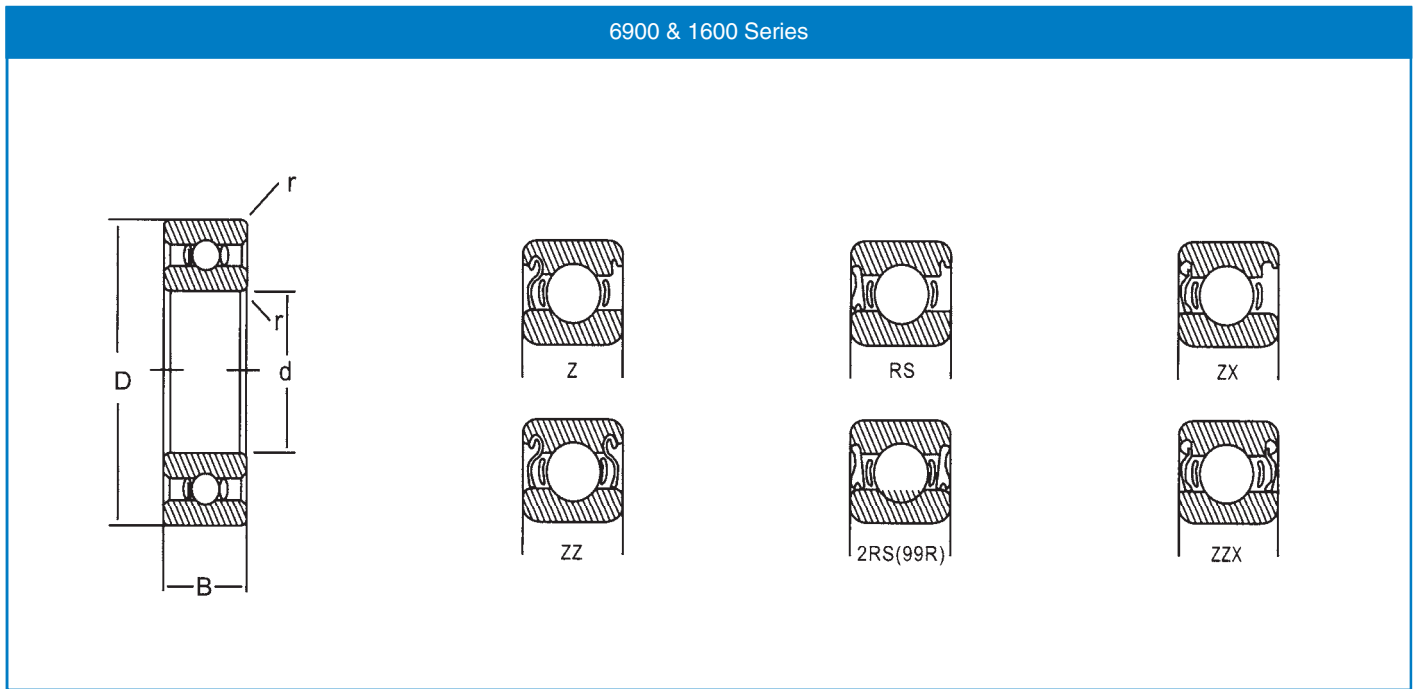


6300 & 6800 Series

Bearing Number	Shape Dimension				Basic Load Rating kN		Max Runout Speed rev/min		Ball Complement		Weight kg
	Bore d	O.d D	Width B	Chamfer r min	Dynamic cr	Static Cor	Grease	Oil	Quantity	Size	
6300 Series											
6300	10	35	11	0.6	7.65	3.480	20000	26000	6	7.144	0.054
6301	12	37	12	1.0	9.72	5.080	17000	22000	6	7.938	0.058
6302	15	42	13	1.0	11.50	5.420	16000	20000	7	7.938	0.082
6303	17	47	14	1.0	10.68	6.660	15000	19000	7	8.731	0.110
6304	20	52	15	1.1	12.25	7.790	13000	17000	7	9.525	0.140
6305	25	62	17	1.1	17.25	11.37	10000	14000	7	11.500	0.220
6306	30	72	19	1.1	21.66	14.80	9000	12000	8	12.000	0.330
6307	35	80	21	1.5	25.68	17.542	8000	10000	8	13.494	0.410
6308	40	90	23	1.5	31.36	22.25	7000	9000	8	15.081	0.600
6309	45	100	25	1.5	52.80	31.70	5600	6700			0.814
6310	50	110	27	2.0	61.80	37.90	5000	5800			1.070
6311	55	120	29	2.0	71.50	44.60	4400	5300			1.370
6312	60	130	31	2.1	81.80	51.90	4200	5000			1.730
6313	65	140	33	2.1	92.70	59.70	4000	4600			2.080
6800 Series											
685	5	11	3	0.15	0.547	0.253	35000	45000	9	1.588	0.0011
686	6	13	3.5	0.15	0.331	0.400	33000	42000	8	2.000	0.0019
687	7	14	3.5	0.15	0.898	0.458	31000	40000	9	2.000	0.0021
688	8	16	4	0.2	1.378	0.711	29000	38000	9	2.381	0.0031
689	9	17	4	0.2	1.378	0.711	28000	36000	9	2.381	0.0032
6800	10	19	5	0.3	1.40	0.75	26000	34000	11	2.000	0.005
6801	12	21	5	0.3	1.40	0.90	22000	30000	12	2.381	0.007
6802	15	24	5	0.3	1.92	1.18	20000	28000	14	2.381	0.008
6803	17	26	5	0.3	2.18	1.28	19000	26000	15	2.381	0.019
6804	20	32	7	0.3	3.45	2.25	17000	22000	14	3.175	0.042
6805	25	37	7	0.3	3.70	2.65	15000	19000	16	3.175	0.048

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6900 & 1600 Series



6900 & 1600 Series

Bearing Number	Shape Dimension				Basic Load Rating kN		Max Runout Speed rev/min		Ball Complement		Weight kg
	Bore d	O.d D	Width B	Chamfer r min	Dynamic cr	Static Cor	Grease	Oil	Quantity	Size	
6900 Series											
695	5	13	4	0.2	1.08	0.42	34000	43000	8	2.000	0.0024
696	6	15	5	0.2	1.48	0.60	32000	40000	8	2.381	0.0038
697	7	17	5	0.3	2.02	0.80	30000	38000	9	2.381	0.0052
698	8	19	6	0.3	2.25	0.92	28000	36000	7	3.500	0.0073
699	9	20	6	0.3	3.30	1.40	25000	34000	9	2.381	0.0082
6900	10	22	6	0.3	3.30	1.40	25000	32000	12	2.381	0.009
6901	12	24	6	0.3	3.38	1.48	20000	28000	9	3.500	0.011
6902	15	28	7	0	4.00	2.02	19000	26000	10	3.969	0.016
6903	17	30	7	3	4.30	2.32	18000	24000	11	3.969	0.018
6904	20	37	9	0.3	6.55	3.60	17000	22000	11	4.763	0.036
6905	25	42	9	0.3	7.05	4.55	14000	18000	13	4.763	0.042
6906	30	47	9	0.3	7.25	5.00	12000	16000	14	3.175	0.048
1600 Series											
16001	12	28	7	0.3	5.08	2.38	28000	32000	8	4.763	0.019
16002	15	32	8	0.3	5.60	2.55	24000	28000	9	4.763	1.025
16003	17	35	8	0.3	6.82	3.38	22000	26000	10	4.763	0.027
16004	20	42	8	0.3	7.90	4.45	18000	20000	11	4.763	0.050
16005	25	47	8	0.3	8.42	5.15	15000	18000	12	5.556	0.060
16006	30	55	9	0.3	11.2	6.25	13000	15000	12	6.35	0.085
16007	35	62	9	0.3	11.5	8.80	11000	13000	14	6.35	0.100

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