

Bearing Types

Our main ball bearing product is the single row radial deep groove ball bearing. Deep groove radial ball bearings with shields or seals are available to provide protection from contamination and grease leakage. Flange type and snap ring type bearings are available for improved housing fits. Our produces ultra thin type radial ball bearings, thrust ball bearings, and bearings.

Radial Deep Groove Ball Bearings (R-, L-, RI-)



Characteristics:

This is the most common type of radial ball bearing. This type of ball bearing can support both radial and axial loads.

Types:

Open, shielded, and sealed
Metric and Inch series

Radial Deep Groove Ball Bearings with Outer Snap Ring (RNR-, LNR-)



Characteristics:

This is a radial ball bearing with an external retaining ring featured on one side of the outer ring surface. This design assists with axial positioning of the bearing in a housing.

Types:

Open and shielded
*High carbon chromium steel is the standard material

Flanged Radial Deep Groove Ball Bearings (RF-, LF-, RIF-)



Characteristics:

This is a radial ball bearing with a flange featured on one side of the outer ring surface. It assists with axial positioning of the bearing in a housing.

Types:

Open, shielded, and sealed
Metric and Inch series

Ultra Thin Radial Ball Bearings (A-)



Characteristics:

The bore relative to the outer diameter is larger than those of standard radial ball bearings.

Types:

Open and shielded
*Stainless steel is the standard material

Bearing Types (continued)

Thrust Ball Bearings

(T)



Characteristics:

A thrust ball bearing bears axial loads, but not radial loads.

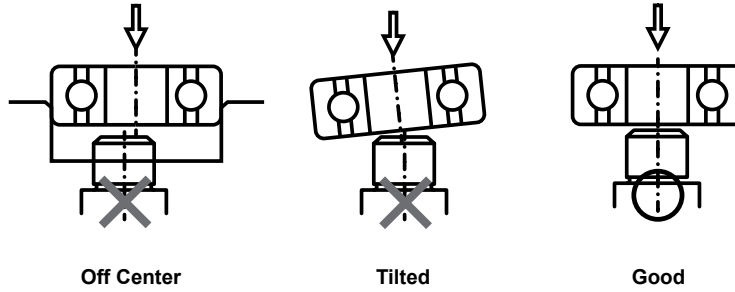
Types:

With or without raceway grooves.

*Stainless Steel is the standard material.

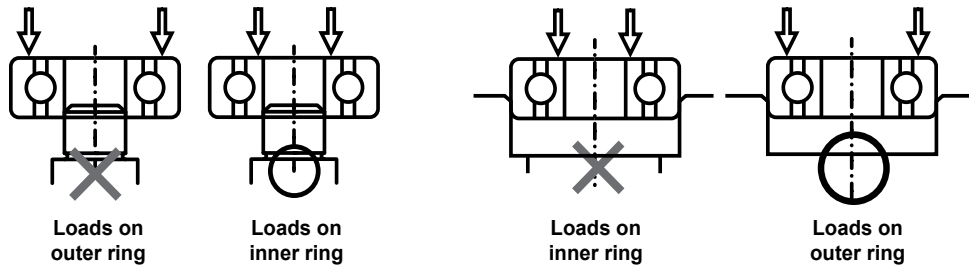
Handling During Insertion

Figure 2-28



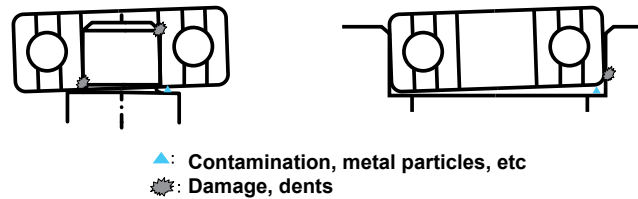
Load Position for Press Fit

Figure 2-29



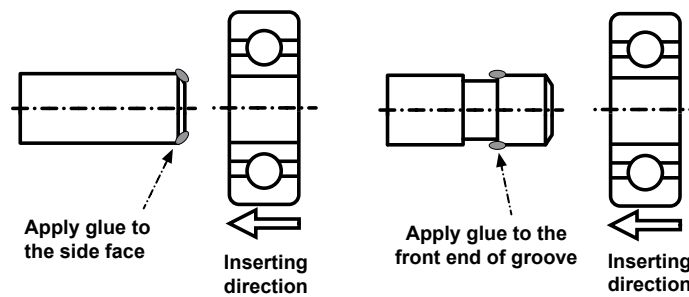
Misalignment Due to Contamination and Damage

Figure 2-30



Applying Adhesive (Examples)

Figure 2-31



Deep Groove Radial Ball Bearings

R-Series & L-Series

Bore d		OD D		Basic Dimension						Chamfer r _s min	Open		
				Width B				Open				Shielded	
				Open		Shielded							
mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch				
1.0	0.0394	3.0	0.1181	1.0	0.0394	-	-	0.05	0.002	L-310			
		4.0	0.1575	1.6	0.0630	-	-	0.10	0.004	R-410			
1.2	0.0472	4.0	0.1575	1.8	0.0709	-	-	0.10	0.004	R-412			
1.5	0.0591	4.0	0.1575	1.2	0.0472	-	-	0.05	0.002	L-415			
		4.0	0.1575	-	-	2.0	0.0787	0.05	0.002	-			
		5.0	0.1969	2.0	0.0787	2.6	0.1024	0.15	0.006	R-515			
2.0	0.0787	6.0	0.2362	2.5	0.0984	3.0	0.1181	0.15	0.006	R-615			
		5.0	0.1969	1.5	0.0591	2.3	0.0906	0.08	0.003	L-520			
		5.0	0.1969	2.5	0.0984	2.5	0.0984	0.08	0.003	L-520W52			
		6.0	0.2362	2.3	0.0906	-	-	0.15	0.006	R-620			
		6.0	0.2362	-	-	3.0	0.1181	0.15	0.006	-			
2.5	0.0984	6.0	0.2362	2.5	0.0984	-	-	0.15	0.006	R-620W52			
		6.0	0.2362	-	-	2.5	0.0984	0.15	0.006	-			
		7.0	0.2756	2.8	0.1102	3.5	0.1378	0.15	0.006	R-720			
		7.0	0.2756	-	-	3.0	0.1181	0.15	0.006	-			
		6.0	0.2362	1.8	0.0709	2.6	0.1024	0.08	0.003	L-625			
3.0	0.1181	7.0	0.2756	2.5	0.0984	3.5	0.1378	0.15	0.006	R-725			
		8.0	0.3150	2.8	0.1102	4.0	0.1575	0.15	0.006	R-825			
		6.0	0.2362	2.0	0.0787	2.5	0.0984	0.08	0.003	L-630			
4.0	0.1575	7.0	0.2756	2.0	0.0787	3.0	0.1181	0.10	0.004	L-730			
		8.0	0.3150	3.0	0.1181	4.0	0.1575	0.15	0.006	R-830			
		9.0	0.3543	3.0	0.1181	5.0	0.1969	0.15	0.006	R-930			
		9.0	0.3543	2.5	0.0984	-	-	0.15	0.006	R-930Y52			
		9.0	0.3543	-	-	4.0	0.1575	0.15	0.006	-			
		10.0	0.3937	4.0	0.1575	4.0	0.1575	0.15	0.006	R-1030			
		7.0	0.2756	2.0	0.0787	2.5	0.0984	0.08	0.003	L-740			
4.0	0.1575	8.0	0.3150	2.0	0.0787	3.0	0.1181	0.10	0.004	L-840			
		9.0	0.3543	2.5	0.0984	4.0	0.1575	0.10	0.004	L-940			
		10.0	0.3937	3.0	0.1181	4.0	0.1575	0.15	0.006	L-1040X2			
		11.0	0.4331	4.0	0.1575	4.0	0.1575	0.15	0.006	R-1140			
		12.0	0.4724	4.0	0.1575	4.0	0.1575	0.20	0.008	R-1240			
		13.0	0.5118	5.0	0.1969	5.0	0.1969	0.20	0.008	R-1340			
		16.0	0.6299	5.0	0.1969	5.0	0.1969	0.30	0.012	R-1640			

Shielded	Sealed	ISO/JIS P/N*	Reference Diameter (mm)				Ball Size Dw mm	No. Z	Basic Load Rating	
			Open		Shield Seal				Dynamic Cr (1) N	Static Cor (2) N
			OR Lo	IR Li	OR Lo	IR Li				
			mm	mm	mm	mm				
-	-	681	2.41	1.60	-	-	0.5000	7	80	23
-	-	691	3.16	2.05	-	-	0.7938	6	158	44
-	-	-	3.16	2.05	-	-	0.7938	6	158	44
-	-	68/1.5	3.25	2.26	-	-	0.6350	7	125	38
L-415X5ZZ	-	68/1.5	-	-	3.42	2.15	0.6000	7	113	34
R-515ZZ	-	69/1.5	3.73	2.60	4.03	2.60	0.7938	7	184	57
R-615ZZ	-	60/1.5	4.73	2.90	5.06	2.90	1.1906	6	324	97
L-520ZZ	-	682	4.00	2.90	4.28	2.90	0.7938	7	187	59
L-520ZZW52	-	-	4.00	2.90	4.28	2.90	0.7938	7	187	59
-	-	692	4.78	3.16	-	-	1.0000	7	279	89
R-620ZZ	-	692	-	-	5.23	3.10	1.1906	6	330	99
-	-	-	4.93	3.10	-	-	1.1906	6	330	99
R-620ZZY52	-	-	-	-	5.23	3.10	1.1906	6	330	99
R-720ZZ	-	602	5.52	3.80	5.93	3.80	1.1906	7	380	126
R-720ZZY03	-	-	-	-	5.93	3.80	1.1906	7	380	126
L-625ZZ	-	68/2.5	4.93	3.80	5.23	3.80	0.7938	8	206	73
R-725ZZ	-	69/2.5	5.52	3.80	5.93	3.80	1.1906	7	380	126
R-825ZZ	-	60/2.5	6.53	4.10	7.19	4.10	1.5875	6	553	176
L-630ZZ	-	673	4.93	3.80	5.23	3.80	0.7938	8	206	73
L-730ZZ	-	683	5.83	4.10	6.13	4.10	1.1906	7	384	129
R-830ZZ	-	693	6.53	4.10	7.19	4.10	1.5875	6	553	176
R-930ZZ	-	603	7.23	4.80	7.64	4.80	1.5875	7	634	219
-	-	-	7.23	4.80	-	-	1.5875	7	634	219
R-930ZZY04	-	-	-	-	7.64	4.80	1.5875	7	634	219
R-1030ZZ	-	623	8.20	5.08	8.20	5.08	1.5875	7	641	226
L-740ZZ	-	674	5.93	4.80	6.33	4.80	0.7938	11	252	106
L-840ZZ	-	-	6.93	5.20	7.24	5.20	1.1906	7	391	140
L-940ZZ	-	684	7.48	5.20	7.93	5.20	1.5875	7	641	226
L-1040X2ZZ	-	-	7.96	5.80	8.50	5.46	1.5875	8	708	266
R-1140ZZ	-	694	9.54	6.40	9.54	6.40	1.5875	8	714	276
R-1240KK1	-	604	9.99	5.62	9.68	5.62	2.0000	7	959	347
R-1340KK	DD	624	11.22	5.97	11.22	5.97	2.3813	7	1306	487
R-1640HH	DD	634	13.41	7.80	13.41	7.80	2.7781	7	1735	671

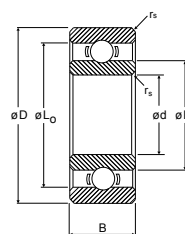
Please consult with Application Engineering for bearing selection.*

Only open type is shown.

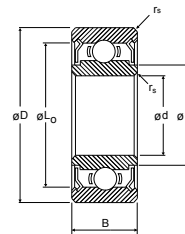
**Column shows the availabilities and types.

(1) Based on JIS B 1518

(2) Based on JIS B 1519



Radial Open Ball Bearings



Radial Shielded Ball Bearings

Deep Groove Radial Ball Bearings (continued)

R-Series & L-Series

Bore d		OD D		Basic Dimension				Chamfer r _s min		Open
				Width B						
				Open		Shielded				
mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	
5.0	0.1969	8.0	0.3150	2.0	0.0787	2.5	0.0984	0.08	0.003	L-850
		9.0	0.3543	2.5	0.0984	3.0	0.1181	0.10	0.004	L-950
		10.0	0.3937	3.0	0.1181	4.0	0.1575	0.10	0.004	L-1050
		11.0	0.4331	3.0	0.1181	5.0	0.1969	0.15	0.006	L-1150
		11.0	0.4331	-	-	4.0	0.1575	0.15	0.006	-
		13.0	0.5118	4.0	0.1575	4.0	0.1575	0.20	0.008	R-1350
		14.0	0.5512	5.0	0.1969	5.0	0.1969	0.20	0.008	R-1450
		16.0	0.6299	5.0	0.1969	5.0	0.1969	0.30	0.012	R-1650
		19.0	0.7480	6.0	0.2362	6.0	0.2362	0.30	0.012	R-1950
6.0	0.2362	10.0	0.3937	2.5	0.0984	3.0	0.1181	0.10	0.004	L-1060
		12.0	0.4724	3.0	0.1181	4.0	0.1575	0.15	0.006	L-1260
		13.0	0.5118	3.5	0.1378	5.0	0.1969	0.15	0.006	L-1360
		15.0	0.5906	5.0	0.1969	5.0	0.1969	0.20	0.008	R-1560X2
		16.0	0.6299	-	-	5.0	0.1969	0.30	0.012	-
		17.0	0.6693	6.0	0.2362	6.0	0.2362	0.30	0.012	R-1760X2
		19.0	0.7480	6.0	0.2362	6.0	0.2362	0.30	0.012	R-1960
7.0	0.2756	11.0	0.4331	2.5	0.0984	3.0	0.1181	0.10	0.004	L-1170
		13.0	0.5118	3.0	0.1181	4.0	0.1575	0.15	0.006	L-1370
		14.0	0.5512	3.5	0.1378	5.0	0.1969	0.15	0.006	L-1470
		19.0	0.7480	6.0	0.2362	6.0	0.2362	0.30	0.012	R-1970
		22.0	0.8661	7.0	0.2756	7.0	0.2756	0.30	0.012	R-2270
8.0	0.3150	12.0	0.4724	2.5	0.0984	3.5	0.1378	0.10	0.004	L-1280
		14.0	0.5512	3.5	0.1378	4.0	0.1575	0.15	0.006	L-1480
		16.0	0.6299	4.0	0.1575	5.0	0.1969	0.20	0.008	L-1680
		19.0	0.7480	6.0	0.2362	6.0	0.2362	0.30	0.012	R-1980
		22.0	0.8661	7.0	0.2756	7.0	0.2756	0.30	0.012	R-2280
		24.0	0.9449	-	-	8.0	0.3150	0.30	0.012	-
9.0	0.3543	17.0	0.6693	4.0	0.1575	5.0	0.1969	0.20	0.008	L-1790
		20.0	0.7874	6.0	0.2362	6.0	0.2362	0.30	0.012	L-2090
10.0	0.3937	19.0	0.7480	5.0	0.1969	7.0	0.2756	0.30	0.012	L-1910
		19.0	0.7480	-	-	5.0	0.1969	0.30	0.012	-
		22.0	0.8661	6.0	0.2362	6.0	0.2362	0.30	0.012	R-2210X3
12.0	0.4724	21.0	0.8268	5.0	0.1969	5.0	0.1969	0.30	0.012	L-2112
		24.0	0.9449	6.0	0.2362	6.0	0.2362	0.30	0.012	R-2412X3

Shielded	Sealed	ISO/JIS P/N*	Reference Diameter				Ball		Basic Load Rating	
			Open		Shield Seal		Size Dw	No. Z	DYN Cr (1)	Static Cor (2)
			OR Lo	IR Li	OR Lo	IR Li				
			mm	mm	mm	mm	mm	N	N	
L-850ZZ	-	675	6.95	5.80	7.26	5.80	0.7938	13	274	130
L-950ZZ	-	-	7.73	6.00	8.04	6.00	1.1906	10	495	207
L-1050ZZ	SS	-	8.63	6.40	8.94	6.40	1.5875	8	714	276
L-1150ZZ	-	685	8.63	6.40	9.54	6.40	1.5875	8	714	276
L-1150ZZY04	-	-	-	-	9.54	6.40	1.5875	8	714	276
R-1350ZZ	DD	695	11.14	6.66	11.14	6.66	2.0000	8	1074	422
R-1450ZZ	-	605	12.14	6.88	12.14	6.88	2.3813	7	1329	508
R-1650HH	DD SS	625	12.50	7.80	13.41	7.80	2.7781	7	1735	671
R-1950ZZ	-	635	15.63	8.67	16.26	8.67	3.9688	6	2805	1060
L-1060ZZ	DD SS	676	8.73	6.95	9.04	6.95	1.1906	9	457	194
L-1260ZZ	DD SS	-	9.94	7.70	10.48	7.70	1.5875	10	831	363
L-1360ZZ	DD SS	686	10.98	8.00	11.44	7.33	2.0000	8	1083	438
R-1560X13KK	DD	696	13.20	7.80	13.20	7.80	2.7781	7	1735	671
R-1660HH	DD	-	-	-	13.41	7.80	2.7781	7	1735	671
R-1760X2ZZ	-	606	14.70	8.22	14.70	8.22	3.5000	6	2265	839
R-1960ZZ	DD	626	15.63	8.67	16.26	8.67	3.9688	6	2805	1060
L-1170ZZ	-	677	9.83	8.10	10.14	8.10	1.1906	9	449	199
L-1370ZZ	-	-	11.13	8.90	11.54	8.43	1.5875	11	880	414
L-1470KK	-	687	12.03	9.00	12.88	9.00	2.0000	9	1175	511
R-1970ZZ	-	607	16.24	9.55	16.24	9.55	3.1750	7	2240	912
R-2270HH	-	627	19.07	10.80	19.07	10.80	3.9688	7	3297	1368
L-1280ZZ	-	678	10.93	9.10	11.24	9.10	1.1906	11	506	249
L-1480ZZ	SS	-	12.13	9.90	12.55	9.90	1.5875	10	819	386
L-1680KK	DD	688	13.40	10.30	14.18	9.68	2.3813	9	1606	712
R-1980KK	DD SS	698	16.68	10.60	16.68	10.60	3.1750	8	2463	1059
R-2280HH	DD	608	19.07	10.80	19.07	10.80	3.9688	7	3297	1368
R-2480KK	-	628	-	-	19.10	11.80	3.9688	7	3297	1368
L-1790ZZ	DD	689	14.84	11.20	15.34	11.20	2.3813	10	1724	813
L-2090KK	-	699	16.71	12.32	17.44	12.32	2.7781	9	2123	985
L-1910ZZ	DD	6800	16.71	12.32	17.44	12.32	2.7781	9	2123	985
L-1910KKY05	DD	-	-	-	17.44	12.32	2.7781	9	2123	985
R-2210X3KK	DD SS	6900	19.40	13.40	19.40	13.40	3.1750	9	2697	1273
L-2112KK	DD SS	6801	19.22	14.40	19.22	14.40	2.3813	12	1917	1042
R-2412X3KK	DD	6901	21.69	14.28	21.69	14.28	3.5719	8	3082	1433

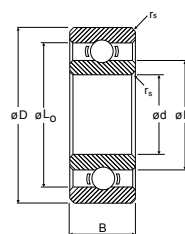
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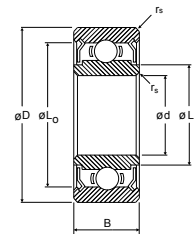
**Column shows the availabilities and types.

(1) Based on JIS B 1518

(2) Based on JIS B 1519



Radial Open Ball Bearings



Radial Shielded Ball Bearings

Deep Groove Flanged Radial Ball Bearings

RF-Series & LF-Series

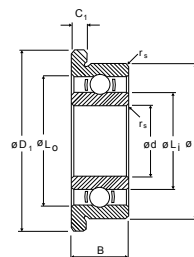
Metric Series Bearings

Bore d		OD D		Basic Dimension						Flange			
				Width B				Chamfer r _s min		Open		Shielded	
				Open		Shielded				OD D ₁	Width C ₁	OD D ₁	Width C ₁
mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	mm	mm	mm
1.0	0.0394	3.0	0.1181	1.0	0.0394	-	-	0.05	0.002	3.80	0.30	3.80	-
1.5	0.0591	4.0	0.1575	1.2	0.0472	2.0	0.0787	0.05	0.002	5.00	0.40	5.00	0.60
		5.0	0.1969	2.0	0.0787	2.6	0.1024	0.15	0.006	6.50	0.60	6.50	0.80
		6.0	0.2362	2.5	0.0984	3.0	0.1181	0.15	0.006	7.50	0.60	7.50	0.80
2.0	0.0787	5.0	0.1969	1.5	0.0591	2.3	0.0906	0.08	0.003	6.10	0.50	6.10	0.60
		6.0	0.2362	2.3	0.0906	3.0	0.1181	0.15	0.006	7.50	0.60	7.50	0.80
		7.0	0.2756	2.8	0.1102	3.5	0.1378	0.15	0.006	8.50	0.70	8.50	0.90
2.5	0.0984	6.0	0.2362	1.8	0.0709	2.6	0.1024	0.08	0.003	7.10	0.50	7.10	0.80
		7.0	0.2756	2.5	0.0984	3.5	0.1378	0.15	0.006	8.50	0.70	8.50	0.90
		8.0	0.3150	2.8	0.1102	4.0	0.1575	0.15	0.006	9.50	0.70	9.50	0.90
3.0	0.1181	6.0	0.2362	2.0	0.0787	2.5	0.0984	0.08	0.003	7.20	0.60	7.20	0.60
		7.0	0.2756	2.0	0.0787	3.0	0.1181	0.10	0.004	8.10	0.50	8.10	0.80
		8.0	0.3150	3.0	0.1181	4.0	0.1575	0.15	0.006	9.50	0.70	9.50	0.90
		9.0	0.3543	3.0	0.1181	5.0	0.1969	0.15	0.006	10.50	0.70	10.50	1.00
		9.0	0.3543	-	-	4.0	0.1575	0.15	0.006	10.60	-	10.60	0.80
4.0	0.1575	10.0	0.3937	4.0	0.1575	4.0	0.1575	0.15	0.006	11.50	1.00	11.50	1.00
		7.0	0.2756	2.0	0.0787	2.5	0.0984	0.08	0.003	8.20	0.60	8.20	0.60
		8.0	0.3150	2.0	0.0787	3.0	0.1181	0.10	0.004	9.20	0.60	9.20	0.60
		9.0	0.3543	2.5	0.0984	4.0	0.1575	0.10	0.004	10.30	0.60	10.30	1.00
		10.0	0.3937	3.0	0.1181	4.0	0.1575	0.15	0.006	11.60	0.60	11.60	0.80
		11.0	0.4331	4.0	0.1575	4.0	0.1575	0.15	0.006	12.50	1.00	12.50	1.00
		12.0	0.4724	4.0	0.1575	4.0	0.1575	0.20	0.008	13.50	1.00	13.50	1.00
5.0	0.1969	13.0	0.5118	5.0	0.1969	5.0	0.1969	0.20	0.008	15.00	1.00	15.00	1.00
		16.0	0.6299	5.0	0.1969	5.0	0.1969	0.30	0.012	18.00	1.00	18.00	1.00
		8.0	0.3150	2.0	0.0787	2.5	0.0984	0.08	0.003	9.20	0.60	9.20	0.60
		9.0	0.3543	2.5	0.0984	3.0	0.1181	0.10	0.004	10.20	0.60	10.20	0.60
		10.0	0.3937	3.0	0.1181	4.0	0.1575	0.10	0.004	11.20	0.60	11.60	0.80
		11.0	0.4331	3.0	0.1181	5.0	0.1969	0.15	0.006	12.50	0.80	12.50	1.00
		13.0	0.5118	4.0	0.1575	4.0	0.1575	0.20	0.008	15.00	1.00	15.00	1.00
5.0	0.1969	14.0	0.5512	5.0	0.1969	5.0	0.1969	0.20	0.008	16.00	1.00	16.00	1.00
		16.0	0.6299	5.0	0.1969	5.0	0.1969	0.30	0.012	18.00	1.00	18.00	1.00
		19.0	0.7480	6.0	0.2362	6.0	0.2362	0.30	0.012	22.00	1.50	22.00	1.50

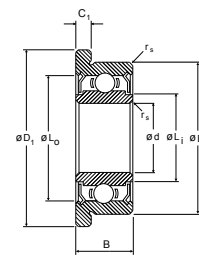
Open	Shielded	Sealed	ISO/JIS P/N*	Reference Diameter				Ball		Basic Load Rating	
				Open		Shield/Seal		Size D _w mm	No. Z	DYN C _r (1)	Static C _{or} (2)
				OR L _o	IR L _i	OR L _o	IR L _i			N	N
				mm	mm	mm	mm				
LF-310	-	-	F681	2.41	1.60	-	-	0.5000	7	80	23
LF-415	LF-415ZZ	-	F68/1.5	3.24	2.26	3.49	2.26	0.6350	7	125	38
RF-515	RF-515ZZ	-	F69/1.5	3.73	2.60	4.03	2.60	0.7938	7	184	57
RF-615	RF-615ZZ	-	F60/1.5	4.73	2.90	5.06	2.90	1.1906	6	324	97
LF-520	LF-520ZZ	-	F682	4.00	2.90	4.28	2.90	0.7938	7	187	59
RF-620	RF-620ZZ	-	F692	4.75	3.16	5.23	3.10	1.1906	6	330	99
RF-720	RF-720ZZ	-	F602	5.52	3.80	5.93	3.80	1.1906	7	380	126
LF-625	LF-625ZZ	-	F68/2.5	4.93	3.80	5.23	3.80	0.7938	8	206	73
RF-725	RF-725ZZ	-	F69/2.5	5.52	3.80	5.93	3.80	1.1906	7	380	126
RF-825	RF-825ZZ	-	F60/2.5	6.53	4.10	7.19	4.10	1.5875	6	553	176
LF-630	LF-630ZZ	-	-	4.93	3.80	5.23	3.80	0.7938	8	206	73
LF-730	LF-730ZZ	-	F683	5.83	4.10	6.13	4.10	1.1906	7	384	129
RF-830	RF-830ZZ	-	F693	6.53	4.10	7.19	4.10	1.5875	6	553	176
RF-930	RF-930ZZ	-	F603	7.23	4.80	7.64	4.80	1.5875	7	634	219
-	RF-930ZZY04	-	-	-	-	7.64	4.80	1.5875	7	634	219
RF-1030	RF-1030ZZ	-	F623	8.20	5.08	8.20	5.08	1.5875	7	641	226
LF-740	LF-740ZZ	-	-	5.93	4.80	6.33	4.80	0.7938	11	252	106
LF-840	LF-840ZZ	-	-	6.93	5.20	7.24	5.20	1.1906	7	391	140
LF-940	LF-940ZZ	-	F684	7.48	5.20	7.93	5.20	1.5875	7	641	226
LF-1040	LF-1040ZZ	-	-	7.96	5.80	8.50	5.46	1.5875	8	708	266
RF-1140	RF-1140ZZ	-	F694	9.54	6.40	9.54	6.40	1.5875	8	714	276
RF-1240	RF-1240ZZ	-	F604	9.99	5.62	9.99	5.62	2.0000	7	959	347
RF-1340	RF-1340HH	-	F624	11.04	7.00	11.04	7.00	2.3813	7	1306	487
RF-1640	RF-1640ZZ	-	F634	13.41	7.80	13.20	7.80	2.7781	7	1735	671
LF-850	LF-850ZZ	-	F675	6.95	5.80	7.26	5.80	0.7938	13	274	130
LF-950	LF-950ZZ	-	-	7.73	6.00	8.04	6.00	1.1906	10	495	207
LF-1050	LF-1050ZZ	-	-	8.63	6.40	8.94	6.40	1.5875	8	714	276
LF-1150	LF-1150ZZ	-	F685	8.63	6.40	9.54	6.40	1.5875	8	714	276
RF-1350	RF-1350ZZ	-	F695	11.14	6.66	11.14	6.66	2.0000	8	1074	422
RF-1450	RF-1450ZZ	-	F605	12.14	6.88	12.14	6.88	2.3813	7	1329	508
RF-1650	RF-1650HH	-	F625	13.41	7.80	13.41	7.80	2.7781	7	1735	671
RF-1950	RF-1950ZZ	-	F635	15.60	8.67	16.26	8.67	3.9688	6	2805	1060

Stainless Steel material is standard for the flanged bearings.
 Please consult with Application Engineering for bearing selection.*
 Only open type is shown.
 **Column shows the availabilities and types.

- (1) Based on JIS B 1518
- (2) Based on JIS B 1519



Radial Flanged Open Ball Bearings



Radial Flanged Shielded Ball Bearings

Deep Groove Flanged Radial Ball Bearings (continued)

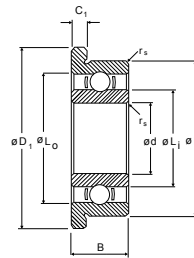
RF-Series & LF-Series

Bore d		OD D		Basic Dimension				Chamfer r _s min		Flange			
				Width B						Open		Shielded	
				Open	Shielded	OD D ₁	Width C ₁			OD D ₁	Width C ₁		
mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	mm	mm	mm
6.0	0.2362	10.0	0.3937	2.5	0.0984	3.0	0.1181	0.10	0.004	11.20	0.60	11.20	0.60
		12.0	0.4724	3.0	0.1181	4.0	0.1575	0.15	0.006	13.20	0.60	13.60	0.80
		13.0	0.5118	3.5	0.1378	5.0	0.1969	0.15	0.006	15.00	1.00	15.00	1.10
		15.0	0.5906	5.0	0.1969	5.0	0.1969	0.20	0.008	17.00	1.20	17.00	1.20
		17.0	0.6693	6.0	0.2362	6.0	0.2362	0.30	0.012	19.00	1.20	19.00	1.20
		19.0	0.7480	6.0	0.2362	6.0	0.2362	0.30	0.012	22.00	1.50	22.00	1.50
7.0	0.2756	11.0	0.4331	2.5	0.0984	3.0	0.1181	0.10	0.004	12.20	0.60	12.20	0.60
		13.0	0.5118	3.0	0.1181	4.0	0.1575	0.15	0.006	14.20	0.60	14.60	0.80
		14.0	0.5512	3.5	0.1378	5.0	0.1969	0.15	0.006	16.00	1.00	16.00	1.10
		19.0	0.7480	-	-	6.0	0.2362	0.30	0.012	-	-	22.00	1.50
		22.0	0.8661	7.0	0.2756	7.0	0.2756	0.30	0.012	25.00	1.50	25.00	1.50
8.0	0.3150	12.0	0.4724	2.5	0.0984	3.5	0.1378	0.10	0.004	13.20	0.60	13.60	0.80
		14.0	0.5512	3.5	0.1378	4.0	0.1575	0.15	0.006	15.60	0.80	15.60	0.80
		16.0	0.6299	4.0	0.1575	5.0	0.1969	0.20	0.008	18.00	1.00	18.00	1.10
		19.0	0.7480	6.0	0.2362	6.0	0.2362	0.30	0.012	22.00	1.50	22.00	1.50
		22.0	0.8661	7.0	0.2756	7.0	0.2756	0.30	0.012	25.00	1.50	25.00	1.50
9.0	0.3543	17.0	0.6693	4.0	0.1575	5.0	0.1969	0.20	0.008	19.00	1.00	19.00	1.10
10.0	0.3937	19.0	0.7480	-	-	7.0	0.2756	0.30	0.012	-	-	22.00	1.50
		22.0	0.8661	-	-	6.0	0.2362	0.30	0.012	-	-	25.00	1.50

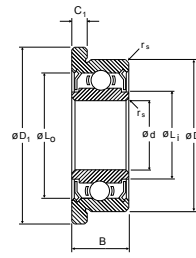
Open	Shielded	Sealed	ISO/JIS P/N*	Reference Diameter				Ball		Basic Load Rating	
				Open		Shield/Seal		Size D _w	No. Z	DYN C _r (1)	Static C _{0r} (2)
				OR L _o	IR L _i	OR L _o	IR L _i				
				mm	mm	mm	mm	mm	N	N	
LF-1060	LF-1060ZZ	-	-	8.73	6.95	9.04	6.95	1.1906	9	457	194
LF-1260	LF-1260ZZ	-	-	9.94	7.70	10.48	7.70	1.5875	10	831	363
LF-1360	LF-1360ZZ	-	F686	10.98	8.00	11.44	7.33	2.0000	8	1083	438
RF-1560	RF-1560ZZ	DD	F696	13.20	7.80	13.20	7.80	2.7781	7	1735	671
RF-1760X2	RF-1760X2ZZ	-	F606	14.70	8.22	14.70	8.22	3.5000	6	2265	839
RF-1960	RF-1960ZZ	-	F626	16.26	8.67	16.26	8.67	3.9688	6	2805	1060
LF-1170	LF-1170ZZ	-	-	9.83	8.10	10.14	8.10	1.1906	9	449	199
LF-1370	LF-1370ZZ	-	-	11.13	8.90	11.54	8.43	1.5875	11	880	414
LF-1470	LF-1470ZZ	-	F687	12.03	9.00	12.45	9.00	2.0000	9	1175	511
-	RF-1970ZZ	DD	F607	-	-	16.24	9.55	3.1750	7	2240	912
RF-2270	RF-2270HH	-	F627	19.07	10.80	19.07	10.80	3.9688	7	3297	1368
LF-1280	LF-1280ZZ	-	-	10.93	9.10	11.24	9.10	1.1906	11	506	249
LF-1480	LF-1480ZZ	DD	-	12.13	9.90	12.55	9.90	1.5875	10	819	386
LF-1680	LF-1680HH	DD	F688	13.40	10.30	14.18	9.68	2.3813	9	1606	712
RF-1980	RF-1980ZZ	DD	F698	16.24	9.55	16.24	9.55	3.1750	7	2240	912
RF-2280	RF-2280HH	-	F608	18.89	10.80	19.07	10.80	3.9688	7	3297	1368
LF-1790	LF-1790ZZ	-	F689	14.81	11.20	15.34	11.20	2.3813	10	1724	813
-	LF-1910ZZ	-	F6800	-	-	17.44	12.32	2.7781	9	2123	985
-	RF-2210X2HH	-	F6900	-	-	19.08	12.40	3.1750	9	2697	1273

Stainless Steel material is standard for the flanged bearings.
 Please consult with Application Engineering for bearing selection.*
 Only open type is shown.
 **Column shows the availabilities and types.

- (1) Based on JIS B 1518
- (2) Based on JIS B 1519



Radial Flanged Open Ball Bearings



Radial Flanged Shielded Ball Bearings

Deep Groove Radial Ball Bearings

JIS Series

Basic Dimension								Open	Shielded
Bore d		OD D		Width B		Chamfer r _s min			
mm	Inch	mm	Inch	mm	Inch	mm	Inch		
5.0	0.1969	19.0	0.7480	6.0	0.2362	0.30	0.012	635	635ZZ
6.0	0.2362	19.0	0.7480	6.0	0.2362	0.30	0.012	626	626ZZ
7.0	0.2756	19.0	0.7480	6.0	0.2362	0.30	0.012	607	607ZZ
		22.0	0.8661	7.0	0.2756	0.30	0.012	627	627ZZ
8.0	0.3150	22.0	0.8661	7.0	0.2756	0.30	0.012	608	608ZZ
9.0	0.3543	24.0	0.9449	7.0	0.2756	0.30	0.012	609	609ZZ
		26.0	1.0236	8.0	0.3150	0.30	0.012	629	629ZZ
10.0	0.3937	26.0	1.0236	8.0	0.3150	0.30	0.012	6000	6000ZZ

NR Type

Basic Dimension									
Bore d		OD D		Width B		Chamfer r _s min		NR Ring (3)	
mm	Inch	mm	Inch	mm	Inch	mm	Inch	OD D ₂	Position C ₂
6.0	0.2362	13.0	0.5118	5.0	0.1969	0.15	0.006	14.50	1.10
		15.0	0.5906	5.0	0.1969	0.20	0.008	17.20	1.50
		17.0	0.6693	6.0	0.2362	0.30	0.012	19.20	1.20
		19.0	0.7480	6.0	0.2362	0.30	0.012	22.10	1.50
7.0	0.2756	19.0	0.7480	6.0	0.2362	0.30	0.012	22.10	1.50
8.0	0.3150	16.0	0.6299	5.0	0.1969	0.20	0.008	18.20	0.95
		22.0	0.8661	7.0	0.2756	0.30	0.012	25.10	2.30
10.0	0.3937	22.0	0.8661	6.0	0.2362	0.30	0.012	24.70	1.62
		26.0	1.0236	8.0	0.3150	0.30	0.012	29.20	2.31

number	ISO/JIS P/N*	Reference Diameter		Ball		Basic Load Rating	
		OR L _o	IR L _i	Size D _w	No. Z	DYN C _r (1)	Static C _{or} (2)
		mm	mm	mm		N	N
DD	635	16.68	9.20	3.5000	7	2614	1053
DD SS	626	16.68	9.20	3.5000	7	2614	1053
DD SS	607	16.68	9.20	3.5000	7	2614	1053
DD SS	627	19.10	10.80	3.9688	7	3297	1368
DD SS	608	19.10	10.80	3.9688	7	3297	1368
DD SS	609	19.10	12.40	3.9688	7	3297	1368
DD SS	629	22.80	12.88	4.7625	7	4578	1970
DD SS	6000	22.80	13.75	4.7625	7	4578	1970

Please consult with Application Engineering for bearing selection.*

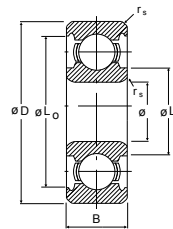
Only open type is shown.

**Column shows the availabilities and types.

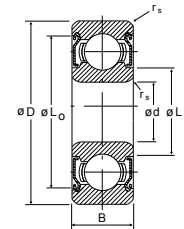
(1) Based on JIS B 1518

(2) Based on JIS B 1519

(3) Column refers to the term specified in JIS B 1513



Radial Open Ball Bearings



Radial Shielded Ball Bearings

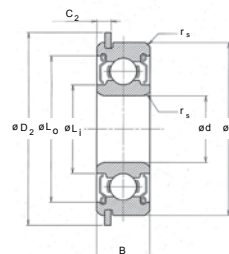
Shielded	ISO/JIS P/N	Reference Diameter		Ball		Basic Load Rating	
		OR L _o	IR L _i	Size D _w	No. Z	DYN C _r (1)	Static C _{or} (2)
		mm	mm	mm		N	N
LNR-1360X3ZZ	686ZZNR	10.48	7.70	1.5875	10	831	363
RNR-1560ZZ	696ZZNR	13.20	7.80	2.7781	7	1735	671
RNR-1760X2ZZ	606ZZNR	14.70	8.22	3.5000	6	2265	839
626ZZNR	626ZZNR	16.68	9.20	3.5000	7	2614	1053
607ZZNR	607ZZNR	16.68	9.20	3.5000	7	2614	1053
LNR-1680KK	688ZZNR	14.18	9.68	2.3813	9	1606	712
608ZZNRSD06	-	19.10	10.80	3.9688	7	3297	1368
RNR-2210X9KK	-	19.40	13.40	3.1750	9	2697	1273
6000ZZNR	-	22.88	13.75	4.7625	7	4578	1970

Please consult with Application Engineering for bearing selection.

(1) Based on JIS B 1518

(2) Based on JIS B 1519

(3) There is a case that the dimensions are different than JIS B 1509.



Radial Shielded Ball Bearings

Deep Groove Radial Ball Bearings

RI-Series & R-Series (inch)

Basic Dimension										
Bore d		OD D		Width B				Chamfer r _s min		Open
				Open		Shielded				
Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	
0.0400	1.016	0.1250	3.175	0.0469	1.191	-	-	0.003	0.08	RI-2X2
0.0469	1.191	0.1562	3.967	0.0625	1.588	0.0937	2.380	0.003	0.08	RI-21/2
0.0550	1.397	0.1875	4.762	0.0781	1.984	0.1094	2.779	0.003	0.08	RI-3
0.0781	1.984	0.2500	6.350	0.0937	2.380	0.1406	3.571	0.003	0.08	RI-4
0.0937	2.380	0.1875	4.762	0.0625	1.588	0.0937	2.380	0.003	0.08	RI-3332
		0.3125	7.938	0.1094	2.779	0.1406	3.571	0.003	0.08	RI-5
0.1250	3.175	0.2500	6.350	0.0937	2.380	0.1094	2.779	0.003	0.08	RI-418
		0.3125	7.938	0.1094	2.779	0.1406	3.571	0.003	0.08	RI-518
		0.3750	9.525	0.1562	3.967	0.1562	3.967	0.012	0.30	R-2
0.1562	3.967	0.3750	9.525	0.1094	2.779	0.1406	3.571	0.005	0.13	RI-618
		0.5000	12.700	0.1562	3.967	0.1960	4.978	0.012	0.30	R-3
0.1875	4.762	0.3125	7.938	0.1094	2.779	0.1250	3.175	0.003	0.08	RI-5532
		0.3750	9.525	0.1250	3.175	0.1250	3.175	0.003	0.08	RI-5632
		0.5000	12.700	0.1562	3.967	0.1960	4.978	0.012	0.30	RI-6632
0.2500	6.350	0.3750	9.525	0.1250	3.175	0.1250	3.175	0.003	0.08	RI-614
		0.5000	12.700	0.1250	3.175	0.1875	4.762	0.005	0.13	RI-814
		0.6250	15.875	0.1960	4.978	0.1960	4.978	0.012	0.30	R-4
		0.7500	19.050	0.2188	5.558	0.2812	7.142	0.016	0.41	RI-1214
0.3125	7.938	0.5000	12.700	0.1562	3.967	0.1562	3.967	0.005	0.13	RI-8516
0.3750	9.525	0.8750	22.225	0.2188	5.558	0.2812	7.142	0.016	0.41	RI-1438
0.5000	12.700	1.1250	28.575	0.2500	6.350	0.3125	7.938	0.016	0.41	RI-1812

Inch Series Bearings

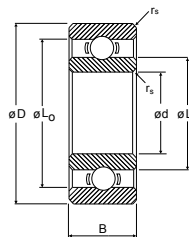
Shielded	Sealed	Reference Diameter				Ball		Basic Load Rating	
		Open		Shield/Seal		Size D _w	No. Z	DYN C _r (1)	Static C _{or} (2)
		OR L _o	IR L _i	OR L _o	IR L _i			N	N
		Inch	Inch	Inch	Inch	mm			
	-	0.101	0.065	-	-	0.6350	6	106	28
RI-21/2ZZ	-	0.124	0.081	0.135	0.081	0.7938	6	158	44
RI-3ZZ	-	0.158	0.093	0.169	0.093	1.1906	5	264	71
RI-4ZZ	-	0.193	0.122	0.206	0.122	1.1906	6	330	99
RI-3332ZZ	-	0.163	0.118	0.169	0.118	0.7938	7	187	59
RI-5ZZ	-	0.271	0.173	0.283	0.173	1.5873	6	563	183
RI-418ZZ	-	0.217	0.161	0.230	0.161	1.0000	7	285	97
RI-518ZZ	-	0.271	0.173	0.283	0.173	1.5879	6	563	183
R-2ZZ	DD	0.301	0.200	0.322	0.200	1.5879	7	641	226
RI-618ZZ	-	0.271	0.173	0.283	0.173	1.5879	6	563	183
RI-5532ZZ	-	0.279	0.221	0.288	0.221	1.1906	7	391	142
RI-5632ZZ	-	0.279	0.221	0.288	0.221	1.1906	7	391	142
RI-6632ZZ	-	0.343	0.235	0.343	0.235	1.5879	8	712	271
R-3KK	DD	0.413	0.276	0.433	0.276	2.3813	7	1306	487
RI-614ZZ	-	0.340	0.285	0.350	0.285	1.0000	13	417	205
RI-814ZZ	-	0.432	0.330	0.455	0.330	1.5879	10	828	374
R-4KK	DD SS	0.513	0.323	0.513	0.323	2.3813	8	1470	599
RI-1214ZZ	-	0.598	0.386	0.641	0.340	3.5719	6	2411	912
RI-8516ZZ	-	0.450	0.362	0.463	0.362	1.5873	11	878	419
RI-1438KK	DD SS	0.709	0.488	0.752	0.488	3.9688	7	3297	1368
RI-1812KK	-	0.947	0.676	0.989	0.630	4.7625	8	5113	2387

Please consult with Application Engineering for bearing selection.*

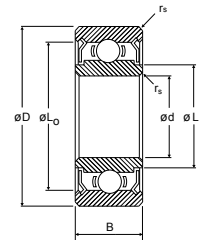
Column shows the availabilities and types.

(1) Based on JIS B 1518

(2) Based on JIS B 1519



Radial Open Ball Bearings



Radial Shielded Ball Bearings

Deep Groove Flanged Radial Ball Bearings

RIF-Series

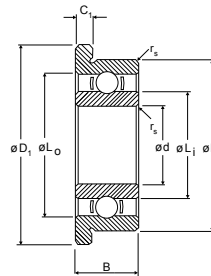
Inch Series Bearings

Basic Dimension													
Bore d		OD D		Width B				Chamfer r _s min		Flange Diameter D ₁		Flange Width C ₁	
				Open		Shielded						Open	
Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
0.0469	1.191	0.1562	3.967	0.0625	1.588	0.0937	2.380	0.003	0.08	0.203	5.16	0.013	0.33
0.0550	1.397	0.1875	4.762	0.0781	1.984	0.1094	2.779	0.003	0.08	0.234	5.94	0.023	0.58
0.0781	1.984	0.2500	6.350	0.0937	2.380	0.1406	3.571	0.003	0.08	0.296	7.52	0.023	0.58
0.0937	2.380	0.1875	4.762	0.0625	1.588	0.0937	2.380	0.003	0.08	0.234	5.94	0.018	0.46
		0.3125	7.938	0.1094	2.779	0.1406	3.571	0.003	0.08	0.359	9.12	0.023	0.58
0.1250	3.175	0.2500	6.350	0.0937	2.380	0.1094	2.779	0.003	0.08	0.296	7.52	0.023	0.58
		0.3125	7.938	0.1094	2.779	0.1406	3.571	0.003	0.08	0.359	9.12	0.023	0.58
		0.3750	9.525	0.1562	3.967	0.1562	3.967	0.012	0.30	0.440	11.18	0.030	0.76
		0.3750	9.525	0.1094	2.779	0.1406	3.571	0.005	0.13	0.422	10.72	0.023	0.58
0.1562	3.967	0.3125	7.938	0.1094	2.779	0.1250	3.175	0.003	0.08	0.359	9.12	0.023	0.58
0.1875	4.762	0.3125	7.938	0.1094	2.779	0.1250	3.175	0.003	0.08	0.359	9.12	0.023	0.58
		0.3750	9.525	0.1250	3.175	0.1250	3.175	0.003	0.08	0.422	10.72	0.023	0.58
		0.5000	12.700	0.1562	3.967	0.1960	4.978	0.012	0.30	0.565	14.35	0.042	1.07
0.2500	6.350	0.3750	9.525	0.1250	3.175	0.1250	3.175	0.003	0.08	0.422	10.72	0.023	0.58
		0.5000	12.700	0.1250	3.175	0.1875	4.762	0.005	0.13	0.547	13.89	0.023	0.58
		0.6250	15.875	0.1960	4.978	0.1960	4.978	0.012	0.30	0.690	17.53	0.042	1.07
0.3125	7.938	0.5000	12.700	0.1562	3.967	0.1562	3.967	0.005	0.13	0.547	13.89	0.031	0.79
0.3750	9.525	0.8750	22.225	0.2188	5.558	0.2812	7.142	0.016	0.41	0.969	24.61	0.062	1.58

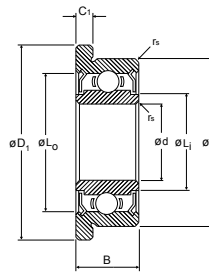
Basic Dimension		Part Number *			Reference Diameter				Ball		Basic Load Rating	
Flange Width C ₁		Open	Shielded	Sealed	Open		Shield Seal		Size D _w	No. Z	DYN C _r (1)	Static C _{or} (2)
Shielded					OR L _o	IR L _i	OR L _o	IR L _i			N	N
Inch	mm				Inch	Inch	Inch	Inch	mm	N	N	
0.031	0.79	RIF-21/2	RIF-21/2ZZ	-	0.124	0.081	0.135	0.081	0.7938	6	158	44
0.031	0.79	RIF-3	RIF-3ZZ	-	0.158	0.093	0.169	0.093	1.1906	5	264	71
0.031	0.79	RIF-4	RIF-4ZZ	-	0.193	0.122	0.206	0.122	1.1906	6	330	99
0.031	0.79	RIF-3332	RIF-3332ZZ	-	0.163	0.118	0.169	0.118	0.7938	7	187	59
0.031	0.79	RIF-5	RIF-5ZZ	-	0.271	0.173	0.283	0.173	1.5875	6	563	183
0.031	0.79	RIF-418	RIF-418ZZ	-	0.217	0.161	0.230	0.161	1.0000	7	285	97
0.031	0.79	RIF-518	RIF-518ZZ	-	0.271	0.173	0.283	0.173	1.5875	6	563	183
0.030	0.76	RF-2	RF-2ZZ	-	0.301	0.200	0.322	0.200	1.5875	7	641	226
0.031	0.79	RIF-618	RIF-618ZZ	-	0.271	0.173	0.283	0.173	1.5875	6	563	183
0.036	0.91	RIF-5532	RIF-5532ZZ	-	0.279	0.221	0.288	0.221	1.1906	7	391	142
0.036	0.91	RIF-5632	RIF-5632ZZ	-	0.279	0.221	0.288	0.221	1.1906	7	391	142
0.031	0.79	RIF-6632	RIF-6632ZZ	-	0.343	0.235	0.343	0.235	1.5875	8	712	271
0.042	1.07	RF-3	RF-3ZZ	-	0.413	0.276	0.435	0.276	2.3813	7	1306	487
0.036	0.91	RIF-614	RIF-614ZZ	-	0.340	0.285	0.350	0.285	1.0000	13	417	205
0.045	1.14	RIF-814	RIF-814ZZ	-	0.432	0.330	0.454	0.330	1.5875	10	828	374
0.042	1.07	RF-4	RF-4HH	DD	0.513	0.323	0.513	0.323	2.3813	8	1470	599
0.031	0.79	RIF-8516	RIF-8516ZZ	-	0.450	0.362	0.463	0.362	1.5875	11	878	419
0.062	1.58	RIF-1438	RIF-1438KK	DD	0.741	0.520	0.752	0.488	3.9688	7	3297	1368

Please consult with Application Engineering for bearing selection.*
 Column shows the availabilities and types.

- (1) Based on JIS B 1518
- (2) Based on JIS B 1519



Radial Flanged Open Ball Bearings



Radial Flanged Shielded Ball Bearings

Tolerances

Miniature and Instrument Ball Bearings Inner Ring

Characteristic	ABEC 1	ABEC 3	ABEC 5	ABEC 7
Mean Bore Tolerance Limits	+0.000 -0.003	+0.000 -0.002	+0.000 -0.002	+0.000 -0.002
Radial Runout Width Variation	.0003 (1) —	.0002 (1) —	.00015 .00020	.0001 .0001
Bore Runout with Face	—	—	.00030	.0001
Race Runout with Face	—	—	.00030	.0001

(1) Add .0001 to the tolerance if bore size is over 10mm (.3937 inch).

Outer Ring

Characteristic	Configuration	Size Range	ABEC 1	ABEC 3	ABEC 5	ABEC 7
Mean O.D. Tolerance Limits	All	0-18mm (0-.709)	+0.000 -0.003	+0.000 -0.003	+0.000 -0.002	+0.000 -0.002
	All	over 18-30mm (.709-1.1811)	+0.0000 -0.0035	+0.000 -0.003	+0.000 -0.002	+0.000 -0.002
Radial Runout	All	0-18mm	.0006	.0004	.0002	.00015
Width Variation	All	over 18-30mm	.0006	.0004	.0002	.00015
O.D. Runout with Face	All	0-30mm	—	—	.0002	.00010
Race Runout with Face	All	0-30mm	—	—	.0003	.00015
Flange Width Tolerance Limits	Plain	0-18mm	—	—	.0003	.00020
	Plain	over 18-30mm	—	—	.0003	.00020
	Flanged	0-30mm	—	—	.0003	.00030
Flange Diameter Tolerance Limits	—	—	—	+0.000 -0.0020	+0.000 -0.0020	+0.000 -0.0020
	—	—	—	+0.0050 -0.0020	+0.000 -0.0010	+0.000 -0.0010

Ring Width

Characteristic	ABEC 1	ABEC 3	ABEC 5	ABEC 7
Width Tolerance	+0.000 -0.005	+0.000 -0.005	+0.000 -0.001	+0.000 -0.001

Temperature Conversion Table

The numbers in the center column refer to the temperatures either in Celsius or Fahrenheit which need conversion to the other scale. When converting from Fahrenheit to Celsius, the equivalent temperature will be found to the left of the center column. If converting from Celsius to Fahrenheit the answer will be found to the right.

°C	°C/°F	°F	°C	°C/°F	°F	°C	°C/°F	°F	°C	°C/°F	°F
-79	-110	-166	37.7	100	212	204	400	752	371	700	1292
-73	-100	-148	43	110	230	210	410	770	376	710	1310
-68	-90	-130	49	120	248	215	420	788	382	720	1328
-62	-80	-112	54	130	266	221	430	806	387	730	1346
-57	-70	-94	60	140	284	226	440	824	393	740	1364
-51	-60	-76	65	150	302	232	450	842	565	1050	1922
-46	-50	-58	71	160	320	238	460	860	571	1060	1940
-40	-40	-40	76	170	338	243	470	878	576	1070	1958
-34	-30	-22	83	180	356	249	480	896	582	1080	1976
-29	-20	-4	88	190	374	254	490	914	587	1090	1994
-23	-10	14	93	200	392	260	500	932	593	1100	2012
-17.7	0	32	99	210	410	265	510	950	598	1110	2030
-17.2	1	33.8	104	220	428	271	520	968	604	1120	2048
-16.6	2	35.6	110	230	446	276	530	986	609	1130	2066
-16.1	3	37.4	115	240	464	282	540	1004	615	1140	2084
-15.5	4	39.2	121	250	482	288	550	1022	620	1150	2102
-15.0	5	41.0	127	260	500	293	560	1040	626	1160	2120
-14.4	6	42.8	132	270	518	299	570	1058	631	1170	2138
-13.9	7	44.6	138	280	536	304	580	1076	637	1180	2156
-13.3	8	46.4	143	290	554	310	590	1094	642	1190	2174
-12.7	9	48.2	149	300	572	315	600	1112	648	1200	2192
-12.2	10	50.0	154	310	590	321	610	1130	653	1210	2210
-6.6	20	68.0	160	320	608	326	620	1148	659	1220	2228
-1.1	30	86.0	165	330	626	332	630	1166	664	1230	2246
4.4	40	104.0	171	340	644	338	640	1184	670	1240	2264
9.9	50	122.0	177	350	662	343	650	1202	675	1250	2282
15.6	60	140.0	182	360	680	349	660	1220	681	1260	2300
21.0	70	158.0	188	370	698	354	670	1238	686	1270	2318
26.8	80	176.0	193	380	716	360	680	1256	692	1280	2336
32.1	90	194.0	199	390	734	365	690	1274	697	1290	2354

Metric Conversion Table

Fraction	Inch	MM	Fraction	Inch	MM	Fraction	Inch	MM
1/64	0.0156	0.3969				11/16	0.6875	17.4625
	0.0250	0.6350	19/64	0.2969	7.5406	45/64	0.7031	17.8594
1/32	0.0312	0.7937	5/16	0.3125	7.9375		0.7087	18.0000
	0.0394	1.0000		0.3150	8.0000	23/32	0.7187	18.2562
	0.0400	1.0160	21/64	0.3281	8.3344	47/64	0.7344	18.6532
3/64	0.0469	1.1906	11/32	0.3437	8.7312		0.7435	18.8849
	0.0472	1.2000		0.3543	9.0000		0.7480	19.0000
	0.0550	1.3970	23/64	0.3594	9.1281	3/4	0.7500	19.0500
	0.0591	1.5000	3/8	0.3750	9.5250	49/64	0.7656	19.4469
1/16	0.0625	1.5875	25/64	0.3906	9.9213		0.7717	19.6012
	0.0709	1.8000		0.3937	10.0000	25/32	0.7812	19.8433
5/64	0.0781	1.9844	13/32	0.4062	10.3187		0.7874	20.0000
	0.0787	2.0000		0.4100	10.4140	51/64	0.7969	20.2402
	0.0906	2.3012	27/64	0.4219	10.7156	13/16	0.8125	20.6375
3/32	0.0937	2.3812		0.4250	10.7950		0.8268	21.0000
	0.0984	2.5000		0.4331	11.0000	53/64	0.8281	21.0344
	0.1000	2.5400	7/16	0.4375	11.1125	27/32	0.8437	21.4312
	0.1024	2.6000	29/64	0.4531	11.5094	55/64	0.8594	21.8281
7/64	0.1094	2.7781		0.4600	11.6840		0.8661	22.0000
	0.1100	2.7940	15/32	0.4687	11.9062	7/8	0.8750	22.2250
	0.1102	2.8000		0.4724	12.0000	57/64	0.8906	22.6219
	0.1181	3.0000	31/64	0.4844	12.3031		0.9055	23.0000
1/8	0.1250	3.1750	1/2	0.5000	12.7000	29/32	0.9062	23.0187
	0.1256	3.1902		0.5118	13.0000	59/64	0.9219	23.4156
	0.1378	3.5000	33/64	0.5156	13.0968	15/16	0.9375	23.8125
9/64	0.1406	3.5719	17/32	0.5312	13.4937		0.9449	24.0000
5/32	0.1562	3.9687	35/64	0.5469	13.8906	61/64	0.9531	24.2094
	0.1575	4.0000		0.5512	14.0000	31/32	0.9687	24.6062
11/64	0.1719	4.3656	9/16	0.5625	14.2875		0.9843	25.0000
3/16	0.1875	4.7625	37/64	0.5781	14.6844	63/64	0.9844	25.0031
	0.1892	4.8057		0.5906	15.0000		1.0000	25.4000
	0.1969	5.0000	19/32	0.5937	15.0812		1.0236	26.0000
13/64	0.2031	5.1594	39/64	0.6094	15.4781		1.0415	26.4541
	0.2165	5.4991	5/8	0.6250	15.8750		1.0480	26.6192
7/32	0.2187	5.5562		0.6299	16.0000	1-1/16	1.0625	26.9875
15/64	0.2344	5.9531	41/64	0.6406	16.2719		1.0630	27.0000
	0.2362	6.0000		0.6500	16.5100		1.1025	28.0000
1/4	0.2500	6.3500	21/32	0.6562	16.6687	1-1/8	1.1250	28.5750
17/64	0.2656	6.7469		0.6620	16.8148		1.1417	29.0000
	0.2756	7.0000		0.6693	17.0000		1.1812	30.0000
9/32	0.2812	7.1437	43/64	0.6719	17.0656	1-3/16	1.1875	30.1625
						1-1/4	1.2500	31.7500
						1-1/2	1.5000	38.1000