

### SIZE RANGE

Deep groove ball bearings are available in a variety of sizes and are the most popular of the rolling bearings. This type of bearing supports radial load and a small degree of axial load in both directions simultaneously. Deep groove ball bearings are popular due to their versatility, affordability, and capability to run at high speeds.

Timken offers deep groove ball bearings in a wide range of sizes and configurations. Offered sizes range from 3 mm to 400 mm bore, and maximum outside diameter (O.D.) of 600 mm. Timken continues to expand the offering of deep groove ball bearings with larger sizes to be introduced. Contact your Timken sales representative for questions and new opportunities.

### TYPES

There are several series of deep groove ball bearings that have been standardized by bearing manufacturers. The boundary dimensions for standard metric bearings are contained in the general plans as specified in ISO (International Organization for Standardization) standard 15:2011 for radial rolling bearings.

The Timken offering includes standard, thin-section, narrow, wide, miniature and extra-small constructions. The offering includes:

- Open basic design
- With shields
- With contact seals
- With non-contact seals
- With a snap ring groove on the outer ring O.D.
- With a snap ring on the outer ring O.D.

### CONFIGURATIONS

Variations may differ based on bearing size and/or series.

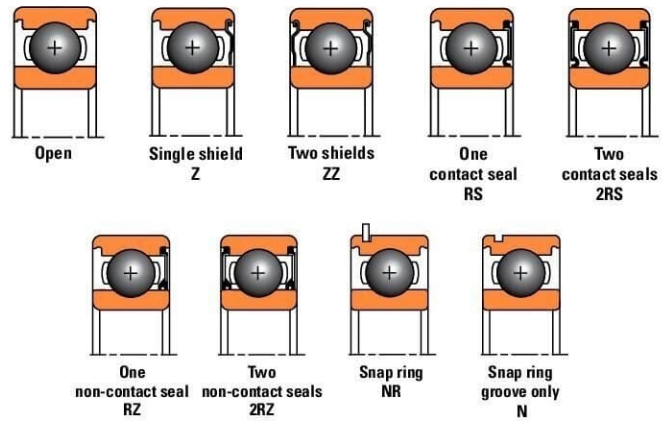


Fig. 1. Deep groove ball bearing configurations.

## CAGES





Cages (also referred to as retainers) make a vital contribution to overall bearing performance. They maintain uniform ball spacing in the bearing as the balls pass into and out of the load zone.

Cages can impact several bearing operational characteristics such as:

- Maximum rotational speed
- Torque characteristics
- Temperature limits
- Lubricant flow

There are a number of different cage types that are commonly used in deep groove ball bearings, the most popular being the riveted steel cage. Table 1 describes the most common cage types.

**TABLE 1. COMMON CAGE TYPES**

Type	Two-Piece Riveted Steel Cage	One-Piece Stainless Steel Crown-Type Cage	One-Piece Polymer Crown-Type Cage	Machined-Brass Cage
Design				
Construction	Two pressed-steel half cages are fixed together with rivets; ball-piloted cage provides good uniformity of ball-to-pocket clearance.	Pressed stainless-steel cage guided by inner ring.	One-piece molded snap-in 6/6 nylon cage.	Two identical half cages made from solid brass, fixed together with rivets.
Advantages	Designed to reduce frictional torque; high rigidity and strength, making it the cage of choice for most applications.	Best performance in low-speed applications where low torque is preferred.	Tough and flexible especially in situations of misalignment; resistant to most solvents, oils and greases.	Superior strength enables this cage to be used in heavily loaded and high-speed applications.

## BEARING SHIELDS AND SEALS

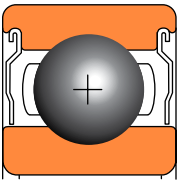
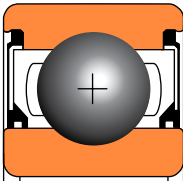
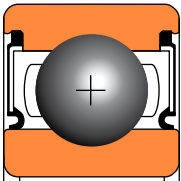
Bearing shields and seals help keep lubricant in and dust, water and other contaminants out.

Timken shielded deep groove ball bearings are available with one or two shields for coarse debris. Single shielded bearings allow for re-lubrication from the open side.

Sealed ball bearings are available with one or two seals for improved protection in harsh environments. Offered in contact or non-contact configurations, Timken seals use high-performance Nitrile Buna Rubber with reinforced low-carbon steel case for standard operating temperatures.

The following table summarizes the main characteristics of shields and seals.

**TABLE 2. CHARACTERISTICS OF SHIELDS AND SEALS**

Type	Shields One = Z Two = ZZ	Non-Contact Seals One = RZ Two = 2RZ	Contact Seals One = RS Two = 2RS
Construction			
Material	Low-carbon pressed steel	Nitrile Buna Rubber with steel case	Nitrile Buna Rubber with steel case
Speed Capability	High speed	High speed	Less than shield(s) and non-contact seal(s) due to seal lip contact
Operating Temperature	-50° C to +120° C	-40° C to +120° C	-40° C to +120° C
Grease Retention	Good	Better than shield(s)	Excellent
Dust Resistance	Good	Better than shield(s)	Excellent
Torque	Low	Low	Greater than shield(s) and non-contact seal(s) due to seal lip contact

NOTE: The above operating temperature ranges are for standard shielded and sealed bearings. If higher temperature capability is needed, alternative bearing, grease or seal materials may be considered. Please contact your Timken sales engineer for such requirements.

## BEARING LUBRICATION

Bearings must be lubricated to minimize friction between balls and raceways, as well as between balls and cages. Lubricants also help to protect the bearings from corrosion and, in some cases, to dissipate heat.

Timken open ball bearings, as well as single-sealed/shielded bearings, are supplied with rust preventive (RP) covering all bearing surfaces. For such bearings, the end user selects and applies the desired lubrication type and quantity as required by the application.

Timken double-sealed and double-shielded deep groove ball bearings are factory pre-lubricated with water-resistant grease chosen for chemical and mechanical stability. The standard grease preferred by Timken for deep groove ball bearings is Mobil Polyrex EM. This is a mineral-oil based, advanced polyurea-thickened grease that maintains proper lubrication for a wide range of operating temperatures from -29° C to

177° C. Mobil Polyrex EM provides protection against rust and corrosion, and additional protection under mild salt-water wash conditions. This grease also is widely preferred in electric motor applications.

The standard factory grease fill is 30 to 50 percent for most Timken double-sealed/shielded ball bearings. This accommodates most applications. The type and amount of grease needed varies depending on operating conditions and bearing series. Most bearings can be filled with customer-specified greases upon request to meet specific application needs. Aside from Mobil Polyrex EM grease, Timken also offers a range of other proven and popular greases suitable for a wide range of applications.

Table 3 is an overview of the common characteristics for the grease used in this product.

**TABLE 3. LUBRICATION**

Product Name	Brand Name	Min. Temp	Max. Temp	Base Oil Type	Thickener	Color	Characteristics and Application
Mobil Polyrex™ EM	Mobil	-29° C	177° C	Mineral Oil	Polyurea	Blue	Electric motor grease; very good resistance to water/salt water

NOTE: For other grease options consult your Timken sales engineer.

## BEARING LIFE

The selection of the appropriate bearing for a given application is dependent on several performance criteria. These include bearing fatigue life, rotating precision, power requirement, temperature limits, speed capabilities and sound requirements. This section deals primarily with bearing life as related to material-associated fatigue.

Bearing life is defined as the length of time, or number of revolutions, until a fatigue spall of 6 mm<sup>2</sup> develops. Since fatigue is a statistical phenomenon, the life of an individual bearing is impossible to predetermine precisely. Bearings that may appear to be identical can exhibit considerable life scatter when tested under identical conditions. Thus, it is necessary to base life predictions on a statistical evaluation of a large number of bearings operating under similar conditions. The Weibull distribution function is the accepted standard for predicting the life of a population of bearings at any given reliability level.

## RATING LIFE

Rating life ( $L_{10}$ ) is the life that 90 percent of a group of apparently identical bearings will complete or exceed before a fatigue spall develops. The  $L_{10}$  life also is associated with 90 percent reliability for a single bearing under a certain load.

## DYNAMIC LOAD RATING

Published dynamic load ratings for deep groove ball bearings are based on the industry standard procedure outlined in ISO 281:2007. This rating, designated as  $C_r$ , is defined as the radial load under which a population of bearings will achieve a  $L_{10}$  life of one million revolutions. Radial load is assumed to be constant in magnitude and direction for radial ball bearings.

## STATIC LOAD RATING

The basic static load rating for Timken bearings (designated as  $C_{0r}$ ) as defined in ISO 76:2006 is based on a maximum contact stress within a non-rotating bearing of 4200 MPa at the center of the most heavily loaded rolling element and raceway contact.

Such stress levels may cause visible light Brinell marks on the bearing raceways. This degree of marking will not have a measurable effect on fatigue life when the bearing is subsequently rotated under a lower application load. If sound, vibration or torque are critical or if a pronounced shock load is present, a lower load limit should be applied. For more information on selecting a bearing for static load conditions, consult your Timken sales engineer.

## SPEED RATING

### THERMAL REFERENCE SPEED

The thermal reference speed is the bearing thermal equilibrium speed based on industry standard reference conditions outlined in ISO 15312:2003. Thermal equilibrium balances the heat generated by the bearing, with heat conduction through the housing and shaft. This standard applies to both bath oil lubricated and 30 percent grease fill packed bearings. It excludes any heat removed by a circulating lubricant. This standard also excludes the outer ring rotating application and heat generated by contact seals.

The ISO 15312 thermal reference speed rating calculations are based on the following assumptions:

- The bearing ambient temperature is 20° C.
- The tolerable bearing/housing interface temperature is 70° C.
- Oil and grease lubricants are considered.
  - For radial bearings with oil lubrication: ISO VG 32 oil.
  - For radial bearings with grease lubrication: ISO VG 150 grease.
- The radial loads assume a normal clearance (CO or CN).
- For radial bearings, the applied load is 5 percent of the static load rating ( $C_{0r}$ ).

Thermal reference speed ratings assume the bearing has been sufficiently broken in. During the break-in process, temperatures may exceed the tolerable limit. Break-in commonly takes between 10 to 36 hours.

Standard bearing materials and lubricants can generally withstand temperatures up to and beyond 100° C. For this reason, a permissible temperature of 100° C was assumed for the thermal speed rating calculation. Contact your Timken sales engineer if your application requires speeds above the Timken published values.

### LIMITING SPEED

For certain ball bearing types and sizes, cage behavior becomes the limiting factor to bearing operating speed. For such bearings, the thermal speed rating per ISO 15312:2003 is not shown. Instead, Timken publishes limiting speeds for those bearings, as is the case for thin-section and extra-small deep groove ball bearings.

For bearings with contact seals, the speed rating also is impacted by the speed of the seal. In general, bearings with contact seals have speed ratings that are 50 percent to 60 percent of the published speed rating of the equivalent open bearing.

## RADIAL INTERNAL CLEARANCE

In the manufacturing of deep groove ball bearings, it is standard practice to assemble rings and rolling elements with a specified internal clearance. This characteristic is necessary to absorb the loss of clearance due to press fitting the bearing rings at mounting or due to expansion of bearings, shafts and housings. Internal clearance in an application is an important factor that has a significant influence on bearing performance.

The radial internal clearance (RIC) in a deep groove ball bearing can be defined as the average outer-ring raceway diameter minus the average inner-ring raceway diameter minus twice the ball diameter.

Internal clearance reduces due to press fitting the bearing rings on the shaft or in the housing. This reduced internal clearance in the bearings at mounted condition is called mounted radial internal clearance.

## RIC OF MINIATURE AND EXTRA-SMALL DEEP GROOVE BALL BEARINGS

The RIC symbols for miniature and extra-small deep groove ball bearings are as follows:

- MC1 – Extra tight
- MC2 – Tight
- MC3 – Normal or regular
- MC4 – Loose
- MC5 – Extra loose
- MC6 – Extra-extra loose

Table 4 provides the selection of RIC for miniature and extra-small deep groove ball bearings.

**TABLE 4. RIC – MINIATURE AND EXTRA-SMALL DEEP GROOVE BALL BEARINGS**

Radial Internal Clearance											
MC1		MC2		MC3		MC4		MC5		MC6	
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
µm		µm		µm		µm		µm		µm	
0	5	3	8	5	10	8	13	13	20	20	28

Standard miniature and extra-small deep groove ball bearings with no clearance designation in the part number are made with the MC3 normal clearance.

## RIC OF STANDARD DEEP GROOVE BALL BEARINGS

The RIC designations for standard deep groove ball bearings are as follows:

- C2 – Tight
- CN or C0 – Normal or regular
- C3 – Loose
- C4 – Extra loose
- C5 – Extra-extra loose

Table 5 below provides the selection of bearing internal clearances for standard deep groove ball bearings.

**TABLE 5. RIC – STANDARD DEEP GROOVE BALL BEARINGS**

Bore Diameter (d)		Radial Internal Clearance									
		C2		CN or C0		C3		C4		C5	
Over	Incl.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
mm		µm		µm		µm		µm		µm	
2.5	6	0	7	2	13	8	23	-	-	-	-
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
50	65	1	15	8	28	23	43	38	61	55	90
65	80	1	15	10	30	25	51	46	71	65	105
80	100	1	18	12	36	30	58	53	84	75	120
100	120	2	20	15	41	36	66	61	97	90	140
120	140	2	23	18	48	41	81	71	114	105	160
140	160	2	23	18	53	46	91	81	130	120	180
160	180	2	25	20	61	53	102	91	147	135	200
180	200	2	30	25	71	63	117	107	163	150	230
200	225	2	35	25	85	75	140	125	195	175	265
225	250	2	40	30	95	85	160	145	225	205	300
250	280	2	45	35	105	90	170	155	245	225	340
280	315	2	55	40	115	100	190	175	270	245	370
315	355	3	60	45	125	110	210	195	300	275	410
355	400	3	70	55	145	130	240	225	340	315	460

## BEARING TOLERANCES

Ball bearings are manufactured to a number of specifications, with each having classes that define tolerances on dimensions such as bore, outer diameter, width and runout.

Standard Timken deep groove ball bearings maintain normal tolerances (P0) according to the current ISO 492 standard. For applications where running tolerance is critical, P6 or P5 tolerances are recommended.

The term “deviation” is defined as the difference between a single ring dimension and the nominal dimension. For metric tolerances, the normal dimension is at a +0 mm tolerance. The deviation is the tolerance range for the listed parameter. Variation is defined as the difference between the largest and smallest measurement of a given parameter for an individual ring.

Tables 6 and 7 provide tolerances for deep groove ball bearing inner and outer rings respectively.

**TABLE 6. INNER RING – TOLERANCES**

Bearing Bore		Bore Deviation	Width Variation	Radial Runout	Face Runout with Bore	Axial Runout	Width Deviation Inner and Outer Rings	
d		$\Delta d_{mp}$	$V_{BS}$	$K_{ia}$	$S_d$	$S_{ia}$	$\Delta Bs$ and $\Delta Cs$	
over	incl.	P0	P0, P6	P0	P5	P5	P0, P6	P5
mm	mm	$\mu m$	$\mu m$	$\mu m$	$\mu m$	$\mu m$	$\mu m$	$\mu m$
2.5	10	-8	15	10	7	7	-120	-40
10	18	-8	20	10	7	7	-120	-80
18	30	-10	20	13	8	8	-120	-120
30	50	-12	20	15	8	8	-120	-120
50	80	-15	25	20	8	8	-150	-150
80	120	-20	25	25	9	9	-200	-200
120	150	-25	30	30	10	10	-250	-250
150	180	-25	30	30	10	10	-250	-250
180	250	-30	30	40	11	13	-300	-300
250	315	-35	35	50	13	15	-350	-350
315	400	-40	40	60	15	20	-400	-400

**TABLE 7. OUTER RING – TOLERANCES**

Bearing O.D.		Outside Deviation	Width Variation	Radial Runout	Axial Runout	Outside Diameter Runout With Face
D		$\Delta D_{mp}$	$V_{CS}$	$K_{ea}$	$S_{ea}$	$S_D$
over	incl.	P0	P0	P0	P5	P5
mm	mm	$\mu m$	$\mu m$	$\mu m$	$\mu m$	$\mu m$
6	18	-8	15	15	8	8
18	30	-9	15	15	8	8
30	50	-11	20	20	8	8
50	80	-13	25	25	10	8
80	120	-15	25	35	11	9
120	150	-18	30	40	13	10
150	180	-25	30	45	14	10
180	250	-30	30	50	15	11
250	315	-35	35	60	18	13
315	400	-40	40	70	20	13
400	500	-45	45	80	23	15
500	630	-50	50	100	25	18

## FITTING PRACTICE

As a general guideline, bearing rings mounted on a rotating member should have an interference fit. Loose fits may permit the ring to creep or turn, and wear the mating surface and backing shoulder. This wear can result in excessive bearing looseness and damage the bearing, shaft or housing.

The choice of fitting practices will mainly depend upon the following parameters:

- Precision class of the bearing.
- Rotating or stationary ring.
- Type of layout (single- or double-row bearings).
- Type and direction of load (continuous/alternate rotating).
- Particular running conditions like shocks, vibrations, over-loading or high speed.
- Capability for machining the bearing seats (grinding, turning or boring).
- Shaft and housing section and material.
- Mounting and setting conditions.

Fig. 2 is a graphical representation of bearing shaft and housing fit selection that conforms to accepted industry standards and practices. The bars designated g6, h6, etc., represent shaft/housing diameter and tolerance ranges to achieve various loose and interference fits required for various load and ring rotation conditions.

Tables 8 and 9, on the following pages, provide the resultant fits based on standard ISO tolerances for shaft and housing.

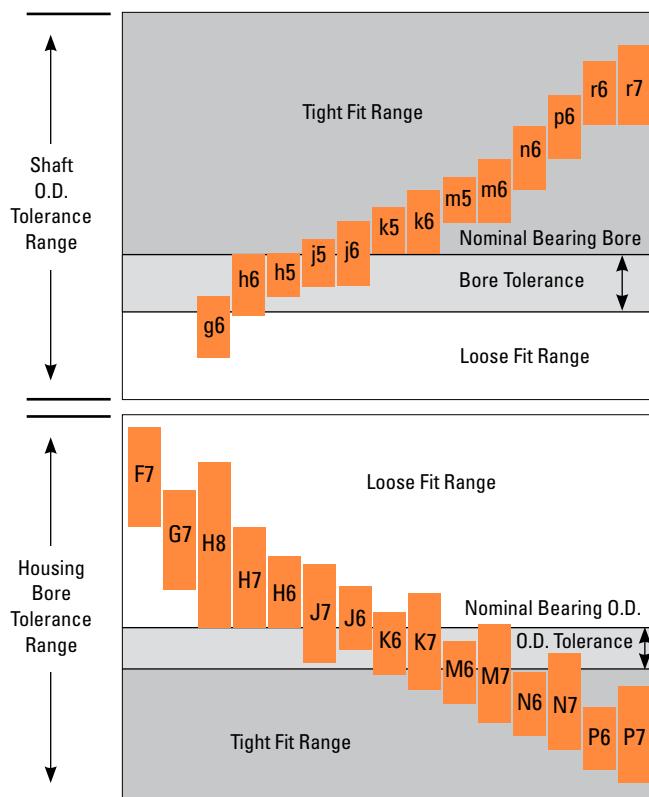


Fig. 2. Shaft and housing fit selection.



# SHAFT TOLERANCES: DEEP GROOVE BALL BEARINGS

TABLE 8. SHAFT TOLERANCES: DEEP GROOVE BALL BEARINGS

Bearing Bore		g6		h5		h6		j5		js5		js6		j6	
Nominal (Max.)	Tolerance	Shaft Diameter	Fit	Shaft Diameter	Fit	Shaft Diameter	Fit	Shaft Diameter	Fit	Shaft Diameter	Fit	Shaft Diameter	Fit	Shaft Diameter	Fit
Over Incl.	Max. Min.	Max. Min.		Max. Min.		Max. Min.		Max. Min.		Max. Min.		Max. Min.		Max. Min.	
mm	µm	µm		µm		µm		µm		µm		µm		µm	
- 3	0 -8	-2 -8	8L 6T	0 -4	4L 8T	0 -6	6L 8T	2 -2	2L 10T	2 -2	2L 10T	3 -3	3L 11T	4 -2	2L 12T
3 6	0 -8	-4 -12	12L 4T	0 -5	5L 8T	0 -8	8L 8T	3 -2	2L 11T	2.5 -2.5	2.5L 10.5T	4 -4	4L 12T	6 -2	2L 14T
6 10	0 -8	-5 -14	14L 3T	0 -6	6L 8T	0 -9	9L 8T	4 -2	2L 12T	3 -3	3L 11T	4.5 -4.5	4.5L 12.5T	7 -2	2L 15T
10 18	0 -8	-6 -17	17L 2T	0 -8	8L 8T	0 -11	11L 8T	5 -3	3L 13T	4 -4	4L 12T	5.5 -5.5	5.5L 13.5T	8 -3	3L 16T
18 30	0 -10	-7 -20	20L 3T	0 -9	9L 10T	0 -13	13L 10T	5 -4	4L 15T	4.5 -4.5	4.5L 14.5T	6.5 -6.5	6.5L 16.5T	9 -4	4L 19T
30 50	0 -12	-9 -25	25L 3T	0 -11	11L 12T	0 -16	16L 12T	6 -5	5L 18T	5.5 -5.5	5.5L 17.5T	8 -8	8L 20T	11 -5	5L 23T
50 80	0 -15	-10 -29	29L 5T	0 -13	13L 15T	0 -19	19L 15T	6 -7	7L 21T	6.5 -6.5	6.5L 21.5T	9.5 -9.5	9.5L 24.5T	12 -7	7L 27T
80 120	0 -20	-12 -34	34L 8T	0 -15	15L 20T	0 -22	22L 20T	6 -9	9L 26T	7.5 -7.5	7.5L 27.5T	11 -11	11L 31T	13 -9	9L 33T
120 180	0 -25	-14 -39	39L 11T	0 -18	18L 25T	0 -25	25L 25T	7 -11	11L 32T	9 -9	9L 34T	12.5 -12.5	12.5L 37.5T	14 -11	11L 39T
180 200	0 -30	-15 -44	44L 15T	0 -20	20L 30T	0 -29	29L 30T	7 -13	13L 37T	10 -10	10L 40T	14.5 -14.5	14.5L 44.5T	16 -13	13L 46T
200 225	0 -30	-15 -44	44L 15T	0 -20	20L 30T	0 -29	29L 30T	7 -13	13L 37T	10 -10	10L 40T	14.5 -14.5	14.5L 44.5T	16 -13	13L 46T
225 250	0 -30	-15 -44	44L 15T	0 -20	20L 30T	0 -29	29L 30T	7 -13	13L 37T	10 -10	10L 40T	14.5 -14.5	14.5L 44.5T	16 -13	13L 46T
250 280	0 -35	-17 -49	49L 18T	0 -23	23L 35T	0 -32	32L 35T	7 -16	16L 42T	11.5 -11.5	11.5L 46.5T	16 -16	16L 51T	16 -16	16L 51T
280 315	0 -35	-17 -49	49L 18T	0 -23	23L 35T	0 -32	32L 35T	7 -16	16L 42T	11.5 -11.5	11.5L 46.5T	16 -16	16L 51T	16 -16	16L 51T
315 355	0 -40	-18 -54	54L 22T	0 -25	25L 40T	0 -36	36L 40T	7 -18	18L 47T	12.5 -12.5	12.5L 52.5T	18 -18	18L 58T	18 -18	18L 58T
355 400	0 -40	-18 -54	54L 22T	0 -25	25L 40T	0 -36	36L 40T	7 -18	18L 47T	12.5 -12.5	12.5L 52.5T	18 -18	18L 58T	18 -18	18L 58T
400 450	0 -45	-20 -60	60L 25T	0 -27	27L 45T	0 -40	40L 45T	7 -20	20L 52T	13.5 -13.5	13.5L 58.5T	20 -20	20L 65T	20 -20	20L 65T
450 500	0 -45	-20 -60	60L 25T	0 -27	27L 45T	0 -40	40L 45T	7 -20	20L 52T	13.5 -13.5	13.5L 58.5T	20 -20	20L 65T	20 -20	20L 65T
500 560	0 -50	-22 -66	66L 28T	0 -28	28L 50T	0 -44	44L 50T	8 -22	22L 58T	14 -14	14L 64T	22 -22	22L 72T	-22 -22	22L 72T
560 630	0 -50	-22 -66	66L 28T	0 -28	28L 50T	0 -44	44L 50T	8 -22	22L 58T	14 -14	14L 64T	22 -22	22L 72T	-22 -22	22L 72T
630 710	0 -75	-24 -74	74L 51T	0 -32	32L 75T	0 -50	50L 75T	10 -25	25L 85T	16 -16	16L 91T	25 -25	25L 100T	25 -25	25L 100T
710 800	0 -75	-24 -74	74L 51T	0 -32	32L 75T	0 -50	50L 75T	10 -25	25L 85T	16 -16	16L 91T	25 -25	25L 100T	25 -25	25L 100T
800 900	0 -100	-26 -82	82L 74T	0 -36	36L 100T	0 -56	56L 100L	12 -28	28L 112T	18 -18	18L 118T	28 -28	28L 128T	28 -28	28L 128T
900 1000	0 -100	-26 -82	82L 74T	0 -36	36L 100T	0 -56	56L 100L	12 -28	28L 112T	18 -18	18L 118T	28 -28	28L 128T	28 -28	28L 128T
1000 1120	0 -125	-28 -94	94L 97T	0 -42	42L 125T	0 -66	66L 125T	13 -33	33L 138T	21 -21	21L 146T	33 -33	33L 158T	33 -33	33L 158T
1120 1250	0 -125	-28 -94	94L 97T	0 -42	42L 125T	0 -66	66L 125T	13 -33	33L 138T	21 -21	21L 146T	33 -33	33L 158T	33 -33	33L 158T

k5		k6		m5		m6		n6		p6		r6		r7	
Shaft Diameter	Fit	Shaft Diameter	Fit	Shaft Diameter	Fit	Shaft Diameter	Fit	Shaft Diameter	Fit	Shaft Diameter	Fit	Shaft Diameter	Fit	Shaft Diameter	Fit
Max. Min.		Max. Min.		Max. Min.		Max. Min.		Max. Min.		Max. Min.		Max. Min.		Max. Min.	
µm		µm		µm		µm		µm		µm		µm		µm	
4	0 12T	6	0 14T	6	2 14T	8	2 16T	-		-		-		-	
6	1 14T	9	1 17T	9	4 17T	12	4 20T	16	8 24T	20	12 28T	23	15 31T	27	15 35T
7	1 15T	10	1 18T	12	6 20T	15	6 23T	19	10 27T	24	15 32T	28	19 36T	34	19 42T
9	1 17T	12	1 20T	15	7 23T	18	7 26T	23	12 31T	29	18 37T	34	23 42T	41	23 49T
11	2 21T	15	2 25T	17	8 27T	21	8 31T	28	15 38T	35	22 45T	41	28 49T	49	28 59T
13	2 25T	18	2 30T	20	9 32T	25	9 37T	33	17 45T	42	26 54T	50	34 62T	59	34 71T
15	2 30T	21	2 36T	24	11 39T	30	11 45T	39	20 54T	51	32 66T	62	41 -77T	73	41 88T
18	3 38T	25	3 45T	28	13 48T	35	13 55T	45	23 65T	59	37 79T	76	51 96T	89	51 109T
21	3 46T	28	3 53T	33	15 58T	40	15 65T	52	27 77T	68	43 93T	90	65 115T	105	65 130T
24	4 54T	33	4 63T	37	17 67T	46	17 76T	60	31 90T	79	50 109T	106	77 136T	123	77 153T
24	4 54T	33	4 63T	37	17 67T	46	17 76T	60	31 90T	79	50 109T	109	80 139T	126	80 156T
24	4 54T	33	4 63T	37	17 67T	46	17 76T	60	31 90T	79	50 109T	113	84 143T	130	84 160T
27	4 62T	36	4 71T	43	20 78T	52	20 87T	66	34 101T	88	56 123T	126	94 161T	146	94 181T
27	4 62T	36	4 71T	43	20 78T	52	20 87T	66	34 101T	88	56 123T	130	98 165T	150	98 185T
29	4 69T	40	4 80T	46	21 86T	57	21 97T	73	37 113T	98	62 138T	144	108 184T	165	108 205T
29	4 69T	40	4 80T	46	21 86T	57	21 97T	73	37 113T	98	62 138T	150	114 190T	171	114 211T
32	5 77T	45	5 90T	50	23 95T	63	23 108T	80	40 125T	108	68 153T	166	126 211T	189	126 234T
32	5 77T	45	5 90T	50	23 95T	63	23 108T	80	40 125T	108	68 153T	172	132 217T	195	132 240T
29	0 79T	44	0 94T	56	26 105T	70	26 120T	88	44 138T	122	78 172T	194	150 244T	220	150 270T
29	0 79T	44	0 94T	56	26 105T	70	26 120T	88	44 138T	122	78 172T	199	155 249T	225	155 275T
32	0 107T	50	0 125T	62	30 137T	80	30 155T	100	50 175T	138	88 213T	225	175 300T	255	175 330T
32	0 107T	50	0 125T	62	30 137T	80	30 155T	100	50 175T	138	88 213T	235	185 310T	265	185 340T
36	0 136T	56	0 156T	70	34 170T	90	34 190T	112	56 212T	156	100 256T	266	210 366T	300	210 400T
36	0 136T	56	0 156T	70	34 170T	90	34 190T	112	56 212T	156	100 256T	276	220 376T	310	220 410T
42	0 167T	66	0 191T	82	40 207T	106	40 231T	132	66 257T	186	120 311T	316	250 441T	355	250 480T
42	0 167T	66	0 191T	82	40 207T	106	40 231T	132	66 257T	186	120 311T	326	260 451T	365	260 490T

# HOUSING TOLERANCES: DEEP GROOVE BALL BEARINGS

TABLE 9. HOUSING TOLERANCES: DEEP GROOVE BALL BEARINGS

Bearing O.D.		F7			G7			H6			H7			H8			J6			J7		
Nominal (Max.)	Tolerance	Housing Bore		Fit	Housing Bore		Fit	Housing Bore		Fit	Housing Bore		Fit	Housing Bore		Fit	Housing Bore		Fit	Housing Bore		Fit
Over Incl.	Max. Min.	Max. Min.			Max. Min.			Max. Min.			Max. Min.			Max. Min.			Max. Min.			Max. Min.		
mm	µm	µm			µm			µm			µm			µm			µm			µm		
6 10	0 -8	28 13	13L 32L		20 5	5L 28L		9 0	0L 17L		15 0	0L 23L		22 0	0L 30L		5 -4	4T 13L		8 -7	7T 16L	
10 18	0 -8	34 16	16L 42L		24 6	6L 32L		11 0	0L 19L		18 0	0L 26L		27 0	0L 35L		6 -5	5T 14L		10 -8	8T 18L	
18 30	0 -9	41 20	20L 50L		28 7	7L 37L		13 0	0L 22L		21 0	0L 30L		33 0	0L 42L		8 -5	5T 10 17L		12 -9	9T 21L	
30 50	0 -11	50 25	25L 61L		34 9	9L 45L		16 0	0L 27L		25 0	0L 36L		39 0	0L 50L		10 -6	6T 21L		14 -11	11T 25L	
50 80	0 -13	60 30	30L 73L		40 10	10L 53L		19 0	0L 32L		30 0	0L 43L		46 0	0L 59L		13 -6	6T 26L		18 -12	12T 31L	
80 120	0 -15	71 36	36L 86L		47 12	12L 62L		22 0	0L 37L		35 0	0L 50L		54 0	0L 69L		16 -6	6T 31L		22 -13	13T 37L	
120 150	0 -18	83 43	43L 101L		54 14	14L 72L		25 0	0L 43L		40 0	0L 58L		63 0	0L 81L		18 -7	7T 36L		26 -14	14T 44L	
150 180	0 -25	83 43	43L 108L		54 14	14L 79L		25 0	0L 50L		40 0	0L 65L		63 0	0L 88L		18 -7	7T 43L		26 -14	14T 51L	
180 250	0 -30	96 50	50L 126L		61 15	15L 91L		29 0	0L 59L		46 0	0L 76L		72 0	0L 102L		22 -7	7T 52L		30 -16	16T 60L	
250 315	0 -35	108 56	56L 143L		69 17	17L 104L		32 0	0L 67L		52 0	0L 87L		81 0	0L 116L		25 -7	7T 60L		36 -16	16T 71L	
315 400	0 -40	119 62	62L 159L		75 18	18L 115L		36 0	0L 76L		57 0	0L 97L		89 0	0L 129L		29 -7	7T 69L		39 -18	18T 79L	
400 500	0 -45	131 68	68L 176L		83 20	20L 128L		40 0	0L 85L		63 0	0L 108L		97 0	0L 142L		33 -7	7T 78L		43 -20	20T 88L	
500 630	0 -50	146 76	76L 196L		92 22	22L 142L		44 0	0L 94L		70 0	0L 120L		110 0	0L 160L		37 -7	7T 87L		48 -22	22T 98L	
630 800	0 -75	160 80	80L 235L		104 24	24L 179L		50 0	0L 125L		80 0	0L 155L		125 0	0L 200L		40 -10	10T 115L		56 -24	24T 131L	
800 1000	0 -100	176 86	86L 276L		116 26	26L 216L		56 0	0L 156L		90 0	0L 190L		140 0	0L 240L		46 -10	10T 146L		64 -26	26T 164L	
1000 1250	0 -125	203 98	98L 328L		133 28	28L 258L		66 0	0L 191L		105 0	0L 230L		165 0	0L 290L		56 -10	10T 181L		77 -28	28T 202L	
1250 1600	0 -160	235 110	110L 395L		155 30	30L 315L		78 0	0L 238L		125 0	0L 285L		195 0	0L 355L		68 -10	10T 228L		95 -30	30T 255L	
1600 2000	0 -200	270 120	120L 470L		182 32	32L 382L		92 0	0L 292L		150 0	0L 350L		230 0	0L 430L		82 -10	10T 282L		118 -32	32T 318L	
2000 2500	0 -250	305 130	130L 555L		209 34	34L 459L		110 0	0L 360L		175 0	0L 425L		280 0	0L 530L		100 -10	10T 350L		141 -34	34T 391L	

JS6			K6			K7			M6			M7			N6			N7			P6			P7		
Housing Bore	Fit		Housing Bore	Fit		Housing Bore	Fit		Housing Bore	Fit		Housing Bore	Fit		Housing Bore	Fit		Housing Bore	Fit		Housing Bore	Fit		Housing Bore	Fit	
Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.	
µm			µm			µm			µm			µm			µm			µm			µm			µm		
4.5	-4.5	4.5T 12.5L	2	-7	7T 10L	5	-10	10T 13L	-3	-12	12T 5L	0	-15	15T 8L	-7	-16	16T 1L	-4	-19	19T 4L	-12	-21	21T 4T	-9	-24	24T 1T
5.5	-5.5	5.5T 13.5L	2	-9	9T 10L	6	-12	12T 14L	-4	-15	15T 4L	0	-18	18T 8L	-9	-20	20T 1T	-5	-23	23T 3L	-15	-26	26T 7T	-11	-29	29T 3T
6.5	-6.5	6.5T 15.5L	2	-11	11T 11L	6	-15	15T 15L	-4	-17	17T 5L	0	-21	21T 9L	-11	-24	24T 2T	-7	-28	28T 2L	-18	-31	31T 9T	-14	-35	35T 5T
8	-8	8T 19L	3	-13	13T 14L	7	-18	18T 18L	-4	-20	20T 7L	0	-25	25T 11L	-12	-28	28T 1T	-8	-33	33T 3L	-21	-37	37T 10T	-17	-42	42T 6T
9.5	-9.5	9.5T 22.5L	4	-15	15T 17L	9	-21	21T 22L	-5	-24	24T 8L	0	-30	30T 13L	-14	-33	33T 1T	-9	-39	39T 4L	-26	-45	45T 13T	-21	-51	51T 8T
11	-11	11T 26L	4	-18	18T 19L	10	-25	25T 25L	-6	-28	28T 9L	0	-35	35T 15L	-16	-38	38T 1T	-10	-45	45T 5L	-30	-52	52T 15T	-24	-59	59T 9T
12.5	-12.5	12.5T 30.5L	4	-21	21T 22L	12	-28	28T 30L	-8	-33	33T 10L	0	-40	40T 18L	-20	-45	45T 2T	-12	-52	52T 6L	-36	-61	61T 18T	-28	-68	68T 10T
12.5	-12.5	12.5T 37.5L	4	-21	21T 29L	12	-28	28T 37L	-8	-33	33T 17L	0	-40	40T 25L	-20	-45	45T 5L	-12	-52	52T 13L	-36	-61	61T 11T	-28	-68	68T 3T
14.5	-14.5	14.5T 44.5L	5	-24	24T 35L	13	-33	33T 43L	-8	-37	37T 22L	0	-46	46T 30L	-22	-51	51T 8L	-14	-60	60T 16L	-41	-70	70T 11T	-33	-79	79T 3T
16	-16	16T 51L	5	-27	27T 40L	16	-36	36T 51L	-9	-41	41T 26L	0	-52	52T 35L	-25	-57	57T 10L	-14	-66	66T 21L	-47	-79	79T 12T	-36	-88	88T 1T
18	-18	18T 58L	7	-29	29T 47L	17	-40	40T 57L	-10	-46	46T 30L	0	-57	57T 40L	-26	-62	62T 14L	-16	-73	73T 24L	-51	-87	87T 11T	-41	-98	98T 1T
20	-20	20T 65L	8	-32	32T 53L	18	-45	45T 63L	-10	-50	50T 35L	0	-63	63T 45L	-27	-67	67T 18L	-17	-80	80T 28L	-55	-95	95T 10T	-45	-108	108T 0T
22	-22	22T 72L	0	-44	44T 50L	0	-70	70T 50L	-26	-70	70T 24L	-26	-96	96T 24L	-44	-88	88T 6L	-44	-114	114T 6L	-78	-122	122T 28T	-78	-148	148T 28T
25	-25	25T 100L	0	-50	50T 75L	0	-80	80T 75L	-30	-80	80T 45L	-30	-110	110T 45L	-50	-100	100T 25L	-50	-130	130T 25L	-88	-138	138T 13T	-88	-168	168T 13T
28	-28	28T 128L	0	-56	56T 100L	0	-90	90T 100L	-34	-90	90T 66L	-34	-124	124T 66L	-56	-112	112T 44L	-56	-146	146T 44L	-100	-156	156T 0T	-100	-190	190T 0T
33	-33	33T 158L	0	-66	66T 125L	0	-105	105T 125L	-40	-106	106T 85L	-40	-145	145T 85L	-66	-132	132T 59L	-66	-171	171T 59L	-120	-186	186T 5L	-120	-225	225T 5L
39	-39	39T 199L	0	-78	78T 160L	0	-125	125T 160L	-48	-126	126T 112L	-48	-173	173T 112L	-78	-156	156T 82L	-78	-203	203T 82L	-140	-218	218T 20L	-140	-265	265T 20L
46	-46	46T 246L	0	-92	92T 200L	0	-150	150T 200L	-58	-150	150T 142L	-58	-208	208T 142L	-92	-184	184T 108L	-92	-242	242T 108L	-170	-262	262T 30L	-170	-320	320T 30L
55	-55	55T 305L	0	-110	110T 250L	0	-175	175T 250L	-68	-178	178T 182L	-68	-243	243T 182L	-110	-220	220T 140L	-110	-285	285T 140L	-195	-305	305T 55L	-195	-370	370T 55L

### NOMENCLATURE

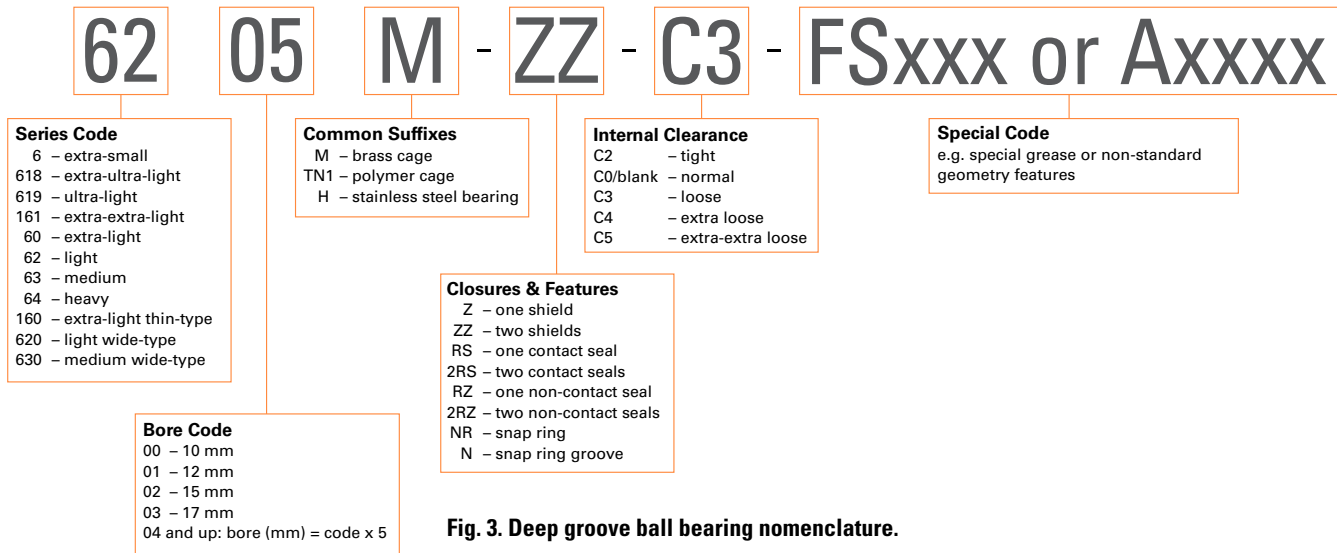


Fig. 3. Deep groove ball bearing nomenclature.

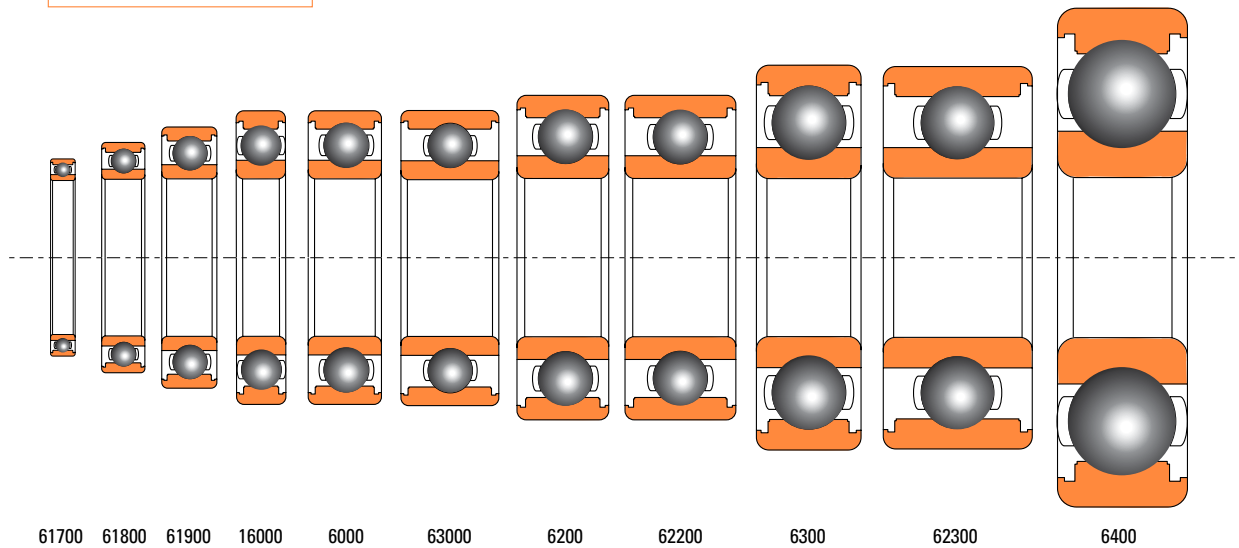


Fig. 4. Timken deep groove ball bearing series.

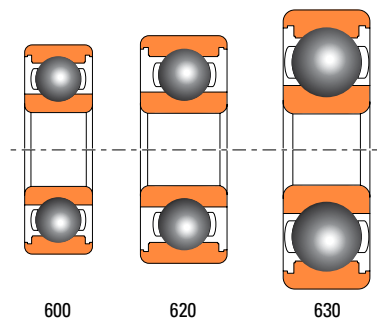


Fig. 5. Timken miniature and extra-small deep groove ball bearing series.

STANDARD 6000 SERIES

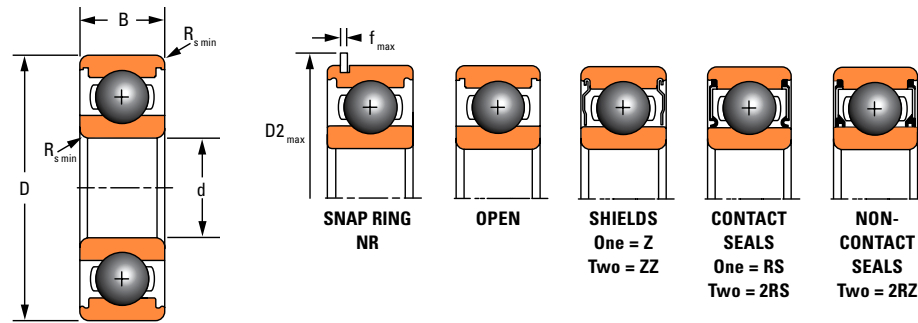


TABLE 10. STANDARD 6000 SERIES

Bearing No.	Features						Boundary Dimensions						Load Ratings		Reference Speed		Weight
							Bore d	O.D. D	Width B	Radius R <sub>s min</sub>	D <sub>2 max</sub>	f <sub>max</sub>	Dynamic C <sub>r</sub>	Static C <sub>0r</sub>	Grease RPM	Oil RPM	
Description	Z	ZZ	RS	2RS	2RZ	NR	mm	mm	mm	mm	mm	mm	kN	kN	RPM	RPM	kg
6000	•	•	•	•	•	•	10	26	8	0.3	29.2	0.70	4.60	2.00	26000	38000	0.020
6200	•	•	•	•		•	10	30	9	0.6	34.7	1.12	5.10	2.40	22000	32000	0.030
6300	•	•	•	•		•	10	35	11	0.6	39.7	1.12	8.10	3.50	20000	29000	0.050
6001	•	•	•	•		•	12	28	8	0.3	30.8	0.85	5.10	2.40	23000	33000	0.020
6201	•	•	•	•	•	•	12	32	10	0.6	36.7	1.12	6.80	3.00	21000	30000	0.040
6301	•	•	•	•		•	12	37	12	1.0	41.3	1.12	9.70	4.20	19000	27000	0.060
6002	•	•	•	•		•	15	32	9	0.3	36.7	1.12	5.60	2.80	20000	30000	0.030
6202	•	•	•	•	•	•	15	35	11	0.6	39.7	1.12	7.60	3.70	19000	28000	0.050
6302	•	•	•	•	•	•	15	42	13	1.0	46.3	1.12	11.40	5.40	16000	24000	0.080
6003	•	•	•	•		•	17	35	10	0.3	39.7	1.12	6.00	3.30	19000	28000	0.040
6203	•	•	•	•	•	•	17	40	12	0.6	44.6	1.12	9.60	4.80	17000	25000	0.070
6303	•	•	•	•	•	•	17	47	14	1.0	52.7	1.12	13.60	6.60	15000	22000	0.120
6004	•	•	•	•	•	•	20	42	12	0.6	46.3	1.12	9.40	5.00	17000	25000	0.070
6204	•	•	•	•	•	•	20	47	14	1.0	52.7	1.12	12.80	6.60	15000	22000	0.100
6304	•	•	•	•	•	•	20	52	15	1.1	57.9	1.12	15.90	7.80	13000	20000	0.140
6005	•	•	•	•	•	•	25	47	12	0.6	52.7	1.12	10.10	5.80	14000	21000	0.080
6205	•	•	•	•	•	•	25	52	15	1.0	57.9	1.12	14.00	7.90	14000	20000	0.130
6305	•	•	•	•		•	25	62	17	1.1	67.7	1.70	20.60	11.20	12000	17000	0.220
6405						•	25	80	21	1.5	86.6	1.70	36.10	18.80	10000	15000	0.530
6006	•	•	•	•	•	•	30	55	13	1.0	60.7	1.12	13.20	8.30	12000	18000	0.110
6206	•	•	•	•	•	•	30	62	16	1.0	67.7	1.70	19.50	11.30	11000	16000	0.200
6306	•	•	•	•	•	•	30	72	19	1.1	78.6	1.70	26.60	15.00	10000	15000	0.350
6406						•	30	90	23	1.5	96.5	2.46	47.30	24.50	9300	13000	0.740
6007	•	•	•	•	•	•	35	62	14	1.0	67.7	1.70	15.90	10.30	11000	16000	0.150
6207	•	•	•	•	•	•	35	72	17	1.1	78.6	1.70	25.70	15.30	10000	14000	0.290
6307	•	•	•	•	•	•	35	80	21	1.5	86.6	1.70	33.40	19.20	9300	13000	0.450
6307M							35	80	21	1.5	–	–	33.40	19.20	9300	13000	0.550
6407							35	100	25	1.5	–	–	55.50	29.40	8500	12000	0.950
6008	•	•	•	•	•	•	40	68	15	1.0	74.6	1.70	16.80	11.50	10000	15000	0.190
6208	•	•	•	•	•	•	40	80	18	1.1	86.6	1.70	29.50	18.10	8800	13000	0.370
6308	•	•	•	•	•	•	40	90	23	1.5	96.5	2.46	40.70	24.00	8500	12000	0.640
6408						•	40	110	27	2.0	116.6	2.46	63.70	34.60	7800	11000	1.250
6009	•	•	•	•	•	•	45	75	16	1.0	81.6	1.70	19.90	14.00	9200	13000	0.230
6209	•	•	•	•		•	45	85	19	1.1	91.6	1.70	31.20	20.30	8200	12000	0.420
6309	•	•	•	•	•	•	45	100	25	1.5	106.5	2.46	48.80	29.30	7800	11000	0.840
6309M				•			45	100	25	1.5	–	–	48.80	29.30	7800	11000	1.025
6409						•	45	120	29	2.0	129.7	2.82	77.20	45.20	7200	10000	1.550
6010	•	•	•	•	•	•	50	80	16	1.0	86.6	1.70	21.80	16.50	8300	12000	0.250
6210	•	•	•	•	•	•	50	90	20	1.1	96.5	2.46	35.00	23.20	7700	11000	0.460
6310	•	•	•	•		•	50	110	27	2.0	116.6	2.46	57.50	35.30	7200	10000	1.050
6310M							50	110	27	2.0	–	–	57.50	35.30	7200	10000	1.260
6410							50	130	31	2.1	–	–	83.10	49.40	6800	9700	1.900
6011	•	•	•	•		•	55	90	18	1.1	96.5	2.46	28.30	22.40	7800	11000	0.360

Speed ratings are for open bearings. Use 50 to 60 percent of the published speed ratings for bearings with contact seals.

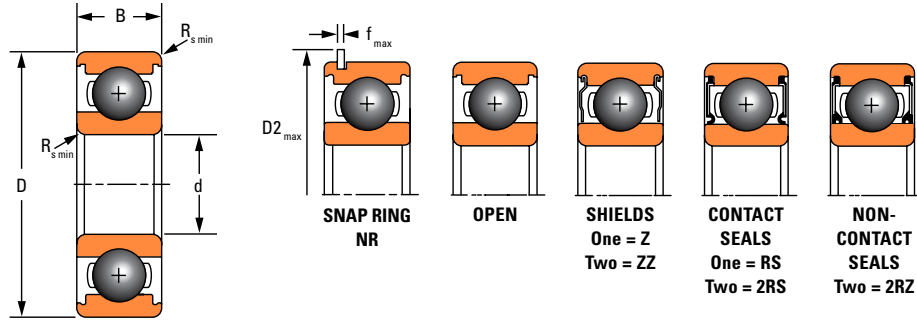
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# DEEP GROOVE BALL BEARINGS

## STANDARD 6000 SERIES

### STANDARD 6000 SERIES

– continued

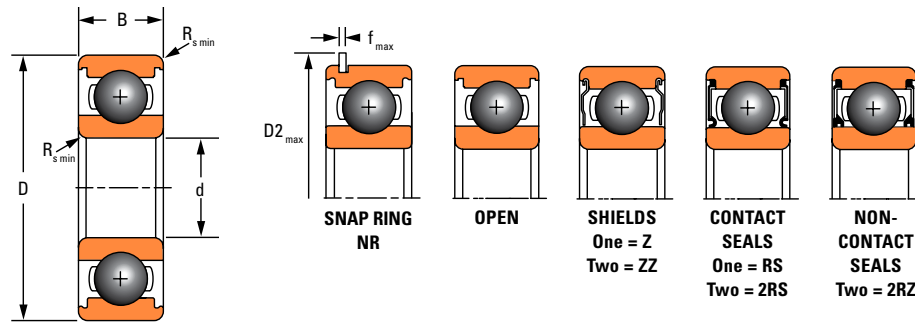


Continued from Table 10.

Bearing No.	Features						Boundary Dimensions						Load Ratings		Reference Speed		Weight
							Bore d	O.D. D	Width B	Radius R <sub>s min</sub>	D <sub>2 max</sub>	f <sub>max</sub>	Dynamic C <sub>r</sub>	Static C <sub>0r</sub>	Grease RPM	Oil RPM	
Description	Z	ZZ	RS	2RS	2RZ	NR	mm	mm	mm	mm	mm	mm	kN	kN	RPM	RPM	kg
6211	•	•	•	•		•	55	100	21	1.5	106.5	2.46	43.40	29.20	7000	10000	0.610
6211M							55	100	21	1.5	–	–	43.40	29.20	7000	10000	0.724
6311	•	•	•	•	•	•	55	120	29	2.0	129.7	2.82	71.50	44.60	6700	10000	1.350
6311M							55	120	29	2.0	–	–	71.50	44.60	6700	10000	1.642
6411						•	55	140	33	2.1	149.7	2.82	100.70	62.40	6300	9100	2.300
6012	•	•	•	•	•	•	60	95	18	1.1	101.6	2.46	29.50	22.70	7200	10000	0.390
6212	•	•	•	•		•	60	110	22	1.5	116.6	2.46	47.80	32.90	6500	9300	0.780
6212M							60	110	22	1.5	–	–	47.80	32.90	6500	9300	0.932
6312	•	•	•	•		•	60	130	31	2.1	139.7	2.82	81.80	51.80	6400	9100	1.700
6312M							60	130	31	2.1	–	–	81.80	51.80	6400	9100	2.141
6412			•				60	150	35	2.1	–	–	109.00	70.10	6000	8600	2.730
6013	•	•	•	•		•	65	100	18	1.1	106.5	2.46	30.50	23.50	6700	9700	0.430
6213	•	•	•	•		•	65	120	23	1.5	129.7	2.82	57.20	40.00	6000	8600	0.990
6213M							65	120	23	1.5	–	–	57.20	40.00	6000	8600	1.218
6313	•	•	•	•		•	65	140	33	2.1	149.7	2.82	92.60	59.70	6000	8600	2.100
6313M							65	140	33	2.1	–	–	92.60	59.70	6000	8600	2.539
6413							65	160	37	2.1	–	–	118.00	78.60	5700	8200	3.300
6014	•	•	•	•	•	•	70	110	20	1.1	116.6	2.46	38.60	30.40	6400	9300	0.570
6214	•	•	•	•		•	70	125	24	1.5	134.7	2.82	60.80	44.00	5700	8300	1.100
6314	•	•	•	•		•	70	150	35	2.1	159.7	2.82	104.00	68.00	5700	8200	2.500
6314M							70	150	35	2.1	–	–	104.00	68.00	5700	8200	3.172
6015	•	•	•	•		•	75	115	20	1.1	121.6	2.46	40.10	33.10	6000	8700	0.600
6015M							75	115	20	1.1	–	–	40.10	33.10	6000	8700	0.636
6215	•	•	•	•		•	75	130	25	1.5	139.7	2.82	66.10	49.30	5500	7900	1.200
6315	•	•	•	•		•	75	160	37	2.1	169.7	2.82	113.40	76.50	5400	7800	3.000
6016	•	•	•	•	•	•	80	125	22	1.1	134.7	2.82	47.50	39.80	5800	8400	0.820
6016M							80	125	22	1.1	–	–	47.50	39.80	5800	8400	0.999
6216	•	•	•	•		•	80	140	26	2.0	149.7	2.82	72.70	53.00	5200	7500	1.400
6216M							80	140	26	2.0	–	–	72.70	53.00	5200	7500	1.678
6316	•	•	•	•		•	80	170	39	2.1	–	–	123.00	86.50	5200	7500	3.600
6316M							80	170	39	2.1	–	–	123.00	86.50	5200	7500	4.480
6017	•	•	•	•		•	85	130	22	1.1	139.7	2.82	52.80	44.50	5400	7900	0.850
6017M							85	130	22	1.1	–	–	52.80	44.50	5400	7900	1.064
6217	•	•	•	•		•	85	150	28	2.0	–	–	83.20	63.80	5000	7200	1.800
6217M							85	150	28	2.0	–	–	83.20	63.80	5000	7200	2.175
6317	•	•	•	•		•	85	180	41	3.0	192.9	3.10	132.70	96.50	5000	7200	4.250
6317M							85	180	41	3.0	–	–	132.70	96.50	5000	7200	5.298
6018	•	•	•	•		•	90	140	24	1.5	149.7	2.82	58.00	50.60	5300	7600	1.120
6218	•	•	•	•		•	90	160	30	2.0	169.7	2.82	96.00	71.50	4800	6900	2.150
6218M							90	160	30	2.0	–	–	96.00	71.50	4800	6900	2.230
6318	•	•	•	•		•	90	190	43	3.0	–	–	142.60	107.20	4800	6900	4.900
6318M							90	190	43	3.0	–	–	142.60	107.20	4800	6900	6.129

Speed ratings are for open bearings. Use 50 to 60 percent of the published speed ratings for bearings with contact seals.

Continued on next page.



Continued from Table 10.

Bearing No.	Features						Boundary Dimensions						Load Ratings		Reference Speed		Weight
							Bore d	O.D. D	Width B	Radius R <sub>s min</sub>	D2 <sub>max</sub>	f <sub>max</sub>	Dynamic C <sub>r</sub>	Static C <sub>0r</sub>	Grease RPM	Oil RPM	
Description	Z	ZZ	RS	2RS	2RZ	NR	mm	mm	mm	mm	mm	mm	kN	kN	RPM	RPM	kg
6019	•	•	•	•			95	145	24	1.5	–	–	60.50	51.00	5000	7300	1.180
6219	•	•	•	•			95	170	32	2.1	–	–	109.00	82.00	4700	6700	2.600
6219M							95	170	32	2.1	–	–	109.00	82.00	4700	6700	3.167
6319	•	•	•	•			95	200	45	3.0	–	–	152.70	118.00	4600	6600	5.750
6319M							95	200	45	3.0	–	–	152.70	118.00	4600	6600	7.106
6020	•	•	•	•		•	100	150	24	1.5	159.7	2.82	60.20	54.20	4800	6900	1.250
6020M							100	150	24	1.5	–	–	60.20	54.20	4800	6900	1.466
6220	•	•	•	•			100	180	34	2.1	–	–	122.00	92.70	4500	6500	3.200
6220M							100	180	34	2.1	–	–	122.00	92.70	4500	6500	3.915
6320	•	•	•	•			100	215	47	3.0	–	–	173.00	140.20	4400	6200	6.980
6320M							100	215	47	3.0	–	–	173.00	140.20	4400	6200	8.540
6021	•	•		•			105	160	26	2.0	–	–	69.20	61.20	4700	6700	1.600
6021M							105	160	26	2.0	–	–	69.20	61.20	4700	6700	1.908
6221		•				•	105	190	36	2.1	202.9	3.10	133.00	105.00	4400	6300	3.710
6321							105	225	49	3.0	–	–	183.70	153.10	4200	6000	8.110
6321M							105	225	49	3.0	–	–	183.70	153.10	4200	6000	9.983
6022	•	•		•		•	110	170	28	2.0	182.9	3.10	82.00	73.00	4600	6600	1.930
6222	•	•	•	•			110	200	38	2.1	–	–	144.00	117.00	4300	6100	4.440
6222M							110	200	38	2.1	–	–	144.00	117.00	4300	6100	5.333
6322		•	•				110	240	50	3.0	–	–	205.00	178.30	3900	5500	9.480
6322M							110	240	50	3.0	–	–	205.00	178.30	3900	5500	11.815
6024	•	•	•	•		•	120	180	28	2.0	192.9	3.10	88.10	79.30	4200	6100	2.030
6024M							120	180	28	2.0	–	–	88.10	79.30	4200	6100	2.500
6224		•	•	•			120	215	40	2.1	–	–	155.30	131.10	4000	5700	5.160
6224M							120	215	40	2.1	–	–	155.30	131.10	4000	5700	6.615
6324							120	260	55	3.0	–	–	227.60	207.40	3600	5100	12.400
6324M							120	260	55	3.0	–	–	227.60	207.40	3600	5100	12.960
6026		•		•		•	130	200	33	2.0	212.9	3.10	250.90	96.80	4100	5900	3.150
6026M							130	200	33	2.0	–	–	250.90	96.80	4100	5900	3.799
6226		•	•	•			130	230	40	3.0	–	–	165.00	148.00	3700	5200	5.850
6226M							130	230	40	3.0	–	–	165.00	148.00	3700	5200	7.540
6326							130	280	58	4.0	–	–	250.90	238.70	3300	4600	15.300
6326M							130	280	58	4.0	–	–	250.90	238.70	3300	4600	18.150
6028		•		•			140	210	33	2.0	–	–	274.00	101.80	3800	5600	3.500
6028M							140	210	33	2.0	–	–	274.00	101.80	3800	5600	4.275
6228			•				140	250	42	3.0	–	–	166.00	150.00	3400	4900	7.450
6228M							140	250	42	3.0	–	–	166.00	150.00	3400	4900	8.460
6328							140	300	62	4.0	–	–	253.00	254.00	3100	4300	18.500
6328M							140	300	62	4.0	–	–	253.00	254.00	3100	4300	22.980
6030		•		•			150	225	35	2.1	–	–	131.70	124.50	3600	5200	4.900
6030M							150	225	35	2.1	–	–	131.70	124.50	3600	5200	4.960
6230							150	270	45	3.0	–	–	176.00	168.00	3200	4500	9.400

Speed ratings are for open bearings. Use 50 to 60 percent of the published speed ratings for bearings with contact seals.

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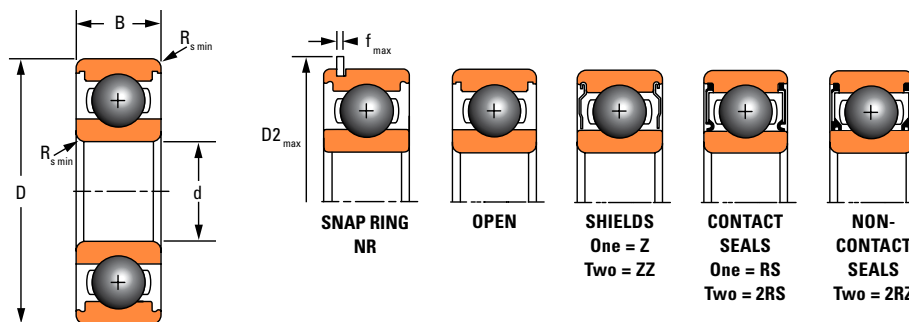


# DEEP GROOVE BALL BEARINGS

## STANDARD 6000 SERIES

### STANDARD 6000 SERIES

– continued

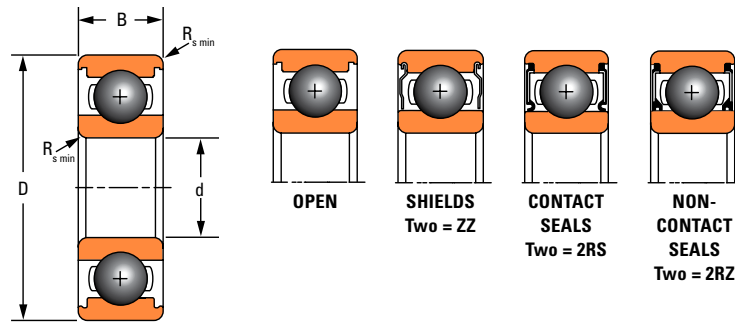


Continued from Table 10.

Bearing No.	Features							Boundary Dimensions					Load Ratings		Reference Speed		Weight
								Bore d	O.D. D	Width B	Radius $R_{s\ min}$	$D2_{\ max}$	$f_{\ max}$	Dynamic $C_r$	Static $C_{0r}$	Grease RPM	
Description	Z	ZZ	RS	2RS	2RZ	NR	mm	mm	mm	mm	mm	mm	kN	kN	RPM	RPM	kg
6230M							150	270	45	3.0	–	–	176.00	168.00	3200	4500	11.900
6330							150	320	65	4.0	–	–	274.00	270.00	2800	4000	22.000
6330M							150	320	65	4.0	–	–	274.00	270.00	2800	4000	28.200
6032	•			•			160	240	38	2.1	–	–	136.60	135.40	3500	5100	5.150
6032M							160	240	38	2.1	–	–	136.60	135.40	3500	5100	6.230
6232							160	290	48	3.0	–	–	185.00	186.00	2900	4200	11.700
6232M							160	290	48	3.0	–	–	185.00	186.00	2900	4200	15.300
6332							160	340	68	4.0	–	–	301.00	317.00	2600	3700	26.000
6332M							160	340	68	4.0	–	–	301.00	317.00	2600	3700	32.900
6034							170	260	42	2.1	–	–	168.00	172.00	3300	4800	6.700
6034M							170	260	42	2.1	–	–	168.00	172.00	3300	4800	8.320
6234							170	310	52	4.0	–	–	212.00	223.00	2700	3900	14.500
6234M							170	310	52	4.0	–	–	212.00	223.00	2700	3900	19.140
6334							170	360	72	4.0	–	–	335.50	378.10	2400	3400	30.700
6334M							170	360	72	4.0	–	–	335.50	378.10	2400	3400	38.800
6036							180	280	46	2.1	–	–	189.00	198.00	3100	4500	8.800
6036M							180	280	46	2.1	–	–	189.00	198.00	3100	4500	10.692
6236							180	320	52	4.0	–	–	227.00	241.00	2600	3700	15.100
6236M							180	320	52	4.0	–	–	227.00	241.00	2600	3700	21.386
6336							180	380	75	4.0	–	–	355.00	405.00	2300	3200	35.600
6336M							180	380	75	4.0	–	–	355.00	405.00	2300	3200	45.770
6038							190	290	46	2.1	–	–	172.00	200.00	3000	4300	9.100
6038M							190	290	46	2.1	–	–	172.00	200.00	3000	4300	11.010
6238							190	340	55	4.0	–	–	378.00	439.00	2400	3400	18.200
6238M							190	340	55	4.0	–	–	378.00	439.00	2400	3400	23.600
6338							190	400	78	5.0	–	–	255.00	281.00	2200	3000	41.000
6338M							190	400	78	5.0	–	–	255.00	281.00	2200	3000	51.370
6040							200	310	51	2.1	–	–	218.00	243.00	2800	4000	11.900
6040M							200	310	51	2.1	–	–	218.00	243.00	2800	4000	14.540
6240							200	360	58	4.0	–	–	269.00	310.00	2300	3200	21.600
6240M							200	360	58	4.0	–	–	269.00	310.00	2300	3200	28.050
6340							200	420	80	5.0	–	–	380.00	445.00	2100	2900	46.300
6340M							200	420	80	5.0	–	–	380.00	445.00	2100	2900	46.450
6044M							220	340	56	3.0	–	–	247.00	290.00	2600	3600	17.750
6244M							220	400	65	4.0	–	–	296.00	365.00	2100	2900	3.700
6344M							220	460	88	5.0	–	–	410.00	520.00	1900	2600	72.700
6048M							240	360	56	3.0	–	–	255.00	315.00	2300	3300	17.900
6052M							260	400	65	4.0	–	–	291.00	375.00	2100	3000	30.480
6252M							260	480	80	5.0	–	–	390.00	530.00	1700	2400	666.000
6056M							280	420	65	4.0	–	–	302.00	405.00	2000	2800	31.000
6064M							320	480	74	4.0	–	–	371.00	540.00	1700	2400	46.000
6072M							360	540	82	5.0	–	–	460.00	720.00	1500	2100	69.000
6080M							400	600	90	5.0	–	–	520.00	865.00	1300	1900	85.800

Speed ratings are for open bearings. Use 50 to 60 percent of the published speed ratings for bearings with contact seals.

**THIN-SECTION  
61000 SERIES**



**TABLE 11. THIN-SECTION 61000 SERIES**

Bearing No.	Features			Boundary Dimensions				Load Ratings		Limiting Speed		Weight
				Bore d	O.D. D	Width B	Radius R <sub>s min</sub>	Dynamic C <sub>r</sub>	Static C <sub>0r</sub>	Grease RPM	Oil RPM	
Description	ZZ	2RS	2RZ	mm	mm	mm	mm	kN	kN	RPM	RPM	kg
61800		•		10	19	5	0.3	1.70	0.84	34000	40000	0.005
61900	•	•		10	22	6	0.3	2.70	1.30	31000	37000	0.009
61701				12	18	4	0.2	0.93	0.53	13000	15000	0.003
61801	•	•		12	21	5	0.3	1.90	1.00	30000	36000	0.005
61901	•	•		12	24	6	0.3	2.90	1.50	28000	33000	0.010
61702				15	21	4	0.2	0.94	0.58	11000	13000	0.003
61802	•	•		15	24	5	0.3	2.10	1.30	26000	31000	0.006
61902	•	•		15	28	7	0.3	4.30	2.30	24000	29000	0.015
61703				17	23	4	0.2	1.00	0.66	9500	11000	0.004
61803	•	•		17	26	5	0.3	2.20	1.50	24000	29000	0.007
61903	•	•		17	30	7	0.3	4.60	2.60	22000	26000	0.016
61704				20	27	4	0.2	1.00	0.72	8500	10000	0.005
61804	•	•		20	32	7	0.3	4.00	2.50	21000	25000	0.016
61904	•	•		20	37	9	0.3	6.40	3.70	19000	22000	0.033
61705				25	32	4	0.2	1.10	0.84	7000	8000	0.006
61805	•	•		25	37	7	0.3	4.30	2.90	18000	21000	0.020
61905	•	•		25	42	9	0.3	7.00	4.60	16000	19000	0.039
61706				30	37	4	0.2	1.10	0.95	5500	7000	0.007
61806	•	•		30	42	7	0.3	4.50	3.40	15000	18000	0.023
61906	•	•		30	47	9	0.3	7.20	5.00	14000	17000	0.044
61707				35	44	5	0.3	1.90	1.60	4900	6000	0.014
61807	•	•		35	47	7	0.3	4.70	3.80	13000	16000	0.027
61907	•		•	35	55	10	0.6	10.90	7.80	12000	14000	0.069
61708				40	50	6	0.3	2.50	2.20	4300	5000	0.021
61808	•	•		40	52	7	0.3	4.90	4.20	12000	14000	0.029
61908	•	•		40	62	12	0.6	13.70	9.90	11000	13000	0.101
61709				45	55	6	0.3	2.60	2.40	3900	4600	0.023
61809	•	•		45	58	7	0.3	6.20	5.40	11000	13000	0.034
61909	•	•		45	68	12	0.6	14.10	10.90	10000	11000	0.123
61710				50	62	6	0.3	2.70	2.70	3500	4100	0.034
61810	•	•		50	65	7	0.3	6.20	5.80	9500	11000	0.047
61910	•	•		50	72	12	0.6	14.50	11.70	9000	11000	0.123
61811	•	•		55	72	9	0.3	8.80	8.10	8600	10000	0.075
61911		•		55	80	13	1.0	16.60	14.10	8100	9600	0.168
61812	•	•		60	78	10	0.3	11.50	10.60	7900	9400	0.094
61912	•	•		60	85	13	1.0	20.20	17.30	7500	8900	0.180
61813	•	•		65	85	10	0.6	11.90	11.50	7300	8600	0.118
61913				65	90	13	1.0	17.30	16.00	7000	8300	0.198
61826		•		130	165	18	1.1	37.90	42.90	3400	5000	0.780
61830				150	190	20	1.1	49.10	57.10	3000	3700	1.170

Speed ratings are for open bearings. Use 50 to 60 percent of the published speed ratings for bearings with contact seals.

# DEEP GROOVE BALL BEARINGS

## NARROW 16000 SERIES

### NARROW 16000 SERIES

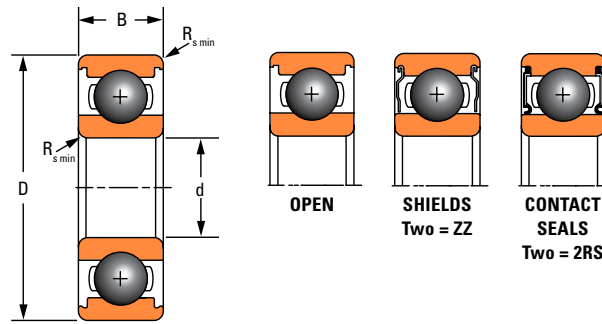
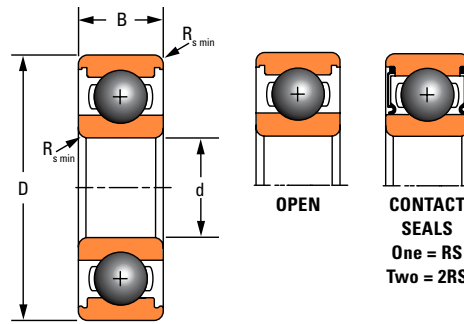


TABLE 12. NARROW 16000 SERIES

Bearing No.	Features		Boundary Dimensions				Load Ratings		Limiting Speed		Weight
			Bore d	O.D. D	Width B	Radius $R_{s\ min}$	Dynamic $C_r$	Static $C_{0r}$	Grease RPM	Oil RPM	
Description	ZZ	2RS	mm	mm	mm	mm	kN	kN	RPM	RPM	kg
16100	•		10	28	8	0.3	4.60	2.00	25000	37000	0.022
16101	•	•	12	30	8	0.3	5.10	2.40	22000	33000	0.024
16002	•		15	32	8	0.3	5.60	2.80	19000	2600	0.027
16003	•		17	35	8	0.3	6.00	3.30	17000	24000	0.030
16004			20	42	8	0.3	6.30	3.80	13000	20000	0.050
16005	•		25	47	8	0.3	7.00	4.60	11000	16000	0.060
16006			30	55	9	0.3	9.20	6.30	10000	14000	0.080
16007			35	62	9	0.3	12.20	8.80	8400	12000	0.100
16008			40	68	9	0.3	12.60	9.70	7400	11000	0.130
16009			45	75	10	0.6	15.60	12.20	6900	10000	0.170
16010			50	80	10	0.6	16.10	13.10	6300	9100	0.180
16011			55	90	11	0.6	19.40	16.30	5800	8500	0.260
16012			60	95	11	0.6	19.90	17.50	5400	7800	0.220
16013			65	100	11	0.6	20.50	18.70	5000	7300	0.290
16014			70	110	13	0.6	26.80	23.60	5000	7100	0.430
16015			75	115	13	0.6	27.60	25.30	4600	6700	0.450
16016			80	125	14	0.6	31.90	29.60	4400	6200	0.590
16017			85	130	14	0.6	32.60	31.60	4200	6100	0.570
16018			90	140	16	1.0	39.90	37.00	4200	6100	0.670
16019			95	145	16	1.0	42.70	41.90	3900	5700	0.710
16020			100	150	16	1.0	43.80	44.30	3800	5400	0.740
16021			105	160	18	1.0	51.80	50.60	3800	5400	1.000
16022			110	170	19	1.0	57.40	56.70	3600	5300	1.300
16024			120	180	19	1.0	58.80	60.40	3300	4800	1.400
16026			130	200	22	1.1	79.70	79.20	3200	4700	1.900
16028			140	210	22	1.1	82.10	85.00	3000	4400	2.000
16030			150	225	24	1.1	91.90	98.50	2900	4200	2.600
16032			160	240	25	1.5	99.00	108.00	2800	4000	4.200

Speed ratings are for open bearings. Use 50 to 60 percent of the published speed ratings for bearings with contact seals.

**WIDE  
62000-63000  
SERIES**



**TABLE 13. WIDE 62000-63000 SERIES**

Bearing No.	Features		Boundary Dimensions				Load Ratings		Limiting Speed		Weight
			Bore d	O.D. D	Width B	Radius $R_{s\ min}$	Dynamic $C_r$	Static $C_{0r}$	Grease	Oil	
Description	RS	2RS	mm	mm	mm	mm	kN	kN	RPM	RPM	kg
62200		•	10	30	14	0.6	6.00	2.40	29000	42000	0.040
62300		•	10	35	17	0.6	8.10	3.40	26000	38000	0.070
63000		•	10	26	12	0.3	4.60	2.00	33000	49000	0.030
62201		•	12	32	14	0.6	6.90	3.10	26000	37000	0.050
62301		•	12	37	17	1.0	9.80	4.20	23000	34000	0.080
63001		•	12	28	12	0.3	5.10	2.40	29000	43000	0.030
62202		•	15	35	14	0.6	7.80	3.80	22000	32000	0.050
62302		•	15	42	17	1.0	11.40	5.40	19000	28000	0.100
63002		•	15	32	13	0.3	5.60	2.80	25000	37000	0.040
62203		•	17	40	16	0.6	9.60	4.80	20000	30000	0.080
62303		•	17	47	19	1.0	13.50	6.60	18000	26000	0.140
63003		•	17	35	14	0.3	6.00	3.30	23000	34000	0.050
62204		•	20	47	18	1.0	12.70	6.60	18000	26000	0.120
62304		•	20	52	21	1.1	15.90	7.80	17000	24000	0.140
63004		•	20	42	16	0.6	9.40	5.00	20000	30000	0.090
62205		•	25	52	18	1.0	14.00	7.80	15000	22000	0.150
62305		•	25	62	24	1.1	22.50	11.60	14000	21000	0.300
63005		•	25	47	16	0.6	10.10	5.80	17000	25000	0.100
62206		•	30	62	20	1.0	19.50	11.20	13000	19000	0.230
62306		•	30	72	27	1.1	28.10	16.00	13000	18000	0.470
63006		•	30	55	19	1.0	13.20	8.30	15000	23000	0.150
62207		•	35	72	23	1.1	25.50	15.30	12000	17000	0.370
62307		•	35	80	31	1.5	33.20	19.00	12000	17000	0.620
63007	•	•	35	62	20	1.0	16.00	10.30	14000	20000	0.200
62208		•	40	80	23	1.1	30.70	19.00	10000	15000	0.440
62308		•	40	90	33	1.5	41.00	24.00	11000	15000	0.850
63008		•	40	68	21	1.0	16.80	11.60	12000	18000	0.240
62209		•	45	85	23	1.1	33.20	21.60	9200	13000	0.460
62309		•	45	100	36	1.5	52.70	31.50	9700	14000	1.100
62210		•	50	90	23	1.1	35.10	23.20	8500	12000	0.470
62310		•	50	110	40	2.0	61.80	38.00	9200	13000	1.500
62211		•	55	100	25	1.5	43.60	29.00	7800	11000	0.680
62311		•	55	120	43	2.0	71.50	45.00	8600	12000	2.000
62212		•	60	110	28	1.5	52.70	36.00	7500	11000	1.000
62312		•	60	130	46	2.1	81.80	51.90	8100	12000	2.500
62213		•	65	120	31	1.5	55.90	40.50	7200	10000	1.300
62214		•	70	125	31	1.5	60.50	45.50	6700	9700	1.400

Speed ratings are for open bearings. Use 50 to 60 percent of the published speed ratings for bearings with contact seals.

# DEEP GROOVE BALL BEARINGS

## MINIATURE AND EXTRA-SMALL 600 SERIES

### MINIATURE AND EXTRA-SMALL 600 SERIES

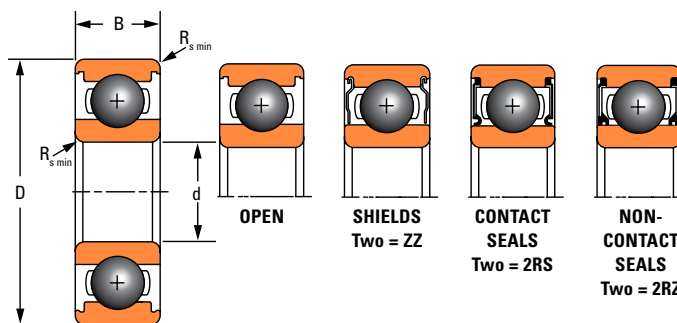


TABLE 14. MINIATURE AND EXTRA-SMALL 600 SERIES

Bearing No.	Features			Boundary Dimensions				Load Ratings		Limiting Speed		Weight
				Bore d	O.D. D	Width B	Radius $R_{s\ min}$	Dynamic $C_r$	Static $C_{0r}$	Grease RPM	Oil RPM	
Description	ZZ	2RS	2RZ	mm	mm	mm	mm	kN	kN	RPM	RPM	kg
618/3				3	7	2	0.10	0.31	0.11	74000	88000	0.0003
619/3				3	8	3	0.15	0.56	0.18	70000	82000	0.0006
603				3	9	3	0.15	0.57	0.19	66000	78000	0.0009
623	•	•		3	10	4	0.15	0.63	0.22	66000	78000	0.0016
633				3	13	5	0.20	1.30	0.49	51000	60000	0.0030
618/4				4	9	2.5	0.10	0.64	0.23	63000	75000	0.0006
619/4				4	11	4	0.15	1.00	0.35	57000	67000	0.0017
604	•			4	12	4	0.20	1.00	0.35	57000	67000	0.0020
624	•	•		4	13	5	0.20	1.30	0.49	51000	60000	0.0027
634	•	•		4	16	5	0.30	1.30	0.52	46000	54000	0.0050
618/5				5	11	3	0.15	0.72	0.28	54000	64000	0.0012
619/5				5	13	4	0.20	1.10	0.43	50000	59000	0.0021
605	•	•		5	14	5	0.20	1.30	0.51	48000	56000	0.0030
625	•	•		5	16	5	0.30	1.70	0.67	44000	52000	0.0040
635	•	•		5	19	6	0.30	2.30	0.89	38000	45000	0.0080
618/6				6	13	3.5	0.15	1.10	0.44	48000	56000	0.0019
619/6	•			6	15	5	0.20	1.30	0.52	46000	54000	0.0040
606	•	•		6	17	6	0.30	2.30	0.84	42000	49000	0.0050
626	•	•	•	6	19	6	0.30	2.30	0.89	38000	45000	0.0070
636				6	22	7	0.30	3.30	1.40	33000	39000	0.0120
618/7				7	14	3.5	0.15	1.20	0.51	44000	52000	0.0020
619/7				7	17	5	0.30	1.60	0.72	40000	47000	0.0050
607	•	•	•	7	19	6	0.30	2.30	0.89	38000	45000	0.0070
627	•	•	•	7	22	7	0.30	3.30	1.40	33000	39000	0.0120
637	•			7	26	9	0.30	4.60	2.00	28000	33000	0.0220
618/8				8	16	4	0.20	1.30	0.59	40000	47000	0.0032
619/8	•	•		8	19	6	0.30	2.20	0.91	37000	44000	0.0060
608	•	•	•	8	22	7	0.30	3.30	1.40	33000	39000	0.0110
628	•	•		8	24	8	0.30	3.30	1.40	31000	37000	0.0170
638	•			8	28	9	0.30	4.60	2.00	28000	33000	0.0270
618/9				9	17	4	0.20	1.30	0.66	37000	44000	0.0034
619/9	•			9	20	6	0.30	2.50	1.10	35000	42000	0.0070
609	•	•	•	9	24	7	0.30	3.40	1.40	30000	36000	0.0130
629	•	•	•	9	26	8	0.30	4.60	2.00	28000	33000	0.0180
639	•			9	30	10	0.60	5.10	2.40	25000	30000	0.0330

Speed ratings are for open bearings. Use 50 to 60 percent of the published speed ratings for bearings with contact seals.