

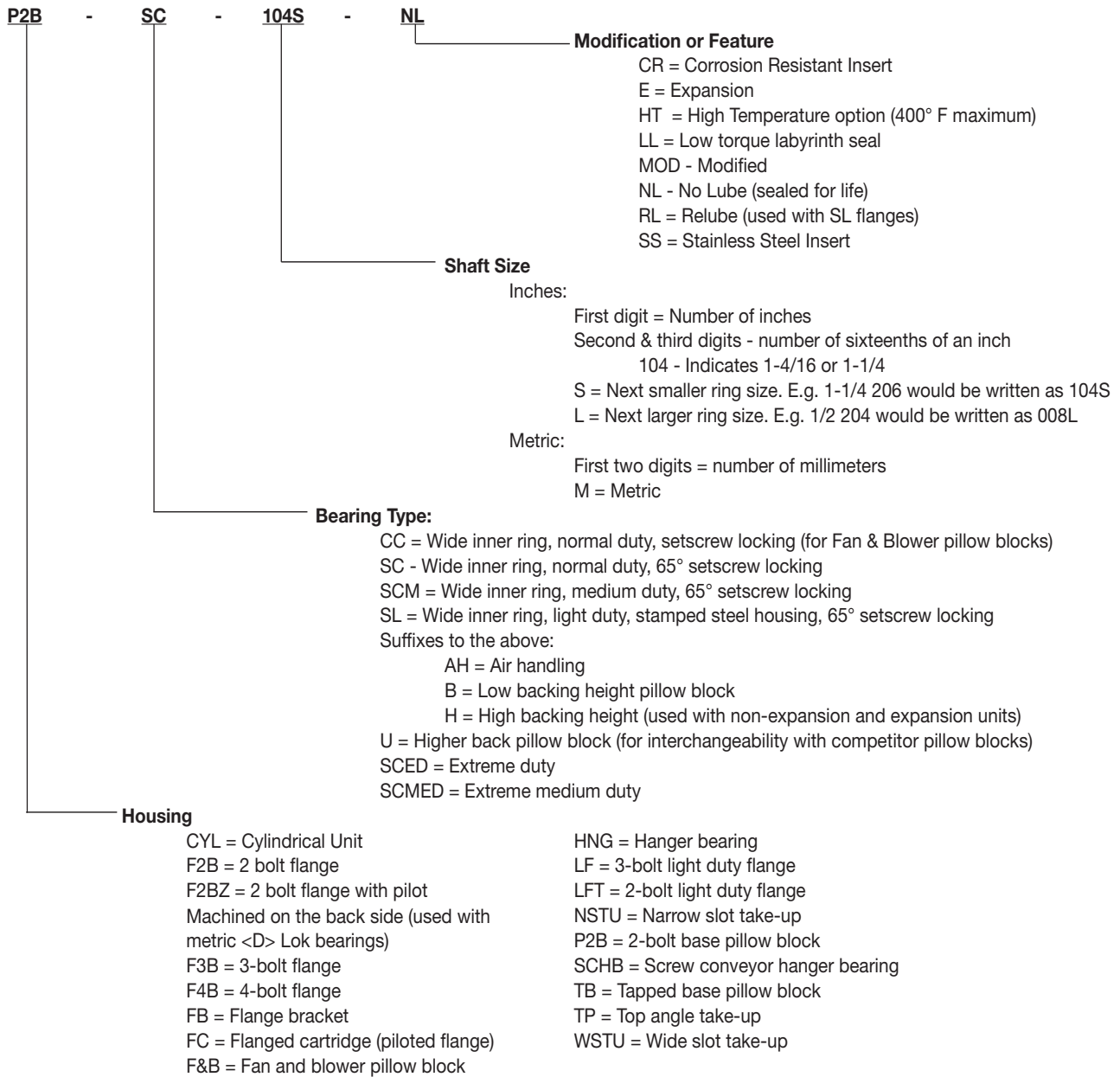


HOW TO ORDER/NOMENCLATURE

Setscrew Ball Bearings HOW TO ORDER

There are two ways to specify DODGE Bearings. Most of the product offering have part numbers with listings shown throughout this catalog. Use of part numbers ensures accurate ordering processing.

When part numbers are not shown, the product may be specified by description or part name. This method is used when ordering units that include modifications or options. To order by description, use the nomenclature key shown below and add any special instructions to the end of the description for options not covered by the nomenclature.



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SELECTION

Setscrew Ball Bearings

Recommended Torque													
◆ Setscrews					D-LOK			Mounting Bolts					
Setscrew Size	Key Hex Across Flats	Recommended Torque			Cap Screw Size	Recom. Torque	EZ-KLEEN Recom. Torque	Metal Housings		EZ-KLEEN Housed Bearings			
		Standard Ball Bearing Insert		Corrosion Resistant Stainless Steel				Bolt Size	Recom. Dry Torque (Grade 2)	2-Bolt PB, 2 & 4 Bolt Fig. and Fig. Brackets		Tapped Base PB	
		Min	Max							Bolt Size	Torque ①	Bolt Size	Torque ②
(in.)	(in.)	(in.-lbs.)	(in.-lbs.)	(in.-lbs.)	(in.)	(in.Olbs.)	(in.-lbs.)	(in.)	(in.Olbs.)	(in.)	(in.-lbs.)	(in.)	(in.-lbs.)
#10	3/32	28	33	25	#8-32	58	46	3/8-16	240	3/8-16	225	3/8-16	175
1/4	1/8	66	80	60	#10-32	90	72	7/16-14	384	7/16-14	350	7/16-14	350
5/16	5/32	126	156	117	1/4-28	180	144	1/2-13	600	1/2-13	500	1/2-13	400
3/8	3/16	228	275	206	5/16-24	400	320	5/8-11	1200	9/16-12	650		
7/16	7/32	342	428	321	3/8-24	750	600	3/4-10	1950	5/8-11	1000		
								7/8-9	2890				
(mm)	(mm)	(N-m)	(N-m)	(N-m)	(mm)	(N-m)	(N-m)	(mm)	(N-m)	(mm)	(N-m)		
M5	2.5	3.2	3.7	2.8	M4	585	4.68	M10	29	M8	15	① Torque for Austenitic (18-8) Stainless	
M6	3	6.2	7.7	5.8	M5	10.75	8.6	M12	50	M10	25		
M8	4	14.2	17.8	13.4	M6	20.5	16.4	M16	124	M12	50	② Max. torque values published. Do not exceed	
M10	5	26	31	23	M8	45	36	M20	238	M14	75		
M12	6	46	57	43				M22	322	M18	125		

Lubrication

High Speed Operation - In the higher speed ranges, too much grease will cause over-heating. The amount of grease that the bearing will take for a particular high speed application can only be determined by experience. If excess grease in the bearing causes overheating, it will be necessary to remove grease fitting to permit excess grease to escape. The bearing has been greased at the factory and is ready to run. When establishing a relubrication schedule, note that a small amount of grease at frequent intervals is preferable to a large amount at infrequent intervals.

◆ **Note:** Dodge does not recommend the use of oils or locking agents on setscrew threads. However, if utilized, the minimum installation torque values should be followed.

Lubrication Guide								
Use a No. 2 Lithium complex base grease or equivalent*								
Hours Run per Day	Suggested Lubrication Period in Weeks							
	1 to 250 RPM	251 to 500 RPM	501 to 750 RPM	751 to 1000 RPM	1001 to 1500 RPM	1501 to 2000 RPM	2001 to 2500 RPM	2501 to 3000 RPM
8	12	12	10	7	5	4	3	2
16	12	7	5	4	2	2	1	1
24	10	5	3	2	1	1	1	1

* For EZ-KLEEN series bearings, use an aluminum complex base grease.

Lubrication recommendations are intended for standard products applied in general operating conditions. For modified products, high temperature applications, and other anomalous applications contact product engineering at 864-284-5700.

Note: Bearing analysis program "BEST" is available on www.ptwizard.com

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Bearing Reference Guide

ULTRA KLEEN

E-Z KLEEN

Extreme Duty

Setscrew Ball Bearing

GRIP TIGHT

D-LOK Ball Bearing



SELECTION

Setscrew Ball Bearings

DODGE mounted ball bearings are primarily designed for radial loading. However, they have the capacity to carry thrust loads and combined radial/thrust loads. The maximum recommended load which can be applied is limited by various components in the system, such as bearing, housing, shaft attachments, speed and life requirements. DODGE mounted ball bearings have been applied successfully when these limits have been exceeded under controlled operating conditions. Contact DODGE Engineering for applications which exceed these recommendations.

Select a bearing from the Selection Chart that has a radial load rating at the operating speed equal to or greater than the calculated Equivalent Radial load for a desired L₁₀ life. This simple method is all that is required for the majority of general applications and provides for occasional average shock loads.

L₁₀ Hours Life-is the life which may be expected for at least 90% of a given group of bearings operating under identical conditions.

For an L₁₀ hours life other than those listed in the Selection Chart, multiply the equivalent Radial load by one of the following factors. For 50,000 L₁₀ hours life, use a factor of 1.18 and for 80,000, use 1.39. Then select a bearing from the bold face (30,000) L₁₀ ratings only in the Selection Chart that has a rating equal to or greater than this value.

Heavy Service-For heavy shock loads, frequent shock loads or severe vibrations, add up to 50% (according to severity of conditions) to the Equivalent Radial Load to obtain a Modified Equivalent Radial Load. Consult Application Engineering for additional selection assistance.

A thrust load value of C/10 is recommended as a guide for general applications and will give adequate L₁₀ life. Where substantial radial load pulls the housing away from the mounting base, both the hold-down bolts and housing must be of adequate strength. Auxiliary load carrying devices, such as shear bars, are advisable for side or end-loading of pillow blocks and radial loads for flange units.

To determine the L₁₀ hours life for loads and RPM's not listed use the following equation:

$$L_{10} = \left(\frac{C}{P} \right)^3 \times \frac{16,667}{N}$$

Where:

L₁₀ = Life, hours

C = Dynamic Capacity, lbs. or N

P = Equivalent Radial Load, lbs. or N

N = Revolutions per minute

When the load on a ball bearing is solely a radial load with no thrust (axial) load, the Equivalent Radial Load (P) is equal to the actual radial load. However, when a thrust (axial) load is applied, the radial and thrust loads applied must be converted into an Equivalent Radial Load. The use of the X (radial factor) and Y (thrust factor) from Table 1 convert the actual applied thrust and radial loads to an Equivalent Radial Load

which has the same effect on the life of a bearing as a radial load of this magnitude.

$$P = (X \times F_R) + (Y \times F_A)$$

Where:

P = Equivalent Radial Load, lbs.

F_R = Radial load, lbs.

F_A = Thrust load, lbs.

e = Thrust load to radial load factor (Table 1)

X = Radial load factor (Table 1)

Y = Thrust factor (Table 1)

C₀ = Basic static capacity

To find X and Y, first calculate F_A/C₀ to determine e. Calculate F_A/F_R and compare to e to determine the X and Y factors to use from Table 1.

Substitute all known values into the Equivalent Radial Load equation. The Equivalent Radial loads (P) thus determined can be used in the L₁₀ life formula or compared to the allowable Equivalent Radial Load rating desired in the expanded rating chart to select a bearing (Table 2).

If calculated value of P is less than F_R, use P=F_R.

F _A / C ₀	e	Radial/Thrust Factors			
		If F _A /F _R is equal to or less than e		If F _A /F _R is greater than e	
		F _A /F _R <= e		F _A /F _R > e	
		X	Y	X	Y
0.014	0.19	1	0	0.56	2.30
0.021	0.21	1	0	0.56	2.15
0.028	0.22	1	0	0.56	1.99
0.042	0.24	1	0	0.56	1.85
0.056	0.26	1	0	0.56	1.71
0.070	0.27	1	0	0.56	1.63
0.084	0.28	1	0	0.56	1.55
0.110	0.30	1	0	0.56	1.45
0.170	0.34	1	0	0.56	1.31
0.280	0.38	1	0	0.56	1.15
0.420	0.42	1	0	0.56	1.04
0.560	0.44	1	0	0.56	1.00

Lubrication-DODGE Ball Bearings are lubricated at the factory and are ready to run. The bearings are initially lubricated with lithium complex based grease and should be relubricated with the same or some equivalent. For high speeds, high loads, extreme temperatures and other abnormal operating conditions, special greases may be required. Contact DODGE Application Engineering for recommendations on these types of applications.

Misalignment-DODGE Ball Bearings are designed to allow a maximum of ±2° static misalignment. These bearings are not suitable for dynamic misalignment. To ensure good alignment, mounting surfaces must be checked for flatness and must lie in the same plane. When tightening base bolts, each bolt should be alternately tightened in incremental torque values until full torque is achieved to prevent the angular shifting of the pillow block that occurs when one bolt is tightened to its full torque. Shimming may be required to minimize misalignment.

Shaft Tolerances		
Normal Shaft Size Inches	Commercial Shaft Tolerances Inches	Recommended Shaft Tolerances Setscrew Ball Bearings Inches
Up to 1-1/2"	+0.000 -0.002	+0.0000 -0.0005
Over 1-1/2" to 2-1/2"	+0.000 -0.003	+0.0000 -0.0010
Over 2-1/2" to 4"	+0.000 -0.004	+0.0000 -0.0010

Note: Bearing analysis program "BEST" is available on www.ptwizard.com

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SELECTION

Setscrew Ball Bearing Inch
Table 2 (continued): Easy Selection Table for Ball Bearing Mounted Units

Ring Size	Shaft Size		Dynamic Capacity C, Lbs.	Static Capacity Co, Lbs.	L ₁₀ life hours	Allowable Equivalent Radial Load Rating (Lbs.) At Various RPM*									
	SC, VSC, SL, CC	SCM				2500	3000	3500	4000	4500	5000	5500	6500	7500	
203	1/2 5/8		2158	1079	20000	150	140	135	130	125	120	115	110	105	
					30000	130	125	115	110	105	100	95	90		
					40000	120	110	105	100	95	90	85	80		
					60000	105	95	90	85	80	75	70	65		
					100000	85	80	80	75	70	65	60	55		
204	1/2 5/8 3/4 13/16		2899	1482	20000	200	190	180	170	165	160	155	150	145	
					30000	175	165	155	150	145	140	135	130		
					40000	160	150	145	135	130	125	120	115		
					60000	140	130	125	120	115	110	105	100		
					100000	115	110	105	100	90	95	90	85		
205	7/8 15/16 1		3146	1769	20000	220	205	195	185	180	175	170	160	150	
					30000	190	180	170	165	155	150	145	140		
					40000	175	165	155	150	140	135	135	125		
					60000	150	140	135	130	125	120	115	110		
					100000	125	120	115	110	105	100	95	90		
206	1-1/16 1-1/8 1-3/16 1-1/4	1	4368	2538	20000	305	285	270	260	250	240	235	200		
					30000	265	250	235	225	220	210	205	195		
					40000	240	225	215	205	200	190	185	175		
					60000	210	200	190	180	175	165	160	155		
					100000	175	165	160	150	145	140	135	130		
207	1-1/4 1-5/16 1-3/8 1-7/16	1-3/16 1-1/4	5759	3461	20000	400	375	355	340	330	315	305			
					30000	350	330	310	300	285	275	270			
					40000	315	300	285	270	260	250	245			
					60000	275	260	250	235	230	220	125			
					100000	235	220	210	200	190	185	180			
208	1-1/2 1-5/8	1-7/16 1-1/2**	7332	4475	20000	510	480	455	435	420	405				
					30000	445	420	400	380	365	355				
					40000	405	380	360	345	330	320				
					60000	355	330	315	300	290	280				
					100000	300	280	265	255	245	235				
209	1-5/8 1-11/16 1-3/4	1-1/2	7891	4906	20000	550	515	490	470	450	435				
					30000	480	450	430	410	395	380				
					40000	435	410	390	370	360	345				
					60000	380	360	340	325	310	300				
					100000	320	300	285	275	265	255				
210	1-15/16 2	1-11/16 1-3/4	7891	5213	20000	550	515	490	470	450					
					30000	480	450	430	410	395					
					40000	435	410	390	370	360	345				
					60000	380	360	340	325	310	300				
					100000	320	300	285	275	265	255				
211	2 2-3/16 2-1/4	1-15/16 2	9755	6588	20000	676	636	604	578						
					30000	591	556	528	505						
					40000	537	505	480	459						
					60000	469	441	419	401						
					100000	395	372	353	338						
212	2-1/4 2-7/16	2-3/16 2-1/4	11791	8100	20000	820	770	730							
					30000	715	675	640							
					40000	650	610	580							
					60000	570	535	510							
					100000	480	450	430							
214	2 11/16	2-7/16 2-1/2	13995	9838	20000	970	915								
					30000	850	800								
					40000	770	725								
					60000	675	635								
					100000	570	535								
215	2-15/16	2-11/16	14872	11108	20000	1035	975								
					30000	905	850								
					40000	820	770								
					60000	715	675								
					100000	605	570								
216		2-15/16 3	17407	13102	20000	1210									
					30000	1055									
					40000	960									
					60000	840									
					100000	705									
218		3-7/16 3-1/2	21451	16641	20000										
					30000										
					40000										
					60000										
					100000										

* Slight interference fit required when operating on the right of the heavy line or in the shaded area ** Piloted flange only

Note: Bearing analysis program "BEST" is available on www.ptwizard.com

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Setscrew Ball Bearing Inch

Table 2 (continued): Easy Selection Table for Ball Bearing Mounted Units

Ring Size	Shaft Size		Dynamic Capacity C, N.	Static Capacity Co, N.	L ₁₀ Life Hours	Allowable equivalent radial load rating (n.) At various RPM*									
	SC, VSC, SL, C	SCM				2500	3000	3500	4000	4500	5000	5500	6500	7500	
203	17mm		9600	4800	20000	667	623	600	578	556	534	512	489	467	
					30000	578	556	512	489	467	467	445	423	400	
					40000	534	489	467	445	423	423	400	378	356	
					60000	467	423	423	400	378	356	358	334	311	
					100000	378	356	356	334	311	311	289	289	267	
204	20mm		12895	6592	20000	890	845	801	756	734	712	689	645	623	
					30000	778	724	689	667	645	623	600	578	534	
					40000	712	667	645	600	578	556	556	512	489	
					60000	623	578	556	534	512	489	467	445	423	
					100000	512	489	467	445	400	423	400	378	356	
205	25mm		13995	7869	20000	979	912	867	823	801	778	756	712	667	
					30000	845	801	756	734	689	667	645	623	578	
					40000	778	734	689	667	623	600	600	556	534	
					60000	667	623	600	578	556	534	512	489	467	
					100000	556	534	512	489	467	445	445	423	400	
206	30mm	25mm	18993	11,290	20000	1357	1268	1201	1156	1112	1068	1045	979		
					30000	1179	1112	1045	1001	979	934	912	867		
					40000	1068	1001	958	912	890	845	823	778		
					60000	934	890	845	801	778	734	712	689		
					100000	778	734	712	667	645	623	600	578		
207	35mm	30mm	25628	15,395	20000	1779	1668	1579	1512	1468	1401	1357			
					30000	1557	1468	1379	1134	1268	1223	1201			
					40000	1401	1334	1268	1201	1156	1112	1090			
					60000	1223	1156	1112	1045	1023	979	956			
					100000	1045	979	934	890	845	823	801			
208	40mm	35mm	32627	19,906	20000	2268	2135	2024	1935	1868	1801				
					30000	1979	1868	1779	1690	1624	1579				
					40000	1801	1690	1601	1535	1468	1423				
					60000	1576	1468	1401	1334	1290	1245				
					100000	1334	1245	1179	1134	1090	1045				
209	45mm	40mm	35115	21,823	20000	2446	2291	2180	2091	2002	1935				
					30000	2135	2002	1913	1824	1757	1690				
					40000	1935	1824	1735	1646	1601	1535				
					60000	1690	1601	1512	1446	1379	1334				
					100000	1423	1334	1268	1223	1179	1134				
210	50mm	45mm	35115	23,189	20000	2446	2291	2180	2091	2002					
					30000	2135	2002	1913	1824	1757					
					40000	1935	1824	1735	1646	1601					
					60000	1690	1601	1512	1446	1379					
					100000	1423	1334	1268	1223	1179					
211	55mm	50mm	43394	29,305	20000	3007	2830	2688	2571						
					30000	2627	2472	2348	2246						
					40000	2387	2246	2134	2041						
					60000	2085	1962	1864	1783						
					100000	1759	1655	1572	1504						
212	60mm	55mm	52470	36,031	20000	3647	3425	3247							
					30000	3180	3002	2847							
					40000	2891	2713	2580							
					60000	2535	2380	2268							
					100000	2135	2002	1913							
214	70mm	65mm	62278	43,762	20000	4315	4070								
					30000	3781	3558								
					40000	3425	3225								
					60000	3002	2824								
					100000	2535	2380								
215	75mm	70mm	66180	49,411	20000	4604	4337								
					30000	4025	3781								
					40000	3647	3425								
					60000	3180	3002								
					100000	2691	2535								
216	75mm		77426	58,281	20000	5382									
					30000	4693									
					40000	4270									
					60000	3736									
					100000	3136									
218		85mm	95371	74,023	20000										
					30000										
					40000										
					60000										

* Slight interference fit required when operating on the right of the heavy line or in the shaded area

Note: Bearing analysis program "BEST" is available on www.ptwizard.com

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