



# SELECTION

## D-LOK 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.0lbs.)	(in.-lbs.)	(in.)	(in.0lbs.)	(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  ② Max. torque values published. Do not exceed	
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		
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.

### 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](http://www.ptwizard.com)

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## D-LOK 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  $L_{10}$  life. This simple method is all that is required for the majority of general applications and provides for occasional average shock loads.

$L_{10}$  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  $L_{10}$  hours life other than those listed in the Selection Chart, multiply the equivalent Radial load by one of the following factors. For 50,000  $L_{10}$  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)  $L_{10}$  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  $L_{10}$  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  $L_{10}$  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:

$L_{10}$  = 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)

$C_0$  = Basic static capacity

To find X and Y, first calculate  $F_A/C_0$  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  $L_{10}$  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  $P=F_R$ .

**Table 1**

$F_A / C_0$	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	
		$F_A/F_R \leq e$		$F_A/F_R > e$	
		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 a lithium complex 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  $\pm 2^\circ$  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.

Normal Shaft Size Inches	Shaft Tolerances		Recommended Shaft Tolerances	
	Commercial Shaft Tolerances Inches		D-LOK Lock 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](http://www.ptwizard.com)

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## D-LOK Ball Bearings - Inch

Table 2: Easy Selection Table for DL and DLM Bearing Mounted Units (Pounds)

Ring Size	Shaft Size		Dynamic Capacity C (Lbs.)	Static Capacity Co (Lbs.)	L <sub>10</sub> Life Hours	Allowable Equivalent Radial Load Ratings (Lbs.) at Various RPM*															
	DL	DLM				50	150	250	500	750	1000	1500	1750	2000	2500	3000	3500	4500	5000	5500	7500
204	3/4		2899	1482	20000	740	515	435	345	300	275	240	225	215	200	190	180	165	160	155	140
					30000	645	450	380	300	260	240	210	200	190	175	165	155	145	140	135	120
					40000	590	410	345	275	240	215	190	180	170	160	150	145	130	125	125	110
					60000	515	355	300	240	210	190	165	155	150	140	130	125	115	110	105	95
					100000	435	300	255	200	175	160	140	130	125	115	110	105	190	95	90	80
205	7/8 15/16 1		3146	1769	20000	805	450	470	375	3225	295	260	245	235	220	205	195	180	175	170	150
					30000	705	485	410	325	285	260	225	215	205	190	180	170	155	150	145	130
					40000	640	445	375	295	260	235	205	195	185	175	165	155	140	135	135	120
					60000	560	385	325	260	225	205	180	170	165	150	140	135	125	120	115	105
					100000	470	325	275	220	190	175	150	145	135	125	120	115	105	100	100	90
206	1-1/8 1-3/16 1-1/4	1	4368	2538	20000	1115	775	655	520	455	410	360	340	325	305	285	270	250	240	235	
					30000	975	675	570	455	395	360	315	300	285	265	250	235	220	210	205	
					40000	885	615	520	410	360	325	285	270	260	240	225	215	200	190	185	
					60000	775	535	455	360	315	285	250	235	225	210	200	190	175	165	160	
					100000	655	455	380	305	265	240	210	200	190	175	165	160	145	140	135	
207	1-1/4 1-3/8 1-7/16	1-3/16 1-1/4	5759	3461	20000	1475	1020	860	685	595	545	475	450	430	400	375	355	330	315	305	
					30000	1285	890	755	595	520	475	415	395	375	350	330	310	285	275	270	
					40000	1170	810	685	545	475	430	375	355	340	315	300	285	260	250	245	
					60000	1020	710	595	475	415	375	330	310	300	275	260	250	230	220	125	
					100000	860	595	505	400	350	315	275	265	250	235	220	210	190	185	180	
208	1-1/2	1-7/16 1-1/2**	7332	4475	20000	1875	1300	1095	870	760	690	605	575	550	510	480	455	420	405		
					30000	1640	1135	960	760	665	605	525	500	480	445	420	400	365	355		
					40000	1490	1030	870	690	605	550	480	455	435	405	380	360	330	320		
					60000	1300	900	760	605	525	480	420	400	380	355	330	315	290	280		
					100000	1095	760	640	510	445	405	355	335	320	300	280	265	245	235		
209	1-5/8 1-11/16 1-3/4	1-1/2	7891	4906	20000	2020	1400	1180	935	820	745	650	615	590	550	515	490	450	435		
					30000	1765	1225	1030	820	715	650	570	540	515	480	450	430	395	380		
					40000	1600	1110	935	745	650	590	515	490	470	435	410	390	360	345		
					60000	1400	970	820	650	570	515	450	430	410	380	360	340	310	300		
					100000	1180	820	690	550	480	435	380	360	345	320	300	285	265	255		
210	1-15/16 2	1-11/16 1-3/4	7891	5213	20000	2020	1400	1180	935	820	745	650	615	590	550	515	490	450	435		
					30000	1765	1225	1030	820	715	650	570	540	515	480	450	430	395			
					40000	1600	1110	935	745	650	590	515	490	470	435	410	390	360			
					60000	1400	970	820	650	570	515	450	430	410	380	360	340	310			
					100000	1180	820	690	550	480	435	380	360	345	320	300	285	265			
211	2 2-3/16	1-15/16 2	9755	6588	20000	2491	1727	1457	1156	1010	918	802	761	729	676	636	604				
					30000	2176	1509	1272	1010	882	802	700	665	636	591	556	528				
					40000	1977	1371	1156	918	802	728	636	604	578	537	505	480				
					60000	1727	1197	1010	802	700	636	556	528	505	469	441	419				
					100000	1457	1010	852	676	591	537	469	445	426	395	372	353				
212	2-1/4 2-7/16	2-3/16 2-1/4	11791	8100	20000	3015	2090	1765	1400	1225	1110	970	925	880	820	770	730				
					30000	2635	1825	1540	1225	1070	970	880	805	770	715	675	640				
					40000	2395	1660	1400	1110	970	880	770	730	700	650	610	580				
					60000	2090	1450	1225	970	850	770	675	640	610	570	535	510				
					100000	1765	1225	1030	820	715	650	570	540	515	480	450	430				
214	2-1/2 2-11/16	2-7/16 2-1/2	13994	9838	20000	3580	2480	2095	1660	1450	1320	1155	1095	1045	970	915					
					30000	3125	2171	1830	1450	1270	1155	1005	955	915	850	800					
					40000	2840	1970	1660	1320	1155	1045	915	870	830	770	725					
					60000	2480	1720	1450	1155	1005	915	800	760	725	675	635					
					100000	2094	1450	1225	970	850	770	675	640	615	570	535					
215	2-15/16	2-11/16	14872	11108	20000	3805	2640	2225	1765	1545	1400	1225	1165	1115	1035	975					
					30000	3325	2305	1945	1545	1350	1225	1070	1015	975	905	850					
					40000	3020	2095	1765	1400	1225	1115	975	925	885	820	770					
					60000	2640	1830	1545	1225	1070	975	850	805	770	715	675					
					100000	2225	1545	1300	1035	905	820	715	680	650	605	570					
216		2-15/16	17407	13102	20000	4450	3085	2605	2065	1805	1640	1435	1360	1300	1210						
					30000	3890	2695	2275	1805	1580	1435	1250	1190	1140	1055						
					40000	3535	2450	2065	1640	1435	1300	1140	1080	1035	960						
					60000	3085	2140	1805	1435	1250	1140	995	945	905	840						
					100000	2605	1805	1525	1210	1055	960	840	795	760	705						
218		3-7/16	21451	16641	20000	5485	3805	3210	2550	2225	2025	1765	1680	1605							
					30000	4795	3325	2805	2225	1945	1765	1545	1465	1405							
					40000	4355	3020	2550	2025	1765	1605	1405	1335	1276							
					60000	3805	2640	2225	1765	1545	1405	1225	1165	1115							
					100000	3210	2225	1880	1490	1300	1185	1035	980	940							

\*\* Piloted flange only

Note: Bearing analysis program "BEST" is available on [www.ptwizard.com](http://www.ptwizard.com)

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## D-LOK Ball Bearings - Metric

**Table 3: Easy Selection Table For DL and DLM Bearing Mounted Units (Newtons)**

Ring Size	Shaft Size (mm)		Dynamic Capacity C (N)	Static Capacity Co (N)	L <sub>10</sub> Life Hours	Allowable Equivalent Radial Load Ratings (N) at Various RPM*																	
	DL	DLM				50	150	250	500	750	1000	1500	1750	2000	2500	3000	3500	4500	5000	5500	7500		
204	20		12895	6592	20000	3292	2291	1935	1535	1334	1223	1068	1001	956	890	845	801	734	712	689	623		
					30000	2869	2002	1690	1334	1156	1068	934	890	845	778	724	689	645	623	600	534		
					40000	2624	1824	1535	1223	1068	956	845	801	756	712	667	645	578	556	556	489	467	423
					60000	2291	1579	1334	1068	934	845	734	689	667	623	578	556	512	489	467	423	400	356
					100000	1935	1334	1134	890	778	712	623	578	556	512	489	467	400	423	400	356		
205	25		13993	7869	20000	3581	2491	2091	1668	1446	1312	1156	1090	1045	979	912	867	801	778	756	667		
					30000	3136	2157	1827	1446	1268	1156	1001	956	912	845	801	756	689	667	645	578		
					40000	2847	1979	1668	1312	1156	1045	912	867	823	778	734	689	623	600	600	534	512	467
					60000	2491	1712	1446	1156	1001	912	801	756	734	667	623	600	556	534	512	467	400	
					100000	2091	1446	1223	979	845	778	667	645	600	556	534	512	467	445	445	400		
206	30		19429	11290	20000	4960	3447	2913	2313	2024	1824	1601	1512	1446	1357	1268	1201	1112	1068	1045			
					30000	4337	3002	2535	2024	1757	1601	1401	1334	1268	1179	1112	1045	979	934	912			
					40000	3936	2736	2313	1824	1601	1446	1268	1201	1156	1068	1001	958	890	845	823			
					60000	3447	2380	2024	1601	1401	1268	1112	1045	1001	934	890	845	778	734	712			
					100000	2913	2024	1690	1357	1179	1068	934	890	845	778	734	712	645	623	600			
207	35		25616	15395	20000	6561	4537	3825	3047	2647	2424	2113	2002	1913	1779	1668	1579	1468	1401	1357			
					30000	5716	3959	3358	2674	2313	2113	1846	1757	1668	1557	1468	1379	1268	1223	1201	1090		
					40000	5204	3603	3047	2424	2113	1913	1668	1579	1512	1401	1334	1268	1156	1112	1090			
					60000	4537	3158	2647	2113	1846	1669	1468	1379	1334	1223	1156	1112	1023	979	956			
					100000	3825	2647	2246	1779	1557	1401	1223	1179	1112	1045	979	934	845	823	801			
208	40	35	32613	19906	20000	8341	5782	4871	3870	3380	3069	2691	2558	2446	2268	2135	2024	1868	1801				
					30000	7295	5048	4270	3380	2958	2691	2335	2224	2135	1979	1868	1779	1624	1579				
					40000	6628	4581	3870	3069	2691	2446	2135	2024	1935	1801	1690	1601	1468	1423				
					60000	5782	4003	3380	2691	2335	2135	1868	1779	1690	1576	1468	1401	1290	1245				
					100000	4871	3380	2847	2268	1979	1801	1579	1490	1423	1334	1245	1179	1090	1045				
209	45		35099	21823	20000	8985	6227	5249	4159	3647	3314	2891	2736	2624	2446	2291	2180	2002	1935				
					30000	7851	5449	4581	3647	3180	2891	2535	2402	2291	2135	2002	1913	1757	1690				
					40000	7117	4937	4159	3314	2891	2624	2291	2180	2091	1935	1824	1735	1601	1535				
					60000	6227	4315	3647	2891	2535	2291	2002	1913	1824	1690	1601	1512	1379	1334				
					100000	5249	3647	3069	2446	2135	1935	1690	1601	1535	1423	1334	1268	1179	1134				
210	50		35099	23189	20000	8985	6227	5249	4159	3647	3314	2891	2736	2624	2446	2291	2180	2002					
					30000	7851	5449	4581	3647	3180	2891	2535	2402	2291	2135	2002	1913	1757					
					40000	7117	4937	4159	3314	2891	2624	2291	2180	2091	1935	1824	1735	1601					
					60000	6227	4315	3647	2891	2535	2291	2002	1913	1824	1690	1601	1512	1379					
					100000	5249	3647	3069	2446	2135	1935	1690	1601	1535	1423	1334	1268	1179					
211	55	50	43394	29305	20000	11079	7682	6479	5142	4492	4082	3566	3387	3241	3007	2830	2688						
					30000	9678	6711	5660	4492	3924	3566	3115	2959	2831	2627	2472	2348						
					40000	8793	6097	5142	4082	3566	3240	2830	2688	2572	2387	2246	2134						
					60000	7682	5326	4492	3566	3115	2830	2472	2348	2247	2085	1962	1864						
					100000	6479	4492	3789	3007	2627	2387	2085	1981	1895	1759	1655	1572						
212	60		52446	36031	20000	13411	9296	7851	6227	5449	4937	4315	4114	3914	3647	3425	3247						
					30000	11720	8118	6850	5449	4759	4315	3914	3581	3425	3180	3002	2847						
					40000	10653	7384	6227	4937	4315	3914	3425	3247	3114	2891	2713	2580						
					60000	9296	6450	5449	4315	3781	3425	3002	2847	2713	2535	2380	2268						
					100000	7851	5449	4581	3647	3180	2891	2535	2402	2291	2135	2002	1913						
214	70	65	62245	43762	20000	15925	11031	9319	7384	6450	5871	5137	4871	4648	4315	4070							
					30000	13900	96721	8140	6450	5649	5137	4470	4248	4070	3781	3558							
					40000	12632	8763	7384	5871	5137	4648	4070	3870	3692	3425	3225							
					60000	11031	7651	6450	5137	4470	4070	3558	3380	3225	3002	2824							
					100000	9318	6450	5449	4315	3781	3425	3002	2847	2736	2535	2380							

\*\* Piloted flange only

**Note:** Bearing analysis program "BEST" is available on [www.ptwizard.com](http://www.ptwizard.com)

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