

Eccentric Collar 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:

$$L_{10} = \left(\frac{C}{P}\right)^3 \times \frac{16667}{\text{RPM}}$$

Where:

L_{10} = Life, hours

C = Dynamic Capacity, lbs. or N

P = Equivalent Radial Load, lbs. or N

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

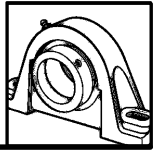
$\frac{F_A}{C_0}$	e	Radial/Thrust Factors			
		If F_A/F_R is equal to or less than e		If F_A/F_R is greater than e	
		$F_A/F_R \leq e$		$F_A/F_R > e$	
		X	Y	X	Y
.014	.19	1	0	.56	2.30
.021	.21	1	0	.56	2.15
.028	.22	1	0	.56	1.99
.042	.24	1	0	.56	1.85
.056	.26	1	0	.56	1.71
.070	.27	1	0	.56	1.63
.084	.28	1	0	.56	1.55
.110	.30	1	0	.56	1.45
.170	.34	1	0	.56	1.31
.280	.38	1	0	.56	1.15
.420	.42	1	0	.56	1.04
.560	.44	1	0	.56	1.00

Lubrication—DODGE Ball Bearings are lubricated at the factory and are ready to run. The bearings are initially lubricated with Shell Alvania #2 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.

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SELECTION



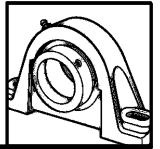
Eccentric Collar Ball Bearings - Inch Easy Selection Table for Ball Bearing Mounted Units – Table 2

RING SIZE	SHAFT SIZE SXR, SXV, SLX	DYNAMIC CAPACITY C (lbs)	STATIC CAPACITY Co (lbs)	L10 LIFE, HOURS	ALLOWABLE EQUIVALENT RADIAL LOAD RATING (LBS.) AT VARIOUS RPM*							
					50	150	250	500	750	1000	1500	1750
203	1/2 5/8	2,158	1,000	20,000	550	380	320	255	225	205	175	170
				30,000	480	335	280	225	195	175	155	145
				40,000	440	305	255	205	175	160	140	135
				60,000	380	265	225	175	155	140	125	115
				100,000	320	225	190	150	130	120	105	100
204	3/4	2,899	1,390	20,000	740	515	435	345	300	275	240	225
				30,000	645	450	380	300	260	240	210	200
				40,000	590	410	345	275	240	215	190	180
				60,000	515	355	300	240	210	190	165	155
				100,000	435	300	255	200	175	160	140	130
205	7/8 15/16 1	3,146	1,565	20,000	805	560	470	375	325	295	260	245
				30,000	705	485	410	325	285	260	225	215
				40,000	640	445	375	295	260	235	205	195
				60,000	560	385	325	260	225	205	180	170
				100,000	470	325	275	220	190	175	150	145
206	1-1/16 1-1/8 1-3/16	4,368	2,250	20,000	1115	775	655	520	455	410	360	340
				30,000	975	675	570	455	395	360	315	300
				40,000	885	615	520	410	360	325	285	270
				60,000	775	535	455	360	315	285	250	235
				100,000	655	455	380	305	265	240	210	200
207	1-1/4 1-5/16 1-3/8 1-7/16	5,759	3,065	20,000	1475	1020	860	685	595	545	475	450
				30,000	1285	890	755	595	520	475	415	395
				40,000	1170	810	685	545	475	430	375	355
				60,000	1020	710	595	475	415	375	330	310
				100,000	860	595	505	400	350	315	275	265
208	1-1/2	7,332	4,005	20,000	1875	1300	1095	870	760	690	605	575
				30,000	1640	1135	960	760	665	605	525	500
				40,000	1490	1030	870	690	605	550	480	455
				60,000	1300	900	760	605	525	480	420	400
				100,000	1095	760	640	510	445	405	355	335
209	1-5/8 1-11/16 1-3/4	7,891	4,450	20,000	2020	1400	1180	935	820	745	650	615
				30,000	1765	1225	1030	820	715	650	570	540
				40,000	1600	1110	935	745	650	590	515	490
				60,000	1400	970	820	650	570	515	450	430
				100,000	1180	820	690	550	480	435	380	360
210	1-15/16 2	7,891	4,450	20,000	2020	1400	1180	935	820	745	650	615
				30,000	1765	1225	1030	820	715	650	570	540
				40,000	1600	1110	935	745	650	590	515	490
				60,000	1400	970	820	650	570	515	450	430
				100,000	1180	820	690	550	480	435	380	360
211	2 2-3/16	9,975	5,630	20,000	2550	1770	1490	1185	1035	940	820	780
				30,000	2230	1545	1305	1035	905	820	720	680
				40,000	2025	1405	1185	940	820	745	650	620
				60,000	1770	1225	1035	820	720	650	570	540
				100,000	1490	1035	875	695	605	550	480	455
212	2-1/4 2-7/16	11,791	6,955	20,000	3015	2090	1765	1400	1225	1110	970	925
				30,000	2635	1825	1540	1225	1070	970	880	805
				40,000	2395	1660	1400	1110	970	880	770	730
				60,000	2090	1450	1225	970	850	770	675	640
				100,000	1765	1225	1030	820	715	650	570	540
215	2-15/16	14,872	9,255	20,000	3805	2640	225	1765	1545	1400	1225	1165
				30,000	3325	2305	1945	1545	1350	1225	1070	1015
				40,000	3020	2095	1765	1400	1225	1115	975	925
				60,000	2640	1830	1545	1225	1070	975	850	805
				100,000	2225	1545	1300	1035	905	820	715	680

* Slight interference fit required when operating in the shaded area.

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SELECTION



Eccentric Collar Ball Bearings - Inch

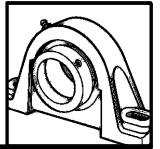
Easy Selection Table for Ball Bearing Mounted Units (Con't) – Table 2

RING SIZE	SHAFT SIZE, SXR, SXV, SLX	DYNAMIC CAPACITY C (lbs)	STATIC CAPACITY Co (lbs)	L10 LIFE, HOURS	ALLOWABLE EQUIVALENT RADIAL LOAD RATING (LBS.) AT VARIOUS RPM*										
					2000	2500	3000	3500	4000	4500	5000	5500	6500	7500	
203	1/2 5/8	2,158	1,000	20,000	160	150	140	135	130	125	120	115	110	105	
				30,000	140	130	125	115	110	105	100	95	90	85	80
				40,000	130	120	110	105	100	95	90	85	80	75	70
				60,000	110	105	95	95	90	85	80	75	70	65	60
				100,000	95	85	80	80	75	70	70	65	60	55	50
204	3/4	2,899	1,390	20,000	215	200	190	180	170	165	160	155	150	140	
				30,000	190	175	165	155	150	145	140	135	130	125	120
				40,000	170	160	150	145	135	130	125	120	115	110	105
				60,000	150	140	130	125	120	115	110	105	100	95	90
				100,000	125	115	110	105	100	90	95	90	85	80	75
205	7/8 15/16 1	3,146	1,565	20,000	235	220	205	195	185	180	175	170	160	150	
				30,000	205	190	180	170	165	155	150	145	140	130	120
				40,000	185	175	165	155	150	140	135	130	125	120	110
				60,000	165	150	140	135	130	125	120	115	110	105	100
				100,000	135	125	120	115	110	105	100	100	95	90	85
206	1-1/16 1-1/8 1-3/16	4,368	2,250	20,000	325	305	285	270	260	250	240	235	220	210	
				30,000	285	265	250	235	225	220	210	205	195	185	175
				40,000	260	240	225	215	205	200	190	185	175	165	155
				60,000	225	210	200	190	180	175	165	160	155	145	135
				100,000	190	175	165	160	150	145	140	135	130	125	120
207	1-1/4 1-5/16 1-3/8 1-7/16	5,759	3,065	20,000	430	400	375	355	340	330	315	305	290	270	
				30,000	375	350	330	310	300	285	275	260	250	245	235
				40,000	340	315	300	285	275	260	250	240	230	220	215
				60,000	300	275	260	250	235	230	220	215	210	205	200
				100,000	250	235	220	210	200	190	185	180	175	170	165
208	1-1/2	7,332	4,005	20,000	550	510	480	455	435	420	405	390	375	360	
				30,000	480	445	420	400	380	365	355	345	330	320	310
				40,000	435	405	380	360	345	330	320	310	300	290	280
				60,000	380	355	330	315	300	290	280	270	260	250	240
				100,000	320	300	280	265	255	245	235	225	215	205	195
209	1-5/8 1-11/16 1-3/4	7,891	4,450	20,000	590	550	515	490	470	450	435	420	405	390	
				30,000	515	480	450	430	410	395	380	365	355	345	335
				40,000	470	435	410	390	370	360	345	330	320	310	300
				60,000	410	380	360	340	325	310	300	290	280	270	260
				100,000	345	320	300	285	275	265	255	245	235	225	215
210	1-15/16 2	7,891	4,450	20,000	590	550	515	490	470	450	435	420	405	390	
				30,000	515	480	450	430	410	395	380	365	355	345	335
				40,000	470	435	410	390	370	360	345	330	320	310	300
				60,000	410	380	360	340	325	310	300	290	280	270	260
				100,000	345	320	300	285	275	265	255	245	235	225	215
211	2 2-3/16	9,975	5,630	20,000	745	695	650	620	595	570	545	520	500	480	
				30,000	650	605	570	540	520	490	470	450	430	410	390
				40,000	595	550	520	490	470	450	430	410	390	370	350
				60,000	520	480	450	430	410	390	370	350	330	310	290
				100,000	435	405	380	360	345	330	315	300	285	270	255
212	2-1/4 2-7/16	11,791	6,955	20,000	880	820	770	730	700	670	640	610	580	550	
				30,000	770	715	675	640	610	580	550	520	490	460	430
				40,000	700	650	610	580	550	520	490	460	430	400	370
				60,000	610	570	535	510	480	450	420	390	360	330	300
				100,000	515	480	450	430	410	390	370	350	330	310	290
215	2-15/16	14,872	9,255	20,000	1115	1035	975	920	870	820	770	720	670	620	
				30,000	975	905	850	790	740	690	640	590	540	490	440
				40,000	885	820	770	710	660	610	560	510	460	410	360
				60,000	770	715	675	630	580	530	480	430	380	330	280
				100,000	650	605	570	530	490	450	410	370	330	290	250

* Slight interference fit required when operating to the right of the heavy line.

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SELECTION



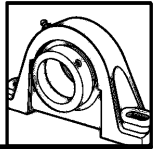
Eccentric Collar Ball Bearings - Metric Easy Selection Table for Ball Bearing Mounted Units – Table 2

RING SIZE	SHAFT SIZE SXR, SXV, SLX	DYNAMIC CAPACITY C (N)	STATIC CAPACITY Co (N)	L10 LIFE, HOURS	ALLOWABLE EQUIVALENT RADIAL LOAD RATING (N) AT VARIOUS RPM*							
					50	150	250	500	750	1000	1500	1750
203	17mm	9,600	4,450	20,000	2446	1690	1423	1134	1001	912	778	758
				30,000	2135	1490	1245	1001	867	778	689	645
				40,000	1957	1357	1134	912	778	712	623	600
				60,000	1690	1179	1001	778	689	623	556	512
				100,000	1423	1001	845	667	578	534	467	445
204	20mm	12,895	6,185	20,000	3292	2291	1835	1535	1334	1223	1068	1001
				30,000	2869	2002	1690	1334	1156	1068	934	890
				40,000	2624	1824	1535	1223	1068	956	845	801
				60,000	2291	1579	1334	1068	934	845	734	689
				100,000	1935	1334	1134	890	778	712	623	578
205	25mm	13,995	6,964	20,000	3581	2491	2091	1668	1446	1312	1156	1090
				30,000	3136	2157	1824	1446	1268	1156	1001	956
				40,000	2847	1979	1668	1312	1156	1045	912	867
				60,000	2491	1712	1446	1156	1001	912	801	756
				100,000	2091	1446	1223	979	845	778	667	645
206	30mm	19,438	10,013	20,000	4960	3447	2913	1313	2024	1824	1601	1512
				30,000	4337	3002	2535	2024	1757	1601	1401	1334
				40,000	3936	2736	2313	1824	1601	1446	1268	1201
				60,000	3447	2380	2024	1601	1401	1268	1112	1045
				100,000	2913	2024	1690	1357	1179	1068	934	890
207	35mm	25,628	13,639	20,000	6561	4537	3825	3047	2647	2424	2113	2002
				30,000	5716	3959	3358	2647	2313	2113	1846	1757
				40,000	5204	3603	3047	2424	2113	1913	1668	1579
				60,000	4537	3158	2647	2113	1846	1668	1468	1379
				100,000	3825	2647	2246	1779	1557	1401	1223	1179
208	40mm	32,627	17,822	20,000	8340	5782	4871	3870	3380	3069	2691	2558
				30,000	7295	5048	4270	3380	2958	2691	2335	2224
				40,000	6628	4581	3870	3069	2691	2446	2135	2024
				60,000	5782	4003	3380	2691	2335	2135	1868	1779
				100,000	4871	3380	2847	2268	1979	1801	1579	1490
209	45mm	35,115	19,803	20,000	8985	6227	5249	4159	3647	3314	2891	2736
				30,000	7851	5449	4581	3647	3180	2891	2535	2402
				40,000	7117	4937	4159	3314	2891	2624	2291	2180
				60,000	6227	4315	3647	2891	2535	2291	2002	1913
				100,000	5249	3647	3069	2446	2135	1935	1690	1601
210	50mm	35,115	19,803	20,000	8985	6227	5249	4159	3647	3314	2891	2736
				30,000	7851	5449	4581	3647	3180	2891	2535	2402
				40,000	7177	4937	4159	3314	2891	2624	2291	2180
				60,000	6227	4315	3647	2891	2535	2291	2002	1913
				100,000	5249	3647	3069	2446	2135	1935	1690	1601
211	55mm	44,389	25,054	20,000	11342	7873	6628	5271	2604	4181	3647	3469
				30,000	9919	6872	5805	4604	4025	3647	3203	3025
				40,000	9007	6249	5271	4181	3647	3314	2891	2758
				60,000	7873	5449	4604	3647	3203	2891	2535	2402
				100,000	6628	4604	3892	3091	2691	2446	2135	2024
212	60mm	52,470	30,950	20,000	13411	9296	7851	6227	5449	4937	4315	4114
				30,000	11720	8118	6850	5449	4759	4315	3914	3481
				40,000	10653	7384	6227	4937	4315	3914	3425	3247
				60,000	9296	6450	5449	4315	3781	3425	3002	2847
				100,000	7851	5449	4581	3647	3180	2891	2535	2402
215	75mm	66,180	41,185	20,000	16925	11743	9897	7851	6872	6227	5449	5182
				30,000	14790	10253	8651	6872	6005	5449	4759	4515
				40,000	13433	9319	7851	6227	5449	4960	4337	4114
				60,000	11743	8140	6872	5449	4759	4337	3781	3581
				100,000	9897	6872	5782	4604	4025	3647	3180	3025

* Slight interference fit required when operating in the shaded area.

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SELECTION



Eccentric Collar Ball Bearings - Metric

Easy Selection Table for Ball Bearing Mounted Units (Con't) – Table 2

RING SIZE	SHAFT SIZE SXR, SXV, SLX	DYNAMIC CAPACITY C (N)	STATIC CAPACITY Co (N)	L10 LIFE, HOURS	ALLOWABLE EQUIVALENT RADIAL LOAD RATING (N) AT VARIOUS RPM*									
					2000	2500	3000	3500	4000	4500	5000	5500	6500	7500
203	17mm	9,600	4,450	20,000	712	667	623	600	578	556	534	512	489	457
				30,000	623	578	556	512	489	467	467	445	423	400
				40,000	578	534	489	467	445	423	423	400	378	358
				60,000	489	467	423	423	400	378	356	356	334	311
				100,000	423	378	356	356	334	311	311	289	289	267
204	20mm	12,895	6,185	20,000	956	890	845	801	756	734	712	689	645	623
				30,000	845	778	734	689	667	645	623	600	578	534
				40,000	756	712	667	645	600	578	556	556	512	489
				60,000	667	623	578	556	534	512	489	457	445	423
				100,000	556	512	489	467	445	400	423	400	378	356
205	25mm	13,995	6,964	20,000	1045	979	912	867	823	801	778	756	712	667
				30,000	912	845	801	756	734	689	667	645	623	578
				40,000	823	778	734	689	667	623	600	600	556	534
				60,000	734	667	623	600	578	556	534	512	489	467
				100,000	600	556	534	512	489	467	445	445	423	400
206	30mm	19,438	10,013	20,000	1446	1357	1268	1201	1156	1112	1068	1045	979	
				30,000	1268	1179	1112	1045	1001	979	934	912	867	
				40,000	1156	1068	1001	956	912	890	845	823	778	
				60,000	1001	934	890	845	801	778	734	712	689	
				100,000	845	778	734	712	667	645	623	600	578	
207	35mm	25,628	13,639	20,000	1913	1779	1668	1579	1512	1468	1401	1357		
				30,000	1668	1557	1468	1379	1334	1268	1223	1201		
				40,000	1512	1401	1334	1268	1201	1156	1112	1090		
				60,000	1334	1223	1156	1112	1045	1023	979	956		
				100,000	1112	1045	979	934	890	845	823	801		
208	40mm	32,627	17,822	20,000	2446	2268	2135	2024	1935	1868	1801			
				30,000	2135	1979	1868	1779	1680	1624	1579			
				40,000	1935	1801	1690	1601	1535	1468	1423			
				60,000	1690	1579	1468	1401	1334	1290	1245			
				100,000	1423	1334	1245	1179	1134	1090	1045			
209	45mm	35,115	19,803	20,000	2624	2446	2291	2180	2091	2002	1935			
				30,000	2291	2135	2002	1913	1824	1757	1690			
				40,000	2091	1935	1824	1735	1646	1601	1535			
				60,000	1824	1690	1601	1512	1446	1379	1334			
				100,000	1535	1423	1334	1268	1223	1179	1134			
210	50mm	35,115	19,803	20,000	2624	2446	2291	2180	2091	2002				
				30,000	2291	2135	2002	1913	1824	1757				
				40,000	2091	1935	1824	1735	1646	1601				
				60,000	1824	1690	1601	1512	1446	1379				
				100,000	1535	1423	1334	1268	1223	1179				
211	55mm	44,389	25,054	20,000	3314	3091	2891	2758	2647					
				30,000	2891	2691	2535	2402	2313					
				40,000	2647	2446	2313	2180	2091					
				60,000	2313	2135	2002	1913	1824					
				100,000	1935	1801	1690	1601	1535					
212	60mm	52,470	30,950	20,000	3914	3647	3425	3247						
				30,000	3425	3180	3002	2847						
				40,000	3114	2891	2713	2580						
				60,000	2713	2535	2380	2268						
				100,000	2291	2135	2002	1913						
215	75mm	66,180	41,185	20,000	4960	4604	4337							
				30,000	4337	4025	3781							
				40,000	3936	3647	3425							
				60,000	3425	3180	3002							
				100,000	2891	2691	2535							

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

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