



For duplex sets of 7000 and 9000 series bearings see page 239.

MRC Bearing Number	Bore		Outside Diameter D		Width B		Fillet Radius ¹⁾ r _a		Basic Radial Load Rating ²⁾				Speed Rating ³⁾	
									Dynamic C ⁴⁾		Static C ₀		Grease	Oil
	mm	in	mm	in	mm	in	mm	in	N	lbf	N	lbf	RPM	RPM
9202-UP	15	.5906	35	1.3780	11	.4331	.64	.025	8 840	1 990	4 250	955	17 000	24 000
9203-UP	17	.6693	40	1.5748	12	.4724	.64	.025	11 700	2 630	6 000	1 350	15 000	20 000
9204-UP	20	.7874	47	1.8504	14	.5512	1.0	.04	14 800	3 330	8 300	1 870	12 000	17 000
9205-UP	25	.9843	52	2.0472	15	.5906	1.0	.04	16 800	3 780	10 400	2 340	10 000	15 000
9206-UP	30	1.1811	62	2.4409	16	.6299	1.0	.04	21 200	4 770	12 700	2 860	8 500	12 000
9207-UP	35	1.3780	72	2.8346	17	.6693	1.0	.04	29 100	6 540	19 300	4 340	8 000	11 000
9208-UP	40	1.5748	80	3.1496	18	.7087	1.0	.04	32 500	7 310	22 400	5 040	7 000	9 500
9209-UP	45	1.7717	85	3.3465	19	.7480	1.0	.04	39 000	8 770	27 500	6 180	6 700	9 000
9210-UP	50	1.9685	90	3.5433	20	.7874	1.0	.04	40 300	9 060	30 000	6 740	6 000	8 000
9211-UP	55	2.1654	100	3.9370	21	.8268	1.5	.06	48 800	11 000	37 500	8 430	5 600	7 500
9212-UP	60	2.3622	110	4.3307	22	.8661	1.5	.06	58 500	13 200	45 500	10 200	5 000	6 700
9213-UP	65	2.5591	120	4.7244	23	.9055	1.5	.06	63 700	14 300	51 000	11 500	4 500	6 000
9214-UP	70	2.7559	125	4.9213	24	.9449	1.5	.06	68 900	15 500	56 000	12 600	4 300	5 600
9215-UP	75	2.9528	130	5.1181	25	.9843	1.5	.06	71 500	16 100	60 000	13 500	4 000	5 300
9216-UP	80	3.1496	140	5.5118	26	1.0236	1.5	.06	83 200	18 700	71 000	16 000	3 800	5 000
9217-UP	85	3.3465	150	5.9055	28	1.1024	2.0	.08	95 600	21 500	83 000	18 700	3 600	4 800
9218-UP	90	3.5433	160	6.2992	30	1.1811	2.0	.08	108 000	24 300	95 000	21 400	3 400	4 500
9219-UP	95	3.7402	170	6.6929	32	1.2598	2.0	.08	124 000	27 900	110 000	24 700	3 200	4 300
9220-UP	100	3.9370	180	7.0866	34	1.3386	2.0	.08	130 000	29 200	125 000	28 100	3 000	4 000
9221-UP	105	4.1339	190	7.4803	36	1.4173	2.0	.08	143 000	32 100	129 000	29 000	2 800	3 800
9222-UP	110	4.3307	200	7.8740	38	1.4961	2.0	.08	153 000	34 400	156 000	35 100	2 600	3 600
9300-UP														
9302-UP	15	.5906	42	1.6535	13	.5118	1.0	.04	12 700	2 860	6 100	1 370	15 000	20 000
9303-UP	17	.6693	47	1.8504	14	.5512	1.0	.04	16 800	3 780	8 500	1 910	13 000	18 000
9304-UP	20	.7874	52	2.0472	15	.5906	1.0	.04	18 600	4 180	9 500	2 140	11 000	16 000
9305-UP	25	.9843	62	2.4409	17	.6693	1.0	.04	24 200	5 440	13 400	3 150	9 000	13 000
9306-UP	30	1.1811	72	2.8346	19	.7480	1.0	.04	32 500	7 310	19 600	4 410	8 000	11 000
9307-UP	35	1.3780	80	3.1496	21	.8268	1.5	.06	39 700	8 920	24 500	5 510	7 500	10 000
9308-UP	40	1.5748	90	3.5433	23	.9055	1.5	.06	47 500	10 700	30 500	6 860	6 700	9 000
9309-UP	45	1.7717	100	3.9370	25	.9843	1.5	.06	59 200	13 300	40 000	8 990	6 000	8 000
9310-UP	50	1.9685	110	4.3307	27	1.0630	2.0	.08	68 900	15 500	52 000	11 700	5 300	7 000
9311-UP	55	2.1654	120	4.7244	29	1.1417	2.0	.08	79 300	17 800	56 000	12 600	4 800	6 300
9312-UP	60	2.3622	130	5.1181	31	1.2205	2.0	.08	90 400	20 300	64 000	14 400	4 500	6 000
9313-UP	65	2.5591	140	5.5118	33	1.2992	2.0	.08	101 000	22 700	80 000	18 000	4 300	5 600
9314-UP	70	2.7559	150	5.9055	35	1.3780	2.0	.08	117 000	26 300	93 000	20 900	3 800	5 000
9315-UP	75	2.9528	160	6.2992	37	1.4567	2.0	.08	127 000	28 600	100 000	22 500	3 600	4 800
9316-UP	80	3.1496	170	6.6929	39	1.5354	2.0	.08	138 000	31 000	110 000	24 700	3 400	4 500
9317-UP	85	3.3465	180	7.0866	41	1.6142	2.5	.10	148 000	33 300	122 000	27 400	3 200	4 300
9318-UP	90	3.5433	190	7.4803	43	1.6929	2.5	.10	159 000	35 700	137 000	30 800	3 000	4 000
9319-UP	95	3.7402	200	7.8740	45	1.7717	2.5	.10	168 000	37 800	150 000	33 700	2 800	3 800
9320-UP	100	3.9370	215	8.4646	47	1.8504	2.5	.10	190 000	42 700	190 000	42 700	2 600	3 600
9321-UP	105	4.1339	225	8.8583	49	1.9291	2.5	.10	203 000	45 600	196 000	44 100	2 400	3 400
9322-UP	110	4.3307	240	9.4488	50	1.9685	2.5	.10	212 000	47 700	228 000	51 300	2 200	3 200

¹⁾ Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear.

²⁾ For thrust rating multiply C by 1.75 and C₀ by 3.85.

³⁾ Listed values are for machined bronze cage, ABEC-1.

The values have been determined through historical application and practice. For a more complete explanation, see page 276.

⁴⁾ Rating for one million revolutions or 500 hours at 33 1/3 RPM.

9000-UP Series Split Inner Ring 40 Degree Angular Contact Ball Bearings Single Bearing

Dynamic and static equivalent radial load and life rating

Dynamic equivalent radial load

$$P = F_R \quad \text{when } F_A/F_R \leq 1.14$$

or

$$P = 0.35 F_R + 0.57 F_A \quad \text{when } F_A/F_R > 1.14$$

P = Dynamic equivalent radial load

F_R = Radial load

F_A = Thrust load

Consult MRC Bearing Services when

$$F_R/F_A > 1.0$$

Static equivalent radial load

$$P_0 = 0.5 F_R + 0.26 F_A$$

P_0 is always $\geq F_R$

P_0 = Static equivalent radial load

F_R = Radial load

F_A = Thrust load

Life rating

$$L_{10} = \left(\frac{C}{P}\right)^3 \quad (\text{millions of revolutions})$$

or

$$L_{10h} = \frac{10^6}{60n} \left(\frac{C}{P}\right)^3 \quad (\text{Hours})$$

C = Basic dynamic radial load rating
(from single-row bearing tables)

P = Dynamic equivalent radial load

n = Speed in rpm

**Dynamic equivalent radial load
and life calculation examples**

Bearing size: 9309 UP

Speed: 2000 RPM

Basic dynamic radial load rating (C) = 13300

Case 1Radial load (F_R) = 1750Thrust load (F_A) = 1960 $F_A/F_R = 1960/1750 = 1.12$ Since $F_A/F_R < 1.14$, equivalent load (P) = $F_R = 1750$

$$\text{Life (L}_{10}) = \left(\frac{C}{P}\right)^3 = \left(\frac{13300}{1750}\right)^3 = 439 \times 10^6 \text{ Rev.}$$

or

$$\begin{aligned} \text{Life (L}_{10}\text{h)} &= \frac{10^6}{60n} \left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000} \left(\frac{13300}{1750}\right)^3 \\ &= 3658 \text{ Hrs} \end{aligned}$$

Case 2Radial load (F_R) = 1750Thrust load (F_A) = 2450 $F_A/F_R = 2450/1750 = 1.40$ Since $F_A/F_R > 1.14$, equivalent load (P) = $0.35 F_R + 0.57 F_A$ $P = 0.35 \times 1750 + 0.57 \times 2450 = 2009$

$$\text{Life (L}_{10}) = \left(\frac{C}{P}\right)^3 = \left(\frac{13300}{2009}\right)^3 = 290 \times 10^6 \text{ Rev.}$$

or

$$\begin{aligned} \text{Life (L}_{10}\text{h)} &= \frac{10^6}{60n} \left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000} \left(\frac{13300}{2009}\right)^3 \\ &= 2417 \text{ Hrs} \end{aligned}$$

Case 3Thrust load (F_A) = 2450 $F_A/F_R = 2450/0 = \infty$ Since $F_A/F_R > 1.14$, equivalent load (P) = $0.35 F_R + 0.57 F_A$ $P = 0.57 \times 2450 = 1397$

$$\text{Life (L}_{10}) = \left(\frac{C}{P}\right)^3 = \left(\frac{13300}{1397}\right)^3 = 863 \times 10^6 \text{ Rev.}$$

or

$$\begin{aligned} \text{Life (L}_{10}\text{h)} &= \frac{10^6}{60n} \left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000} \left(\frac{13300}{1397}\right)^3 \\ &= 7192 \text{ Hrs} \end{aligned}$$
