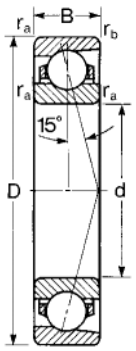


MRC XLS Series bearings are single-row 15 degree angular contact bearings made to inch dimensions. They are similar to MRC R-type bearings and 7000 Series bearings. The XLS Series bearing is made with a heavy race shoulder and one counterbored race shoulder on the outer ring.
MRC XLS Series bearings have ample radial and thrust capacity for the majority of applications involving light radial loads, light thrust loads in one direction, or combinations of these. They are used in such applications where space limitations exist.

MRC Bearing Number	Bore d		Outside Diameter D		Width B		Fillet Radius[1] r_a		Fillet Radius[1] r_b		ZD^2		Basic Radial Load Rating Dynamic C[3]		Basic Radial Load Rating Static C_0		Speed Rating[2] Grease	Speed Rating[2] Oil
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	N	lbf	N	lbf	RPM	RPM
XLS-1⅜	34.9	**1.3750**	65.1	**2.5625**	14.3	**.5625**	1.0	**.04**	.60	**.024**	1 060	**1.65**	22 500	**5 060**	15 600	**3 510**	11 000	13 000
XLS-1½	38.1	**1.5000**	68.3	**2.6875**	14.3	**.5625**	1.0	**.04**	.60	**.024**	1 140	**1.77**	23 800	**5 350**	17 000	**3 820**	9 800	12 000
XLS-1⅝	41.3	**1.6250**	73.0	**2.8750**	14.3	**.5625**	1.0	**.04**	.60	**.024**	1 220	**1.89**	24 200	**5 400**	18 600	**4 180**	9 000	11 000
XLS-1¾	44.5	**1.7500**	76.2	**3.0000**	14.3	**.5625**	1.0	**.04**	.60	**.024**	1 300	**2.01**	25 100	**5 640**	20 000	**4 500**	8 200	10 000
XLS-1⅞	47.6	**1.8750**	80.1	**3.1875**	15.9	**.625**	1.0	**.04**	.60	**.024**	1 540	**2.39**	29 600	**6 650**	23 600	**5 310**	8 200	10 000
XLS-2	50.8	**2.0000**	84.1	**3.3125**	15.9	**.625**	1.0	**.04**	.60	**.024**	1 630	**2.53**	32 000	**6 790**	25 500	**5 730**	7 800	9 500
XLS-2⅛	54.0	**2.1250**	87.3	**3.4375**	15.9	**.625**	1.5	**.06**	.60	**.024**	1 630	**2.53**	30 200	**6 790**	25 500	**5 730**	7 400	9 000
XLS-2¼	57.2	**2.2500**	90.5	**3.5625**	15.9	**.625**	1.5	**.06**	.60	**.024**	1 720	**2.67**	31 200	**7 010**	27 000	**6 070**	7 100	8 700
XLS-2½-S	63.5	**2.5000**	98.4	**3.8750**	17.5	**.6875**	1.5	**.06**	.60	**.024**	1 360	**2.11**	26 000	**5 850**	22 000	**4 950**	6 500	7 900
XLS-2½	63.5	**2.5000**	98.4	**3.8750**	17.5	**.6875**	1.5	**.06**	.60	**.024**	1 900	**2.95**	32 500	**7 310**	31 000	**6 740**	6 400	7 800
XLS-2⅝	66.7	**2.6250**	105	**4.1250**	17.5	**.6875**	1.5	**.06**	.60	**.024**	2 470	**3.83**	42 300	**9 510**	39 000	**8 770**	6 100	7 400
XLS-2¾	70.0	**2.7500**	105	**4.1250**	17.5	**.6875**	1.5	**.06**	.60	**.024**	2 470	**3.83**	42 300	**9 510**	39 000	**8 770**	6 000	7 300
XLS-3	76.2	**3.0000**	114	**4.5000**	19.1	**.750**	2.0	**.08**	1.0	**.040**	2 720	**4.21**	44 200	**9 940**	44 000	**9 890**	5 500	6 700
XLS-3¼	82.6	**3.2500**	121	**4.7500**	19.1	**.750**	2.0	**.08**	1.0	**.040**	2 840	**4.40**	44 900	**10 100**	46 500	**10 500**	5 100	6 200
XLS-3½	88.9	**3.5000**	127	**5.0000**	19.1	**.750**	2.0	**.08**	1.0	**.040**	3 090	**4.79**	47 500	**10 700**	51 000	**11 500**	4 800	5 900
XLS-3¾	95.3	**3.7500**	133	**5.2500**	19.1	**.750**	2.0	**.08**	1.0	**.040**	3 210	**4.98**	47 500	**10 700**	53 000	**11 900**	4 500	5 500
XLS-4¼	108	**4.2500**	152	**6.0000**	22.2	**.875**	2.0	**.08**	1.0	**.040**	4 190	**6.50**	61 800	**13 900**	69 500	**15 600**	3 900	4 800
XLS-4½	114	**4.5000**	159	**6.2500**	22.2	**.875**	2.0	**.08**	1.0	**.040**	4 350	**6.75**	61 800	**13 900**	73 500	**16 500**	3 800	4 600
XLS-4¾	121	**4.7500**	165	**6.5000**	22.2	**.875**	2.0	**.08**	1.0	**.040**	4 520	**7.00**	63 700	**14 300**	76 500	**17 200**	3 600	4 400
XLS-5	127	**5.0000**	178	**7.0000**	25.4	**1.000**	2.0	**.08**	1.0	**.040**	5 510	**8.54**	78 000	**17 500**	91 500	**20 600**	3 400	4 100
XLS-5½	140	**5.5000**	191	**7.5000**	25.4	**1.000**	2.5	**.10**	1.0	**.040**	5 920	**9.18**	79 300	**17 800**	100 000	**22 500**	3 100	3 800
XLS-6	152	**6.0000**	203	**8.0000**	25.4	**1.000**	2.5	**.10**	1.0	**.040**	6 330	**9.81**	81 900	**18 400**	108 000	**24 300**	2 900	3 500
XLS-6¼	159	**6.2500**	216	**8.5000**	28.6	**1.125**	2.5	**.10**	1.0	**.040**	7 550	**11.7**	97 500	**21 900**	129 000	**29 000**	2 700	3 300
XLS-6½	165	**6.5000**	222	**8.7500**	28.6	**1.125**	2.5	**.10**	1.0	**.040**	7 800	**12.0**	99 500	**22 400**	134 000	**30 100**	2 600	3 200
XLS-7	178	**7.0000**	241	**9.5000**	31.8	**1.250**	3.0	**.12**	1.5	**.060**	9 480	**14.7**	119 000	**26 800**	160 000	**36 000**	2 400	2 900
XLS-7¼	184	**7.2500**	248	**9.7500**	31.8	**1.250**	3.0	**.12**	1.5	**.060**	9 740	**15.1**	121 000	**27 200**	166 000	**37 300**	2 300	2 800
XLS-7¾	197	**7.7500**	267	**10.5000**	34.9	**1.375**	3.0	**.12**	1.5	**.060**	11 200	**17.4**	138 000	**31 000**	193 000	**43 400**	2 100	2 600
XLS-8	203	**8.0000**	273	**10.7500**	34.9	**1.375**	3.0	**.12**	1.5	**.060**	11 600	**18.0**	140 000	**31 500**	200 000	**45 000**	2 100	2 500
XLS-8¼	210	**8.2500**	279	**11.0000**	34.9	**1.375**	3.0	**.12**	1.5	**.060**	12 000	**18.6**	140 000	**31 500**	204 000	**45 900**	2 100	2 500
XLS-8½	216	**8.5000**	292	**11.5000**	38.1	**1.500**	3.0	**.12**	1.5	**.060**	13 600	**21.0**	163 000	**36 600**	232 000	**52 200**	2 000	2 400
XLS-9	229	**9.0000**	305	**12.0000**	38.1	**1.500**	3.0	**.12**	1.5	**.060**	15 300	**23.7**	182 000	**40 900**	260 000	**58 500**	1 900	2 300
XLS-10	254	**10.0000**	337	**13.2500**	41.3	**1.625**	4.0	**.16**	1.5	**.060**	17 300	**26.8**	190 000	**42 700**	290 000	**65 200**	1 600	2 000

[1] Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear.
[2] Listed values are for pressed steel or polyamide cage, ABEC-1.
For phenolic composition cage, multiply by 1.66 for grease and 2.00 for oil. For machined bronze cage, multiply by 1.25 for grease and 1.50 for oil. For phenolic composition cage, ABEC-5 or 7, multiply by 2.30 for grease and 2.80 for oil. The speed rating adjustment factors have been determined through historical application and practice. For a more complete explanation, see page 276.
[3] Rating for one million revolutions or 500 hours at 33⅓ RPM.

Dynamic and static equivalent radial load and life rating

Dynamic equivalent radial load

$P = XF_R + YF_A$

P = Dynamic equivalent radial load
F_R = Radial load
F_A = Thrust load
Z = Number of balls
D = Ball diameter
X = Radial load factor
Y = Thrust load factor
e = Limiting factor for F_A/F_R

Contact Angle	F_A/ZD^2		$F_A/F_R > e$		e
	Units N, mm	Units lb, in	X	Y	
15°	0.172	25	0.44	1.47	0.38
	0.345	50		1.40	0.40
	0.689	100		1.30	0.43
	1.03	150		1.23	0.46
	1.38	200		1.19	0.47
	2.07	300		1.12	0.50
	3.45	500		1.02	0.55
	5.17	750		1.00	0.56
	6.89	1 000		1.00	0.56

When $F_A/F_R \leq e$, use X = 1.0, Y = 0.
Values of Y for loads not shown are obtained from chart to the right.

Life rating

$L10 = \left(\frac{C}{P}\right)^3$ (Millions of revolutions)

or

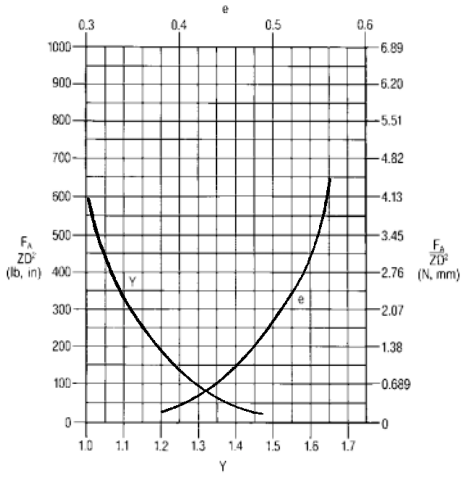
$L10_h = \frac{10^6}{60n}\left(\frac{C}{P}\right)^3$ (Hours)

C = Basic dynamic load rating
P = Dynamic equivalent radial load
n = Speed in RPM

Static equivalent radial load

$P_0 = 0.6\ F_R + 0.5\ F_A$
P_0 is always $\geq F_R$

P_0 = Static equivalent radial load
F_R = Radial load
F_A = Thrust load



Dynamic equivalent radial load and life calculation examples

Bearing size: 309R
Speed = 2000 RPM
Basic dynamic load rating (C) = 13200 lbf
$ZD^2 = 4.69$

Case 1
Radial load (F_R) = 1890
Equivalent load (P) = $X F_R + Y F_A$
$P = F_R = 1890$
Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{13200}{1890}\right)^3 = 341 \times 10^6$ Rev.

or
Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{13200}{1890}\right)^3$
= 2839 Hrs

Case 2
Radial load (F_R) = 1890
Thrust load (F_A) = 1250
Equivalent load (P) = $XF_R + YF_A$
$F_A/ZD^2 = 1250/4.69 = 267$
X = 0.44
Y = 1.15
$P = 0.44 \times 1890 + 1.15 \times 1250 = 2269$
Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{13200}{2269}\right)^3 = 197 \times 10^6$ Rev.

or
Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{13200}{2269}\right)^3$
= 1641 Hrs

Case 3
Thrust load (F_A) = 1250
Equivalent load (P) = YF_A
$F_A/ZD^2 = 1250/4.69 = 267$
Y = 1.15
$P = 1.15 \times 1250 = 1438$
Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{13200}{1438}\right)^3 = 773 \times 10^6$ Rev.

or
Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{13200}{1438}\right)^3$
= 6646 Hrs

Dynamic equivalent radial load

$P = X F_R + Y F_A$

P = Dynamic equivalent radial load
F_R = Radial load
F_A = Thrust load
X = Radial load factor
Y = Thrust load factor
Z = Number of balls
D = Ball diameter
e = Limiting factor for F_A/F_R

Contact Angle	$\frac{F_A}{ZD^2}$		Tandem DT Mounting		DB or DF Mounting				e
			$F_A/F_R > e$		$F_A/F_R \leq e$		$F_A/F_R > e$		
	Units N, mm	Units lb, in	X	Y	X	Y	X	Y	
15°	0.172	25	0.44	1.47	1	1.65	0.72	2.39	0.38
	0.345	50		1.40		1.57		2.28	0.40
	0.689	100		1.30		1.46		2.11	0.43
	1.03	150		1.23		1.38		2.00	0.46
	1.38	200		1.19		1.34		1.93	0.47
	2.07	300		1.12		1.26		1.82	0.50
	3.45	500		1.02		1.14		1.66	0.55
	5.17	750		1.00		1.12		1.63	0.56
	6.89	1 000		1.00		1.12		1.63	0.56

For tandem DT, when $F_A/F_R < e$, use X = 1.0, Y = 0
Values of Y for loads not shown are obtained from chart below

Life rating

$L10 = \left(\frac{C}{P}\right)^3$ (millions of revolutions)

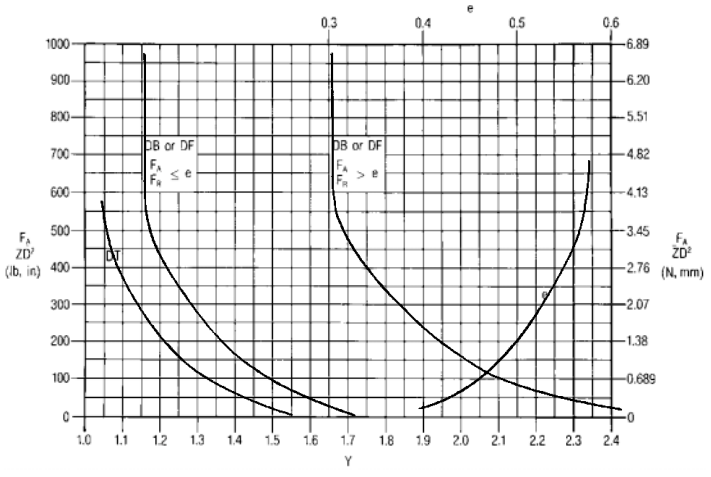
or

$L10h = \frac{10^6}{60n}\left(\frac{C}{P}\right)^3$ (Hours)

For DB or DF Mounting:
C = Duplex pair dynamic radial load rating (from duplex bearing tables)
or
C = Single-row dynamic radial load rating times $(i)^{0.7}$, where i = 2
For tandem mounting:
C = Single-row dynamic radial load rating times $(i)^{0.7}$, where i = number of bearings in set
P = Dynamic equivalent radial load
n = Speed in RPM

Static equivalent radial load

$P_0 = 1.0 F_R + 0.94 F_A$
P_0 = Static equivalent radial load
F_R = Radial load
F_A = Thrust load



Dynamic equivalent radial load and life calculation examples

Bearing size: 309 RDU (DB or DF Pair)
Speed: 2000 RPM
Duplex pair basic dynamic radial load
Rating (C) = 21500 lbf
ZD^2 = 4.69

Case 1

Radial load (F_R) = 1890
Thrust load (F_A) = 1250
Equivalent load (P) = X F_R + Y F_A
F_A/F_R = 1250/1890 = 0.66
F_A/ZD^2 = 1250/4.69 = 267
Since F_A/F_R > e, X = 0.72, Y = 1.86
P = 0.72 × 1890 + 1.86 × 1250 = 3686

Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{21500}{3686}\right)^3 = 198 \times 10^6$ Rev.

or

Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{21500}{3686}\right)^3$

= 1654 Hrs

Case 2

Radial load (F_R) = 1890
Thrust load (F_A) = 450
Equivalent load (P) = X F_R + Y F_A
F_A/F_R = 450/1890 = 0.24
F_A/ZD^2 = 450/4.69 = 96
Since F_A/F_R < e, X = 1.0, Y = 1.46
P = 1.0 × 1890 + 1.46 × 450 = 2547

Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{21500}{2547}\right)^3 = 601 \times 10^6$ Rev.

or

Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{21500}{2547}\right)^3$

= 5012 Hrs

Case 3

Thrust load (F_A) = 1250
Equivalent load (P) = X F_R + Y F_A
F_A/F_R = 1250/0 = ∞
F_A/ZD^2 = 1250/4.69 = 267
Since F_A/F_R > e, Y = 1.86
P = 1.86 × 1250 = 2325

Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{21500}{2325}\right)^3 = 791 \times 10^6$ Rev.

or

Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{21500}{2325}\right)^3$

= 6590 Hrs

Bearing size: 309 RDT
3 bearings in tandem
Speed: 2000 RPM
Single-row basic dynamic radial
Load Rating (C) = 13200 lbf
ZD^2 = 4.69

Case 1

Thrust load (F_A) = 2500
Equivalent load (P) = X F_R + Y F_A
F_A/F_R = 2500/0 = ∞
F_A/ZD^2 = 2500/4.69 = 533
Since F_A/F_R > e, X = 0.44, Y = 1.02
P = 1.02 × 2500 = 2550
Load rating = $(i)^{0.7} \times 13200$
= $(3)^{0.7} \times 13200 = 28510$

Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{28510}{2550}\right)^3 = 1398 \times 10^6$ Rev.

or

Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{28510}{2550}\right)^3$

= 11650 Hrs

Case 2

Radial load (F_R) = 1890
Thrust load (F_A) = 2500
Equivalent load (P) = X F_R + Y F_A
F_A/F_R = 2500/1890 = 1.32
F_A/ZD^2 = 2500/4.69 = 533
Since F_A/F_R > e, X = 0.44, Y = 1.02
P = 0.44 × 1890 + 1.02 × 2550 = 3382
Load rating = $(i)^{0.7} \times 13200$
= $(3)^{0.7} \times 13200 = 28510$

Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{28510}{3382}\right)^3 = 599 \times 10^6$ Rev.

or

Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{28510}{2550}\right)^3$

= 4992 Hrs