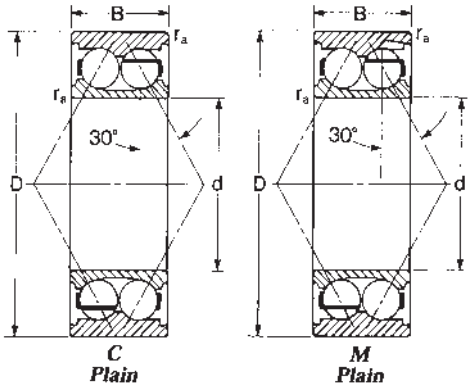


MRC double-row angular contact ball bearings are manufactured in two main types: C-type (Conrad construction) and M-type (maximum capacity with filling notches). Each of the two rows has a 30˚ contact angle.

C-type

Conrad construction, or C-type, double-row ball bearings have contact angles that converge outside the bearing, thereby increasing resistance to misalignment. This type does not have filling notches. These bearings are recommended for applications where single-row ball bearings are inadequate, but radial loads are not so great as to suggest a filling-notch bearing. They will take heavy radial loads and axial loads equally in either direction. The C-type design fully meets the requirements of American Petroleum Institute (API) Specification 610.

Both the inner and the outer rings have closure grooves. These bearings are available with seals, shields, and snap-rings.

M-type

Maximum capacity double-row ball bearings have filling notches on one side to permit assembling the maximum number of balls into the bearing. Contact angles converge outside the bearing. All inner and outer rings have closure grooves. These bearings may be equipped with seals, shields, and snap-rings. The M-type bearing has very heavy radial capacity. It also has thrust capacity in one direction, with the ability to accommodate light thrust load in the reversing direction.

Part numbers on M-type double-row bearings are normally located on either the side face or the O.D. surface of the bearing.The side face marking is always on the side opposite the filling notch and the O.D. marking is offset from the center away from the filling notch. Therefore, double sealed or shielded bearings with the filling notch covered from view can be oriented correctly.

Ball Cages and Types

The cage supplied with C-type and M-type bearings is a one-piece crown-type of heat-treated pressed steel. It is snapped into place after the full quota of balls has been introduced between the inner and outer ring.

The older MRC 5000 series double-row ball bearings were made in three series — 5200 Light, 5300 Medium, and 5400 Heavy — each with progressively larger cross sections. These old-style 5000 type double-rows were available in the SB Conrad and maximum capacity configurations. The SB Conrad version had contact angles which diverged inwardly, thereby increasing resistance to misalignment. The maximum capacity version had contact angles which converged inwardly, giving it the capability of handling small amounts of misalignment. It also had filling notches on both sides, for the introduction of a maximum complement of balls.

Our double-row ball bearings are available in the C-type (Conrad construction) and M-type (with filling notches on one side only). Both types feature inwardly diverging contact angles, which provide greater rigidity than found in the previous double-row filling-notch type bearings. A unique manufacturing system utilizing "common parts" is employed in the manufacture of these bearings. Using a minimum number of components, the system provides greater flexibility for producing either Conrad or maximum capacity types as open bearings or with a variety of closures. Twenty-four variations of a single bearing size can be manufactured to solve your application problems.

The chart on pages 85-86 outlines the suffixes and widths of MRC 5000 series bearings. The data on the chart do not represent actual availability of double-row products. These data are intended to be used as references for interchanging. Current style double-rows appear next to their old-style counterparts that are the same width.

MRC Double-Row Suffix Identification Summary

Suffix	Description
B	Rigid construction, maximum capacity.
BK	Rigid construction, maximum capacity, standard width.
C	Conrad, rigid construction, standard width.
C1	1/8″ additional width from standard. 5205C1 & 5212C1 are 1/16″ wider than standard.
F	One shield
FF	Two shields
G	Snap-ring
K	Standard width
M	Maximum capacity, rigid construction, standard width.
M1	1/8″ additional width from standard. 5205M1 & 5212M1 are 1/16″ wider than standard.
Plain	Maximum capacity, nonrigid construction. Narrow width in 5200 series, extra width is required with closures.
S	Conrad construction (Note: always combined with additional suffix letters)
SB	Conrad, rigid construction, narrow width. Extra width is required with closures.
SBK	Conrad, rigid construction, standard width.
Z	One seal
ZZ	Two seals

Basic Bearing Number	Old—Style Suffix	New—Style Suffix	Width (inches)
5200 Series			
5106	SBZZ		29/32
5200	SB		9/16
	SBKF		9/16
	SBKFF		9/16
	SBKZ		9/16
	SBKZZ		9/16
5201	SB		5/8
	SBFG		5/8
	SBKF		5/8
	SBKFF		5/8
	SBKFFG		5/8
	SBKFG		5/8
	SBKZ		5/8
	SBKZZ		5/8
5202	Plain		5/8
	SB		5/8
	SBFG		11/16
	SBKF		5/8
	SBKFF		5/8
	SBKFG		5/8
	SBKZZ		5/8
5203	SB		11/16
	SBKF		11/16
	SBKFF		11/16
	SBKFFG		11/16
	SBKFG		11/16
	SBKZ		11/16
	SBKZZ		11/16
5204	Plain		3/4
	K	M	13/16
	KF	MF	13/16
	SB		3/4
	SBK	C	13/16
	SBKF	CF	13/16
	SBKFF	CFF	13/16
	SBKFFG	CFFG	13/16
	SBKFG	CFG	13/16
	SBKG	CG	13/16
	SBKZ	CZ	13/16
5205	F	MF1	7/8
	K	M	13/16
	KG	MG	13/16
	Plain		3/4
	SB		3/4
	SBF	CF1	7/8
	SBK	C	13/16
	SBKF	CF	13/16
	SBKFF	CFF	13/16
	SBKFG	CFG	13/16
	SBKG	CG	13/16
	—	C1, M1	7/8
5206	F	MF1	1 1/16
	K	M	15/16
	KF	MF	15/16
	KFF	MFF	15/16
	KG	MG	15/16
	Plain		3/4
	SBF	CF1	1 1/16
	SBK	C	15/16
	SBKF	CF	15/16
	SBKFF	CFF	15/16
	SBKFFG	CFFG	15/16
	SBKFG	CFG	15/16
	SBKG	CG	15/16
	SBZZ	CZZ1	1 1/16
	SBKZZG	CZZG1	1 1/16
	—	C1, M1	1 1/16
5207	F	MF1	1 3/16
	K	M	1 1/16
	KF	MF	1 1/16
	KFF	MFF	1 1/16
	KFG	MFG	1 1/16
	KG	MG	1 1/16
	Plain		7/8
	SBK	C	1 1/16
	SBKF	CF	1 1/16
	SBKFF	CFF	1 1/16
	SBKFG	CFG	1 1/16
	SBKFFG	CFFG	1 1/16
	SBKG	CG	1 1/16
	—	C1, M1	1 3/16
5208	BKF	MF	1 3/16
	BKFF	MFF	1 3/16
	K	M	1 3/16
	KF	MF	1 3/16
	KFF	MFF	1 3/16
	KFG	MFG	1 3/16
	KG	MG	1 3/16
	Plain		1
	SBK	C	1 3/16
	SBKF	CF	1 3/16
	SBKFF	CFF	1 3/16
	SBKFG	CFG	1 3/16
	SBKG	CG	1 3/16
5209	K	M	1 3/16
	KF	MF	1 3/16
	KG	MG	1 3/16
	Plain		1
	SBK	C	1 3/16
	SBKF	CF	1 3/16
	SBKFF	CFF	1 3/16
5210	K	M	1 3/16
	KF	MF	1 3/16
	KFF	MFF	1 3/16
	KG	MG	1 3/16
	Plain		1
	—	C	1 3/16

Basic Bearing Number	Old—Style Suffix	New—Style Suffix	Width (inches)
5300 Series			
5300	SB		¾
5301	SB		¾
5302	Plain		¾
	SB		¾
5303	G		⅞
	KF		⅞
	KFG		⅞
	SB		⅞
	SBG		⅞
	SBKF		⅞
	SBKFF		⅞
	SBKFG		⅞
5304	F	MF1	1
	Plain	M	⅞
	SB	C	⅞
	SBF	CF1	1
	SBG	CG	⅞
	SBKF	CF	⅞
	SBKFF	CFF	⅞
	SBKFFG	CFFG	⅞
	SBKFG	CFG	⅞
	—	C1, M1	1
5305	F		1⅛
	FG		1⅛
	G	MG	1
	KFF	MFF	1
	Plain	M	1
	SB	C	1
	SBF		1⅛
	SBFG		1⅛
	SBG	CG	1
	SBKF	CF	1
	SBKFF	CFF	1
	SBKFG	CFG	1
5306	B	M	1 3/16
	BKFF	MFF	1 3/16
	F	MF1	1 5/16
	FG	MFG1	1 5/16
	G	MG	1 3/16
	KF	MF	1 3/16
	KFF	MFF	1 3/16
	KFG	MFG	1 3/16
	Plain	M	1 3/16
	—	C1, M1	1 5/16
	—	C	1 3/16

Basic Bearing Number	Old—Style Suffix	New—Style Suffix	Width (inches)
5307	BKFF	MFF	1⅜
	F	MF1	1½
	FG	MFG1	1½
	G	MG	1⅜
	KF	MF	1⅜
	KFG	MFG	1⅜
	Plain	M	1⅜
	—	C1, M1	1½
	—	C	1⅜
5308	BG	MG	1 7/16
	F	MF1	1 9/16
	FG	MFG1	1 9/16
	G	MG	1 7/16
	Plain	M	1 7/16
	—	C	1 7/16
	—	C1, M1	1 9/16
5309	B	M	1 9/16
	F	MF1	1 11/16
	FG	MFG1	1 11/16
	G	MG	1 9/16
	Plain	M	1 9/16
	—	C	1 9/16
	—	C1, M1	1 11/16
5310	F	MF1	1⅞
	FG	MFG1	1⅞
	G	MG	1¾
	KF	MF	1¾
	KFG	MFG	1¾
	Plain	M	1¾
	—	C	1¾
	—	C1, M1	1⅞
5311	F	MF1	2 1/16
	FG	MFG1	2 1/16
	G	MG	1 15/16
	Plain	M	1 15/16
	—	C	1 15/16
	—	C1, M1	2 1/16
5312	F	MF1	2¼
	FG	MFG1	2¼
	G	MG	2⅛
	Plain	M	2⅛
	—	C	2⅛
	—	C1, M1	2¼
5313	F	MF1	2 7/16
	FG	MFG1	2 7/16
	G	MG	2 5/16
	Plain	M	2 5/16
	—	C	2 5/16
	—	C1, M1	2 7/16
5314	F	MF1	2⅝
	G	MG	2½
	KF	MF	2½
	KFG	MFG	2½
	Plain	M	2½
	—	C	2½
	—	C1, M1	2⅝

Basic Bearing Number	Old—Style Suffix	New—Style Suffix	Width (inches)
5315	F	MF1	2 13/16
	G	MG	2 11/16
	Plain	M	2 11/16
	—	C	2 11/16
	—	C1, M1	2 13/16
5316	G	MG	2 11/16
	Plain	M	2 11/16
	—	C	2 11/16
5317	Plain		2⅞
	—	C	2⅞
5318	Plain		2⅞
	—	C	2⅞
5319	Plain		3 1/16
	—	C	3 1/16
5320	Plain		3¼
5321	Plain		3 7/16
5322	Plain		3⅝
5400 Series			
5403	Plain		1 3/16
5404	Plain		1⅜
5405	Plain		1⅜
5406	Plain		1 9/16
	—	C	1 9/16
5407	G		1¾
	Plain		1¾
	—	C	1¾
5408	Plain		1 15/16
	—	C	1 15/16
5409	G		2⅛
	Plain		2⅛
	—	C	2⅛
5410	F		2 7/16
	Plain		2 5/16
	—	C	2 5/16
5411	F		2⅝
	G		2½
	Plain		2½
	—	C	2½
5412	Plain		2⅝
	—	C	2⅝
5413	Plain		2 13/16
	—	C	2 13/16
5414	Plain		3⅛
	—	C	3⅛
5415	Plain		3¼
	—	C	3¼
5416	Plain		3 7/16
	—	C	3 7/16
5417	Plain		3⅝
	—	C	3⅝
5418	Plain		3⅞
	—	C	3⅞
5419	Plain		4 3/16

Bearing numbers of MRC double-row ball bearings produced before 1983 differ from the C- and M-types listed in this catalog. Shown below is the interchange of pre-1983 bearing numbers with the C- and M-types.

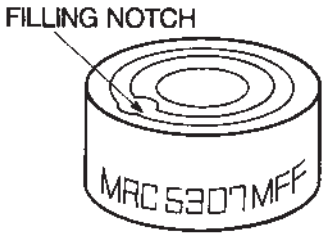
5000 Series double-row bearings not listed here maintain the original bearing number and must be specified by that number when ordering.

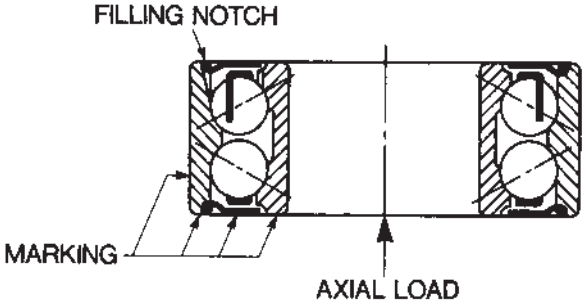
MRC Bearing Numbers	
Prior to 1983	**Superseded by**
5200SB	**5200C***
5200SBKF	**5200CF***
5200SBKFF	**5200CFF***
5200SBKZ	**5200CZ***
5200SBKZZ	**5200CZZ***
5201SB	**5201C***
5201SBKF	**5201CF***
5201SBKFF	**5201CFF***
5201SBKZ	**5201CZ***
5201SBKZZ	**5201CZZ***
5202SB	**5202C***
5202SBKFF	**5202CFF***
5202SBFG	**5202CFG1***
5202SBKFG	**5202CFG***
5202SBKZ	**5202CZ***
5202SBKZZ	**5202CZZ***
5203SB	**5203C***
5203SBKF	**5203CF***
5203SBKFF	**5203CFF***
5203SBKFG	**5203CFG***
5203SBKZ	**5203CZ***
5203SBKZZ	**5203CZZ***
5204SBK	**5204C**
5204SBKF	**5204CF**
5204SBKFF	**5204CFF**
5204SBKFG	**5204CFG**
5204SBKFFG	**5204CFFG**
5204SBKG	**5204CG**
5204SBKZ	**5204CZ**
5205SBK	**5205C**
5205SBF	**5205CF1**
5205SBKF	**5205CF**
5205SBKFF	**5205CFF**
5205SBKG	**5205CG**
5206SBK	**5206C**
5206SBF	**5206CF1**
5206SBKF	**5206CF**
5206SBKFF	**5206CFF**
5206SBKFG	**5206CFG**
5206SBKG	**5206CG**
5206SBZZ	**5206CZZ1**
5207F	**5207MF1**
5207SBK	**5207C**
5207SBKF	**5207CF**
5207SBKFF	**5207CFF**
5207SBKFG	**5207CFG**
5207SBKG	**5207CG**
5208SBK	**5208C**
5208SBKF	**5208CF**
5208SBKFF	**5208CFF**
5208SBKFG	**5208CFG**
5208SBKG	**5208CG**
5209K	**5209M**
5209KF	**5209MF**
5209SBFF	**5209CFF**
5209KG	**5209MG**
5210K	**5210M**
5210KF	**5210MF**
5210KFF	**5210MFF**
5210KG	**5210MG**

MRC Bearing Numbers	
Prior to 1983	**Superseded by**
5211K	**5211M**
5211KF	**5211MF**
5211KFG	**5211MFG**
5211KG	**5211MG**
5212F	**5212MF1**
5212FG	**5212MFG1**
5212K	**5212M**
5212KF	**5212MF**
5212KFG	**5212MFG**
5212KG	**5212MG**
5213K	**5213M**
5213KF	**5213MF**
5213KFG	**5213MFG**
5213KG	**5213MG**
5214K	**5214M**
5214KF	**5214MF**
5214KG	**5214MG**
5215K	**5215M**
5215KF	**5215MF**
5215KFF	**5215MFF**
5215KFG	**5215MFG**
5215KG	**5215MG**
5216K	**5216M**
5216KF	**5216MF**
5216KFG	**5216MFG**
5216KG	**5216MG**
5217K	**5217M**
5217KF	**5217MF**
5217KG	**5217MG**
5218K	**5218M**
5218KF	**5218MF**
5218KG	**5218MG**
5219	**5219**
5219G	**5219G**
5220	**5220**
5220G	**5220G**
5221	**5221**
5222	**5222**
5222KF	**5222KF**
5300SB	**5300C***
5301SB	**5301C***
5302SB	**5302C***
5303SB	**5303C***
5303SBG	**5303CG***
5303SBKF	**5303CF***
5303SBKFF	**5303CFF***
5303SBKFG	**5303CFG***
5304SB	**5304C**
5304SBF	**5304CF1**
5304SBKF	**5304CF**
5304SBKFF	**5304CFF**
5305SB	**5305C**
5305SBG	**5305CG**
5305SBKF	**5305CF**
5305SBKFF	**5305CFF**
5305SBKFG	**5305CFG**

MRC Bearing Numbers	
Prior to 1983	**Superseded by**
5306	**5306M**
5306F	**5306MF1**
5306FG	**5306MFG1**
5306G	**5306MG**
5306KF	**5306MF**
5306KFF	**5306MFF**
5306KFG	**5306MFG**
5307	**5307M**
5307F	**5307MF1**
5307FG	**5307MFG1**
5307G	**5307MG**
5307KF	**5307MF**
5307KFG	**5307MFG**
5308	**5308M**
5308F	**5308MF1**
5308FG	**5308MFG1**
5308G	**5308MG**
5309	**5309M**
5309B	**5309M**
5309F	**5309MF1**
5309FG	**5309MFG1**
5309G	**5309MG**
5310	**5310**
5310F	**5310MF1**
5310FG	**5310MFG1**
5310G	**5310MG**
5310KF	**5310MF**
5310KFG	**5310MFG**
5311	**5311M**
5311F	**5311MF1**
5311FG	**5311MFG1**
5311G	**5311MG**
5312	**5312M**
5312F	**5312MF1**
5312FG	**5312MFG1**
5312G	**5312MG**
5313	**5313M**
5313F	**5313MF1**
5313FG	**5313MFG1**
5313G	**5313MG**
5314	**5314M**
5314F	**5314MF1**
5314G	**5314MG**
5314KF	**5314MF**
5315	**5315M**
5315F	**5315MF1**
5315G	**5315MG**
5316	**5316M**
5316G	**5316MG**
5317	**5317**
5318	**5318**
5319	**5319**
5320	**5320**
5321	**5321**
5322	**5322**

*Listed for information only. Not currently in production. Use SB types.





Since the filling notch row is not visible on 5000MFF and 5000MZZ bearings, it is necessary to identify which row of balls has the notch in those cases where the bearing will be subjected to axial load. Axial load should be carried on the non-filling notch row. A moderate reversing axial load is permissible on the filling notch row.

The filling notch is oriented in relation to the identification marking on the bearing, which will be found in one of the following locations:

- Side face of the outer ring
- Side face of the inner ring
- OD surface of the outer ring
- Face of the closure

In each case the marking will occur on the side of the bearing opposite the filling notch as illustrated above.

A typical application of a 5000MFF or 5000MZZ bearing is shown above in which it is subjected to an axial load in an upward direction. The bearing should be mounted with the filling notch up so that the axial load is taken by the bottom, non-filling notch row.

5200 and 5300 Series

Bore Diameter d				Axial Internal Clearance															
Over		Including		C2				Normal C0				C3				C4			
				.001 mm		.0001 in		.001 mm		.0001 in		.001 mm		.0001 in		.001 mm		.0001 in	
mm	in	mm	in	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
		10	.3937	1	11	0	4	5	21	2	8	12	28	5	11	25	45	10	18
10	.3937	18	7087	1	12	0	5	6	23	2	9	13	31	5	12	27	47	11	19
18	.7087	24	.9449	2	14	1	6	7	25	3	10	16	34	6	13	28	48	11	19
24	.9449	30	1.1811	2	15	1	6	8	27	3	11	18	37	7	15	30	50	12	20
30	1.1811	40	1.5748	2	16	1	6	9	29	4	11	21	40	8	16	33	54	13	21
40	1.5748	50	1.9685	2	18	1	7	11	33	4	13	23	44	9	17	36	58	14	23
50	1.9685	65	2.5591	3	22	1	9	13	36	5	14	26	48	10	19	40	63	16	25
65	2.5591	80	3.1496	3	24	1	9	15	40	6	16	30	54	12	21	46	71	18	28
80	3.1496	100	3.9370	3	26	1	10	18	46	7	18	35	63	14	25	55	83	22	33
100	3.9370	110	4.3307	4	30	2	12	22	53	9	21	42	73	17	29	65	96	26	38

Bore Diameter d				Radial Internal Clearance															
Over		Including		C2				Normal C0				C3				C4			
				.001 mm		.0001 in		.001 mm		.0001 in		.001 mm		.0001 in		.001 mm		.0001 in	
mm	in	mm	in	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
		10	.3937	0.6	7	0	2.4	3	13	1.2	5	8	18	3	7	15	27	6	11
10	.3937	18	.7087	0.6	7	0	3	3.6	14	1.2	5	8	18	3	7	18	27	7	11
18	.7087	24	.9449	1.2	8	0.6	3.6	4	15	1.8	6	11	21	4	8	18	27	7	11
24	.9449	30	1.1811	1.2	9	0.6	3.6	5	16	1.8	7	11	23	4	9	18	31	7	12
30	1.1811	40	1.5748	1.2	10	0.6	3.6	5	17	2.4	7	12	25	5	10	21	33	8	13
40	1.5748	50	1.9685	1.2	11	0.6	4	7	20	2.4	8	12	25	5	10	21	36	8	14
50	1.9685	65	2.5591	1.8	13	0.6	5	8	22	3	8	15	27	6	11	25	38	10	15
65	2.5591	80	3.1496	1.8	14	0.6	5	9	24	3.6	10	18	33	7	13	27	44	11	17
80	3.1496	100	3.9370	1.8	16	0.6	6	11	28	4	11	21	38	8	15	33	50	13	20
100	3.9370	110	4.3307	2.4	18	1.2	7	13	32	5	13	25	44	10	17	40	58	16	23

5400 Series

Bore Diameter d				Radial Internal Clearance															
Over		Including		C2				Normal C0				C3				C4			
				.001 mm		.0001 in		.001 mm		.0001 in		.001 mm		.0001 in		.001 mm		.0001 in	
mm	in	mm	in	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
		30	1.1811	1	8	0.4	3	2	13	1	5	13	23	5	9	20	38	8	15
30	1.1811	40	1.5748	1	8	0.5	3	6	13	2	5	15	23	6	9	23	41	9	16
40	1.5748	50	1.9685	1	8	0.5	3	6	15	2	6	15	25	6	10	23	44	9	17
50	1.9685	65	2.5591	1	11	0.5	4	6	15	2	6	15	28	6	11	25	45	10	18
65	2.5591	70	2.7559	1	11	0.5	4	6	18	2	7	18	31	7	12	28	48	11	19
70	2.7559	80	3.1496	0	6	0	2	6	18	2	7	18	33	7	13	33	48	13	19
80	3.1496	90	3.5433	0	7	0	3	7	23	3	9	23	44	9	17	44	65	17	26

Dynamic Rating

To obtain dynamic thrust rating multiply dynamic radial rating C by the factor shown below.

Size	Factor
5200SB-5203SB 5300SB-5303SB 5403C-5414C	0.71
5204C&M-5218C&M 5304C&M-5319C&M	0.81

Example:

Bearing size: 5307C
Basic dynamic radial load rating (C) =11100 lbf
Thrust rating factor = 0.81
Thrust rating = 0.81 × 11100 = 8991 lbf

Sizes 5415C-5419C have 0˚ contact angles and are not included in the above tables. When thrust load is present, the equivalent radial load should be used to determine life.

Static Rating

To obtain static thrust rating multiply static radial rating C_0 by the factor shown below.

Size	Factor
5200SB-5203SB 5300SB-5303SB 5204C&M-5206C&M 5403C-5414C	0.57
5207C&M-5218C&M 5304C&M-5319C&M	0.66

Example:

Bearing size: 5214M
Basic static radial load rating (C_0) = 28100 lbf
Thrust rating factor = 0.66
Thrust rating = 0.66 × 28100 = 18546 lbf

Double-row angular contact ball bearings with non-standard extra wide width are currently available as a retrofit kit. These replacement units consist of a standard width double-row angular contact ball bearing and two specially designed spacers packaged together in a single carton.

Spacers
The Extra Width Double-Row Angular Contact Ball Bearing Retrofit Kit is simple to use. When used with bearings without snap rings, place both spacers on the same side, as shown in Figure 1.

With snap ring bearings, the inner ring spacer must be installed on the side opposite the snap ring, as shown in Figure 2. The outer spacer is not needed in applications where the bearing's snap ring controls the axial location of the outer ring in the housing.

The spacers accommodate slight variations in the shaft and housing seat width. The inner ring and spacer can be secured to the shaft with a retaining ring or threaded locknut. If a locknut is used, the amount of clamping force can be regulated to make slight adjustments in the shaft's axial location. The spacer rings yield slightly when an axial clamping force is applied. The spacer rings also exert a reaction force, which helps maintain the initial clamping force and helps prevent the inner ring from becoming loose on the shaft. The same circumstances apply to the outer ring spacers when an end cap is used to clamp the bearing's outer ring against a housing shoulder.

Because the spacer rings are designed to yield slightly when axial clamping forces are applied, the spacer rings should always be replaced with new spacer rings anytime the bearing is removed, replaced or reinstalled.

Materials for Rings, Balls and Spacers
High-carbon chromium vacuum-processed steel (SAE 52100) is used for all balls and rings. Machined and roll formed spacer rings are fabricated from 1018 carbon steel and 304 stainless steel.

Mounting Instructions

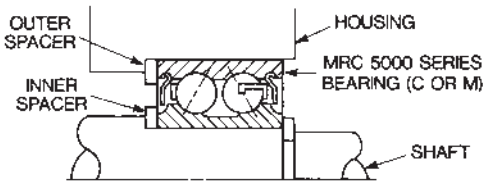


Figure 1

Without Snap Ring

1. Install inner and outer ring spacers onto the shaft and into the housing bore respectively.
2. Install bearing in accordance with normal mounting instructions.
3. If any locking devices such as snap rings or locknuts are normally used to secure the bearing on the shaft or in the housing be sure they are properly installed.
4. These inner and outer ring spacers are adjusted to proper width prior to installation. During bearing installation their width may be slightly altered to accommodate variations in shaft and housing shoulder distances. As a consequence, when a new extra width retrofit bearing kit is installed the new spacer rings supplied with the kit should always be used and the old spacers discarded.

Mounting Instructions

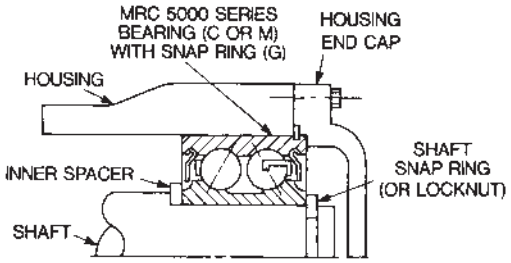


Figure 2

With Snap Ring

1. Install the inner ring spacer onto the shaft. The outer ring spacer is not used with a snap ring bearing and may be discarded.
2. Install bearing in accordance with normal mounting instructions.
3. If any locking devices such as snap rings, locknuts or end caps are normally used to secure the bearing on the shaft or in the housing be sure they are properly installed.
4. These inner and outer ring spacers are adjusted to proper width prior to installation. During bearing installation their width may be slightly altered to accommodate variations in shaft and housing shoulder distances. As a consequence, when a new extra width retrofit bearing kit is installed the new spacer rings supplied with the kit should always be used and the old spacers discarded.

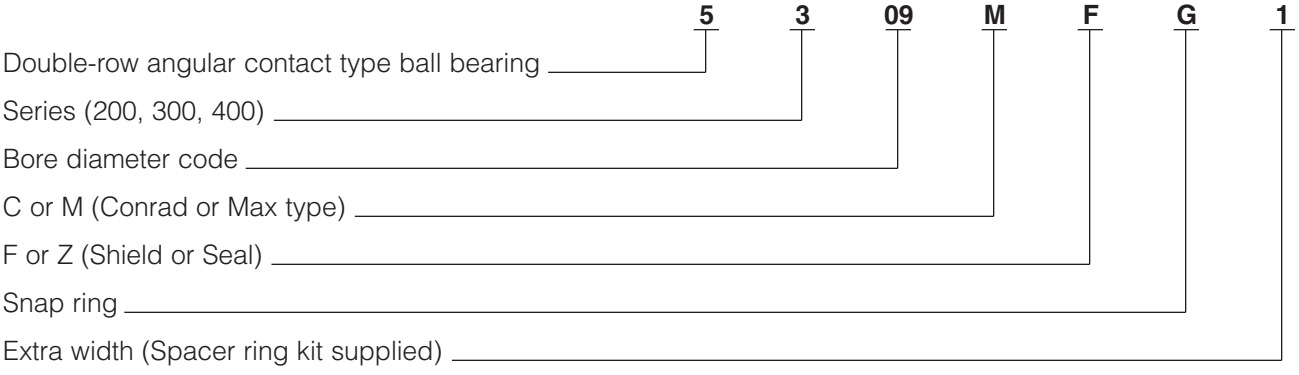
Extra Wide 5000 Series Part Numbers

A listing of available part numbers appears below. This listing may change with sizes being added or deleted based on demand.

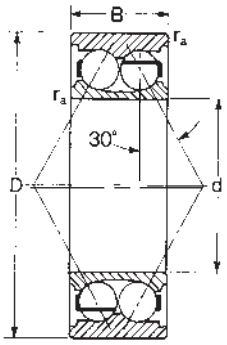
MRC Part Number	Width including Spacers		
		Inches	mm
5205CF1	7/8	.8750	22.23
5205MF1	7/8	.8750	22.23
5206CF1	1 1/16	1.0625	26.99
5206MF1	1 1/16	1.0625	26.99
5206SBZZ*	1 1/16	1.0625	26.99
5212MF1	1 1/2	1.5000	38.10
5304CF1	1	1.0000	25.40
5304MF1	1	1.0000	25.40
5305CF1	1 1/8	1.1250	28.58
5305MFG1	1 1/8	1.1250	28.58
5306MFG1	1 5/16	1.3125	33.34
5306MF1	1 5/16	1.3125	33.34
5307MF1	1 1/2	1.5000	38.10
5307MFG1	1 1/2	1.5000	38.10
5308MFG1	1 9/16	1.5625	39.69
5308MF1	1 9/16	1.5625	39.69
5309MFG1	1 11/16	1.6875	42.86
5309MF1	1 11/16	1.6875	42.86
5310MFG1	1 7/8	1.8750	47.63
5310MF1	1 7/8	1.8750	47.63
5311MFG1	2 1/16	2.0625	52.39
5311MF1	2 1/16	2.0625	52.39
5312MFG1	2 1/4	2.2500	57.15
5312MF1	2 1/4	2.2500	57.15
5313MFG1	2 7/16	2.4375	61.91
5313MF1	2 7/16	2.4375	61.91
5315MF1	2 13/16	2.8125	71.44

*Currently stocked. No spacer needed.

Nomenclature



5200-C bearings are used with moderate to heavy radial loads, two-directional thrust loads, or a combination of both.




CF/SBKF
One Shield


CZ/SBKZ
One Seal


CFF/SBKFF
Two Shields


CZZ/SBKZZ
Two Seals


CFZ/SBKFZ
Shield & Seal


CG/SBKG
Snap-Ring


CFG/SBKFG
One Shield
& Snap-Ring


CZG
One Seal
& Snap-Ring


CFFG/
SBKFFG
Two Shields
& Snap-Ring


CZZG
Two Seals
& Snap-Ring


CFZG
Shield, Seal
& Snap-Ring

MRC Bearing Number	Bore d		Outside Diameter D		Width B		Fillet Radius[1] r_a		Basic Radial Load Rating				Speed Rating[2]		
									Dynamic C[3]		Static C_0				
	mm	in	mm	in	mm	in	mm	in	N	lbf	N	lbf	Open and Shielded Grease RPM	Oil RPM	Single and Double Sealed Grease RPM
5200-SB	10	.3937	30	1.1811	14.29	.5625	.64	.025	7 610	1 710	4 300	967	16 000	22 000	16 000
5201-SB	12	.4724	32	1.2598	15.88	.6250	.64	.025	10 400	2 340	5 600	1 260	15 000	20 000	15 000
5202-SB	15	.5906	35	1.3780	15.88	.6250	.64	.025	11 400	2 560	6 800	1 530	12 000	17 000	12 000
5203-SB	17	.6693	40	1.5748	17.47	.6876	.64	.025	14 300	3 210	8 800	1 980	10 000	15 000	10 000
5204-C	20	.7874	47	1.8504	20.64	.8125	1.0	.04	19 000	4 270	12 000	2 700	9 000	13 000	9 000
5205-C	25	.9843	52	2.0472	20.64	.8125	1.0	.04	20 800	4 680	14 000	3 150	8 000	11 000	8 000
5205-C1	25	.9843	52	2.0472	22.23	.8750	1.0	.04	20 800	4 680	14 000	3 150	8 000	11 000	8 000
5206-C	30	1.1811	62	2.4409	23.81	.9375	1.0	.04	28 600	6 430	20 400	4 590	7 000	9 500	7 000
5206-C1	30	1.1811	62	2.4409	26.99	1.0625	1.0	.04	28 600	6 430	20 400	4 590	7 000	9 500	7 000
5207-C	35	1.3780	72	2.8346	26.99	1.0625	1.0	.04	37 700	8 480	27 500	6 180	6 000	8 000	6 000
5207-C1	35	1.3780	72	2.8346	30.16	1.1875	1.0	.04	37 700	8 480	27 500	6 180	6 000	8 000	6 000
5208-C	40	1.5748	80	3.1496	30.16	1.1875	1.0	.04	44 900	10 100	34 000	7 640	5 600	7 500	5 600
5209-C	45	1.7717	85	3.3465	30.16	1.1875	1.0	.04	48 800	11 000	39 000	8 770	5 000	6 700	5 000
5210-C	50	1.9685	90	3.5433	30.16	1.1875	1.0	.04	48 800	11 000	39 000	8 770	4 800	6 300	4 800
5211-C	55	2.1654	100	3.9370	33.34	1.3125	1.5	.06	57 200	12 900	47 500	10 700	4 300	5 600	4 300
5212-C	60	2.3622	110	4.3307	36.51	1.4375	1.5	.06	70 200	15 800	58 500	13 200	3 800	5 000	3 800
5212-C1	60	2.3622	110	4.3307	38.10	1.5000	1.5	.06	70 200	15 800	58 500	13 200	3 800	5 000	3 800
5213-C	65	2.5591	120	4.7244	38.10	1.5000	1.5	.06	80 600	18 100	73 500	16 500	3 600	4 800	3 600
5214-C	70	2.7559	125	4.9213	39.69	1.5625	1.5	.06	88 400	19 900	80 000	18 000	3 200	4 300	3 200
5215-C	75	2.9528	130	5.1181	41.28	1.6250	1.5	.06	95 600	21 500	88 000	19 800	3 200	4 300	3 200
5216-C	80	3.1496	140	5.5118	44.45	1.7500	2.0	.08	106 000	23 900	95 000	21 400	2 800	3 800	2 800
5217-C	85	3.3465	150	5.9055	49.21	1.9375	2.0	.08	124 000	27 900	110 000	24 700	2 600	3 600	2 600
5218-C	90	3.5433	160	6.2992	52.39	2.0625	2.0	.08	130 000	29 300	120 000	27 000	2 400	3 400	2 400
5219-C	95	3.7402	170	6.6929	55.56	2.1875	2.0	.08	159 000	35 700	146 000	32 800	2 200	3 200	2 200
5220-C	100	3.9370	180	7.0866	60.33	2.3750	2.0	.08	178 000	40 000	166 000	37 300	2 000	3 000	2 000
5221-C	105	4.1339	190	7.4803	65.09	2.5625	2.0	.08	186 000	41 800	180 000	40 500	1 800	2 800	1 800
5222-C	110	4.3307	200	7.8740	69.85	2.7500	2.0	.08	203 000	45 600	200 000	45 000	1 600	2 600	1 600

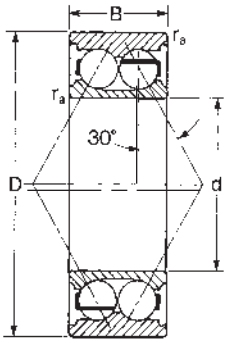
[1] Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear.

[2] Listed values are for pressed steel cage, ABEC-1.
The values have been determined through historical application and practice. For a more complete explanation, see page 274.

[3] Rating for one million revolutions or 500 hours at 33⅓ RPM.

Note: Extra width bearings identified by the suffix C1 are supplied with a retrofit kit described on pages 91, 92.

5300-C bearings are used with heavy radial loads, two-directional thrust loads, or a combination of both.




CF/SBKF
One Shield


CZ/SBKZ
One Seal


CFF/SBKFF
Two Shields


CZZ/SBKZZ
Two Seals


CFZ/SBKFZ
Shield & Seal


CG/SBKG
Snap-Ring


CFG/SBKFG
One Shield
& Snap-Ring


CZG
One Seal
& Snap-Ring


CFFG/
SBKFFG
Two Shields
& Snap-Ring


CZZG
Two Seals
& Snap-Ring


CFZG
Shield, Seal
& Snap-Ring

MRC Bearing Number	Bore d		Outside Diameter D		Width B		Fillet Radius[1] r_a		Basic Radial Load Rating				Speed Rating[2]		
									Dynamic C^{3}		Static C_0		Open and Shielded Grease	Oil	Single and Double Sealed Grease
	mm	in	mm	in	mm	in	mm	in	N	lbf	N	lbf	RPM	RPM	RPM
5300-SB	10	**.3937**	35	**1.3780**	19.05	**.7500**	.64	**.025**	10 600	**2 380**	6 100	**1 370**	15 000	20 000	15 000
5301-SB	12	**.4724**	37	**1.4567**	19.05	**.7500**	1.0	**.04**	11 700	**2 630**	6 800	**1 530**	14 000	18 000	14 000
5302-SB	15	**.5906**	42	**1.6535**	19.05	**.7500**	1.0	**.04**	15 100	**3 390**	9 300	**2 090**	11 000	15 000	11 000
5303-SB	17	**.6693**	47	**1.8504**	22.23	**.8750**	1.0	**.04**	21 600	**4 860**	12 700	**2 860**	11 000	14 000	11 000
5304-C	20	**.7874**	52	**2.0472**	22.23	**.8750**	1.0	**.04**	22 500	**5 060**	14 600	**3 280**	8 500	12 000	8 500
5304-C1	20	**.7874**	52	**2.0472**	25.40	**1.0000**	1.0	**.04**	22 500	**5 060**	14 600	**3 280**	8 500	12 000	8 500
5305-C	25	**.9843**	62	**2.4409**	25.40	**1.0000**	1.0	**.04**	30 700	**6 910**	20 400	**4 590**	7 500	10 000	7 500
5306-C	30	**1.1811**	72	**2.8346**	30.16	**1.1875**	1.0	**.04**	41 600	**9 360**	29 000	**6 520**	6 300	8 500	6 300
5306-C1	30	**1.1811**	72	**2.8346**	33.34	**1.3125**	1.0	**.04**	41 600	**9 360**	29 000	**6 520**	6 300	8 500	6 300
5307-C	35	**1.3780**	80	**3.1496**	34.93	**1.3750**	1.5	**.06**	49 400	**11 100**	34 500	**7 760**	5 600	7 500	5 600
5307-C1	35	**1.3780**	80	**3.1496**	38.10	**1.5000**	1.5	**.06**	49 400	**11 100**	34 500	**7 760**	5 600	7 500	5 600
5308-C	40	**1.5748**	90	**3.5433**	36.51	**1.4375**	1.5	**.06**	60 500	**13 600**	43 000	**9 760**	5 000	6 700	5 000
5308-C1	40	**1.5748**	90	**3.5433**	39.69	**1.5625**	1.5	**.06**	60 500	**13 600**	43 000	**9 760**	5 000	6 700	5 000
5309-C	45	**1.7717**	100	**3.9370**	39.69	**1.5625**	1.5	**.06**	72 800	**16 400**	53 000	**11 900**	4 500	6 000	4 500
5309-C1	45	**1.7717**	100	**3.9370**	42.86	**1.6875**	1.5	**.06**	72 800	**16 400**	53 000	**11 900**	4 500	6 000	4 500
5310-C	50	**1.9685**	110	**4.3307**	44.45	**1.7500**	2.0	**.08**	85 200	**19 200**	64 000	**14 400**	4 000	5 300	4 000
5310-C1	50	**1.9685**	110	**4.3307**	47.63	**1.8750**	2.0	**.08**	85 200	**19 200**	64 000	**14 400**	4 000	5 300	4 000
5311-C	55	**2.1654**	120	**4.7244**	49.21	**1.9375**	2.0	**.08**	106 000	**23 900**	81 500	**18 300**	3 800	5 000	3 800
5311-C1	55	**2.1654**	120	**4.7244**	52.39	**2.0625**	2.0	**.08**	106 000	**23 900**	81 500	**18 300**	3 800	5 000	3 800
5312-C	60	**2.3622**	130	**5.1181**	53.98	**2.1250**	2.0	**.08**	121 000	**27 200**	95 000	**21 400**	3 400	4 500	3 400
5312-C1	60	**2.3622**	130	**5.1181**	57.15	**2.2500**	2.0	**.08**	121 000	**27 200**	95 000	**21 400**	3 400	4 500	3 400
5313-C	65	**2.5591**	140	**5.5118**	58.74	**2.3125**	2.0	**.08**	138 000	**31 100**	108 000	**24 300**	3 200	4 300	3 200
5313-C1	65	**2.5591**	140	**5.5118**	61.91	**2.4375**	2.0	**.08**	138 000	**31 100**	108 000	**24 300**	3 200	4 300	3 200
5314-C	70	**2.7559**	150	**5.9055**	63.50	**2.5000**	2.0	**.08**	153 000	**34 400**	125 000	**28 100**	2 800	3 800	2 800
5314-C1	70	**2.7559**	150	**5.9055**	66.68	**2.6250**	2.0	**.08**	153 000	**34 400**	125 000	**28 100**	2 800	3 800	2 800
5315-C	75	**2.9528**	160	**6.2992**	68.26	**2.6875**	2.0	**.08**	168 000	**37 800**	140 000	**31 500**	2 600	3 600	2 600
5315-C1	75	**2.9528**	160	**6.2992**	71.44	**2.8125**	2.0	**.08**	168 000	**37 800**	140 000	**31 500**	2 600	3 600	2 600
5316-C	80	**3.1496**	170	**6.6929**	68.26	**2.6875**	2.0	**.08**	182 000	**41 000**	156 000	**35 100**	2 400	3 400	2 400
5317-C	85	**3.3465**	180	**7.0866**	73.03	**2.8750**	2.5	**.10**	195 000	**43 900**	176 000	**39 600**	2 200	3 200	2 200
5318-C	90	**3.5433**	190	**7.4803**	73.03	**2.8750**	2.5	**.10**	212 000	**47 700**	196 000	**44 100**	2 000	3 000	2 000
5319-C	95	**3.7402**	200	**7.8740**	77.79	**3.0625**	2.5	**.10**	234 000	**52 700**	224 000	**50 400**	1 900	2 800	1 900
5320-C	100	**3.9370**	215	**8.4646**	82.55	**3.2500**	2.5	**.10**	255 000	**57 300**	255 000	**57 300**	1 800	2 600	1 800
5322-C	110	**4.3307**	240	**9.4488**	92.08	**3.6250**	2.5	**.10**	291 000	**65 400**	305 000	**68 600**	1 700	2 400	1 700

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

[2] Listed values are for pressed steel cage, ABEC-1.

The values have been determined through historical application and practice. For a more complete explanation, see page 274.

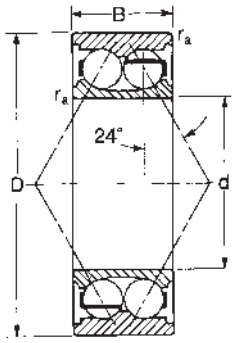
[3] Rating for one million revolutions or 500 hours at 33⅓ RPM.

Note: Extra width bearings identified by the suffix C1 are supplied with a retrofit kit described on pages 91, 92.

5400 Series bearings are used with extremely heavy radial loads, two-directional thrust loads, or a combination of both.

5406-5414 have a 24˚ contact angle per row.

5415-5418 have a 0° contact angle.



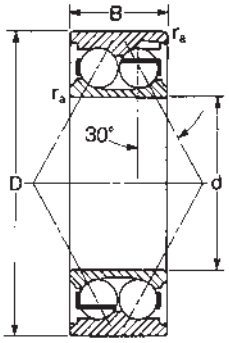
MRC Bearing Number	Bore d		Outside Diameter D		Width B		Fillet Radius[1] r_a		Basic Radial Load Rating				Speed Rating[2]	
									Dynamic C[3]		Static C_0		Grease	Oil
	mm	in	mm	in	mm	in	mm	in	N	lbf	N	lbf	RPM	RPM
5406C	30	**1.1811**	90	**3.5433**	39.69	**1.5625**	1.5	**.06**	67 600	**15 200**	45 000	**10 100**	5 300	7 000
5407C	35	**1.3780**	100	**3.9370**	44.45	**1.7500**	1.5	**.06**	76 100	**17 000**	49 000	**11 000**	4 800	6 300
5408C	40	**1.5748**	110	**4.3307**	49.21	**1.9375**	2.0	**.08**	88 400	**19 900**	57 000	**12 800**	4 300	5 600
5409C	45	**1.7717**	120	**4.7244**	53.98	**2.1250**	2.0	**.08**	112 000	**25 200**	78 000	**17 600**	4 000	5 300
5410C	50	**1.9685**	130	**5.1181**	58.74	**2.3125**	2.0	**.08**	143 000	**32 200**	102 000	**23 000**	3 600	4 800
5411C	55	**2.1654**	140	**5.5118**	63.50	**2.5000**	2.0	**.08**	146 000	**32 900**	102 000	**23 000**	3 200	4 300
5412C	60	**2.3622**	150	**5.9055**	66.68	**2.6250**	2.0	**.08**	159 000	**35 800**	114 000	**25 700**	3 000	4 000
5413C	65	**2.5591**	160	**6.2992**	71.44	**2.8125**	2.0	**.08**	195 000	**43 900**	156 000	**35 100**	2 800	3 800
5414C	70	**2.7559**	180	**7.0866**	79.38	**3.1250**	2.5	**.10**	199 000	**44 800**	156 000	**35 100**	2 400	3 400
5415C	75	**2.9528**	190	**7.4803**	82.55	**3.2500**	2.5	**.10**	212 000	**47 700**	200 000	**45 000**	2 200	3 200
5416C	80	**3.1496**	200	**7.8740**	87.31	**3.4375**	2.5	**.10**	229 000	**51 500**	216 000	**48 600**	2 000	3 000
5417C	85	**3.3465**	210	**8.2677**	92.08	**3.6250**	3.0	**.12**	255 000	**57 300**	255 000	**57 300**	1 900	2 800
5418C	90	**3.5433**	225	**8.8583**	98.43	**3.8750**	3.0	**.12**	281 000	**63 200**	300 000	**67 400**	1 800	2 600

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

[2] Listed values are for pressed steel cage, ABEC-1.
The values have been determined through historical application and practice. For a more complete explanation, see page 274.

[3] Rating for one million revolutions or 500 hours at 33⅓ RPM.

5200M bearings are used with heavy radial loads, two-directional thrust loads, or a combination of both. Thrust load should be carried on the non-filling notch row. Moderate thrust load is permissible on the filling notch row.



MF
One Shield

MZ
One Seal

MFF
Two Shields

MZZ
Two Seals

MFZ
Shield & Seal

MG
Snap-Ring

MFG
One Shield
& Snap-Ring

MZG
One Seal
& Snap-Ring

MFFG
Two Shields
& Snap-Ring

MZZG
Two Seals
& Snap-Ring

MFZG
Shield, Seal
& Snap-Ring

MRC Bearing Number	Bore d		Outside Diameter D		Width B		Fillet Radius[1] r_a		Basic Radial Load Rating				Speed Rating[2]		
									Dynamic C^3		Static C_0		Open and Grease	Shielded Oil	Single and Double Sealed Grease
	mm	in	mm	in	mm	in	mm	in	N	lbf	N	lbf	RPM	RPM	RPM
5204-M	20	**.7874**	47	**1.8504**	20.64	**.8125**	1.0	**.04**	20 500	**4 610**	17 000	**3 820**	9 000	13 000	9 000
5205-M	25	**.9843**	52	**2.0472**	20.64	**.8125**	1.0	**.04**	22 900	**5 150**	21 200	**4 770**	8 000	11 000	8 000
5205-M1	25	**.9843**	52	**2.0472**	22.23	**.8750**	1.0	**.04**	22 900	**5 150**	21 200	**4 770**	8 000	11 000	8 000
5206-M	30	**1.1811**	62	**2.4409**	23.81	**.9375**	1.0	**.04**	30 300	**6 820**	28 000	**6 290**	7 000	9 500	7 000
5206-M1	30	**1.1811**	62	**2.4409**	26.99	**1.0625**	1.0	**.04**	30 300	**6 820**	28 000	**6 290**	7 000	9 500	7 000
5207-M	35	**1.3780**	72	**2.8346**	26.99	**1.0625**	1.0	**.04**	39 100	**8 800**	36 500	**8 210**	6 000	8 000	6 000
5207-M1	35	**1.3780**	72	**2.8346**	30.16	**1.1875**	1.0	**.04**	39 100	**8 800**	36 500	**8 210**	6 000	8 000	6 000
5208-M	40	**1.5748**	80	**3.1496**	30.16	**1.1875**	1.0	**.04**	49 500	**11 100**	49 000	**11 000**	5 600	7 500	5 600
5209-M	45	**1.7717**	85	**3.3465**	30.16	**1.1875**	1.0	**.04**	51 200	**11 500**	54 000	**12 100**	5 000	6 700	5 000
5210-M	50	**1.9685**	90	**3.5433**	30.16	**1.1875**	1.0	**.04**	53 900	**12 100**	58 500	**13 200**	4 800	6 300	4 800
5211-M	55	**2.1654**	100	**3.9370**	33.34	**1.3125**	1.5	**.06**	66 000	**14 900**	76 500	**17 200**	4 300	5 600	4 300
5212-M	60	**2.3622**	110	**4.3307**	36.51	**1.4375**	1.5	**.06**	78 100	**17 600**	88 000	**19 800**	3 800	5 000	3 800
5212-M1	60	**2.3622**	110	**4.3307**	38.10	**1.5000**	1.5	**.06**	78 100	**17 600**	88 000	**19 800**	3 800	5 000	3 800
5213-M	65	**2.5591**	120	**4.7244**	38.10	**1.5000**	1.5	**.06**	88 000	**19 800**	106 000	**23 800**	3 600	4 800	3 600
5214-M	70	**2.7559**	125	**4.9213**	39.69	**1.5625**	1.5	**.06**	101 000	**22 700**	125 000	**28 100**	3 200	4 300	3 200
5215-M	75	**2.9528**	130	**5.1181**	41.28	**1.6250**	1.5	**.06**	108 000	**24 300**	137 000	**30 800**	3 200	4 300	3 200
5216-M	80	**3.1496**	140	**5.5118**	44.45	**1.7500**	2.0	**.08**	128 000	**28 800**	160 000	**36 000**	2 800	3 800	2 800
5217-M	85	**3.3465**	150	**5.9055**	49.21	**1.9375**	2.0	**.08**	142 000	**32 000**	176 000	**39 600**	2 600	3 600	2 600
5218-M	90	**3.5433**	160	**6.2992**	52.39	**2.0625**	2.0	**.08**	151 000	**34 000**	193 000	**43 400**	2 400	3 400	2 400

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

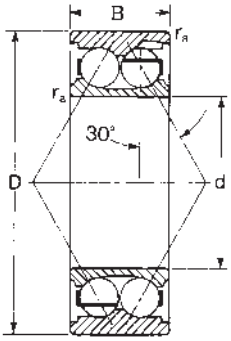
[2]) Listed values are for pressed steel cage, ABEC-1.

The values have been determined through historical application and practice. For a more complete explanation, see page 274.

[3] Rating for one million revolutions or 500 hours at 33⅓ RPM.

Note: Extra width bearings identified by the suffix M1 are supplied with a retrofit kit described on pages 91, 92.

5300M bearings are used with heavy radial loads, two-directional thrust loads, or a combination of both. Thrust load should be carried on the non-filling notch row. Moderate thrust load is permissible on the filling notch row.



MF
One Shield

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Two Shields

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Shield & Seal

MG
Snap-Ring

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One Seal
& Snap-Ring

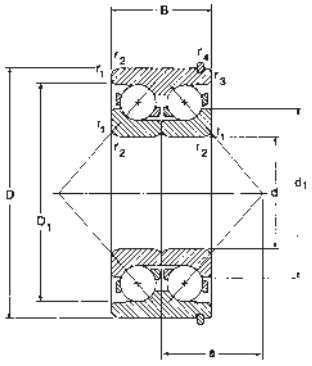
MFFG
Two Shields
& Snap-Ring

MZZG
Two Seals
& Snap-Ring

MFZG
Shield, Seal
& Snap-Ring

MRC Bearing Number	Bore d		Outside Diameter D		Width B		Fillet Radius[1] r_a		Basic Radial Load Rating: Dynamic C[3]		Basic Radial Load Rating: Static C_0		Speed Rating[2]: Open and Shielded Grease	Speed Rating[2]: Oil	Speed Rating[2]: Single and Double Sealed Grease
	mm	in	mm	in	mm	in	mm	in	N	lbf	N	lbf	RPM	RPM	RPM
5304-M	20	.7874	52	2.0472	22.23	.8750	1.0	.04	23 800	5 360	20 000	4 500	8 500	12 000	8 500
5304-M1	20	.7874	52	2.0472	25.40	1.0000	1.0	.04	23 800	5 360	20 000	4 500	8 500	12 000	8 500
5305-M	25	.9843	62	2.4409	25.40	1.0000	1.0	.04	34 100	7 670	30 500	6 860	7 500	10 000	7 500
5306-M	30	1.1811	72	2.8346	30.16	1.1875	1.0	.04	46 800	10 500	43 000	9 670	6 300	8 500	6 300
5306-M1	30	1.1811	72	2.8346	33.34	1.3125	1.0	.04	46 800	10 500	43 000	9 670	6 300	8 500	6 300
5307-M	35	1.3780	80	3.1496	34.93	1.3750	1.5	.06	52 300	11 800	48 000	10 800	5 600	7 500	5 600
5307-M1	35	1.3780	80	3.1496	38.10	1.5000	1.5	.06	52 300	11 800	48 000	10 800	5 600	7 500	5 600
5308-M	40	1.5748	90	3.5433	36.51	1.4375	1.5	.06	67 100	15 100	65 500	14 700	5 000	6 700	5 000
5308-M1	40	1.5748	90	3.5433	39.69	1.5625	1.5	.06	67 100	15 100	65 500	14 700	5 000	6 700	5 000
5309-M	45	1.7717	100	3.9370	39.69	1.5625	1.5	.06	80 900	18 200	80 000	18 000	4 500	6 000	4 500
5309-M1	45	1.7717	100	3.9370	42.86	1.6875	1.5	.06	80 900	18 200	80 000	18 000	4 500	6 000	4 500
5310-M	50	1.9685	110	4.3307	44.45	1.7500	2.0	.08	95 200	21 400	95 000	21 400	4 000	5 300	4 000
5310-M1	50	1.9685	110	4.3307	47.63	1.8750	2.0	.08	95 200	21 400	95 000	21 400	4 000	5 300	4 000
5311-M	55	2.1654	120	4.7244	49.21	1.9375	2.0	.08	119 000	26 800	122 000	27 400	3 800	5 000	3 800
5311-M1	55	2.1654	120	4.7244	52.39	2.0625	2.0	.08	119 000	26 800	122 000	27 400	3 800	5 000	3 800
5312-M	60	2.3622	130	5.1181	53.98	2.1250	2.0	.08	134 000	30 200	143 000	32 100	3 400	4 500	3 400
5312-M1	60	2.3622	130	5.1181	57.15	2.2500	2.0	.08	134 000	30 200	143 000	32 100	3 400	4 500	3 400
5313-M	65	2.5591	140	5.5118	58.74	2.3125	2.0	.08	154 000	34 700	163 000	36 600	3 200	4 300	3 200
5313-M1	65	2.5591	140	5.5118	61.91	2.4375	2.0	.08	154 000	34 700	163 000	36 600	3 200	4 300	3 200
5314-M	70	2.7559	150	5.9055	63.50	2.5000	2.0	.08	172 000	38 700	186 000	41 800	2 800	3 800	2 800
5314-M1	70	2.7559	150	5.9055	66.68	2.6250	2.0	.08	172 000	38 700	186 000	41 800	2 800	3 800	2 800
5315-M	75	2.9528	160	6.2992	68.26	2.6875	2.0	.08	187 000	42 000	208 000	46 800	2 600	3 600	2 600
5315-M1	75	2.9528	160	6.2992	71.44	2.8125	2.0	.08	187 000	42 000	208 000	46 800	2 600	3 600	2 600
5316-M	80	3.1496	170	6.6929	68.26	2.6875	2.0	.08	201 000	45 200	236 000	53 100	2 400	3 400	2 400
5317	85	3.3465	180	7.0866	73.03	2.8750	2.5	.10	198 000	44 500	245 000	55 100	2 200	3 200	2 200
5318	90	3.5433	190	7.4803	73.03	2.8750	2.5	.10	224 000	50 400	290 000	65 200	2 000	3 000	2 000
5319	95	3.7402	200	7.8740	77.79	3.0625	2.5	.10	242 000	54 400	315 000	70 800	1 900	2 800	1 900

[1] Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear.
[2] Listed values are for pressed steel cage, ABEC-1.
The values have been determined through historical application and practice. For a more complete explanation, see page 274.
[3] Rating for one million revolutions or 500 hours at 33⅓ RPM.
Note: Extra width bearings identified by the suffix M1 are supplied with a retrofit kit described on pages 91, 92.



5300 UPG series bearings are a specialized double-row angular contact design developed specifically for pump applications. The bearings are capable of carrying axial loads in either direction, radial loads, or a combination of both. Machined brass cages, ABEC 3 tolerances, 40° contact angle and reduced ("CB") end play are standard features selected to improve performance for these bearings.

The MRC 5300 UPG Series is "The Pump Bearing"

MRC Bearing Number	Bore d		Outside Diameter D		Width B		Fillet Radius[1] r_a		Basic Radial Load Rating				Speed Rating	
									Dynamic C[2]		Static C_0			
	mm	in	mm	in	mm	in	mm	in	N	lbf	N	lbf	Grease RPM	Oil RPM
5308UPG	40	**1.5748**	90	**3.5433**	36.51	**1.4375**	1.5	**0.06**	49 400	**11 110**	41 500	**9 330**	5 000	6 700
5309UPG	45	**1.7717**	100	**3.9370**	39.69	**1.5625**	1.5	**0.06**	61 800	**13 890**	52 000	**11 690**	4 500	6 000
5310UPG	50	**1.9685**	110	**4.3307**	44.45	**1.7500**	2.0	**0.08**	81 900	**18 410**	69 500	**15 620**	4 000	5 300
5311UPG	55	**2.1654**	120	**4.7244**	49.21	**1.9375**	2.0	**0.08**	95 600	**21 490**	83 000	**18 660**	3 800	5 000
5313UPG	65	**2.5591**	140	**5.5118**	58.74	**2.3125**	2.1	**0.08**	138 000	**31 000**	122 000	**27 400**	3 200	4 300

[1] Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear.
[2] Rating for one million revolutions or 500 hours at $33^1/_3$ 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
X = Radial load factor
Y = Thrust load factor
C_0 = Basic static radial load rating
e = Limiting factor for F_A/F_R

Size	e	$F_A/F_R \le e$		$F_A/F_R > e$	
		X	Y	X	Y
5200SB–5206C&M 5300SB–5303SB 5403C–5414C	0.66	1.0	0.92	0.67	1.41
5207C&M–5218C&M 5304C&M–5319C&M	0.80	1.0	0.78	0.63	1.24
5308UPG–5313UPG	1.14	1.0	0	0.35	0.57

Size	F_A/C_0	Normal Clearance (ST Fit)			C3 Clearance (LO Fit)		
		e	X	Y	e	X	Y
5415C–5419C	0.025	0.22	0.56	2.0	0.25	0.52	1.8
	0.040	0.24	0.56	1.8	0.28	0.52	1.65
	0.070	0.27	0.56	1.6	0.30	0.52	1.5
	0.13	0.31	0.56	1.4	0.34	0.52	1.33
	0.25	0.37	0.56	1.2	0.40	0.52	1.17
	0.50	0.44	0.56	1.0	0.48	0.52	1.0

Values of Y and e for loads not shown are obtained by linear interpolation.

Life Rating

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

or

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

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

Static equivalent radial load

$P_0 = X_0F_R + Y_0F_A$

P_0 = Static equivalent radial load
F_R = Radial load
F_A = Thrust load
X_0 = Radial load factor
Y_0 = Thrust load factor

Size	X_0	Y_0	
5200SB–5206C&M 5300SB–5303SB 5403C–5414C	1.0	0.76	
5207C&M–5218C&M 5304C&M–5319C&M	1.0	0.66	
5308–5313UPG	0.50	0.26	
5415C–5419C	0.60	0.50	Po is always $\ge F_R$

Minimum Radial Load

To insure satisfactory operation of double row, angular contact ball bearings, they must be subjected to a minimum radial load, which is especially true at high speeds where inertia forces of the balls and cage, and the friction in the lubricant, can cause skidding to occur between the balls and raceway.

The required minimum radial load can be estimated from:

$$F_{r\,m} = K_r \left(\frac{\gamma n}{1000}\right)^{2/3}\left(\frac{d_m}{100}\right)^2$$

$F_{r\,m}$=Minimum radial load (N)
K_r = Minimum load factor

Series	Kr
5200SB&C	60
5200M	90
5300SB&C	70
5300M	110
5400C	70

γ = Oil viscosity at operating temperature (cSt)
n = Speed in RPM

d_m = Mean bearing diameter $= \left(\frac{D+d}{2}\right)$,(mm)

D = Bearing outside diameter (mm)
d = Bearing inside diameter (mm)

Dynamic equivalent radial load and life calculation examples

Bearing size: 5210 M
Speed: 2000 RPM
Basic dynamic radial load rating (C) = 12100

Case 1
Radial load (F_R) = 1750
F_A/F_R = 0/1750 = 0
Equivalent load (P) = X F_R + Y F_A
Since F_A/F_R < e, equivalent load
(P) = 1.0 F_R + 0.78 F_A = 1.0 × 1750 = 1750

Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{12100}{1750}\right)^3 = 331 \times 10^6$ Rev.

or

Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{12100}{1750}\right)^3$

= 2755 Hrs

Case 2
Radial load (F_R) = 1750
Thrust load (F_A) = 1300
F_A/F_R = 1300/1750 = 0.74
Equivalent load (P) = X F_R + Y F_A
Since F_A/F_R < e, equivalent load
(P) = 1.0 F_R + 0.78 F_A = 1.0 × 1750 + 0.78 × 1300= 2764

Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{12100}{2764}\right)^3 = 83.9 \times 10^6$ Rev.

or

Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{12100}{2764}\right)^3$

= 699 Hrs

Case 3
Radial load (F_R) = 1750
Thrust load (F_A) = 1500
F_A/F_R = 1500/1750 = 0.86
Equivalent load (P) = X F_R + Y F_A
Since F_A/F_R > e, equivalent load
(P) = 0.63 F_R + 1.24 F_A
= 0.63 × 1750 + 1.24 × 1500 = 2963

Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{12100}{2963}\right)^3 = 68.1 \times 10^6$ Rev.

or

Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{12100}{2963}\right)^3$

= 568 Hrs

Case 4
Thrust load (F_A) = 1500
F_A/F_R = 1500/0 = ∞
Equivalent load (P) = X F_R + Y F_A
Since F_A/F_R > e, equivalent load
(P) = 0.63 F_R + 1.24 F_A = 1.24 × 1500 = 1860

Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{12100}{1860}\right)^3 = 275 \times 10^6$ Rev.

or

Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{12100}{1860}\right)^3$

= 2294 Hrs

Bearing size: 5203 SB
Speed: 2000 RPM
Basic dynamic radial load rating (C) = 3210

Case 1
Radial load (F_R) = 500
F_A/F_R = 0/500 = 0
Equivalent load (P) = X F_R + Y F_A
Since F_A/F_R < e, equivalent load
(P) = 1.0 F_R + 0.92 F_A = 1.0 × 500 = 500

Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{3210}{500}\right)^3 = 265 \times 10^6$ Rev.

or

Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{3210}{500}\right)^3$

= 2205 Hrs

Case 2
Radial load (F_R) = 500
Thrust load (F_A) = 325
F_A/F_R = 325/500 = 0.65
Equivalent load (P) = X F_R + Y F_A
Since F_A/F_R < e, equivalent load
(P) = 1.0 F_R + 0.92 F_A = 1.0 × 500 + 0.92 × 325= 799

Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{3210}{799}\right)^3 = 64.8 \times 10^6$ Rev.

or

Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{3210}{799}\right)^3$

= 540 Hrs

Case 3
Radial load (F_R) = 500
Thrust load (F_A) = 375
F_A/F_R = 375/500 = 0.75
Equivalent load (P) = X F_R + Y F_A
Since F_A/F_R > e, equivalent load
(P) = 0.67 F_R + 1.41 F_A
= 0.67 × 500 + 1.41 × 375 = 864

Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{3210}{864}\right)^3 = 51.3 \times 10^6$ Rev.

or

Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{3210}{864}\right)^3$

= 427 Hrs

Case 4
Thrust load (F_A) = 375
F_A/F_R = 375/0 = ∞
Equivalent load (P) = X F_R + Y F_A
Since F_A/F_R > e, equivalent load
(P) = 0.67 F_R + 1.41 F_A = 1.41 × 375 = 529

Life (L10) = $\left(\frac{C}{P}\right)^3 = \left(\frac{3210}{529}\right)^3 = 223 \times 10^6$ Rev.

or

Life (L10h) = $\frac{10^6}{60n}\left(\frac{C}{P}\right)^3 = \frac{10^6}{60 \times 2000}\left(\frac{3210}{529}\right)^3$

= 1862 Hrs