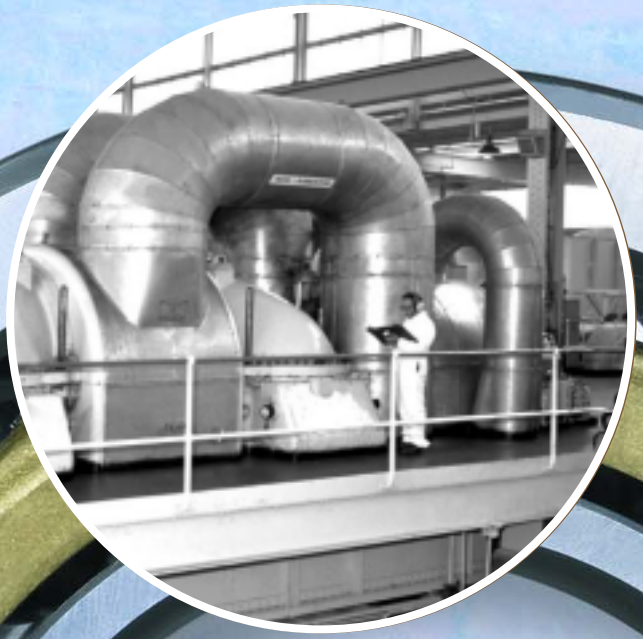
MRC





MRC Bearing Solutions for Pumps

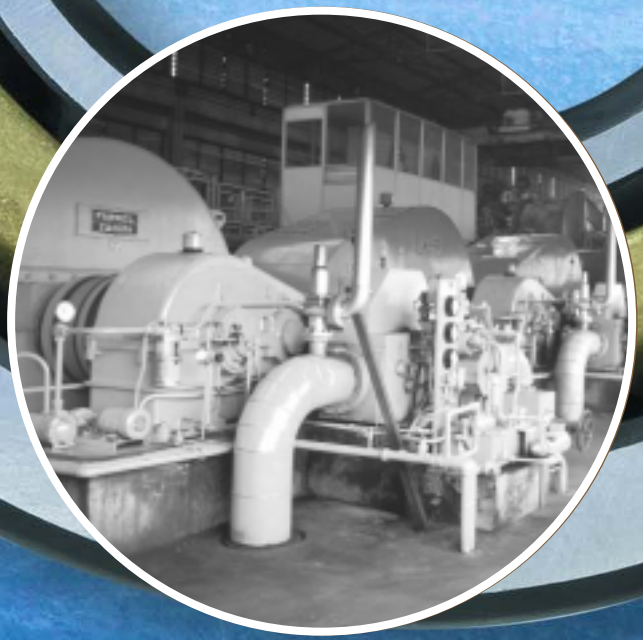


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Bearings for Centrifugal Pumps: Selection of the Proper Bearing Solution

The most common cause of pump bearing failure is not fatigue

Thrust bearings for centrifugal pumps seldom achieve the theoretical life specified by API and ANSI standards. This is because pump bearings usually fail from causes other than fatigue.

Causes include:

- Impact
- Contamination
- Excessive thrust
- Inadequate/ineffective lubrication
- Static vibration
- Insufficient loading
- Misalignment

Users tend to ignore the fact that bearings are designed for specific operating conditions and use the same bearing for most pump applications. Consequently, the 40° single-row angular contact ball bearing is applied in applications where it may not be the best choice.

High contact angle vs. low contact angle

Bearings with low contact angles are designed primarily for radial loads. Bearings with high contact angles are most suitable for thrust (axial) loads. Neither bearing does both well and compromises are often required to achieve acceptable bearing performance. Pump applications are not consistent and loads may vary from high thrust, to near zero thrust, to thrust in the opposite direction. High contact angle bearings require substantial thrust load in order to overcome the centrifugal and gyroscopic forces acting on the balls and prevent ball skidding. (The higher the contact angle, the more thrust load required.) Low contact angle bearings require little or no thrust load to prevent ball skidding. In addition, remember that only one bearing in a pair, mounted back-to-back or face-to-face, is thrust loaded. However, the unloaded bearing has the same minimum thrust load requirement as the loaded bearing. Therefore, an axial preload must be applied to the pair to be sure that both bearings have adequate thrust load to overcome the centrifugal and gyroscopic forces.

Assuring minimum required thrust load

Operating preload plus the external thrust on the primary bearing is additive and the load may be



high enough to cause unacceptably high operating temperatures. In this publication, the minimum required thrust load for all bearings is listed. **To select the proper bearing, the external loads, temperatures, shaft fits and speed must be considered.** Only with this information can an optimum bearing solution be found. If the above conditions cannot be determined, reasonable assumptions must be made in order to make the initial bearing selection.

Reasonable assumptions are:

- Open impellers develop relatively high thrust load, usually toward the intake (suction)
- Closed impellers develop relatively low thrust load, usually toward the intake (suction)
- Double suction impeller pumps (always closed) usually have little or no thrust load
- Thrust load in a direction opposite the intake (suction) is usually low

These assumptions should be used only as a guide for tentative bearing selection. Once the bearings have operated, the loads can be more accurately determined by observing the location and width of the ball path on the raceways.

MRC offers the widest selection of ball bearings for pumps in the bearing industry

A solution exists for nearly every combination of loads and speeds. **Start the selection process by referring to pages 2 and 3.** The information on these pages will guide you to the proper bearings. Please contact MRC Bearing Services at 1-800-MRC-7000 for additional information regarding bearing selection.

Ball Bearing Type		Cage	Contact Angle	Performance Level	Characteristic: Radial Stiffness / Axial Stiffness / Speed / Radial Capacity / Thrust Capacity
200S and 300S Series Single-Row Deep Groove		ball-guided two-piece pressed steel	0°	Extremely High / Very High / High / Moderate	
5200C and 5300C Series Double-Row Angular Contact		ball-guided one-piece pressed steel	30°	Extremely High / Very High / High / Moderate	
5300UPG Series Double-Row Angular Contact Pump Bearing		ball-guided one-piece machined brass	40°	Extremely High / Very High / High / Moderate	
7200DU and 7300DU Single-Row Angular Contact Duplex Pair		ball-guided two-piece pressed steel	29°	Extremely High / Very High / High / Moderate	
7200PDU and 7300PDU 7200PJDE and 7300PJDE 7200PJDU and 7300PJDU Single-Row Angular Contact Duplex Pair		design varies with bearing type (brass mat'l – all types)	40°	Extremely High / Very High / High / Moderate	
8000 Series PumPac Bearing Set		land-guided one-piece machined brass	40° and 15°	Extremely High / Very High / High / Moderate	
8000AAB Series PumPac Triplex Bearing Set		land-guided one-piece machined brass	40° and 40° and 15°	Extremely High / Very High / High / Moderate	
8000BB Series PumPac Diamond Bearing Set		land-guided one-piece machined brass	15° and 15°	Extremely High / Very High / High / Moderate	
97000U2 Duplex Tandem Pair Radial & Axial Looseness in Bearing System		land-guided one-piece machined bronze	29°	Extremely High / Very High / High / Moderate	
97000UP2 Duplex Tandem Pair Radial & Axial Looseness in Bearing System		land-guided one-piece machined bronze	40°	Extremely High / Very High / High / Moderate	

Applications	For Details
Steady rest positions to accommodate radial load in centrifugal pumps. Most electric motors use this bearing to accommodate radial loads. Seldom used as a primary thrust bearing in centrifugal pumps.	See Pages 8 – 13
Most often used in ANSI pumps with moderate thrust loads. 5200C and 5300C series ball bearings can also be used in the radial position when the radial load is excessive for 200S and 300S series single-row deep groove ball bearings.	See Pages 14 – 19
For moderate speed centrifugal pumps. Used as thrust bearing where high thrust loads are expected. A retrofit-free bearing upgrade for API 610 Standard (5th Edition) and ANSI pumps in order to meet ANSI+ standards.	See Pages 20 – 23
For high speed centrifugal pumps. This bearing can run at higher speeds than the 7200PDU and 7300PDU series and requires less thrust load to maintain proper traction forces between the ball and raceway surfaces.	See Pages 24 – 29
For moderate speed centrifugal pumps. Used as thrust bearings where high thrust loads are expected. Temperatures, loads, and shaft fits should be known in order to establish proper preload or axial clearance.	See Pages 30 – 45
For centrifugal pumps with heavy thrust loads that are not reversing or reverse only momentarily. Very effective as a thrust bearing in high speed pumps when direction of thrust is known. Forgiving in an application when thrust loads and temperatures have not been determined.	See Pages 46 – 49
For pumps involving very heavy primary thrust loads. A PumPac “triplex” set contains two 40° bearings in tandem matched back-to-back with one 15° bearing.	See Pages 50 – 53
Balanced pumps, operating with light or no thrust loads at high speeds. (For example, double suction impeller pumps; including the popular axially split case or “between bearings” design.) Similarly, pumps with closed impellers, balance holes, and pump-out vanes that result in light thrust loads.	See Pages 54 – 57
For vertical or other types of pumps where endplay is not a major concern. This bearing type will be specified for speeds higher than those accommodated by the 97000UP2 series. This product is often used in ethylene stirrer motor applications.	See Pages 58 – 61
For vertical or other types of pumps, as well as electric motor applications, where an extremely high thrust load is possible. Often used in ethylene reactors and deep water pumps.	See Pages 58 – 61

Why a Preload or Clearance?

Angular contact bearings require a minimum thrust load to keep the balls tracking at the designed contact angle. With less than the minimum required thrust load, centrifugal force will cause the balls to track at different contact angles on the outer ring and inner ring raceways. This condition will eventually result in premature bearing failure.

The thrust load is assured by providing an adequate operating preload. Operating preload is dependent upon:

- Manufactured preload/clearance
- Shaft and housing fits
- Temperature differential between the inner and outer rings

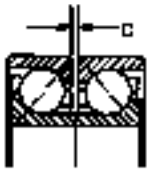
Angular contact bearings with a high contact angle require a heavier minimum thrust load than a bearing with a low contact angle.

Due to this fact, bearings with a low contact angle like the MRC PumPac® Diamond 8000BB series often work best in pumps where little or no thrust load is present and the loads are primarily radial in nature.

MRC offers a wide range of angular contact bearings for various application conditions, including 15°, 29° and 40° contact angle bearings.

Call MRC Bearing Services at 1-800-MRC-7000 for assistance with selecting the proper bearing.

These charts show the manufactured axial clearance and preload standards for angular contact sets.



Back-to-back



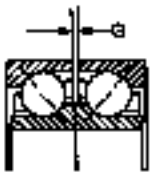
Face-to-face

Bore diameter d over	incl.	Axial Internal Clearance (unmounted) Class CA .001 mm min	CA .001 mm max	CA .0001 in min	CA .0001 in max	CB .001 mm min	CB .001 mm max	CB .0001 in min	CB .0001 in max	CC .001 mm min	CC .001 mm max	CC .0001 in min	CC .0001 in max
mm													
–	10	4	12	1.6	4.7	14	22	5.5	8.7	22	30	8.7	12
10	18	5	13	2.0	5.1	15	23	5.9	9.1	24	32	9.4	13
18	30	7	15	2.8	5.9	18	26	7.1	10	32	40	13	16
30	50	9	17	3.5	6.7	22	30	8.7	12	40	48	16	19
50	80	11	23	4.3	9.1	26	38	10	15	48	60	19	24
80	120	14	26	5.5	10	32	44	13	17	55	67	22	26
120	180	17	29	6.7	11	35	47	14	19	62	74	24	29
180	250	21	37	8.3	15	45	61	18	24	74	90	29	35
250	315	26	42	10	17	52	68	20	27	90	106	35	42

MRC 7000PJDE bearings are stocked with the CB execution.



Back-to-back



Face-to-face

Bore diameter d over	incl.	Preload (unmounted) Class GA N min	GA N max	GA lbf min	GA lbf max	GB N min	GB N max	GB lbf min	GB lbf max	GC N min	GC N max	GC lbf min	GC lbf max
mm													
10	18	0	80	0	18	30	330	7	74	230	660	52	148
18	30	0	120	0	27	40	480	9	108	340	970	76	218
30	50	0	160	0	36	60	630	13	142	450	1280	101	288
50	80	0	380	0	85	140	1500	31	337	1080	3050	243	686
80	120	0	410	0	92	150	1600	34	360	1150	3250	259	731
120	180	0	540	0	121	200	2150	45	483	1500	4300	337	967
180	250	0	940	0	211	330	3700	74	832	2650	7500	596	1686
250	315	0	1080	0	243	380	4250	85	955	3000	8600	674	1933

MRC 7000PJDU bearings are stocked with the GA execution.

Handling and Maintenance

Contamination

A high percentage of ball and roller bearing problems can be attributed to foreign matter entering the system. Because bearings are highly sensitive to dirt and moisture, care must be taken to keep the bearings and pump cavity clean. Testing has shown that particles passing through a filter as fine as 5 microns may cause severe damage. Experience has shown that lubricating systems that pressurize the bearing cavity, such as air-oil-mist, greatly reduce contamination and increase bearing life.

Lubrication

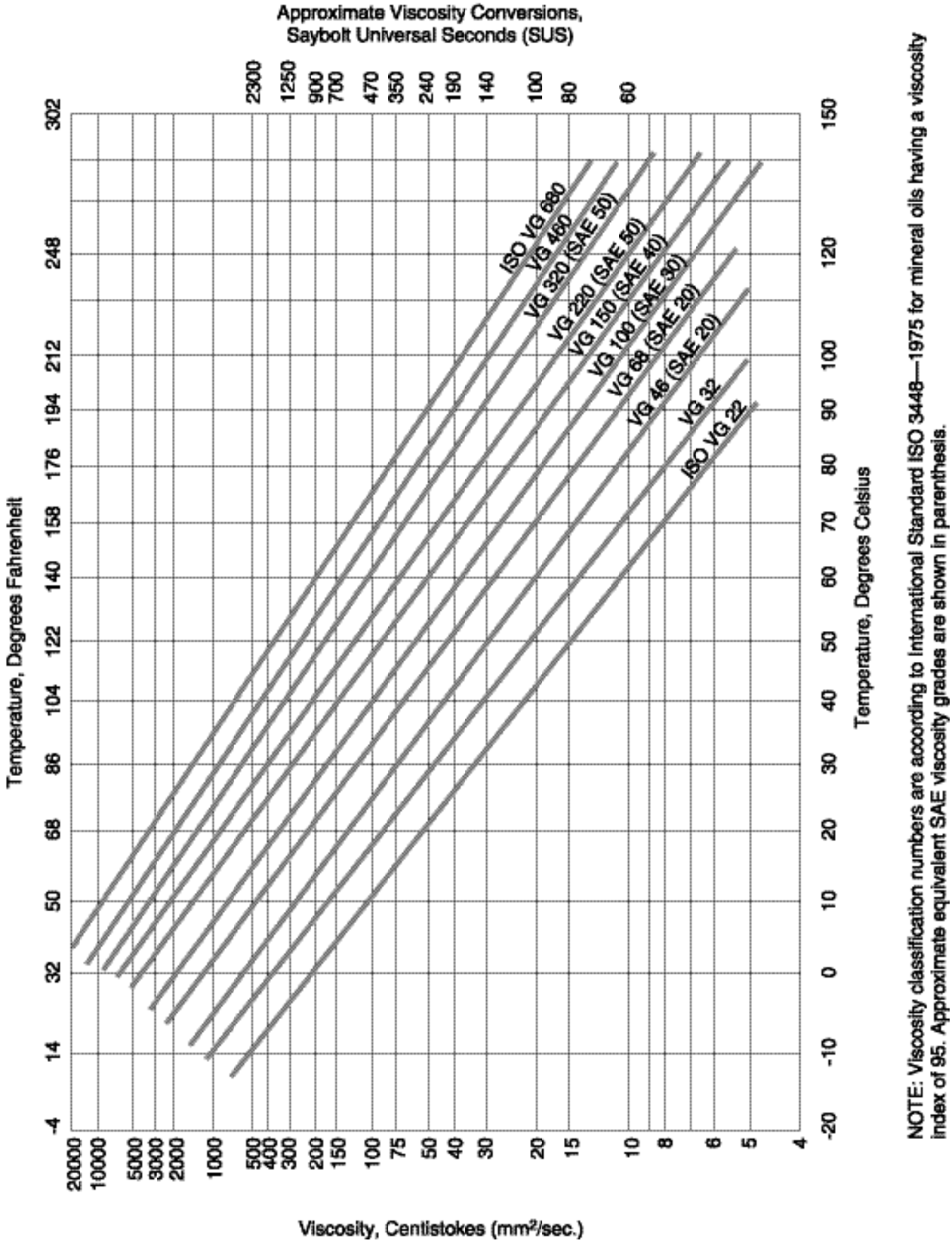
Generally, for ball bearings, it is a good rule to select an oil that will have a viscosity of at least 70 SUS (13 cSt) at the bearing operating temperature. From the chart on page 6, the operating viscosity of an ISO grade oil can be determined at the bearing operating temperature. The frequency of oil change depends upon the operating conditions and the quality of the lubricant. Mineral oils oxidize and should be replaced at three month intervals if operated continuously at 212° F (100° C). Longer intervals are possible at lower operating temperatures. Synthetic oils are more resistant to deterioration from exposure to high temperatures and may allow for less frequent replacement. Early blackening of the oil strongly indicates a poor lubrication condition and can result from many sources. Multi-grade oils, and lubricants with detergents and viscosity improvers, are not recommended.

Shaft and Housing Fits

The standard recommended shaft and housing fits are included in the technical data section for each individual bearing. The tolerances are those recommended for bearings mounted on solid steel shafts. The interference fit between the bearing bore and the shaft journal causes a reduction of clearance in the bearings and an increase in operating preload. Excessive preload may result in a hot running condition. Bearings such as the 7000PDU that have a GA preload in the unmounted condition usually employ a light interference fit such as an ISO h5 shaft fit. With bearings that have internal axial clearance CB, heavier interference fits are usually acceptable. Each time a pump or motor is rebuilt, both the shaft diameter and bearing bore should be measured to be absolutely sure that both meet specification and to eliminate the chance of creating excessive operating preload.

Stainless steel shafts have a higher coefficient of thermal expansion than carbon steel shafts. When bearings are installed on stainless steel shafts, it may be necessary to reduce the interference fit and/or select a bearing having greater clearance.

Operating Viscosity Chart



NOTE: Viscosity classification numbers are according to International Standard ISO 3448—1975 for mineral oils having a viscosity index of 95. Approximate equivalent SAE viscosity grades are shown in parenthesis.

"Bearing Reliability in Centrifugal Pumps" – The MRC Pump School

Recommended for

- Service, maintenance, machine repair, and plant/facility engineering staff of an industrial plant, OEM facility, institution, public utility, or commercial building who use rolling bearings and related equipment.
- Managers and technicians at industrial plants and OEM facilities responsible for rolling bearing performance and reliability.
- Rotating equipment engineers, reliability engineers, millwrights, mechanics, and maintenance supervisors.

All individuals should have direct involvement or responsibility for pump maintenance and installation.

Course Objective

To provide attendees with a thorough knowledge of the design, function, and maintenance requirements of rolling bearings in a centrifugal pump. Additionally, the course describes the preferred methods for installation, start up, and run-in of rolling bearings in pumps. Lastly, troubleshooting and solutions for common pump bearing problems are covered. Knowledge of these areas allows the attendee to be better prepared to maximize the service life and reliability of pumps in their facility.

Course Schedule/Length

The course is offered twice during the calendar year. The first offering is during the spring of the year (April/May) and is held in Hanover, PA; while the second offering is during the autumn of the year (September/October) and is held in San Diego, CA. The course is two days in length. Successful completion of the course will earn the attendee 1.6 CEU's.

Course Description

The topics listed below are addressed in a series of lectures, discussions, and hands-on workshops.

Pump classification and function

- Different styles of pumps
- General concepts of pump function
- Theory and design of centrifugal pumps (overhung impeller vs. split case)
- Basic information on pump curves, head, pressure/velocity relationships, specific speed, best efficiency point (BEP), $NPSH_R$ vs. $NPSH_A$, and cavitation
- Impeller and volute designs
- Origins of radial and axial (thrust) loads

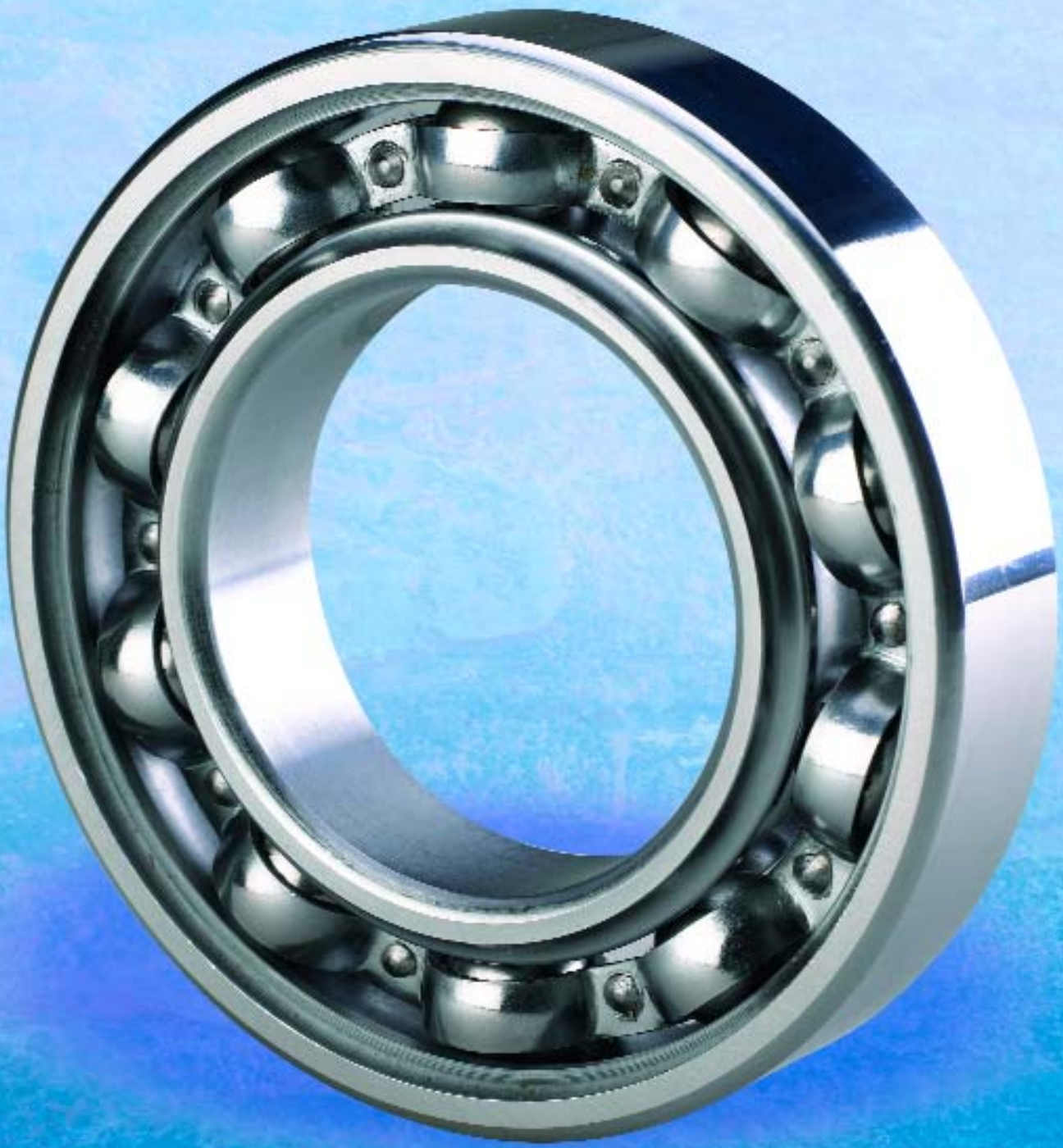
Bearing selection and internal dynamics

- Bearing basics
- Bearing selections for the radial and thrust positions of a centrifugal pump; including API and ANSI specifications
- Axial clearance vs. preload
- Appropriate contact angle and cage style
- Fundamentals of lubrication; including grease vs. oil, relubrication intervals, lubrication systems, vertical shafts, and compatibility issues
- Behavior of angular contact ball bearings under application conditions

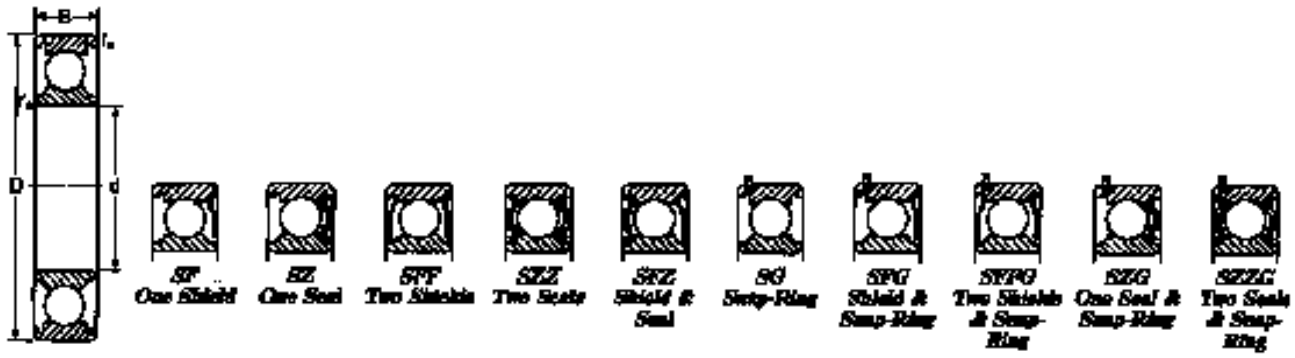
Installation, maintenance, and troubleshooting

- Shaft and housing fits
- Hands-on workshop: Preferred methods of mounting and dismounting ball bearings
- Hands-on workshop: Bearing failure analysis; including load zone interpretation, static vibration (e.g. false brinelling), impact (e.g. brinelling), electrical arcing (e.g. fluting), misalignment, overloading, insufficient loading, parasitic loads, contamination, fretting corrosion, and inadequate/ineffective lubrication

Please contact our Reliability Maintenance Institute
Toll Free: 1-866-753-7378 or visit us on the web at www.skfusa.com/rmi
for official schedule dates, tuition fees, and cancellation policy.



200S and 300S series single-row deep groove ball bearings (non-filling slot)



S-type bearings are used in the radial position in nearly every centrifugal pump and are commonly used in electric motors and magnetic drive pumps.

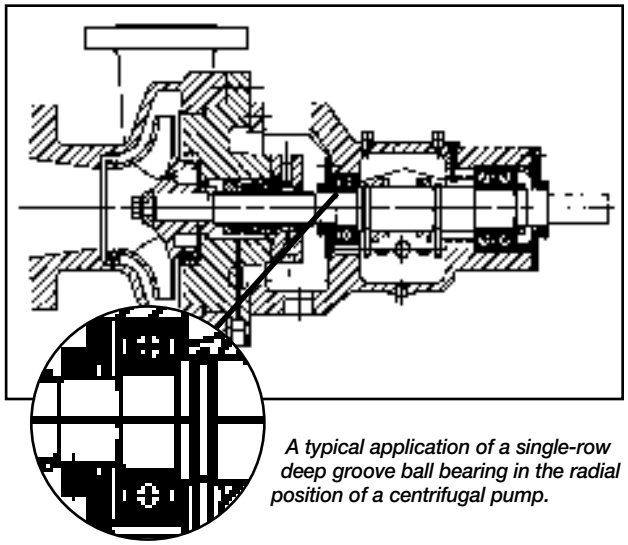
- ABEC-1
- ABMA C3 internal radial clearance
- Two-piece riveted steel cage (no polyamide cages for petrochemical use)
- 30% full of polyurea grease in a bearing with double closures

The API 610 Standard recommends that bearings, other than angular contact bearings, have greater than Normal internal radial clearance. All MRC single-row deep groove ball bearings, without filling slots, have greater than Normal internal radial clearance (e.g. C3 clearance) as standard.

MRC single-row deep groove ball bearings are assembled with a two-piece, riveted steel cage. API 610 strongly recommends against the use of filling slot bearings. MRC product is API 610 compliant.

S-type bearings are available with a wide assortment of seals, shields and snap rings.

Sealed and shielded bearings are prepacked with a premium quality polyurea grease suitable for non-continuous operating temperatures as high as 300° F (150° C).



A typical application of a single-row deep groove ball bearing in the radial position of a centrifugal pump.

Hybrid Bearings

MRC 200S and 300S series single-row deep groove ball bearings are also manufactured as hybrid bearings. These bearings combine SAE 52100 steel rings with silicon nitride (ceramic) rolling elements. They are typically utilized in applications where there is ineffective lubrication, excessive contamination, or stray electrical currents. Even under poor lubrication conditions, metal-to-metal contact between the raceways and balls is eliminated due to the use of the ceramic material. Hybrid bearings can achieve a service life which is three to thirty times longer than the standard all-steel bearing under these adverse conditions. Most of the sizes found on the following pages are available as hybrid bearings. For more information, please contact MRC Bearing Services at 1-800-MRC-7000 and request MRC Hybrid Ceramic Ball Bearings publication M880-600.

200S series single-row deep groove ball bearings (non-filling slot)

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	1) FILLET RADIUS r_a mm in	BASIC RADIAL LOAD RATING		BALLS PER ROW	
					DYNAMIC 3) C N lbf	STATIC C_o N lbf	NUMBER	DIAMETER mm in
204S	20 .7874	47 1.8504	14 .5512	1.0 .04	12700 2860	6550 1470	8	7.938 .3125
205S	25 .9843	52 2.0472	15 .5906	1.0 .04	14000 3150	7800 1750	9	7.938 .3125
206S	30 1.1811	62 2.4409	16 .6299	1.0 .04	19500 4380	11200 2520	9	9.525 .3750
207S	35 1.3780	72 2.8346	17 .6693	1.0 .04	25500 5730	15300 3440	9	11.113 .4375
208S	40 1.5748	80 3.1496	18 .7087	1.0 .04	30700 6900	19000 4270	9	12.304 .4844
209S	45 1.7717	85 3.3465	19 .7480	1.0 .04	33200 7460	21600 4860	10	12.304 .4844
210S	50 1.9685	90 3.5433	20 .7874	1.0 .04	35100 7890	23200 5220	10	12.700 .5000
211S	55 2.1654	100 3.9370	21 .8268	1.5 .06	43600 9800	29000 6520	10	14.288 .5625
212S	60 2.3622	110 4.3307	22 .8661	1.5 .06	47500 10700	32500 7310	10	15.083 .5938
213S	65 2.5591	120 4.7244	23 .9055	1.5 .06	55900 12600	40500 9110	11	15.875 .6250
214S	70 2.7559	125 4.9213	24 .9449	1.5 .06	60500 13600	45000 10100	11	16.670 .6563
215S	75 2.9528	130 5.1181	25 .9843	1.5 .06	66300 14900	49000 11000	11	17.463 .6875
216S	80 3.1496	140 5.5118	26 1.0236	2.0 .08	72800 16400	53000 11900	10	19.050 .7500
217S	85 3.3465	150 5.9055	28 1.1024	2.0 .08	83200 18700	64000 14400	10	20.638 .8125
218S	90 3.5433	160 6.2992	30 1.1811	2.0 .08	95600 21500	73500 16500	11	21.433 .8438
219S	95 3.7402	170 6.6929	32 1.2598	2.0 .08	108000 24300	81500 18300	10	23.812 .9375
220S	100 3.9370	180 7.0866	34 1.3386	2.0 .08	124000 27900	93000 20900	10	25.400 1.0000
221S	105 4.1339	190 7.4803	36 1.4173	2.0 .08	133000 29900	104000 23400	10	26.988 1.0625
222S	110 4.3307	200 7.8740	38 1.4961	2.0 .08	143000 32100	118000 26500	10	28.575 1.1250
224S	120 4.7244	215 8.4646	40 1.5748	2.0 .08	146000 32800	118000 26500	9	30.163 1.1875

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
2) Values have been determined through historical application and practice
3) Rating for one million revolutions or 500 hours at 33⅓ RPM

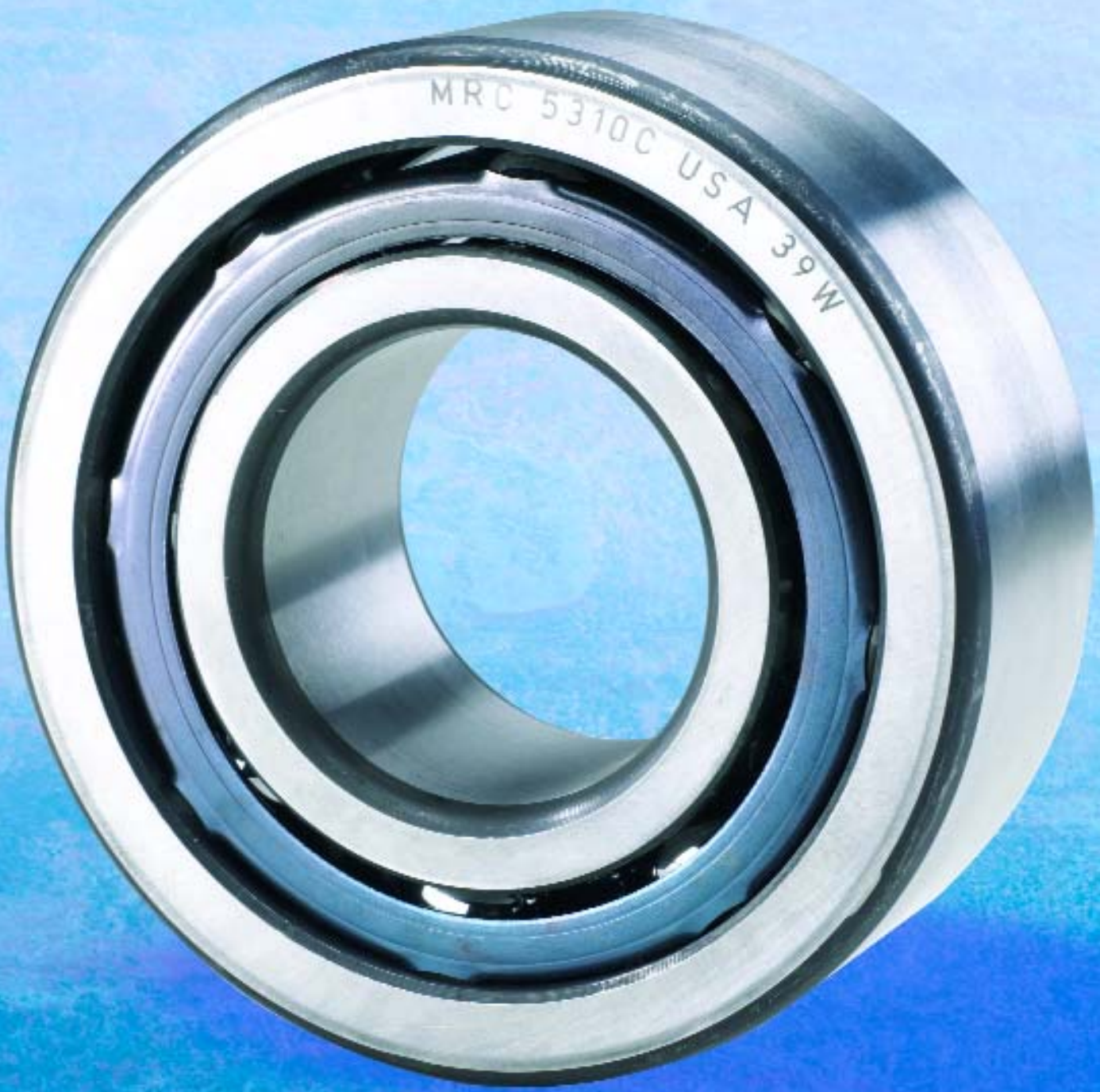
	PITCH DIAMETER mm in	SPEED RATING 2)		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
		GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	33.5 1.3189	15000	18000	20.011 .7878	20.002 .7875	47.016 1.8510	47.000 1.8504
	39.0 1.5370	12000	15000	25.011 .9847	25.002 .9844	52.019 2.0479	52.000 2.0472
	46.0 1.8110	10000	13000	30.011 1.1815	30.002 1.1812	62.019 2.4416	62.000 2.4409
	53.5 2.1063	9000	11000	35.013 1.3785	35.002 1.3781	72.019 2.8353	72.000 2.8346
	60.0 2.3622	8500	10000	40.013 1.5753	40.002 1.5749	80.019 3.1503	80.000 3.1496
	65.0 2.5591	7500	9000	45.013 1.7722	45.002 1.7718	85.022 3.3474	85.000 3.3465
	70.0 2.7559	7000	8500	50.013 1.9690	50.002 1.9686	90.022 3.5442	90.000 3.5433
	77.5 3.0512	6300	7500	55.015 2.1660	55.002 2.1655	100.022 3.9379	100.000 3.9370
	84.5 3.3268	6000	7000	60.015 2.3628	60.002 2. 3623	110.022 4.3316	110.000 4.3307
	92.8 3.6535	5300	6300	65.015 2.5597	65.002 2.5592	120.022 4.7253	120.000 4.7244
	97.5 3.8386	5000	6000	70.015 2.7565	70.002 2.7560	125.025 4.9223	125.000 4.9213
	102.5 4.0354	4800	5600	75.015 2.9534	75.002 2.9529	130.025 5.1191	130.000 5.1181
	110.0 4.3307	4500	5300	80.015 3.1502	80.002 3.1497	140.025 5.5128	140.000 5.5118
	117.5 4.6260	4300	5000	85.018 3.3472	85.003 3.3466	150.025 5.9065	150.000 5.9055
	125.3 4.9331	3800	4500	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992
	132.5 5.2166	3600	4300	95.018 3.7409	95.003 3.7403	170.025 6.6939	170.000 6.6929
	140.0 5.5118	3400	4000	100.018 3.9377	100.003 3.9371	180.025 7.0876	180.000 7.0866
	147.5 5.8071	3200	3800	105.018 4.1346	105.003 4.1340	190.029 7.4814	190.000 7.4803
	155.0 6.1024	3000	3600	110.018 4.3314	110.003 4.3308	200.029 7.8751	200.000 7.8740
	167.5 6.5945	2800	3400	120.018 4.7251	120.003 4.7245	215.029 8.4657	215.000 8.4646

300S series single-row deep groove ball bearings (non-filling slot)

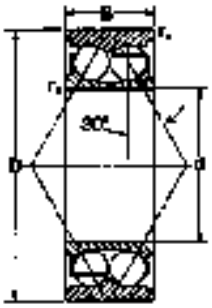
MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	1) FILLET RADIUS r_a mm in	BASIC RADIAL LOAD RATING		BALLS PER ROW	
					DYNAMIC 3) C N lbf	STATIC C_o N lbf	NUMBER	DIAMETER mm in
304S	20 .7874	52 2.0472	15 .5906	1.0 .04	15900 3570	7800 1750	7	9.525 .3750
305S	25 .9843	62 2.4409	17 .6693	1.0 .04	21200 4760	10800 2430	7	11.500 .4528
306S	30 1.1811	72 2.8346	19 .7480	1.0 .04	28100 6320	16000 3600	8	12.304 .4844
307S	35 1.3780	80 3.1496	21 .8268	1.5 .06	33200 7460	19000 4270	8	13.495 .5313
308S	40 1.5748	90 3.5433	23 .9055	1.5 .06	41000 9220	24000 5400	8	15.083 .5938
309S	45 1.7717	100 3.9370	25 .9843	1.5 .06	52700 11900	31500 7080	8	17.463 .6875
310S	50 1.9685	110 4.3307	27 1.0630	2.0 .08	61800 13900	38000 8540	8	19.050 .7500
311S	55 2.1654	120 4.7244	29 1.1417	2.0 .08	71500 16100	45000 10100	8	20.638 .8125
312S	60 2.3622	130 5.1181	31 1.2205	2.0 .08	81900 18400	52000 11700	8	22.225 .8750
313S	65 2.5591	140 5.5118	33 1.2992	2.0 .08	92300 20800	60000 13500	8	23.813 .9375
314S	70 2.7559	150 5.9055	35 1.3780	2.0 .08	104000 23400	68000 15300	8	25.400 1.0000
315S	75 2.9528	160 6.2992	37 1.4567	2.0 .08	114000 25600	76500 17200	8	26.988 1.0625
316S	80 3.1496	170 6.6929	39 1.5354	2.0 .08	124000 27900	86500 19400	8	28.575 1.1250
317S	85 3.3465	180 7.0866	41 1.6142	2.5 .10	133000 29900	96500 21700	8	30.163 1.1875
318S	90 3.5433	190 7.4803	43 1.6929	2.5 .10	143000 32100	108000 24300	8	31.750 1.2500
319S	95 3.7402	200 7.8740	45 1.7717	2.5 .10	153000 34400	118000 26500	8	33.338 1.3125
320S	100 3.9370	215 8.4646	47 1.8504	2.5 .10	174000 39100	140000 31500	8	36.513 1.4375
321S	105 4.1339	225 8.8583	49 1.9291	2.5 .10	182000 40800	153000 34400	8	38.100 1.5000
322S	110 4.3307	240 9.4488	50 1.9685	2.5 .10	203000 45600	180000 40500	8	41.275 1.6250
324S	120 4.7244	260 10.2362	55 2.1654	2.5 .10	208000 46800	186000 41800	8	41.275 1.6250

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
2) Values have been determined through historical application and practice
3) Rating for one million revolutions or 500 hours at 33⅓ RPM

	PITCH DIAMETER mm in	SPEED RATING 2)		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
		GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	36.0 1.4173	13000	16000	20.011 .7878	20.002 .7875	52.019 2.0479	52.000 2.0472
	43.5 1.7126	11000	14000	25.011 .9847	25.002 .9844	62.019 2.4416	62.000 2.4409
	52.0 2.0472	9000	11000	30.011 1.1815	30.002 1.1812	72.019 2.8353	72.000 2.8346
	57.5 2.2638	8500	10000	35.013 1.3785	35.002 1.3781	80.019 3.1503	80.000 3.1496
	65.0 2.5591	7500	9000	40.013 1.5753	40.002 1.5749	90.022 3.5442	90.000 3.5433
	72.5 2.8543	6700	8000	45.013 1.7722	45.002 1.7718	100.022 3.9379	100.000 3.9370
	80.0 3.1496	6300	7500	50.013 1.9690	50.002 1.9686	110.022 4.3316	110.000 4.3307
	87.5 3.4449	5600	6700	55.015 2.1660	55.002 2.1655	120.022 4.7253	120.000 4.7244
	95.0 3.7402	5000	6000	60.015 2.3628	60.002 2.3623	130.025 5.1191	130.000 5.1181
	102.5 4.0354	4800	5600	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
	110.0 4.3307	4500	5300	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
	117.5 4.6260	4300	5000	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
	125.0 4.9213	3800	4500	80.015 3.1502	80.002 3.1497	170.025 6.6939	170.000 6.6929
	132.5 5.2165	3600	4300	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
	140.0 5.5118	3400	4000	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803
	147.5 5.8071	3200	3800	95.018 3.7409	95.003 3.7403	200.029 7.8751	200.000 7.8740
	157.5 6.2008	3000	3600	100.018 3.9377	100.003 3.9371	215.029 8.4657	215.000 8.4646
	165.0 6.4961	2800	3400	105.018 4.1346	105.003 4.1340	225.029 8.8594	225.000 8.8583
	175.0 6.8898	2600	3200	110.018 4.3314	110.003 4.3308	240.029 9.4499	240.000 9.4488
	190.0 7.4803	2400	3000	120.018 4.7251	120.003 4.7245	260.032 10.2375	260.000 10.2362


MRC 5310C USA 39W

5200C and 5300C series
30º double-row angular contact ball bearings



Double-row angular contact ball bearings are used extensively in ANSI standard centrifugal pumps and some older API style pumps. They are typically used as the primary thrust bearing; however, in some rare cases, they have been used as the radial bearing of some pumps and motors. MRC 5000C bearings are compliant with ANSI requirements. Double-row bearings with ball loading grooves (filling slots) are not recommended for pump applications.

Proven Track Record

Long service life and reliable performance have earned MRC angular contact ball bearings an excellent reputation in the pump industry. The standard product features which have contributed to this exceptional performance include: ABEC-1 precision tolerances, a 30° contact angle per row, ABMA C3 internal radial clearance, one-piece heat treated pressed steel cages, as well as multiple sealing options. In addition, the contact angles diverge inwardly, which provides greater rigidity and increased resistance to misalignment. These features have allowed MRC double-row bearings to accommodate combined axial and radial loads, high speeds, poor lubrication conditions, and contaminated environments.

Technical Improvements*

Improved materials

MRC double-row angular contact ball bearings are manufactured from an extremely high quality bearing steel with a very low oxygen content and a minimum number of impurities. The rings are manufactured from cold rolled blanks, and both rings are heat treated to provide dimensional stability up to 300° F (150° C). These advantages allow the bearings to maintain built-in clearances over their entire service life.

Improved internal geometry

Twenty-first century computer-aided design and manufacturing programs have permitted subtle improvements in the bearings. These small, but effective, modifications to the bearing's internal geometry lead to measurable improvements in both performance and service life. One benefit of this fine tuning is that MRC double-row ball bearings are less sensitive to axial overloading.

Improved precision tolerances

MRC double-row angular contact ball bearings are manufactured to ABEC-3 (P6) dimensional and running accuracies. This feature provides smoother and truer operation with less heat generation, lower vibration, and more precise shaft guidance.

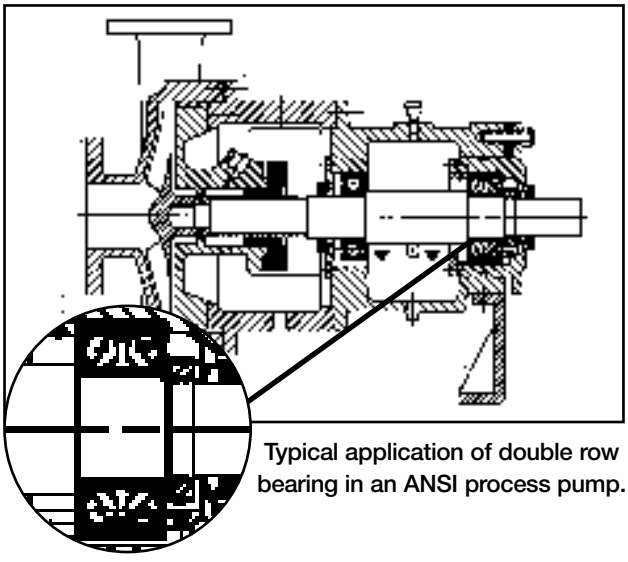
Improved ball quality

The balls used in MRC double-row angular contact ball bearings are one ISO grade better than the balls previously utilized. The more precise ball diameter improves running accuracy even at high speeds, while reducing noise and bearing operating temperature.

New crown cage

MRC double-row angular contact ball bearings have a newly developed one-piece crown cage of heat-treated pressed steel. The new cage design will allow for improved ball guidance and better lubricant film formation.

*While a significant number of the bearings incorporate the technical improvements described above, the implementation of the improvements across the entire product range is an ongoing process. Please contact MRC before ordering to determine which sizes have been converted.



Typical application of double row bearing in an ANSI process pump.

5200C series 30º double-row angular contact ball bearings

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1) r_a mm in	BASIC RADIAL LOAD RATING 2) DYNAMIC 4) C N lbf	BASIC RADIAL LOAD RATING 2) STATIC C_o N lbf	BALLS PER ROW NUMBER	BALLS PER ROW DIAMETER mm in
5204C	20 .7874	47 1.8504	20.64 .8125	1.0 .04	19000 4270	12000 2700	8	7.938 .3125
5205C	25 .9843	52 2.0472	20.64 .8125	1.0 .04	20800 4680	14000 3150	9	7.938 .3125
5206C	30 1.1811	62 2.4409	23.81 .9375	1.0 .04	28600 6430	20400 4590	9	9.525 .3750
5207C	35 1.3780	72 2.8346	26.99 1.0625	1.0 .04	37700 8480	27500 6180	9	11.113 .4375
5208C	40 1.5748	80 3.1496	30.16 1.1875	1.0 .04	44900 10100	34000 7640	9	12.304 .4844
5209C	45 1.7717	85 3.3465	30.16 1.1875	1.0 .04	48800 11000	39000 8770	10	12.304 .4844
5210C	50 1.9685	90 3.5433	30.16 1.1875	1.0 .04	48800 11000	39000 8770	10	12.304 .4844
5211C	55 2.1654	100 3.9370	33.34 1.3125	1.5 .06	57200 12900	47500 10700	10	13.495 .5313
5212C	60 2.3622	110 4.3307	36.51 1.4375	1.5 .06	70200 15800	58500 13200	10	15.083 .5938
5213C	65 2.5591	120 4.7244	38.10 1.5000	1.5 .06	80600 18100	73500 16500	11	15.875 .6250
5214C	70 2.7559	125 4.9213	39.69 1.5625	1.5 .06	88400 19900	80000 18000	11	16.670 .6563
5215C	75 2.9528	130 5.1181	41.28 1.6250	1.5 .06	95600 21500	88000 19800	11	17.463 .6875
5216C	80 3.1496	140 5.5118	44.45 1.7500	2.0 .08	106000 23900	95000 21400	10	19.050 .7500
5217C	85 3.3465	150 5.9055	49.21 1.9375	2.0 .08	124000 27900	110000 24700	10	20.638 .8125
5218C	90 3.5433	160 6.2992	52.39 2.0625	2.0 .08	130000 29300	120000 27000	10	21.433 .8438
5219C	95 3.7402	170 6.6929	55.56 2.1875	2.0 .08	159000 35700	146000 32800	10	23.812 .9375
5220C	100 3.9370	180 7.0866	60.33 2.3750	2.0 .08	178000 40000	166000 37300	10	25.400 1.0000
5222C	110 4.3307	200 7.8740	69.85 2.7500	2.0 .08	203000 45600	200000 45000	10	25.400 1.0000

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
2) For thrust rating, multiply C by 0.81 and C_0 by 1.52
3) Values have been determined through historical application and practice
4) Rating for one million revolutions or 500 hours at 33⅓ RPM
5) Based on 1800 RPM for 5218C through 5222C
6) Based on an oil viscosity of 16 centistokes (mm^2/s) at bearing operating temperature

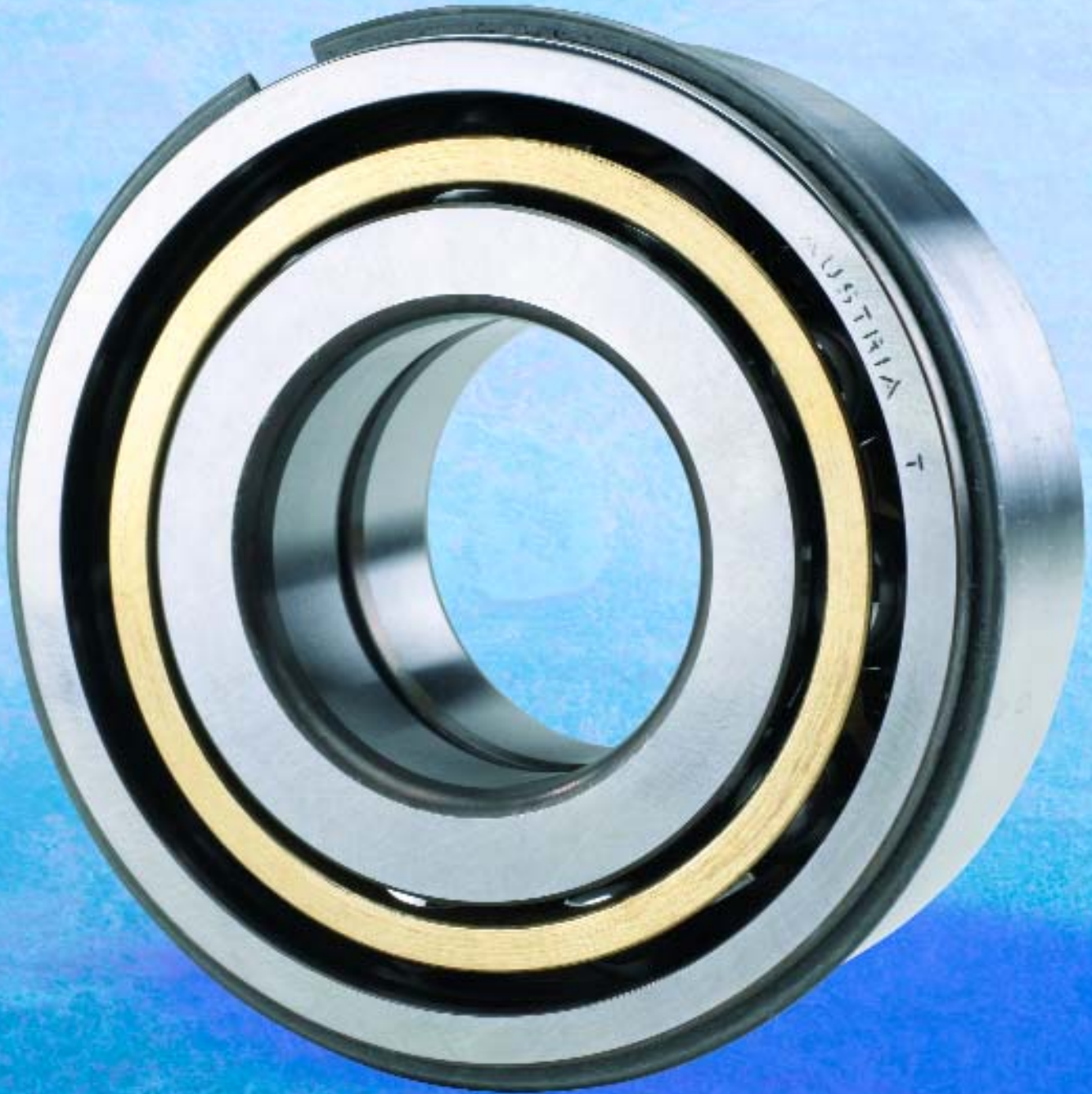
	PITCH DIAMETER mm in	MIN. REQD. RADIAL LOAD AT 3600 RPM N lbf 6)	THRUST FOR 25000 HRS L_{10} AT 3600 RPM N lbf	SPEED RATING 3)		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	32.9 1.2965	101 23	874 197	9000	13000	20.011 .7878	20.002 .7875	47.016 1.8510	47.000 1.8504
	37.7 1.4839	133 30	957 216	8000	11000	25.011 .9847	25.002 .9844	52.019 2.0479	52.000 2.0472
	46.0 1.8110	190 43	1315 296	7000	9500	30.011 1.1815	30.002 1.1812	62.019 2.4416	62.000 2.4409
	52.5 2.0663	257 58	1733 390	6000	8000	35.013 1.3785	35.002 1.3781	72.019 2.8353	72.000 2.8346
	58.7 2.3122	323 73	2064 465	5600	7500	40.013 1.5753	40.002 1.5749	80.019 3.1503	80.000 3.1496
	65.0 2.5591	379 85	2244 506	5000	6700	45.013 1.7722	45.002 1.7718	85.022 3.3474	85.000 3.3465
	68.9 2.7107	439 99	2244 506	4800	6300	50.013 1.9690	50.002 1.9686	90.022 3.5442	90.000 3.5433
	75.4 2.9682	538 121	2630 593	4300	5600	55.015 2.1660	55.002 2.1655	100.022 3.9379	100.000 3.9370
	82.5 3.2464	647 146	3227 727	3800	5000	60.015 2.3628	60.002 2.3623	110.022 4.3316	110.000 4.3307
	93.5 3.6818	766 173	3705 833	3600	4800	65.015 2.5597	65.002 2.5592	120.022 4.7253	120.000 4.7244
	97.5 3.8386	851 192	4064 915	3200	4300	70.015 2.7565	70.002 2.7560	125.025 4.9223	125.000 4.9213
	101.5 3.9955	941 212	4395 989	3200	4300	75.015 2.9534	75.002 2.9529	130.025 5.1191	130.000 5.1181
	108.4 4.2685	1083 244	4873 1099	2800	3800	80.015 3.1502	80.002 3.1497	140.025 5.5128	140.000 5.5118
	115.6 4.5502	1236 278	5700 1283	2600	3600	85.018 3.3472	85.003 3.3466	150.025 5.9065	150.000 5.9055
	123.5 4.8629	881 5) 199	7529 5) 1697	2400	3400	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992
	132.6 5.2185	990 5) 223	9209 5) 2068	2200	3200	95.018 3.7409	95.003 3.7403	170.025 6.6939	170.000 6.6929
	140.1 5.5138	1105 5) 249	10309 5) 2317	2000	3000	100.018 3.9377	100.003 3.9371	180.025 7.0876	180.000 7.0866
	154.9 6.0984	1355 5) 305	11757 5) 2641	1600	2600	110.018 4.3314	110.003 4.3308	200.029 7.8751	200.000 7.8740

5300C series 30º double-row angular contact ball bearings

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1) r_a mm in	BASIC RADIAL LOAD RATING 2) DYNAMIC 4) C N lbf	BASIC RADIAL LOAD RATING 2) STATIC C_o N lbf	BALLS PER ROW NUMBER	BALLS PER ROW DIAMETER mm in
5304C	20 .7874	52 2.0472	22.23 .8750	1.0 .04	22500 5060	14600 3280	8	8.731 .3438
5305C	25 .9843	62 2.4409	25.40 1.0000	1.0 .04	30700 6910	20400 4590	8	10.319 .4063
5306C	30 1.1811	72 2.8346	30.16 1.1875	1.0 .04	41600 9360	29000 6520	8	12.304 .4844
5307C	35 1.3780	80 3.1496	34.93 1.3750	1.5 .06	49400 11100	34500 7760	8	13.495 .5313
5308C	40 1.5748	90 3.5433	36.51 1.4375	1.5 .06	60500 13600	43000 9760	8	15.083 .5938
5309C	45 1.7717	100 3.9370	39.69 1.5625	1.5 .06	72800 16400	53000 11900	8	16.670 .6563
5310C	50 1.9685	110 4.3307	44.45 1.7500	2.0 .08	85200 19200	64000 14400	8	18.258 .7188
5311C	55 2.1654	120 4.7244	49.21 1.9375	2.0 .08	106000 23900	81500 18300	8	20.638 .8125
5312C	60 2.3622	130 5.1181	53.98 2.1250	2.0 .08	121000 27200	95000 21400	8	22.225 .8750
5313C	65 2.5591	140 5.5118	58.74 2.3125	2.0 .08	138000 31100	108000 24300	8	23.813 .9375
5314C	70 2.7559	150 5.9055	63.50 2.5000	2.0 .08	153000 34400	125000 28100	8	25.400 1.0000
5315C	75 2.9528	160 6.2992	68.26 2.6875	2.0 .08	168000 37800	140000 31500	8	26.988 1.0625
5316C	80 3.1496	170 6.6929	68.26 2.6875	2.0 .08	182000 41000	156000 35100	8	28.575 1.1250
5317C	85 3.3465	180 7.0866	73.03 2.8750	2.5 .10	195000 43900	176000 39600	8	30.163 1.1875
5318C	90 3.5433	190 7.4803	73.03 2.8750	2.5 .10	212000 47700	196000 44100	8	31.750 1.2500
5319C	95 3.7402	200 7.8740	77.79 3.0625	2.5 .10	234000 52700	224000 50400	8	34.131 1.3438
5320C	100 3.9370	215 8.4646	82.55 3.2500	2.5 .10	255000 57300	255000 57300	8	36.513 1.4375
5322C	110 4.3307	240 9.4488	92.08 3.6250	2.5 .10	291000 65400	305000 68600	8	39.688 1.5625

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
2) For thrust rating, multiply C by 0.81 and C_0 by 1.52
3) Values have been determined through historical application and practice
4) Rating for one million revolutions or 500 hours at 33⅓ RPM
5) Based on 1800 RPM for 5316C through 5322C
6) Based on an oil viscosity of 16 centistokes (mm^2/s) at bearing operating temperature

	PITCH DIAMETER mm in	MIN. REQD. RADIAL LOAD AT 3600 RPM N lbf 6)	THRUST FOR 25000 HRS L_{10} AT 3600 RPM N lbf	SPEED RATING 3)		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	36.6 1.4406	136 31	1035 233	8500	12000	20.011 .7878	20.002 .7875	52.019 2.0479	52.000 2.0472
	43.5 1.7126	198 45	1412 318	7500	10000	25.011 .9847	25.002 .9844	62.019 2.4416	62.000 2.4409
	51.3 2.0215	272 62	1913 431	6300	8500	30.011 1.1815	30.002 1.1812	72.019 2.8353	72.000 2.8346
	56.2 2.2138	346 78	2271 511	5600	7500	35.013 1.3785	35.002 1.3781	80.019 3.1503	80.000 3.1496
	63.0 2.4790	442 100	2782 626	5000	6700	40.013 1.5753	40.002 1.5749	90.022 3.5442	90.000 3.5433
	70.0 2.7544	549 124	3347 754	4500	6000	45.013 1.7722	45.002 1.7718	100.022 3.9379	100.000 3.9370
	77.5 3.0512	669 151	3917 883	4000	5300	50.013 1.9690	50.002 1.9686	110.022 4.3316	110.000 4.3307
	86.2 3.3949	800 180	4873 1099	3800	5000	55.015 2.1660	55.002 2.1655	120.022 4.7253	120.000 4.7244
	93.4 3.6777	943 212	5563 1251	3400	4500	60.015 2.3628	60.002 2.3623	130.025 5.1191	130.000 5.1181
	101.0 3.9754	1097 247	6344 1430	3200	4300	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
	109.1 4.2954	1264 284	7033 1582	2800	3800	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
	114.0 4.4870	1442 325	7723 1738	2600	3600	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
	124.0 4.8804	1028 5) 232	10541 5) 2375	2400	3400	80.015 3.1502	80.002 3.1497	170.025 6.6939	170.000 6.6929
	131.4 5.1734	1155 5) 260	11294 5) 2543	2200	3200	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
	138.8 5.4664	1290 5) 290	12278 5) 2763	2000	3000	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803
	147.5 5.8071	1431 5) 322	13553 5) 3053	1900	2800	95.018 3.7409	95.003 3.7403	200.029 7.8751	200.000 7.8740
	156.0 6.1417	1632 5) 367	14769 5) 3319	1800	2600	100.018 3.9377	100.003 3.9371	215.029 8.4657	215.000 8.4646
	175.0 6.8898	2015 5) 453	16854 5) 3788	1700	2400	110.018 4.3314	110.003 4.3308	240.029 9.4499	240.000 9.4488


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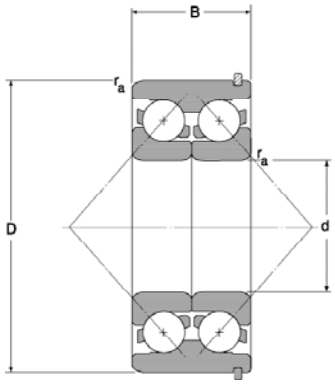
5300UPG series
40º double-row angular contact ball bearings

Upgrading the double-row angular contact ball bearings in API 610 Standard, 5th Edition and ANSI-style pumps to duplexed single-row angular contact ball bearings to meet ANSI + standards typically meant expensive and time-consuming modifications.

MRC has taken the features of the industry leading 7000PJDE single-row angular contact ball bearing and incorporated them into the standard double-row angular contact ball bearing's dimensional package.

- Machined brass cage
- CB axial internal clearance
- ABEC-3 (P6) tolerances

Each feature of the MRC Pump Bearing directly addresses the most common operational challenges faced by ANSI-style pumps: high loads and poor lubrication—which lead to high bearing operating temperatures—lubricant degradation, and ultimately premature failure.



U = Split inner ring
P = 40º contact angle
G = Snap ring (standard)

The MRC Pump Bearing

40° Contact Angle

Steeper than the contact angle of the standard double-row angular contact ball bearing, the Pump Bearing's 40° contact angle gives the bearing increased thrust capacity.

Machined Brass Cage

Proven in single-row angular contact ball bearings to be robust for performance in heavy duty and poor lubrication conditions. Takes longer to fail and produces noise on impending failure, therefore giving operators a longer time to react for maintenance and effectively reducing unexpected downtime.

CB Axial Internal Clearance

Building on the success of the reduced end play in single-row angular contacts, the Pump Bearing's new optimized axial clearance promotes load sharing between the two rows of balls and reduces the possibility of skidding in the inactive ball set.

ABEC-3 (P6) Tolerances

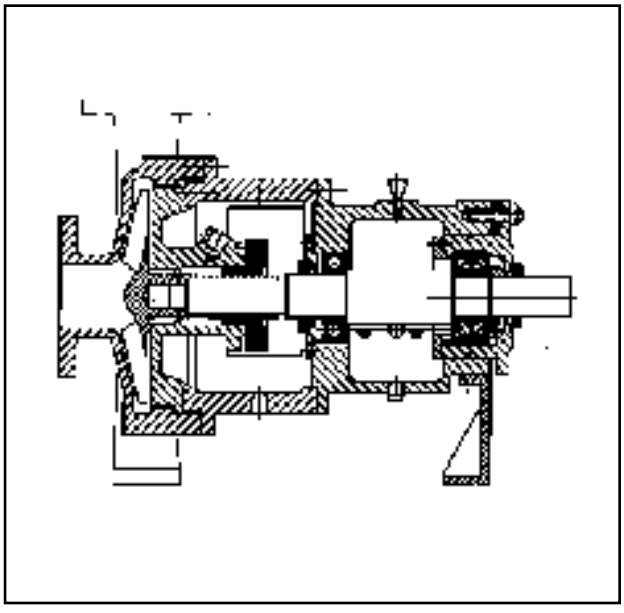
A feature found in MRC single-row angular contact ball bearings, ABEC 3 (P6) tolerances contribute to better control of the bearing's mounted condition and, ultimately, smoother bearing operation.



5300UPG series 40° double-row angular contact ball bearings

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1) r_a mm in	BASIC RADIAL LOAD RATING 2) DYNAMIC 4) C N lbf	BASIC RADIAL LOAD RATING 2) STATIC C_o N lbf	BALLS PER ROW NUMBER	BALLS PER ROW DIAMETER mm in
5308UPG	40 1.5748	90 3.5433	36.51 1.4375	1.5 .06	49400 11110	41500 9330	11	12.700 .5000
5309UPG	45 1.7717	100 3.9370	39.69 1.5625	1.5 .06	61800 13890	52000 11690	11	14.288 .5625
5310UPG	50 1.9685	110 4.3307	44.45 1.7500	2.0 .08	81900 18410	69500 15620	11	16.669 .6563
5311UPG	55 2.1654	120 4.7244	49.21 1.9375	2.0 .08	95600 21490	83000 18660	11	18.256 .7188
5313UPG	65 2.5591	140 5.5118	58.74 2.3125	2.1 .08	138000 31000	122000 27400	11	22.225 .8750

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
2) For thrust rating, multiply C by 1.08 and C_0 by 1.93
3) Values have been determined through historical application and practice
4) Rating for one million revolutions or 500 hours at 33⅓ RPM



The MRC Pump Bearing's dimensions are identical to those for standard DRACBB's with comparable bore sizes.

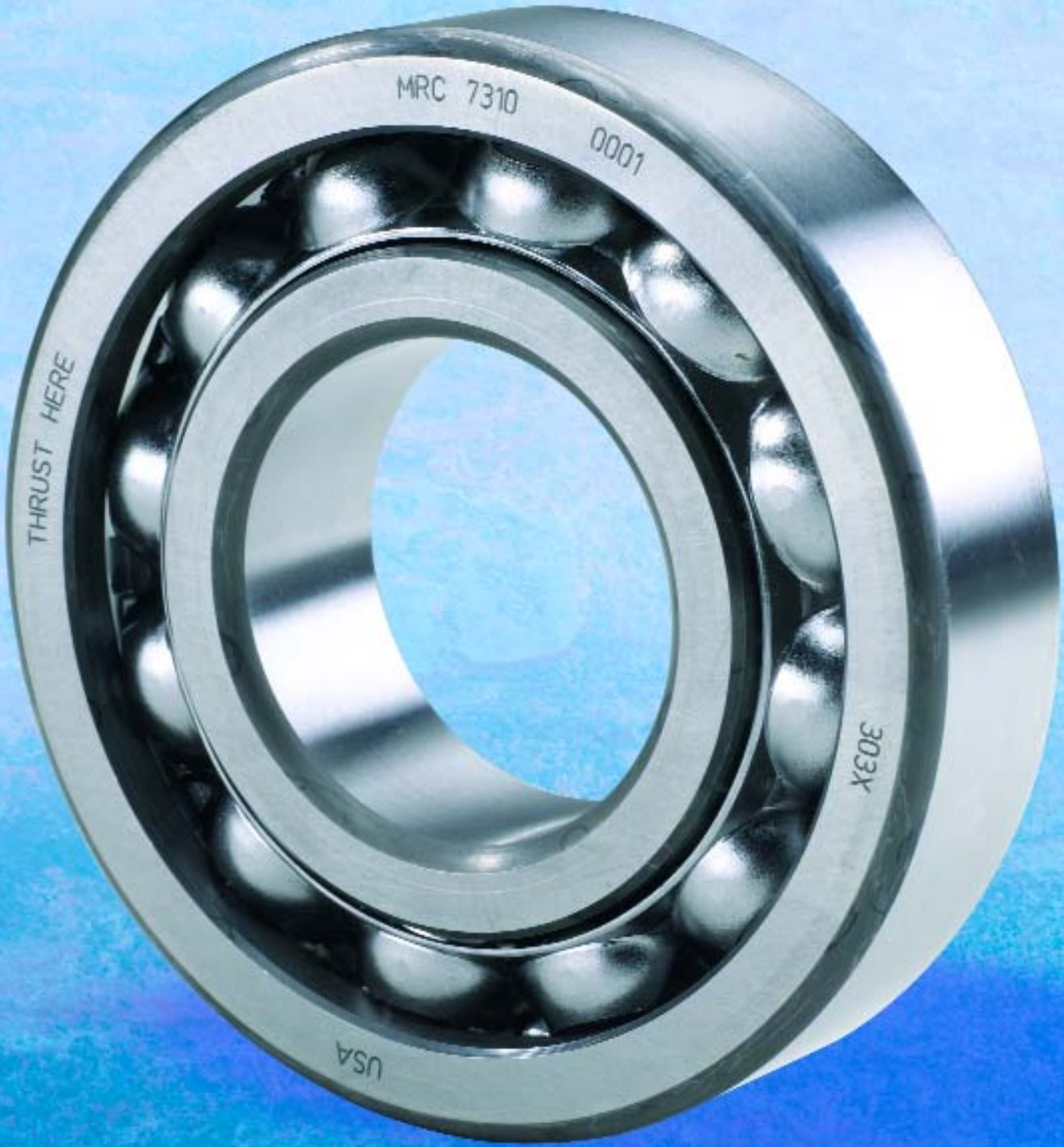


The MRC Pump Bearing is equipped with robust machined brass cages that perform better in heavy duty applications and marginal lubrication conditions.

	PITCH DIAMETER mm in	MIN. REQD. THRUST LOAD AT 3600 RPM N lbf	THRUST FOR 25000 HRS L_{10} AT 3600 RPM N lbf	SPEED RATING 3)		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	65.0 2.5591	122 28	3028 681	5000	6700	40.013 1.5753	40.002 1.5749	90.022 3.5442	90.000 3.5433
	72.5 2.8543	193 44	3788 852	4500	6000	45.013 1.7722	45.002 1.7718	100.022 3.9379	100.000 3.9370
	80.0 3.1496	334 76	5020 1129	4000	5300	50.013 1.9690	50.002 1.9686	110.022 4.3316	110.000 4.3307
	87.5 3.4449	480 108	5860 1318	3800	5000	55.015 2.1660	55.002 2.1655	120.022 4.7253	120.000 4.7244
	102.5 4.0354	1004 226	8458 1900	3200	4300	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118



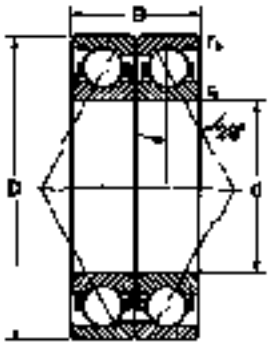
During operation, one row of balls in the MRC Pump Bearing supports the primary axial load, while the other row of balls handles thrust in the opposite direction.


MRC 7310
0001
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7200DU and 7300DU series
29° angular contact ball bearings

The MRC 7000DU series is a medium contact angle bearing. Similar in design to the MRC 7000PDU series, the lower contact angle allows for higher speeds, lower thrust load requirements and greater radial loads.

- ABEC-1
- Heavy-stock, stamped steel cages
- GA preload
- Stocked as universally ground half pairs



Due to the 29° contact angle and smaller balls, this bearing can run with a relatively low thrust load. It also runs well with a combination of moderate thrust and radial load.

The 7000DU series should be considered for applications where thrust is moderate and the pump has a history of running hot. Many older style API pumps were equipped with the 7000DU bearing-type. When replaced with a 40° angular contact bearing, these older pumps often run much hotter.

These bearings are stocked with flush ground faces (GA preload). When heavier than recommended shaft interferences are employed, a bearing with an axial clearance (CB) may be necessary. Special axial clearances can be obtained on a Made-To-Order basis.

7200DU series 29° angular contact ball bearings

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		BASIC RADIAL LOAD RATING 2)		BALLS PER ROW	
				r_a mm in	r_b mm in	DYNAMIC 4) C N lbf	STATIC C_o N lbf	NUMBER	DIAMETER mm in
7204DU	20 .7874	47 1.8504	28 1.1024	1.0 .04	.60 .024	20800 4680	14600 3280	12	7.144 .2813
7205DU	25 .9843	52 2.0472	30 1.1811	1.0 .04	.60 .024	25100 5640	19000 4270	12	7.938 .3125
7206DU	30 1.1811	62 2.4409	32 1.2598	1.0 .04	.60 .024	27600 6200	23600 5310	14	7.938 .3125
7207DU	35 1.3780	72 2.8346	34 1.3386	1.0 .04	.60 .024	37700 8480	34000 7640	14	9.525 .3750
7208DU	40 1.5748	80 3.1496	36 1.4173	1.0 .04	.60 .024	49400 11100	45500 10200	14	11.113 .4375
7209DU	45 1.7717	85 3.3465	38 1.4961	1.0 .04	.60 .024	49400 11100	46500 10500	14	11.113 .4375
7210DU	50 1.9685	90 3.5433	40 1.5748	1.0 .04	.60 .024	54000 12100	54000 12100	16	11.113 .4375
7211DU	55 2.1654	100 3.9370	42 1.6535	1.5 .06	1.0 .04	79300 17800	75000 16900	14	14.288 .5625
7212DU	60 2.3622	110 4.3307	44 1.7323	1.5 .06	1.0 .04	85200 19100	88000 19800	16	14.288 .5625
7213DU	65 2.5591	120 4.7244	46 1.8110	1.5 .06	1.0 .04	104000 23400	110000 24700	16	15.875 .6250
7214DU	70 2.7559	125 4.9213	48 1.8898	1.5 .06	1.0 .04	104000 23400	110000 24700	16	15.875 .6250
7215DU	75 2.9528	130 5.1181	50 1.9685	1.5 .06	1.0 .04	130000 29200	140000 31500	17	17.463 .6875
7216DU	80 3.1496	140 5.5118	52 2.0472	2.0 .08	1.0 .04	121000 27200	134000 30100	16	17.463 .6875
7217DU	85 3.3465	150 5.9055	56 2.2047	2.0 .08	1.0 .04	148000 33300	166000 37300	17	19.050 .7500
7218DU	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	190000 42700	236000 53100	16	22.225 .8750
7219DU	95 3.7402	170 6.6929	64 2.5197	2.0 .08	1.0 .04	199000 44700	228000 51300	17	22.225 .8750
7220DU	100 3.9370	180 7.0866	68 2.6772	2.0 .08	1.0 .04	225000 50600	260000 58500	17	23.813 .9375
7221DU	105 4.1339	190 7.4803	72 2.8346	2.0 .08	1.0 .04	242000 54400	295000 66300	16	25.400 1.0000
7222DU	110 4.3307	200 7.8740	76 2.9921	2.0 .08	1.0 .04	265000 59600	310000 69700	16	26.988 1.0625
7224DU	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	281000 63200	355000 79800	16	28.575 1.1250

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

2) For thrust rating, multiply C by 0.81 and C_0 by 1.47

3) Listed values are for machined brass cages and have been determined through historical application and practice

4) Rating for one million revolutions or 500 hours at 33⅓ RPM

5) Based on 1800 RPM for 7220DU through 7224DU

Tabulated vaules are for back-to-back (DB) or face-to-face (DF) mounting arrangement

	PITCH DIAMETER mm in	MIN. REQD. THRUST LOAD AT 3600 RPM N lbf [5]	THRUST FOR 25000 HRS L_{10} AT 3600 RPM N lbf [5]	SPEED RATING [3]		RECOMMENDED SHAFT DIAMETER (h5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	33.7 1.3256	7 2	957 216	12000	15000	20.000 .7874	19.990 .7870	47.016 1.8510	47.000 1.8504
	37.7 1.4839	11 3	1154 260	9600	13000	25.000 .9843	24.991 .9839	52.019 2.0479	52.000 2.0472
	46.2 1.8201	16 4	1269 285	8000	10000	30.000 1.1811	29.990 1.1807	62.019 2.4416	62.000 2.4409
	53.8 2.1168	31 7	1733 390	7400	9600	35.000 1.3780	34.991 1.3776	72.019 2.8353	72.000 2.8346
	60.3 2.3740	54 13	2271 511	6200	8000	40.000 1.5748	39.990 1.5744	80.019 3.1503	80.000 3.1496
	65.3 2.5719	60 14	2271 511	5800	7600	45.000 1.7717	44.991 1.7713	85.022 3.3474	85.000 3.3465
	70.4 2.7697	75 17	2483 557	5100	6600	50.000 1.9685	49.990 1.9681	90.022 3.5442	90.000 3.5433
	76.5 3.0100	145 33	3646 819	4800	6200	55.000 2.1654	54.988 2.1649	100.022 3.9379	100.000 3.9370
	85.4 3.3632	190 43	3917 878	4300	5600	60.000 2.3622	59.987 2.3617	110.022 4.3316	110.000 4.3307
	93.0 3.6600	282 64	4781 1076	3900	5100	65.000 2.5591	64.988 2.5586	120.022 4.7253	120.000 4.7244
	98.0 3.8578	301 68	4781 1076	3700	4800	70.000 2.7559	69.987 2.7554	125.025 4.9223	125.000 4.9213
	101.4 3.9903	434 98	5976 1343	3400	4500	75.000 2.9528	74.988 2.9523	130.025 5.1191	130.000 5.1181
	110.6 4.3524	454 102	5563 1251	3300	4200	80.000 3.1496	79.987 3.1491	140.025 5.5128	140.000 5.5118
	118.1 4.6491	665 150	6804 1531	3000	3900	85.000 3.3465	84.986 3.3459	150.025 5.9065	150.000 5.9055
	124.5 4.9012	1024 231	8734 1963	2900	3800	90.000 3.5433	89.985 3.5427	160.025 6.3002	160.000 6.2992
	132.5 5.2165	1174 264	9148 2055	2800	3600	95.000 3.7402	94.986 3.7396	170.025 6.6939	170.000 6.6929
	140.7 5.5394	383 [5] 87	13031 [5] 2931	2600	3300	100.000 3.9370	99.985 3.9364	180.025 7.0876	180.000 7.0866
	148.2 5.8361	460 [5] 104	14016 [5] 3151	2400	3100	105.000 4.1339	104.986 4.1333	190.029 7.4814	190.000 7.4803
	155.8 6.1329	578 [5] 130	15348 [5] 3452	2300	3000	110.000 4.3307	109.985 4.3301	200.029 7.8751	200.000 7.8740
	169.0 6.6524	748 [5] 169	16275 [5] 3661	2200	2800	120.000 4.7244	119.985 4.7238	215.029 8.4657	215.000 8.4646

7300DU series 29° angular contact ball bearings

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		BASIC RADIAL LOAD RATING 2)		BALLS PER ROW	
				r_a mm in	r_b mm in	DYNAMIC 4) C N lbf	STATIC C_o N lbf	NUMBER	DIAMETER mm in
7304DU	20 .7874	52 2.0472	30 1.1811	1.0 .04	.60 .024	30200 6790	21200 4770	10	9.525 .3750
7305DU	25 .9843	62 2.4409	34 1.3386	1.0 .04	.60 .024	34500 7760	27000 6070	12	9.525 .3750
7306DU	30 1.1811	72 2.8346	38 1.4961	1.0 .04	.60 .024	46200 10400	37500 8430	12	11.113 .4375
7307DU	35 1.3780	80 3.1496	42 1.6535	1.5 .06	1.0 .04	58500 13200	48000 10800	12	12.700 .5000
7308DU	40 1.5748	90 3.5433	46 1.8110	1.5 .06	1.0 .04	71500 16100	61000 13700	12	14.288 .5625
7309DU	45 1.7717	100 3.9370	50 1.9685	1.5 .06	1.0 .04	85200 19200	75000 16900	12	15.875 .6250
7310DU	50 1.9685	110 4.3307	54 2.1260	2.0 .08	1.0 .04	121000 27200	106000 23800	12	19.050 .7500
7311DU	55 2.1654	120 4.7244	58 2.2835	2.0 .08	1.0 .04	140000 31500	125000 28100	12	20.638 .8125
7312DU	60 2.3622	130 5.1181	62 2.4409	2.0 .08	1.0 .04	159000 35700	146000 32800	12	22.225 .8750
7313DU	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	178000 40000	173000 38900	14	22.225 .8750
7314DU	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	182000 40900	170000 38200	12	23.813 .9375
7315DU	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	225000 50600	228000 51300	14	25.400 1.0000
7316DU	80 3.1496	170 6.6929	78 3.0709	2.0 .08	1.0 .04	234000 52600	240000 54000	13	26.988 1.0625
7317DU	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	265000 59600	285000 64100	14	28.575 1.1250
7318DU	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	276000 62000	300000 67400	13	30.163 1.1875
7319DU	95 3.7402	200 7.8740	90 3.5433	2.5 .10	1.0 .04	291000 65400	325000 73100	13	31.750 1.2500
7320DU	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	312000 70100	365000 82100	13	33.338 1.3125
7321DU	105 4.1339	225 8.8583	98 3.8583	2.5 .10	1.0 .04	332000 74600	400000 89900	13	34.925 1.3750
7322DU	110 4.3307	240 9.4488	100 3.9370	2.5 .10	1.0 .04	371000 83400	475000 107000	13	38.100 1.5000
7324DU	120 4.7244	260 10.2362	110 4.3307	2.5 .10	1.0 .04	423000 95100	560000 126000	13	41.275 1.6250
7326DU	130 5.1181	280 11.0236	116 4.5669	3.0 .12	1.0 .04	468000 105000	640000 144000	13	44.450 1.7500
7328DU	140 5.5118	300 11.8110	124 4.8819	3.0 .12	1.0 .04	507000 114000	735000 165000	13	47.625 1.8750
7330DU	150 5.9055	320 12.5984	130 5.1181	3.0 .12	1.0 .04	559000 126000	865000 194000	14	49.213 1.9375
7332DU	160 6.2992	340 13.3858	136 5.3543	3.0 .12	1.0 .04	618000 139000	965000 217000	14	52.388 2.0625

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

2) For thrust rating, multiply C by 0.81 and C_0 by 1.47

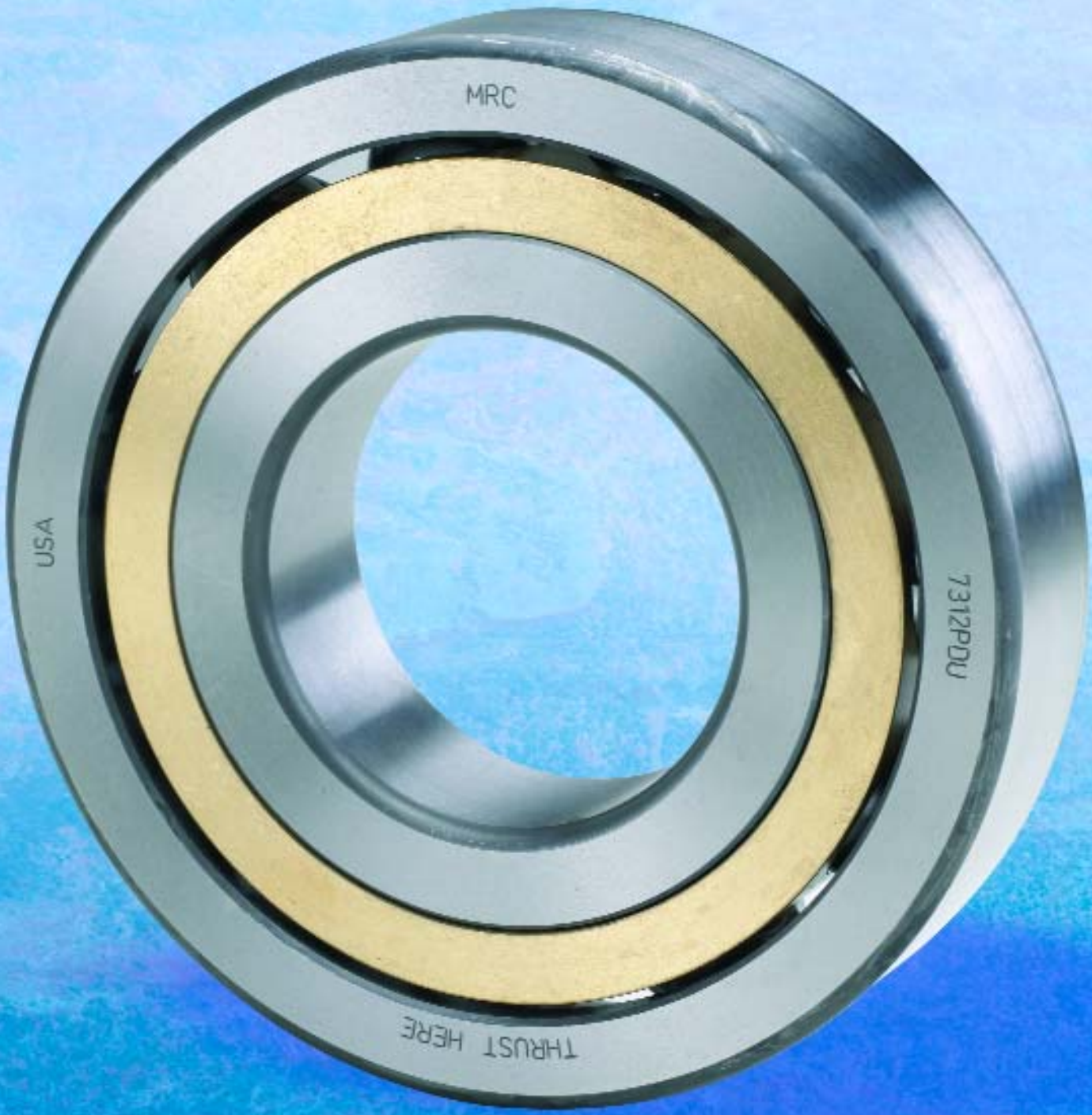
3) Listed values are for machined brass cages and have been determined through historical application and practice

4) Rating for one million revolutions or 500 hours at 33⅓ RPM

5) Based on 1800 RPM for 7318DU through 7332DU

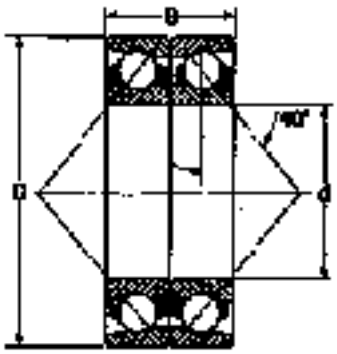
Tabulated vaules are for back-to-back (DB) or face-to-face (DF) mounting arrangement

	PITCH DIAMETER mm in	MIN. REQD. THRUST LOAD AT 3600 RPM N lbf [5]	THRUST FOR 25000 HRS L_{10} AT 3600 RPM N lbf [5]	SPEED RATING [3]		RECOMMENDED SHAFT DIAMETER (h5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	35.7 1.4072	13 3	1389 313	10000	14000	20.000 .7874	19.990 .7870	52.019 2.0479	52.000 2.0472
	43.7 1.7212	21 5	1586 357	8800	11000	25.000 .9843	24.991 .9839	62.019 2.4416	62.000 2.4409
	51.3 2.0179	38 9	2124 479	7400	9600	30.000 1.1811	29.990 1.1807	72.019 2.8353	72.000 2.8346
	57.8 2.2751	63 15	2690 607	6800	8800	35.000 1.3780	34.991 1.3776	80.019 3.1503	80.000 3.1496
	65.5 2.5791	102 23	3287 741	5800	7600	40.000 1.5748	39.990 1.5744	90.022 3.5442	90.000 3.5433
	72.9 2.8687	156 35	3917 883	5100	6600	45.000 1.7717	44.991 1.7713	100.022 3.9379	100.000 3.9370
	78.8 3.1025	281 63	5563 1251	4600	6000	50.000 1.9685	49.990 1.9681	110.022 4.3316	110.000 4.3307
	85.4 3.3610	386 87	6436 1448	4100	5300	55.000 2.1654	54.988 2.1649	120.022 4.7253	120.000 4.7244
	95.0 3.7401	543 122	7309 1642	3900	5100	60.000 2.3622	59.987 2.3617	130.025 5.1191	130.000 5.1181
	103.0 4.0557	705 159	8183 1839	3700	4800	65.000 2.5591	64.988 2.5586	140.025 5.5128	140.000 5.5118
	110.6 4.3524	798 180	8367 1881	3300	4200	70.000 2.7559	69.987 2.7554	150.025 5.9065	150.000 5.9055
	118.1 4.6491	1207 272	10343 2326	3100	4000	75.000 2.9528	74.988 2.9523	160.025 6.3002	160.000 6.2992
	125.6 4.9459	1430 322	10757 2418	2900	3800	80.000 3.1496	79.987 3.1491	170.025 6.6939	170.000 6.6929
	133.2 5.2427	1940 436	12182 2740	2800	3600	85.000 3.3465	84.986 3.3459	180.025 7.0876	180.000 7.0866
	140.7 5.5394	560 [5] 126	15985 [5] 3591	2600	3400	90.000 3.5433	89.985 3.5427	190.029 7.4814	190.000 7.4803
	148.2 5.8361	688 [5] 155	16854 [5] 3788	2500	3200	95.000 3.7402	94.986 3.7396	200.029 7.8751	200.000 7.8740
	158.3 6.2318	855 [5] 193	18070 [5] 4060	2400	3100	100.000 3.9370	99.985 3.9364	215.029 8.4657	215.000 8.4646
	165.8 6.5286	1029 [5] 232	19228 [5] 4321	2300	3000	105.000 4.1339	104.986 4.1333	225.029 8.8594	225.000 8.8583
	175.9 6.9242	1405 [5] 316	21487 [5] 4831	2200	2800	110.000 4.3307	109.985 4.3301	240.029 9.4499	240.000 9.4488
	188.9 7.4351	1914 [5] 431	24499 [5] 5508	2000	2600	120.000 4.7244	119.985 4.7238	260.032 10.2375	260.000 10.2362
	203.8 8.0227	2580 [5] 580	27105 [5] 6082	1800	2400	130.000 5.1181	129.982 5.1174	280.032 11.0249	280.000 11.0236
	218.7 8.6104	3406 [5] 766	29363 [5] 6603	1800	2200	140.000 5.5118	139.982 5.5111	300.032 11.8123	300.000 11.8110
	233.6 9.1956	4367 [5] 982	32375 [5] 7298	1600	2100	150.000 5.9055	149.982 5.9048	320.036 12.5998	320.000 12.5984
	248.5 9.7833	5603 [5] 1260	35792 [5] 8051	1500	2000	160.000 6.2992	159.982 6.2985	340.036 13.3872	340.000 13.3858


MRC
USA
7312PDU
THRUST HERE

7200PDU and 7300PDU series 40° angular contact ball bearings with land-guided, machined bronze cage

MRC 7000PDU bearings are especially recommended for pumps, motors and other devices that generate heavy axial loads at high speeds. 7000PDU bearings are not intended to run in pumps that generate only small- or no-thrust loads. See the table on pages 32 and 33 for minimum thrust loads. The bearing with an aircraft-style machined bronze cage runs particularly well in applications where thrust loads vary greatly during operation and periods of ball skidding are unavoidable. Similarly, this bearing type resists destructive vibration forces when cavitation occurs.



Experience has shown that this bearing, with a land-guided, machined bronze cage is very forgiving when ball skidding occurs. With oil lubrication, this cage type runs cooler than most other executions.

- ABEC-1
- Land-guided, machined bronze cage
- Stocked with GA preload (other preloads available on a Made-To-Order basis)
- Stocked as universally ground half pairs

The MRC 7000PDU series angular contact ball bearing has been traditionally supplied with the faces ground flush (GA) and used with an h5 shaft fit. When heavier interference fits are employed, a bearing with axial clearance (CB) may be needed. Call 1-800-MRC-7000 for assistance in selecting special axial clearances.

7200PDU and 7300PDU series 40° angular contact ball bearings with land-guided, machined bronze cage

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		BASIC RADIAL LOAD RATING 2)		BALLS PER ROW	
				r_a mm in	r_b mm in	DYNAMIC 4) C N lbf	STATIC C_o N lbf	NUMBER	DIAMETER mm in
7216PDU	80 3.1496	140 5.5118	52 2.0472	2.0 .08	1.0 .04	135000 30300	140000 31500	15	19.844 .7813
7218PDU	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	178000 40000	190000 42700	15	23.019 .9063
7219PDU	95 3.7402	170 6.6929	64 2.5197	2.0 .08	1.0 .04	199000 44700	220000 49400	15	24.606 .9688
7220PDU	100 3.9370	180 7.0866	68 2.6772	2.0 .08	1.0 .04	212000 47700	250000 56200	15	25.400 1.0000
7222PDU	110 4.3307	200 7.8740	76 2.9921	2.0 .08	1.0 .04	251000 56400	310000 69700	15	28.575 1.1250
7224PDU	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	270000 60700	325000 73100	15	30.163 1.1875
7226PDU	130 5.1181	230 9.0551	80 3.1496	2.5 .10	1.0 .04	302000 67900	390000 87700	16	31.750 1.2500
7228PDU	140 5.5118	250 9.8425	84 3.3071	2.5 .10	1.0 .04	319000 71700	430000 96700	16	33.338 1.3125
7230PDU	150 5.9055	270 10.6299	90 3.5433	2.5 .10	1.0 .04	351000 78900	520000 117000	17	34.925 1.3750
7232PDU	160 6.2992	290 11.4173	96 3.7795	2.5 .10	1.0 .04	390000 87700	560000 126000	16	38.100 1.5000
7306PDU	30 1.1811	72 2.8346	38 1.4961	1.0 .04	.60 .024	52700 11800	39000 8770	10	13.494 .5313
7307PDU	35 1.3780	80 3.1496	42 1.6535	1.5 .06	1.0 .04	63700 14300	49000 11000	10	15.081 .5938
7308PDU	40 1.5748	90 3.5433	46 1.8110	1.5 .06	1.0 .04	76100 17100	61000 13700	10	16.669 .6563
7309PDU	45 1.7717	100 3.9370	50 1.9685	1.5 .06	1.0 .04	97500 21900	80000 18000	11	18.256 .7188
7310PDU	50 1.9685	110 4.3307	54 2.1260	2.0 .08	1.0 .04	112000 25200	104000 23400	11	19.844 .7813
7311PDU	55 2.1654	120 4.7244	58 2.2835	2.0 .08	1.0 .04	130000 29200	112000 25200	11	21.431 .8438
7312PDU	60 2.3622	130 5.1181	62 2.4409	2.0 .08	1.0 .04	148000 33300	129000 29000	11	23.019 .9063
7313PDU	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	165000 37100	160000 36000	11	24.606 .9688
7314PDU	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	190000 42700	186000 41800	11	26.988 1.0625
7315PDU	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	208000 46800	200000 45000	11	28.575 1.1250
7316PDU	80 3.1496	170 6.6929	78 3.0709	2.0 .08	1.0 .04	225000 50600	220000 49500	11	30.163 1.1875
7317PDU	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	238000 53500	245000 55100	11	31.750 1.2500
7318PDU	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	255000 57300	270000 60700	11	33.338 1.3125
7319PDU	95 3.7402	200 7.8740	90 3.5433	2.5 .10	1.0 .04	276000 62000	300000 67400	11	34.925 1.3750
7320PDU	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	307000 69000	380000 85400	12	36.513 1.4375
7321PDU	105 4.1339	225 8.8583	98 3.8583	2.5 .10	1.0 .04	325000 73100	390000 87700	12	38.100 1.5000
7322PDU	110 4.3307	240 9.4488	100 3.9370	2.5 .10	1.0 .04	345000 77600	455000 102000	12	39.688 1.5625
7324PDU	120 4.7244	260 10.2362	110 4.3307	2.5 .10	1.0 .04	390000 87700	530000 119000	12	44.450 1.7500
7326PDU	130 5.1181	280 11.0236	116 4.5669	3.0 .12	1.0 .04	449000 101000	610000 137000	12	47.625 1.8750
7328PDU	140 5.5118	300 11.8110	124 4.8819	3.0 .12	1.0 .04	488000 110000	695000 156000	12	50.800 2.0000

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

2) For thrust rating, multiply C by 1.08 and C_o by 1.93

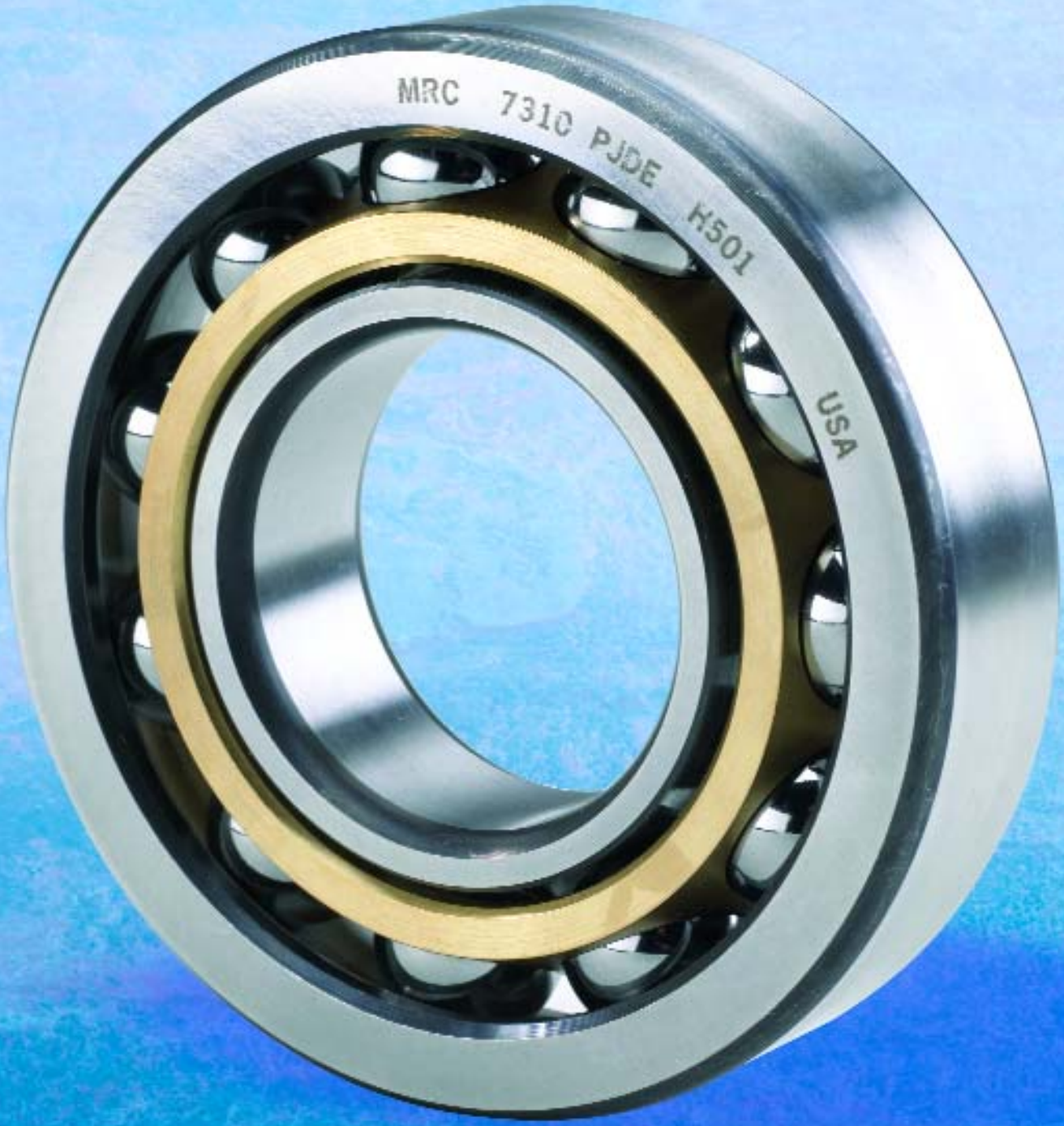
3) Listed values are for machined bronze cage and have been determined through historical application and practice

4) Rating for one million revolutions or 500 hours at 33⅓ RPM

5) Based on 1800 RPM for 7219PDU through 7232PDU and 7317PDU through 7328PDU

Tabulated vaules are for back-to-back (DB) or face-to-face (DF) mounting arrangement

	PITCH DIAMETER mm in	MIN. REQD. THRUST LOAD AT 3600 RPM N lbf [5]	THRUST FOR 25000 HRS L_{10} AT 3600 RPM N lbf [5]	SPEED RATING [3]		RECOMMENDED SHAFT DIAMETER (h5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	110.0 4.3307	1090 245	8275 1858	3000	4000	80.000 3.1496	79.987 3.1491	140.025 5.5128	140.000 5.5118
	125.0 4.9213	1925 433	10910 2452	2600	3600	90.000 3.5433	89.985 3.5427	160.025 6.3002	160.000 6.2992
	132.5 5.2165	622 [5] 140	15367 [5] 3452	2400	3400	95.000 3.7402	94.986 3.7396	170.025 6.6939	170.000 6.6929
	140.0 5.5118	727 [5] 164	16371 [5] 3684	2200	3200	100.000 3.9370	99.985 3.9364	180.025 7.0876	180.000 7.0866
	155.5 6.1204	1146 [5] 258	19383 [5] 4356	1900	2800	110.000 4.3307	109.985 4.3301	200.029 7.8751	200.000 7.8740
	167.5 6.5945	1458 [5] 328	20850 [5] 4688	1700	2400	120.000 4.7244	119.985 4.7238	215.029 8.4657	215.000 8.4646
	180.0 7.0866	1956 [5] 440	23321 [5] 5244	1700	2400	130.000 5.1181	129.982 5.1174	230.029 9.0562	230.000 9.0551
	195.0 7.6772	2468 [5] 555	24634 [5] 5537	1600	2200	140.000 5.5118	139.982 5.5111	250.029 9.8436	250.000 9.8425
	210.0 8.2677	3263 [5] 734	27105 [5] 6093	1500	2000	150.000 5.9055	149.982 5.9048	270.032 10.6312	270.000 10.6299
	225.0 8.8583	4258 [5] 958	30116 [5] 6773	1300	1700	160.000 6.2992	159.982 6.2985	290.032 11.4186	290.000 11.4173
	51.0 2.0079	96 22	3230 724	6700	9000	30.000 1.1811	29.990 1.1807	72.019 2.8353	72.000 2.8346
	57.5 2.2638	152 34	3905 877	6000	8000	35.000 1.3780	34.991 1.3776	80.019 3.1503	80.000 3.1496
	65.0 2.5591	233 53	4665 1049	5300	7000	40.000 1.5748	39.990 1.5744	90.022 3.5442	90.000 3.5433
	72.5 2.8543	377 85	5976 1343	4800	6300	45.000 1.7717	44.991 1.7713	100.022 3.9379	100.000 3.9370
	80.0 3.1496	537 121	6865 1545	4300	5600	50.000 1.9685	49.990 1.9681	110.022 4.3316	110.000 4.3307
	87.5 3.4449	743 167	7968 1790	3800	5000	55.000 2.1654	54.988 2.1649	120.022 4.7253	120.000 4.7244
	95.0 3.7402	1002 226	9071 2041	3600	4800	60.000 2.3622	59.987 2.3617	130.025 5.1191	130.000 5.1181
	102.5 4.0355	1324 298	10113 2274	3200	4300	65.000 2.5591	64.988 2.5586	140.025 5.5128	140.000 5.5118
	110.0 4.3307	1863 419	11645 2618	3000	4000	70.000 2.7559	69.987 2.7554	150.025 5.9065	150.000 5.9055
	117.5 4.6260	2368 533	12749 2869	2800	3800	75.000 2.9528	74.988 2.9523	160.025 6.3002	160.000 6.2992
	125.0 4.9213	2970 668	13791 3102	2600	3600	80.000 3.1496	79.987 3.1491	170.025 6.6939	170.000 6.6929
	132.5 5.2166	920 [5] 207	18379 [5] 4132	2400	3400	85.000 3.3465	84.986 3.3459	180.025 7.0876	180.000 7.0866
	140.0 5.5118	1127 [5] 254	19692 [5] 4425	2200	3200	90.000 3.5433	89.985 3.5427	190.029 7.4814	190.000 7.4803
	147.5 5.8071	1368 [5] 308	21313 [5] 4788	2000	3000	95.000 3.7402	94.986 3.7396	200.029 7.8751	200.000 7.8740
	157.5 6.2008	1832 [5] 412	23707 [5] 5329	1900	2800	100.000 3.9370	99.985 3.9364	215.029 8.4657	215.000 8.4646
	165.0 6.4961	2182 [5] 491	25097 [5] 5645	1800	2600	105.000 4.1339	104.986 4.1333	225.029 8.8594	225.000 8.8583
	175.0 6.8898	2629 [5] 591	26641 [5] 5993	1700	2400	110.000 4.3307	109.985 4.3301	240.029 9.4499	240.000 9.4488
	190.0 7.4803	3976 [5] 894	30116 [5] 6773	1600	2200	120.000 4.7244	119.985 4.7238	260.032 10.2375	260.000 10.2362
	205.0 8.0709	5286 [5] 1189	34672 [5] 7800	1500	2000	130.000 5.1181	129.982 5.1174	280.032 11.0249	280.000 11.0236
	220.0 8.6614	6896 [5] 1551	37684 [5] 8495	1400	1900	140.000 5.5118	139.982 5.5111	300.032 11.8123	300.000 11.8110


MRC 7310 PJDE H501
USA

7200PJDE and 7300PJDE series 40° angular contact ball bearings with ball-centered cage and CB clearance

Single-row 40º angular contact ball bearings are the most popular pump thrust bearings in service today. MRC 7000PJDE series bearings are compliant with API 610 requirements.

Proven Track Record

Long service life and reliable performance have earned MRC angular contact ball bearings an excellent reputation in the pump industry. The standard product features which have contributed to this exceptional performance include: ABEC-3 precision tolerances, a 40° contact angle, controlled internal CB axial clearance, one-piece ball-guided machined brass cages and universal grinding. These features have allowed MRC single-row duplexed bearings to accommodate combined axial and radial loads, high speeds and poor lubrication conditions.

Technical Improvements*

Improved materials

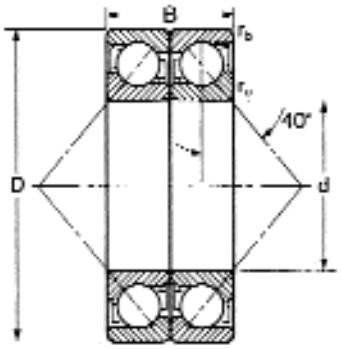
MRC 7000PJDE series single-row angular contact ball bearings are manufactured from an extremely high quality bearing steel with a very low oxygen content and a minimum number of impurities. The rings are manufactured from forged blanks, and both rings are heat treated to provide dimensional stability up to 300° F (150° C). These advantages allow the bearings to maintain built-in clearances over their entire service life.

Improved internal geometry

Twenty-first century computer-aided design and manufacturing programs have permitted subtle improvements in the bearings. These small, but effective, modifications to the bearing's internal geometry lead to measurable improvements in both performance and service life. One benefit of this fine tuning is that MRC single-row 40º ball bearings are less sensitive to axial overloading.

Improved precision tolerances

MRC 7000PJDE series single-row angular contact ball bearings are manufactured to ABEC-5 (P5) running accuracy and ABEC-3 (P6) dimensional



accuracy. This feature provides smoother and truer operation with less heat generation, lower vibration, and more precise shaft guidance.

Improved ball quality

The balls used in MRC 7000PJDE series single-row angular contact ball bearings are one ISO grade better than the balls previously utilized. The more precise ball diameter improves running accuracy even at high speeds, while reducing noise and bearing operating temperature.

New cage

MRC 7000PJDE series single-row angular contact ball bearings have an improved machined brass cage which has been manufactured to closer tolerances. The new cage will allow for superior ball guidance as well as better lubricant film formation.

*MRC continuously works to improve the performance and durability of our products. With these technical improvements, you will notice the longer service life and higher reliability associated with our single-row 40º angular contact ball bearings. While a significant number of the bearings incorporate the technical improvements described above, the implementation of the improvements across the entire product range is an ongoing process. Please contact MRC before ordering to determine which sizes have been converted.

7200PJDE series 40° angular contact ball bearings with ball-centered cage and CB clearance

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		BASIC RADIAL LOAD RATING 2)		BALLS PER ROW	
				r_a mm in	r_b mm in	DYNAMIC 4) C N lbf	STATIC C_o N lbf	NUMBER	DIAMETER mm in
7205PJDE	25 .9843	52 2.0472	30 1.1811	1.0 .04	.60 .024	24200 5400	18600 4150	13	7.938 .3125
7206PJDE	30 1.1811	62 2.4409	32 1.2598	1.0 .04	.60 .024	36400 8190	28500 6400	12	10.319 .4063
7207PJDE	35 1.3780	72 2.8346	34 1.3386	1.0 .04	.60 .024	47500 10800	38000 8650	12	11.906 .4688
7208PJDE	40 1.5748	80 3.1496	36 1.4173	1.0 .04	.60 .024	51300 11500	39000 8900	13	12.700 .5000
7209PJDE	45 1.7717	85 3.3465	38 1.4961	1.0 .04	.60 .024	55900 12500	48000 10800	14	12.700 .5000
7210PJDE	50 1.9685	90 3.5433	40 1.5748	1.0 .04	.60 .024	60500 13500	57000 12700	15	12.700 .5000
7211PJDE	55 2.1654	100 3.9370	42 1.6535	1.5 .06	1.0 .04	76100 16800	72000 16300	15	14.288 .5625
7212PJDE	60 2.3622	110 4.3307	44 1.7323	1.5 .06	1.0 .04	93600 21200	91500 20400	15	16.100 .6339
7213PJDE	65 2.5591	120 4.7244	46 1.8110	1.5 .06	1.0 .04	108000 24200	108000 24000	15	17.463 .6875
7214PJDE	70 2.7559	125 4.9213	48 1.8898	1.5 .06	1.0 .04	111000 24700	112000 25000	15	17.700 .6969
7215PJDE	75 2.9528	130 5.1181	50 1.9685	1.5 .06	1.0 .04	114000 25500	120000 27000	16	17.700 .6969
7216PJDE	80 3.1496	140 5.5118	52 2.0472	2.0 .08	1.0 .04	130000 29100	140000 31500	16	19.050 .7500
7217PJDE	85 3.3465	150 5.9055	56 2.2047	2.0 .08	1.0 .04	156000 35100	166000 36500	16	21.000 .8268
7218PJDE	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	178000 40300	193000 43000	16	22.500 .8858
7219PJDE	95 3.7402	170 6.6929	64 2.5197	2.0 .08	1.0 .04	199000 44200	216000 48000	16	24.000 .9449
7220PJDE	100 3.9370	180 7.0866	68 2.6772	2.0 .08	1.0 .04	221000 48800	245000 55000	16	25.400 1.0000
7222PJDE	110 4.3307	200 7.8740	76 2.9921	2.0 .08	1.0 .04	251000 55900	290000 65500	15	28.575 1.1250
7224PJDE	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	270000 60500	325000 73500	15	30.163 1.1875

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

2) For thrust rating, multiply C by 1.08 and C_o by 1.93

3) Listed values are for machined brass cage and have been determined through historical application and practice

4) Rating for one million revolutions or 500 hours at 33⅓ RPM

5) Based on 1800 RPM for 7218PJDE through 7224PJDE

Tabulated vaules are for back-to-back (DB) or face-to-face (DF) mounting arrangement

	PITCH DIAMETER mm in	MIN. REQD. THRUST LOAD AT 3600 RPM N lbf [5]	THRUST FOR 25000 HRS L_{10} AT 3600 RPM N lbf [5]	SPEED RATING [3]		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	38.5 1.5157	21 5	1484 331	8000	11000	25.011 .9847	25.002 .9844	52.019 2.0479	52.000 2.0472
	46.0 1.8110	49 11	2231 502	7000	9500	30.011 1.1815	30.002 1.1812	62.019 2.4416	62.000 2.4409
	53.5 2.1063	88 20	2912 662	6000	8000	35.013 1.3785	35.002 1.3781	72.019 2.8353	72.000 2.8346
	60.4 2.3780	132 30	3145 705	5600	7500	40.013 1.5753	40.002 1.5749	80.019 3.1503	80.000 3.1496
	65.0 2.5591	155 35	3427 767	5300	7000	45.013 1.7722	45.002 1.7718	85.022 3.3474	85.000 3.3465
	70.0 2.7559	182 41	3709 828	4800	6300	50.013 1.9690	50.002 1.9686	90.022 3.5442	90.000 3.5433
	77.5 3.0512	286 65	4665 1030	4300	5600	55.015 2.1660	55.002 2.1655	100.022 3.9379	100.000 3.9370
	85.0 3.3465	446 101	5737 1300	3800	5000	60.015 2.3628	60.002 2.3623	110.022 4.3316	110.000 4.3307
	92.5 3.6417	619 140	6620 1484	3400	4500	65.015 2.5597	65.002 2.5592	120.022 4.7253	120.000 4.7244
	97.5 3.8386	685 154	6804 1514	3200	4300	70.015 2.7565	70.002 2.7560	125.025 4.9223	125.000 4.9213
	102.5 4.0354	775 175	6987 1563	3200	4300	75.015 2.9534	75.002 2.9529	130.025 5.1191	130.000 5.1181
	110.0 4.3307	1037 233	7968 1784	2800	3800	80.015 3.1502	80.002 3.1497	140.025 5.5128	140.000 5.5118
	117.5 4.6260	1474 332	9562 2152	2600	3600	85.018 3.3472	85.003 3.3466	150.025 5.9065	150.000 5.9055
	125.0 4.9213	482 [5] 109	13746 [5] 3112	2400	3400	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992
	132.5 5.2165	619 [5] 140	15367 [5] 3414	2200	3200	95.018 3.7409	95.003 3.7403	170.025 6.6939	170.000 6.6929
	140.0 5.5118	775 [5] 175	17066 [5] 3769	2000	3000	100.018 3.9377	100.003 3.9371	180.025 7.0876	180.000 7.0866
	155.0 6.1024	1141 [5] 257	19383 [5] 4317	1900	2800	110.018 4.3314	110.003 4.3308	200.029 7.8751	200.000 7.8740
	167.8 6.6043	1461 [5] 329	20850 [5] 4672	1700	2400	120.018 4.7251	120.003 4.7245	215.029 8.4657	215.000 8.4646

Hybrid Bearings

MRC single-row 40º angular contact ball bearings can also be manufactured as hybrid bearings. These bearings combine SAE 52100 steel rings with silicon nitride (ceramic) rolling elements. They are typically utilized in applications where there is ineffective lubrication, excessive contamination, or stray electrical currents. Even under poor lubrication conditions, metal-to-metal contact between the raceways and balls is eliminated due to the use of the ceramic material. Hybrid bearings can achieve a service life that is three to 30 times longer than the standard all-steel bearing under these adverse conditions. For more information, please contact MRC Bearing Services at 1-800-MRC-7000 and ask for our applications engineering department.

7300PJDE series 40° angular contact ball bearings with ball-centered cage and CB clearance

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		BASIC RADIAL LOAD RATING 2)		BALLS PER ROW	
				r_a mm in	r_b mm in	DYNAMIC 4) C N lbf	STATIC C_o N lbf	NUMBER	DIAMETER mm in
7304PJDE	20 .7874	52 2.0472	30 1.1811	1.0 .04	.60 .024	30700 6890	20800 4650	9	10.000 .3937
7305PJDE	25 .9843	62 2.4409	34 1.3386	1.0 .04	.60 .024	39700 8920	28000 6300	10	11.500 .4528
7306PJDE	30 1.1811	72 2.8346	38 1.4961	1.0 .04	.60 .024	52700 11900	39000 8800	10	13.494 .5313
7307PJDE	35 1.3780	80 3.1496	42 1.6535	1.5 .06	1.0 .04	62400 14000	49000 11000	11	14.288 .5625
7308PJDE	40 1.5748	90 3.5433	46 1.8110	1.5 .06	1.0 .04	76100 16800	61000 13400	11	15.875 .6250
7309PJDE	45 1.7717	100 3.9370	50 1.9685	1.5 .06	1.0 .04	92300 20800	75000 17000	11	17.700 .6969
7310PJDE	50 1.9685	110 4.3307	54 2.1260	2.0 .08	1.0 .04	112000 25100	95000 21200	11	19.844 .7813
7311PJDE	55 2.1654	120 4.7244	58 2.2835	2.0 .08	1.0 .04	130000 29100	110000 24500	11	21.431 .8438
7312PJDE	60 2.3622	130 5.1181	62 2.4409	2.0 .08	1.0 .04	156000 35100	140000 31500	12	23.019 .9063
7313PJDE	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	174000 39700	160000 35500	12	24.606 .9688
7314PJDE	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	195000 43600	180000 40000	12	26.194 1.0313
7315PJDE	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	203000 44900	196000 44000	12	26.988 1.0625
7316PJDE	80 3.1496	170 6.6929	78 3.0709	2.0 .08	1.0 .04	221000 48800	220000 49000	12	28.575 1.1250
7317PJDE	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	238000 52700	245000 55000	12	30.163 1.1875
7318PJDE	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	255000 57200	270000 61000	12	31.750 1.2500
7319PJDE	95 3.7402	200 7.8740	90 3.5433	2.5 .10	1.0 .04	270000 60500	300000 67000	12	33.338 1.3125
7320PJDE	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	325000 72800	380000 86500	12	37.980 1.4953
7321PJDE	105 4.1339	225 8.8583	98 3.8583	2.5 .10	1.0 .04	325000 72800	390000 88000	12	37.980 1.4953
7322PJDE	110 4.3307	240 9.4488	100 3.9370	2.5 .10	1.0 .04	364000 81900	450000 100000	12	41.275 1.6250
7324PJDE	120 4.7244	260 10.2362	110 4.3307	2.5 .10	1.0 .04	390000 87100	500000 112000	13	41.275 1.6250
7326PJDE	130 5.1181	280 11.0236	116 4.5669	3.0 .12	1.0 .04	403000 90400	540000 120000	12	44.450 1.7500
7328PJDE	140 5.5118	300 11.8110	124 4.8819	3.0 .12	1.0 .04	449000 101000	620000 137000	12	47.625 1.8750

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

2) For thrust rating, multiply C by 1.08 and C_o by 1.93

3) Listed values are for machined brass cage and have been determined through historical application and practice

4) Rating for one million revolutions or 500 hours at 33⅓ RPM

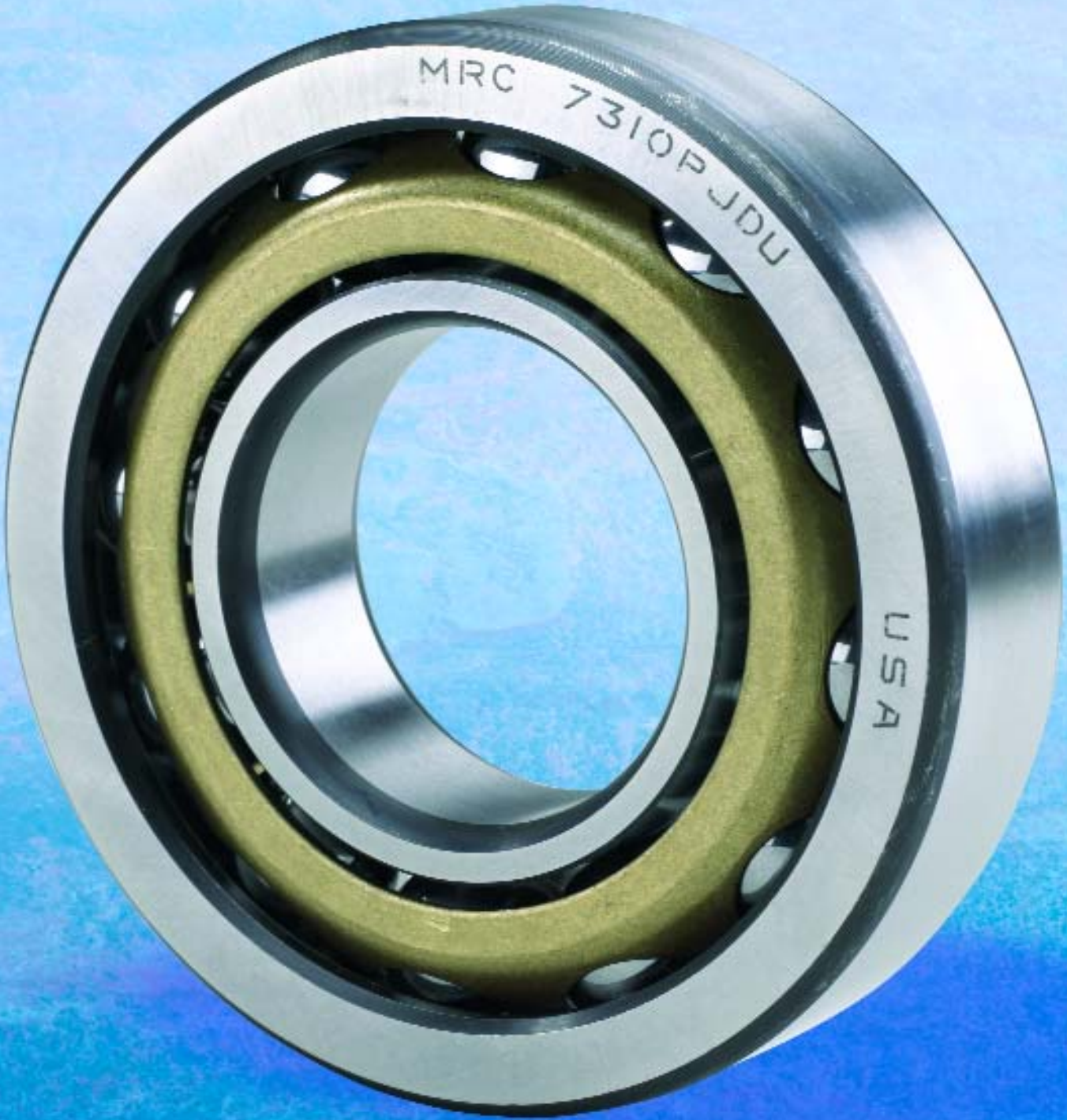
5) Based on 1800 RPM for 7316PJDE through 7328PJDE

Tabulated vaules are for back-to-back (DB) or face-to-face (DF) mounting arrangement

	PITCH DIAMETER mm in	MIN. REQD. THRUST LOAD AT 3600 RPM N lbf [5]	THRUST FOR 25000 HRS L_{10} AT 3600 RPM N lbf [5]	SPEED RATING [3]		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	36.4 1.4331	25 6	1882 423	9000	13000	20.011 .7878	20.002 .7875	52.019 2.0479	52.000 2.0472
	43.5 1.7126	51 12	2434 547	7500	10000	25.011 .9847	25.002 .9844	62.019 2.4416	62.000 2.4409
	51.0 2.0079	96 22	3230 730	6300	8500	30.011 1.1815	30.002 1.1812	72.019 2.8353	72.000 2.8346
	57.5 2.2638	144 33	3825 859	5600	7500	35.013 1.3785	35.002 1.3781	80.019 3.1503	80.000 3.1496
	65.0 2.5591	225 51	4665 1030	5000	6700	40.013 1.5753	40.002 1.5749	90.022 3.5442	90.000 3.5433
	72.5 2.8543	347 78	5658 1275	4500	6000	45.013 1.7722	45.002 1.7718	100.022 3.9379	100.000 3.9370
	80.5 3.1693	542 122	6865 1539	4000	5300	50.013 1.9690	50.002 1.9686	110.022 4.3316	110.000 4.3307
	87.6 3.4488	744 168	7968 1784	3600	4800	55.015 2.1660	55.002 2.1655	120.022 4.7253	120.000 4.7244
	95.1 3.7441	1095 247	9562 2152	3400	4500	60.015 2.3628	60.002 2.3623	130.025 5.1191	130.000 5.1181
	102.5 4.0354	1445 325	10665 2434	3200	4300	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
	110.0 4.3307	1875 422	11952 2673	2800	3800	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
	117.5 4.6260	2213 498	12442 2752	2600	3600	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
	125.0 4.9213	700 [5] 158	17066 [5] 3769	2400	3400	80.015 3.1502	80.002 3.1497	170.025 6.6939	170.000 6.6929
	132.5 5.2165	873 [5] 197	18379 [5] 4070	2200	3200	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
	140.0 5.5118	1077 [5] 243	19692 [5] 4417	2000	3000	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803
	147.5 5.8071	1315 [5] 296	20850 [5] 4672	1900	2800	95.018 3.7409	95.003 3.7403	200.029 7.8751	200.000 7.8740
	157.6 6.2047	2040 [5] 459	25097 [5] 5622	1800	2600	100.018 3.9377	100.003 3.9371	215.029 8.4657	215.000 8.4646
	165.0 6.4961	2164 [5] 487	25097 [5] 5622	1700	2400	105.018 4.1346	105.003 4.1340	225.029 8.8594	225.000 8.8583
	175.3 6.9031	2932 [5] 659	28109 [5] 6325	1700	2400	110.018 4.3314	110.003 4.3308	240.029 9.4499	240.000 9.4488
	190.3 7.4937	3525 [5] 793	30116 [5] 6726	1600	2200	120.018 4.7251	120.003 4.7245	260.032 10.2375	260.000 10.2362
	205.0 8.0709	4378 [5] 985	31120 [5] 6981	1500	2000	130.021 5.1189	130.003 5.1182	280.032 11.0249	280.000 11.0236
	220.0 8.6614	5781 [5] 1300	34672 [5] 7800	1400	1900	140.021 5.5126	140.003 5.5119	300.032 11.8123	300.000 11.8110

Hybrid Bearings

MRC single-row 40º angular contact ball bearings can also be manufactured as hybrid bearings. These bearings combine SAE 52100 steel rings with silicon nitride (ceramic) rolling elements. They are typically utilized in applications where there is ineffective lubrication, excessive contamination, or stray electrical currents. Even under poor lubrication conditions, metal-to-metal contact between the raceways and balls is eliminated due to the use of the ceramic material. Hybrid bearings can achieve a service life that is three to 30 times longer than the standard all-steel bearing under these adverse conditions. For more information, please contact MRC Bearing Services at 1-800-MRC-7000 and ask for our applications engineering department.


MRC 7310PJDU
USA

7200PJDU and 7300PJDU series 40° angular contact ball bearings with ball-centered cage and GA preload

Single-row 40º angular contact ball bearings are the most popular pump thrust bearings in service today. MRC 7000PJDU series bearings are compliant with API 610 requirements.

Proven Track Record

Long service life and reliable performance have earned MRC angular contact ball bearings an excellent reputation in the pump industry. The standard product features which have contributed to this exceptional performance include: ABEC-3 precision tolerances, a 40° contact angle, controlled internal GA preload, one-piece ball-guided pressed brass cages and universal grinding. These features have allowed MRC single-row duplexed bearings to accommodate combined axial and radial loads, high speeds and poor lubrication conditions.

Technical Improvements*

Improved materials

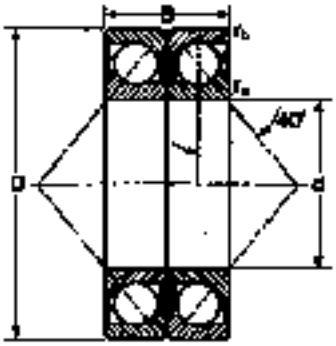
MRC 7000PJDU series single-row angular contact ball bearings are manufactured from an extremely high quality bearing steel with a very low oxygen content and a minimum number of impurities. The rings are manufactured from forged blanks, and both rings are heat treated to provide dimensional stability up to 300° F (150° C). These advantages allow the bearings to maintain built-in preloads over their entire service life.

Improved internal geometry

Twenty-first century computer-aided design and manufacturing programs have permitted subtle improvements in the bearings. These small but effective modifications to the bearing's internal geometry lead to measurable improvements in both performance and service life. One benefit of this fine tuning is that MRC single-row 40º ball bearings are less sensitive to axial overloading.

Improved precision tolerances

MRC 7000PJDU series single-row angular contact ball bearings are manufactured to ABEC-5 (P5) running accuracy and ABEC-3 (P6) dimensional accuracy. This feature provides smoother and truer operation with less heat generation, lower vibration, and more precise shaft guidance.



Improved ball quality

The balls used in MRC 7000PJDU series single-row angular contact ball bearings are one ISO grade better than the balls previously utilized. The more precise ball diameter improves running accuracy even at high speeds, while reducing noise and bearing operating temperature.

New cage

MRC 7000PJDU series single-row angular contact ball bearings have an improved pressed brass cage which has been manufactured to closer tolerances. The new cage will allow for superior ball guidance as well as better lubricant film formation.

*MRC continuously works to improve the performance and durability of our products. With these technical improvements, you will notice the longer service life and higher reliability associated with our single-row 40º angular contact ball bearings. While a significant number of the bearings incorporate the technical improvements described above, the implementation of the improvements across the entire product range is an ongoing process. Please contact MRC before ordering to determine which sizes have been converted.

7200PJDU series 40° angular contact ball bearings with ball-centered cage and GA preload

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		BASIC RADIAL LOAD RATING 2)		BALLS PER ROW	
				r_a mm in	r_b mm in	DYNAMIC 4) C N lbf	STATIC C_o N lbf	NUMBER	DIAMETER mm in
7205PJDU	25 .9843	52 2.0472	30 1.1811	1.0 .04	.60 .024	25100 5590	20400 4550	14	7.938 .3125
7206PJDU	30 1.1811	62 2.4409	32 1.2598	1.0 .04	.60 .024	39000 8710	31000 6950	13	10.319 .4063
7207PJDU	35 1.3780	72 2.8346	34 1.3386	1.0 .04	.60 .024	50700 11400	41500 9300	13	11.906 .4688
7208PJDU	40 1.5748	80 3.1496	36 1.4173	1.0 .04	.60 .024	59200 13300	52000 11600	14	12.700 .5000
7209PJDU	45 1.7717	85 3.3465	38 1.4961	1.0 .04	.60 .024	61800 13800	56000 12500	15	12.700 .5000
7210PJDU	50 1.9685	90 3.5433	40 1.5748	1.0 .04	.60 .024	63700 14300	61000 13400	16	12.700 .5000
7211PJDU	55 2.1654	100 3.9370	42 1.6535	1.5 .06	1.0 .04	78000 17200	76500 17300	16	14.288 .5625
7212PJDU	60 2.3622	110 4.3307	44 1.7323	1.5 .06	1.0 .04	93600 21200	91500 20400	15	16.100 .6339
7213PJDU	65 2.5591	120 4.7244	46 1.8110	1.5 .06	1.0 .04	108000 24200	108000 24000	15	17.463 .6875
7214PJDU	70 2.7559	125 4.9213	48 1.8898	1.5 .06	1.0 .04	114000 25500	118000 26500	16	17.700 .6969
7215PJDU	75 2.9528	130 5.1181	50 1.9685	1.5 .06	1.0 .04	119000 26500	127000 28500	17	17.700 .6969
7216PJDU	80 3.1496	140 5.5118	52 2.0472	2.0 .08	1.0 .04	135000 30200	146000 32500	17	19.050 .7500
7217PJDU	85 3.3465	150 5.9055	56 2.2047	2.0 .08	1.0 .04	156000 35100	166000 36500	16	21.000 .8268
7218PJDU	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	178000 40300	193000 43000	16	22.500 .8858
7219PJDU	95 3.7402	170 6.6929	64 2.5197	2.0 .08	1.0 .04	199000 44200	216000 48000	16	24.000 .9449
7220PJDU	100 3.9370	180 7.0866	68 2.6772	2.0 .08	1.0 .04	221000 48800	245000 55000	16	25.400 1.0000
7222PJDU	110 4.3307	200 7.8740	76 2.9921	2.0 .08	1.0 .04	260000 58500	310000 69500	16	28.575 1.1250
7224PJDU	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	270000 60500	325000 73500	15	30.163 1.1875

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

2) For thrust rating, multiply C by 1.08 and C_o by 1.93

3) Listed values are for stamped brass cage and have been determined through historical application and practice

4) Rating for one million revolutions or 500 hours at 33⅓ RPM

5) Based on 1800 RPM for 7218PJDU through 7224PJDU

Tabulated vaules are for back-to-back (DB) or face-to-face (DF) mounting arrangement

	PITCH DIAMETER mm in	MIN. REQD. THRUST LOAD AT 3600 RPM N lbf [5]	THRUST FOR 25000 HRS L_{10} AT 3600 RPM N lbf [5]	SPEED RATING [3]		RECOMMENDED SHAFT DIAMETER (h5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	38.5 1.5157	23 5	1539 343	8500	12000	25.000 .9843	24.991 .9839	52.019 2.0479	52.000 2.0472
	46.0 1.8110	53 12	2391 534	7500	10000	30.000 1.1811	29.990 1.1807	62.019 2.4416	62.000 2.4409
	53.5 2.1063	95 22	3108 699	6300	8500	35.000 1.3780	34.991 1.3776	72.019 2.8353	72.000 2.8346
	60.4 2.3780	142 32	3629 816	5600	7500	40.000 1.5748	39.990 1.5744	80.019 3.1503	80.000 3.1496
	65.0 2.5591	166 38	3788 846	5300	7000	45.000 1.7717	44.991 1.7713	85.022 3.3474	85.000 3.3465
	70.0 2.7559	194 44	3905 877	4800	6300	50.000 1.9685	49.990 1.9681	90.022 3.5442	90.000 3.5433
	77.5 3.0512	305 69	4781 1055	4500	6000	55.000 2.1654	54.988 2.1649	100.022 3.9379	100.000 3.9370
	85.0 3.3465	446 101	5737 1300	3800	5000	60.000 2.3622	59.987 2.3617	110.022 4.3316	110.000 4.3307
	92.5 3.6417	619 140	6620 1484	3400	4500	65.000 2.5591	64.988 2.5586	120.022 4.7253	120.000 4.7244
	97.5 3.8386	731 165	6987 1563	3200	4300	70.000 2.7559	69.987 2.7554	125.025 4.9223	125.000 4.9213
	102.5 4.0354	824 186	7294 1625	3200	4300	75.000 2.9528	74.988 2.9523	130.025 5.1191	130.000 5.1181
	110.0 4.3307	1102 248	8275 1851	2800	3800	80.000 3.1496	79.987 3.1491	140.025 5.5128	140.000 5.5118
	117.5 4.6260	1474 332	9562 2152	2600	3600	85.000 3.3465	84.986 3.3459	150.025 5.9065	150.000 5.9055
	125.0 4.9213	482 [5] 109	13746 [5] 3112	2400	3400	90.000 3.5433	89.985 3.5427	160.025 6.3002	160.000 6.2992
	132.5 5.2165	619 [5] 140	15367 [5] 3414	2200	3200	95.000 3.7402	94.986 3.7396	170.025 6.6939	170.000 6.6929
	140.0 5.5118	775 [5] 175	17066 [5] 3769	2200	3200	100.000 3.9370	99.985 3.9364	180.025 7.0876	180.000 7.0866
	155.0 6.1024	1217 [5] 274	20078 [5] 4518	1900	2800	110.000 4.3307	109.985 4.3301	200.029 7.8751	200.000 7.8740
	167.8 6.6043	1461 [5] 329	20850 [5] 4672	1700	2400	120.000 4.7244	119.985 4.7238	215.029 8.4657	215.000 8.4646

Hybrid Bearings

MRC single-row 40º angular contact ball bearings can also be manufactured as hybrid bearings. These bearings combine SAE 52100 steel rings with silicon nitride (ceramic) rolling elements. They are typically utilized in applications where there is ineffective lubrication, excessive contamination, or stray electrical currents. Even under poor lubrication conditions, metal-to-metal contact between the raceways and balls is eliminated due to the use of the ceramic material. Hybrid bearings can achieve a service life that is three to 30 times longer than the standard all-steel bearing under these adverse conditions. For more information, please contact MRC Bearing Services at 1-800-MRC-7000 and ask for our applications engineering department.

7300PJDU series 40° angular contact ball bearings with ball-centered cage and GA preload

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		BASIC RADIAL LOAD RATING 2)		BALLS PER ROW	
				r_a mm in	r_b mm in	DYNAMIC 4) C N lbf	STATIC C_o N lbf	NUMBER	DIAMETER mm in
7304PJDU	20 .7874	52 2.0472	30 1.1811	1.0 .04	.60 .024	30700 6890	20800 4650	10	10.000 .3937
7305PJDU	25 .9843	62 2.4409	34 1.3386	1.0 .04	.60 .024	42300 9560	31000 6950	11	11.500 .4528
7306PJDU	30 1.1811	72 2.8346	38 1.4961	1.0 .04	.60 .024	55900 12500	42500 9500	11	13.494 .5313
7307PJDU	35 1.3780	80 3.1496	42 1.6535	1.5 .06	1.0 .04	62400 14000	49000 11000	11	14.288 .5625
7308PJDU	40 1.5748	90 3.5433	46 1.8110	1.5 .06	1.0 .04	79300 17400	65500 14600	12	15.875 .6250
7309PJDU	45 1.7717	100 3.9370	50 1.9685	1.5 .06	1.0 .04	97500 22100	81500 18300	12	17.700 .6969
7310PJDU	50 1.9685	110 4.3307	54 2.1260	2.0 .08	1.0 .04	119000 26500	102000 22800	12	19.844 .7813
7311PJDU	55 2.1654	120 4.7244	58 2.2835	2.0 .08	1.0 .04	138000 30700	120000 27000	12	21.431 .8438
7312PJDU	60 2.3622	130 5.1181	62 2.4409	2.0 .08	1.0 .04	156000 35100	140000 31500	12	23.019 .9063
7313PJDU	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	174000 39700	160000 35500	12	24.606 .9688
7314PJDU	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	195000 43600	180000 40000	12	26.194 1.0313
7315PJDU	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	212000 46800	212000 47500	13	26.988 1.0625
7316PJDU	80 3.1496	170 6.6929	78 3.0709	2.0 .08	1.0 .04	229000 50700	236000 53000	13	28.575 1.1250
7317PJDU	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	251000 55900	265000 60000	13	30.163 1.1875
7318PJDU	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	270000 60500	290000 65500	13	31.750 1.2500
7319PJDU	95 3.7402	200 7.8740	90 3.5433	2.5 .10	1.0 .04	286000 63700	325000 73500	13	33.338 1.3125
7320PJDU	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	325000 72800	380000 86500	12	37.980 1.4953
7321PJDU	105 4.1339	225 8.8583	98 3.8583	2.5 .10	1.0 .04	345000 78000	415000 93000	13	37.980 1.4953
7322PJDU	110 4.3307	240 9.4488	100 3.9370	2.5 .10	1.0 .04	364000 81900	450000 100000	12	41.275 1.6250
7324PJDU	120 4.7244	260 10.2362	110 4.3307	2.5 .10	1.0 .04	390000 87100	500000 112000	13	41.275 1.6250
7326PJDU	130 5.1181	280 11.0236	116 4.5669	3.0 .12	1.0 .04	403000 90400	540000 120000	12	44.450 1.7500
7328PJDU	140 5.5118	300 11.8110	124 4.8819	3.0 .12	1.0 .04	449000 101000	620000 137000	12	47.625 1.8750

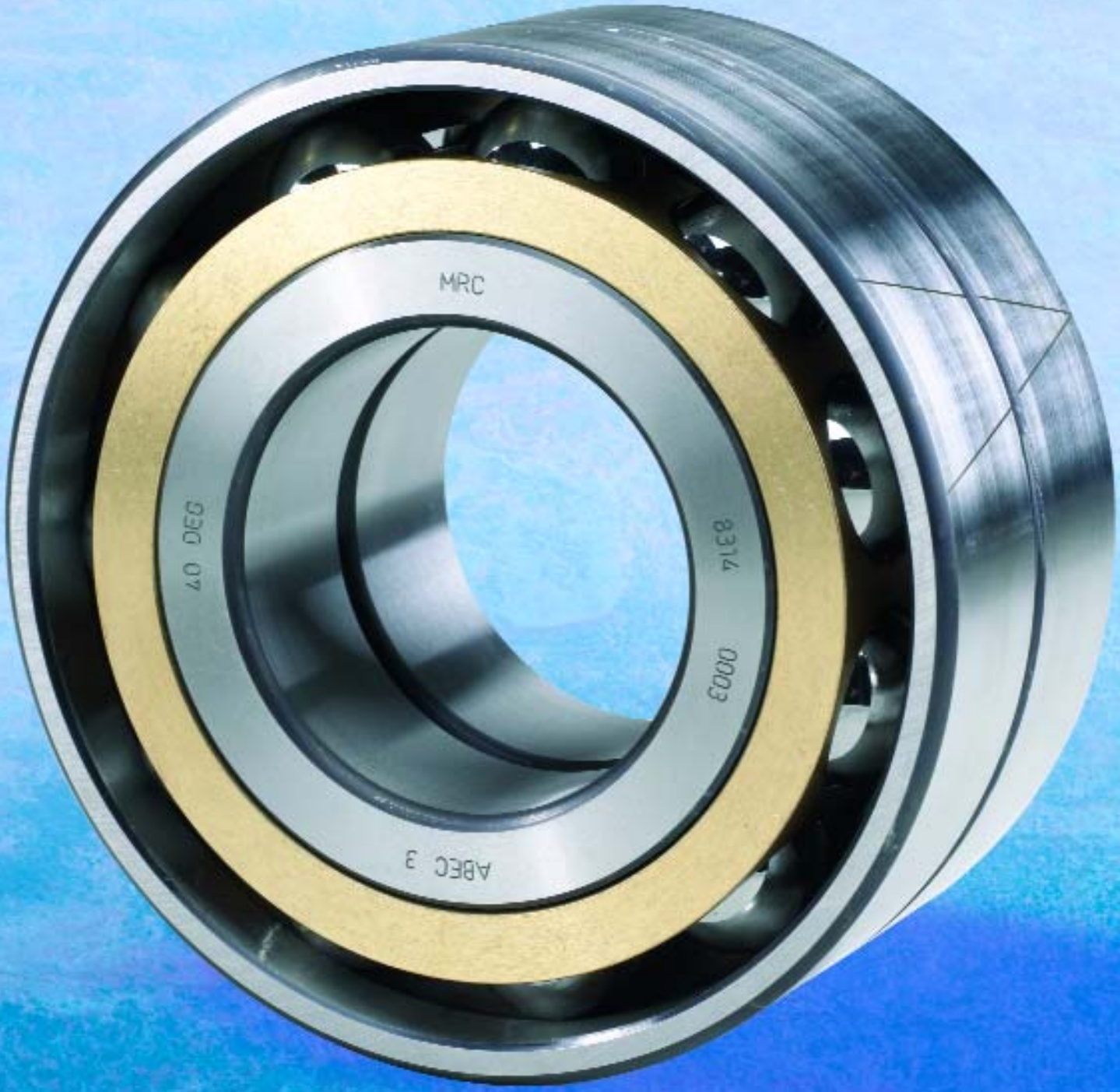
1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
2) For thrust rating, multiply C by 1.08 and C_o by 1.93
3) Listed values are for stamped brass cage and have been determined through historical application and practice
4) Rating for one million revolutions or 500 hours at 33⅓ RPM
5) Based on 1800 RPM for 7316PJDU through 7328PJDU

Tabulated vaules are for back-to-back (DB) or face-to-face (DF) mounting arrangement

	PITCH DIAMETER mm in	MIN. REQD. THRUST LOAD AT 3600 RPM N lbf [5]	THRUST FOR 25000 HRS L_{10} AT 3600 RPM N lbf [5]	SPEED RATING [3]		RECOMMENDED SHAFT DIAMETER (h5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	36.4 1.4331	28 7	1882 423	9000	13000	20.000 .7874	19.990 .7870	52.019 2.0479	52.000 2.0472
	43.5 1.7126	56 13	2593 586	7500	10000	25.000 .9843	24.991 .9839	62.019 2.4416	62.000 2.4409
	51.0 2.0079	106 24	3427 767	6700	9000	30.000 1.1811	29.990 1.1807	72.019 2.8353	72.000 2.8346
	57.5 2.2638	144 33	3825 859	6000	8000	35.000 1.3780	34.991 1.3776	80.019 3.1503	80.000 3.1496
	65.0 2.5591	245 56	4861 1067	5300	7000	40.000 1.5748	39.990 1.5744	90.022 3.5442	90.000 3.5433
	72.5 2.8543	379 86	5976 1355	4800	6300	45.000 1.7717	44.991 1.7713	100.022 3.9379	100.000 3.9370
	80.5 3.1693	591 133	7294 1625	4300	5600	50.000 1.9685	49.990 1.9681	110.022 4.3316	110.000 4.3307
	87.6 3.4488	811 183	8458 1882	3800	5000	55.000 2.1654	54.988 2.1649	120.022 4.7253	120.000 4.7244
	95.1 3.7441	1095 247	9562 2152	3400	4500	60.000 2.3622	59.987 2.3617	130.025 5.1191	130.000 5.1181
	102.5 4.0354	1445 325	10665 2434	3200	4300	65.000 2.5591	64.988 2.5586	140.025 5.5128	140.000 5.5118
	110.0 4.3307	1875 422	11952 2673	2800	3800	70.000 2.7559	69.987 2.7554	150.025 5.9065	150.000 5.9055
	117.5 4.6260	2397 539	12994 2869	2600	3600	75.000 2.9528	74.988 2.9523	160.025 6.3002	160.000 6.2992
	125.0 4.9213	758 [5] 171	17684 [5] 3916	2400	3400	80.000 3.1496	79.987 3.1491	170.025 6.6939	170.000 6.6929
	132.5 5.2165	946 [5] 213	19383 [5] 4317	2400	3400	85.000 3.3465	84.986 3.3459	180.025 7.0876	180.000 7.0866
	140.0 5.5118	1167 [5] 263	20850 [5] 4672	2000	3000	90.000 3.5433	89.985 3.5427	190.029 7.4814	190.000 7.4803
	147.5 5.8071	1425 [5] 321	22085 [5] 4919	2000	3000	95.000 3.7402	94.986 3.7396	200.029 7.8751	200.000 7.8740
	157.6 6.2047	2040 [5] 459	25097 [5] 5622	1900	2800	100.000 3.9370	99.985 3.9364	215.029 8.4657	215.000 8.4646
	165.0 6.4961	2344 [5] 527	26641 [5] 6024	1800	2600	105.000 4.1339	104.986 4.1333	225.029 8.8594	225.000 8.8583
	175.3 6.9031	2932 [5] 659	28109 [5] 6325	1700	2400	110.000 4.3307	109.985 4.3301	240.029 9.4499	240.000 9.4488
	190.3 7.4937	3525 [5] 793	30116 [5] 6726	1600	2200	120.000 4.7244	119.985 4.7238	260.032 10.2375	260.000 10.2362
	205.0 8.0709	4378 [5] 985	31120 [5] 6981	1500	2000	130.000 5.1181	129.982 5.1174	280.032 11.0249	280.000 11.0236
	220.0 8.6614	5781 [5] 1300	34672 [5] 7800	1400	1900	140.000 5.5118	139.982 5.5111	300.032 11.8123	300.000 11.8110

Hybrid Bearings

MRC single-row 40º angular contact ball bearings can also be manufactured as hybrid bearings. These bearings combine SAE 52100 steel rings with silicon nitride (ceramic) rolling elements. They are typically utilized in applications where there is ineffective lubrication, excessive contamination, or stray electrical currents. Even under poor lubrication conditions, metal-to-metal contact between the raceways and balls is eliminated due to the use of the ceramic material. Hybrid bearings can achieve a service life that is three to 30 times longer than the standard all-steel bearing under these adverse conditions. For more information, please contact MRC Bearing Services at 1-800-MRC-7000 and ask for our applications engineering department.


MRC
40 DEG
8314 0003
ABEC 3

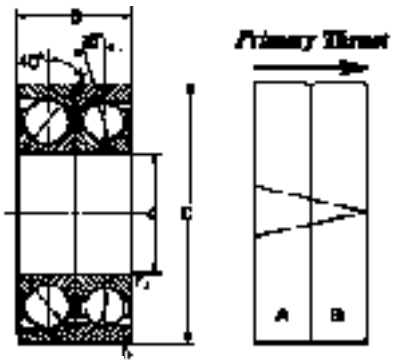
8000 series PumPac®
40°/15° angular contact ball bearings

The three PumPac® series are matched sets of 40° and 15° angular contact ball bearings with computer optimized internal design. The 8000 series has one 40° bearing mounted back-to-back with one 15° bearing. The 8000AAB series has two tandem mounted 40° bearings matched back-to-back with one 15° bearing. The 8000BB series has two 15° bearings mounted back-to-back.

- ABEC-3 tolerances
- 40°/15° contact angles
- Land-riding, machined brass cage
- CB axial clearance
- Heat treated for dimensional stability
- "V" etched O.D.

The PumPac 8000 series is used in centrifugal pumps, large vertical electric motors, compressors, centrifuges, and other applications subject to thrust loads while operating at relatively high speeds. The bearings are mounted so that the 40° bearing takes the primary thrust (axial) load.

Traditionally, matched sets of 40° angular contact bearings are used to obtain maximum theoretical fatigue life; but, in most instances, only a fraction of the calculated life is actually achieved. At the heart of these premature failures are phenomena known as ball sliding and ball shuttling in the unloaded or inactive bearing. Angular contact ball bearings used in high speed (3600 RPM) pumps and other applications require a minimum axial load for proper operation. Without axial load, centrifugal and gyroscopic forces in the unloaded



bearing will cause the balls to rotate at an angle contrary to their true rolling axis; and, as a result, the balls will momentarily lose contact with the raceway. In addition, a microscopic wear or lapping process occurs, giving the appearance of a burnished or polished raceway. While the oil film thickness separating the ball and raceway is reduced, friction and heat are generated, oil viscosity is lowered, and wear is accelerated. This thermally unstable condition dramatically reduces bearing service life.

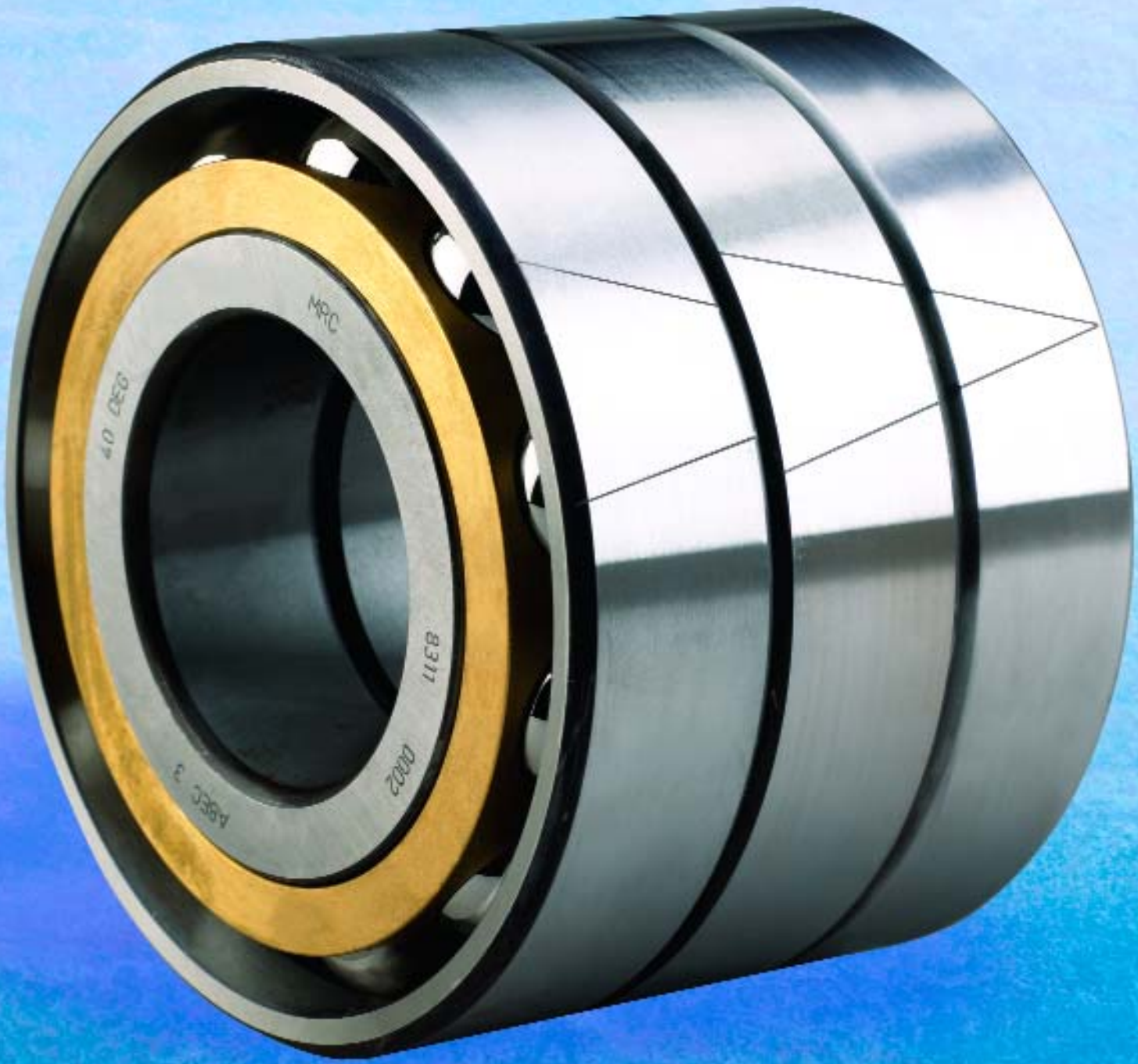
The main benefit of the PumPac bearing system is that the 15° bearing is designed with considerably less internal clearance than the 40° bearing, making it less susceptible to the centrifugal and gyroscopic forces which result in ball sliding and shuttling. This bearing also provides additional radial stiffness, helping to maintain the integrity of the shaft and mechanical seals. The 40° loaded bearing provides sufficient axial rigidity under the imposed thrust load.

8000 series PumPac® 40º/15º angular contact ball bearings

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		40° (A) Bearing						
						BASIC RADIAL LOAD RATING 2)		BALLS PER ROW		PITCH DIAMETER mm in	MIN. REQD. THRUST AT 3600 RPM N lbf 5)	THRUST FOR 25000 HRS L_{10} @ 3600 RPM N lbf 5)
				r_a mm in	r_b mm in	DYNAMIC 4) C N lbf	STATIC C_o N lbf	NUMBER	DIAMETER mm in			
8218	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	133000 29900	143000 32100	15	23.019 .9063	125.5 4.9394	1934 435	13300 2990
8219	95 3.7402	170 6.6929	64 2.5197	2.0 .08	1.0 .04	151000 33900	163000 36600	15	24.606 .9688	133.0 5.2360	2499 562	15100 3390
8220	100 3.9370	180 7.0866	68 2.6772	2.0 .08	1.0 .04	159000 35700	173000 38900	15	25.400 1.0000	140.5 5.5318	2917 656	15900 3570
8222	110 4.3307	200 7.8740	76 2.9921	2.0 .08	1.0 .04	190000 42700	220000 49500	15	28.575 1.1250	155.6 6.1248	4586 1031	19000 4270
8224	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	238000 53500	245000 55100	15	30.163 1.1875	168.1 6.6184	1464 5) 329	29986 5) 6741
8238	190 7.4803	340 13.3858	110 4.3307	3.0 .12	1.0 .04	351000 78900	570000 128000	17	42.863 1.6875	265.9 10.4668	7678 5) 1727	44223 5) 9941
8308	40 1.5748	90 3.5433	46 1.8110	1.5 .06	1.0 .04	60500 13600	45500 10200	10	16.669 .6563	65.0 2.5591	233 53	6050 1360
8309	45 1.7717	100 3.9370	50 1.9685	1.5 .06	1.0 .04	76100 17100	61000 13700	11	18.256 .7188	72.5 2.8544	377 85	7610 1710
8310	50 1.9685	110 4.3307	54 2.1260	2.0 .08	1.0 .04	87100 19600	72000 16200	11	19.844 .7813	80.0 3.1496	537 121	8710 1960
8311	55 2.1654	120 4.7244	58 2.2835	2.0 .08	1.0 .04	101000 22700	85000 19100	11	21.431 .8438	87.5 3.4449	743 167	10100 2270
8312	60 2.3622	130 5.1181	62 2.4409	2.0 .08	1.0 .04	114000 25600	96500 21700	11	23.019 .9063	95.0 3.7402	1002 226	11400 2560
8313	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	127000 28500	112000 25200	11	24.606 .9688	102.5 4.0355	1324 298	12700 2850
8314	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	148000 33300	134000 31500	11	26.988 1.0625	110.0 4.3307	1863 419	14800 3330
8315	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	159000 35700	150000 33700	11	28.575 1.1250	117.5 4.6260	2368 533	15900 3570
8316	80 3.1496	170 6.6929	78 3.0709	2.0 .08	1.0 .04	172000 38700	166000 37300	11	30.163 1.1875	125.0 4.9213	2970 668	17200 3870
8317	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	186000 41800	186000 41800	11	31.750 1.2500	132.5 5.2166	3679 827	18600 4180
8318	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	199000 44700	204000 45900	11	33.338 1.3125	140.0 5.5118	4508 1014	19900 4470
8319	95 3.7402	200 7.8740	90 3.5433	2.5 .10	1.0 .04	212000 47600	228000 51300	11	34.925 1.3750	147.5 5.8071	5470 1230	21200 4760
8320	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	238000 53500	270000 60700	12	36.513 1.4375	157.5 6.2008	7325 1647	23800 5350
8322	110 4.3307	240 9.4488	100 3.9370	2.5 .10	1.0 .04	265000 59600	320000 71900	12	39.688 1.5625	175.0 6.8898	2629 5) 591	33388 5) 7510
8326	130 5.1181	280 11.0236	116 4.5669	3.0 .12	1.0 .04	345000 77500	455000 102000	12	47.625 1.8750	205.0 8.0709	5286 5) 1189	43467 5) 9765
8330	150 5.9055	320 12.5984	130 5.1181	3.0 .12	1.0 .04	410000 92100	585000 132000	12	53.975 2.1250	235.0 9.2520	8849 5) 1990	51657 5) 11604
8336	180 7.0866	380 14.9606	150 5.9055	3.0 .12	1.0 .04	507000 114000	815000 183000	13	60.325 2.3750	280.0 11.0236	16219 5) 3647	63878 5) 14363

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
2) For thrust rating of bearing (A), multiply C by 1.75 and C_o by 3.85. For thrust rating of bearing (B), multiply C by 0.83 and C_o by 2.00
3) Values have been determined through historical application and practice
4) Rating for one million revolutions or 500 hours at 33⅓ RPM claculated according to actual bearing raceway geometry
5) Based on 1800 RPM for 8224, 8238, and 8322 through 8336

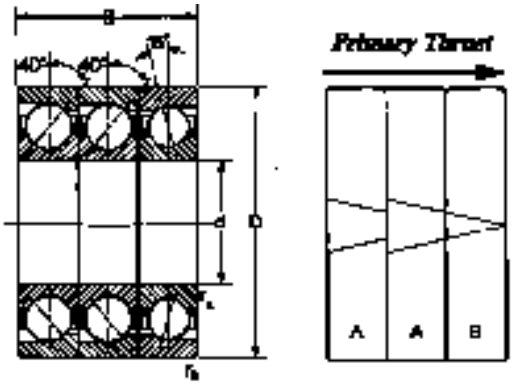
15° (B) Bearing											
BASIC RADIAL LOAD RATING [2]		BALLS PER ROW		PITCH DIAMETER mm in	MIN. REQD. THRUST AT 3600 RPM [5] N lbf	THRUST FOR 25000 HRS L_{10} @ 3600 RPM [5] N lbf	SPEED RATING [3]		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
DYNAMIC [4] C N lbf	STATIC Co N lbf	NUMBER	DIAMETER mm in				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
124000 27900	108000 24300	15	22.225 .8750	125.4 4.9362	270 61	5890 1326	3400	4500	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992
133000 29900	118000 26500	16	22.225 .8750	133.4 5.2516	311 70	6318 1421	3200	4300	95.018 3.7409	95.003 3.7403	170.025 6.6939	170.000 6.6929
146000 32800	134000 30100	16	23.813 .9375	141.7 5.5768	405 91	6935 1558	3000	4000	100.018 3.9377	100.003 3.9371	180.025 7.0876	180.000 7.0866
182000 40900	170000 38200	16	26.988 1.0625	156.9 6.1754	649 146	8645 1943	2600	3600	110.018 4.3314	110.003 4.3308	200.029 7.8751	200.000 7.8740
199000 44700	193000 43400	16	28.575 1.1250	167.9 6.6096	207 [5] 47	11910 [5] 2676	2200	3200	120.018 4.7251	120.003 4.7245	215.029 8.4657	215.000 8.4646
377000 84800	500000 112000	17	42.863 1.6875	265.4 10.4500	1186 [5] 267	22562 [5] 5075	1400	1900	190.024 7.4812	190.004 7.4805	340.036 13.3872	340.000 13.3858
48800 11000	33500 7530	12	14.288 .5625	65.3 2.5719	28 7	2318 523	6700	9000	40.013 1.5753	40.002 1.5749	90.022 3.5442	90.000 3.5433
58500 13200	40500 9100	12	15.875 .6250	72.9 2.8687	43 10	2779 627	6000	8000	45.013 1.7722	45.002 1.7718	100.022 3.9379	100.000 3.9370
76100 17100	52000 11700	11	19.050 .7500	78.8 3.1025	71 16	3615 813	5300	7000	50.013 1.9690	50.002 1.9686	110.022 4.3316	110.000 4.3307
88400 19900	61000 13700	11	20.638 .8125	85.4 3.3610	97 22	4199 946	4800	6300	55.015 2.1660	55.002 2.1655	120.022 4.7253	120.000 4.7244
101000 22700	71000 16000	11	22.225 .8750	95.0 3.7401	137 31	4798 1079	4500	6000	60.015 2.3628	60.002 2.3623	130.025 5.1191	130.000 5.1181
108000 24300	80000 18000	12	22.225 .8750	103.0 4.0557	167 38	5130 1155	4300	5600	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
121000 27200	93000 20900	12	23.813 .9375	110.6 4.3524	221 50	5748 1292	3800	5000	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
146000 32800	114000 25600	13	25.400 1.0000	118.1 4.6491	310 70	6935 1558	3600	4800	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
159000 35700	129000 29200	13	26.988 1.0625	125.6 4.9459	395 89	7553 1696	3400	4500	80.015 3.1502	80.002 3.1497	170.025 6.6939	170.000 6.6929
174000 39100	146000 32800	13	28.575 1.1250	133.2 5.2427	497 112	8265 1858	3200	4300	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
186000 41800	160000 36000	13	30.163 1.1875	140.0 5.5118	614 138	8835 1986	3000	4000	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803
199000 44700	180000 40500	13	31.750 1.2500	148.2 5.8361	759 171	9453 2124	2800	3800	95.018 3.7409	95.003 3.7403	200.029 7.8751	200.000 7.8740
212000 47700	200000 45000	13	33.338 1.3125	158.3 6.2318	944 213	10070 2266	2600	3600	100.018 3.9377	100.003 3.9371	215.029 8.4657	215.000 8.4646
255000 57300	255000 57300	13	38.100 1.5000	175.9 6.9242	388 [5] 88	15261 [5] 3430	2200	3200	110.018 4.3314	110.003 4.3308	240.029 9.4499	240.000 9.4488
296000 66500	345000 77600	13	44.450 1.7500	203.8 8.0227	712 [5] 160	17715 [5] 3980	1800	2600	130.021 5.1189	130.003 5.1182	280.032 11.0249	280.000 11.0236
390000 87700	475000 107000	13	49.213 1.9375	233.6 9.1956	1120 [5] 252	23340 [5] 5249	1600	2200	150.021 5.9063	150.003 5.9056	320.036 12.5998	320.000 12.5984
475000 107000	640000 144000	14	57.150 2.2500	278.3 10.9561	2270 [5] 511	28427 [5] 6404	1300	1600	180.021 7.0874	180.003 7.0867	380.036 14.9620	380.000 14.9606


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ABEC 3

8000AAB series PumPac® Triplex 40°/40°/15° angular contact ball bearings

The PumPac 8000AAB series consists of a triplex set with two tandem mounted 40° bearings matched back-to-back with one 15° bearing.

- ABEC-3 tolerances
- 40°/40°/15° contact angles
- Land-riding, machined brass cage
- CB axial clearance
- Heat treated for dimensional stability

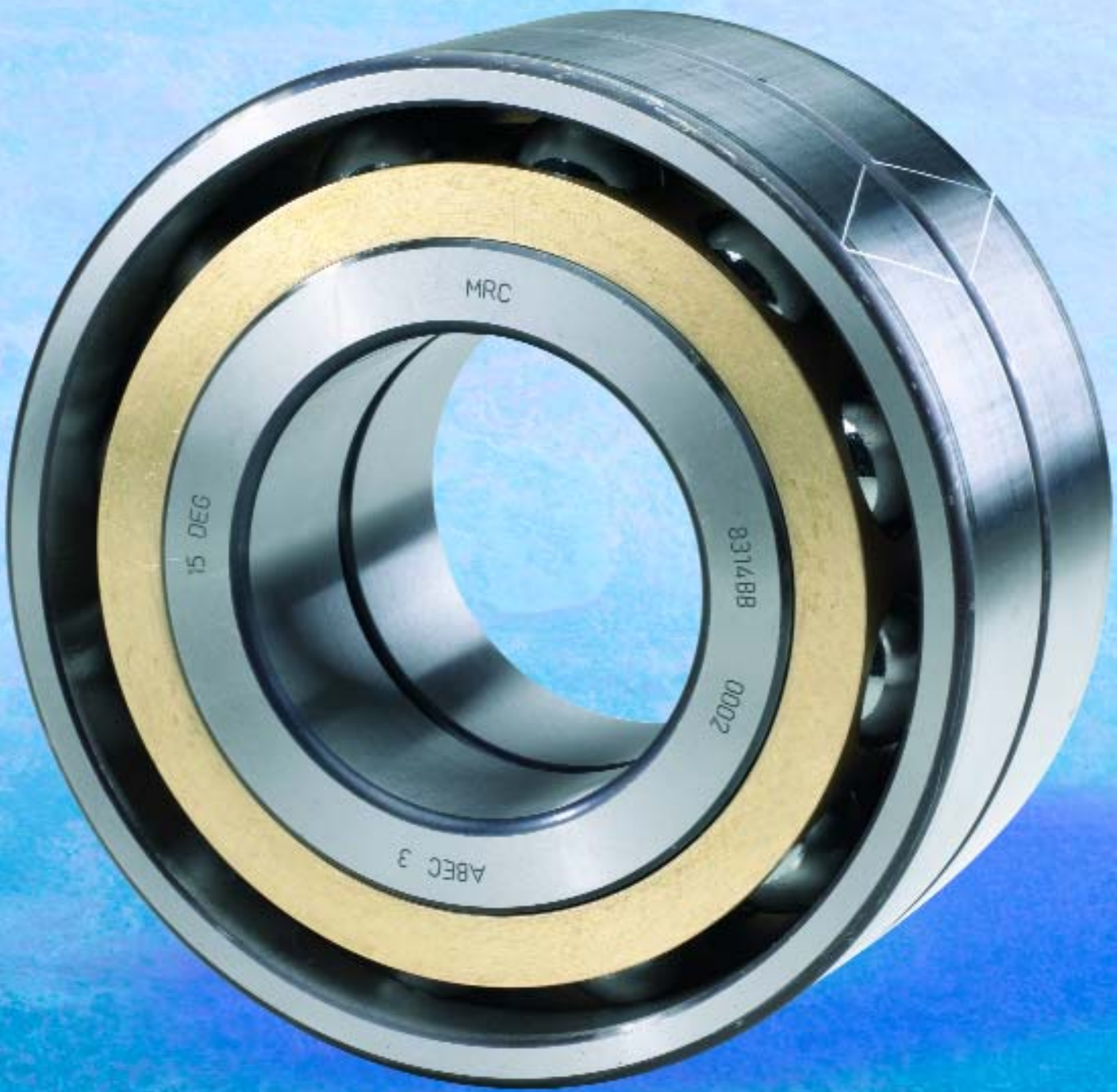


8000AAB series PumPac® Triplex 40°/40°/15° angular contact ball bearings

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		40° (AA) Bearings						
						BASIC RADIAL LOAD RATING 2)		BALLS PER ROW		PITCH DIAMETER mm in	MIN. REQD. THRUST AT 3600 RPM N lbf 5)	THRUST FOR 25000 HRS L_{10} @ 3600 RPM N lbf 5)
				r_a mm in	r_b mm in	DYNAMIC 4) C N lbf	STATIC C_o N lbf	NUMBER	DIAMETER mm in			
8218AAB	90 3.5433	160 6.2992	90 3.5433	2.0 .08	1.0 .04	216000 48500	285000 64100	15	23.019 .9063	125.5 4.9394	3868 870	21600 4850
8219AAB	95 3.7402	170 6.6929	96 3.7795	2.0 .08	1.0 .04	247000 55500	325000 73100	15	24.606 .9688	133.0 5.2360	4998 1124	24700 5550
8220AAB	100 3.9370	180 7.0866	102 4.0157	2.0 .08	1.0 .04	260000 58400	345000 78700	15	25.400 1.0000	140.5 5.5318	5834 1312	26000 5840
8222AAB	110 4.3307	200 7.8740	114 4.4882	2.0 .08	1.0 .04	307000 69000	440000 98900	15	28.575 1.1250	155.6 6.1248	9172 2062	30700 6900
8224AAB	120 4.7244	215 8.4646	120 4.7244	2.0 .08	1.0 .04	390000 87600	490000 110000	15	30.163 1.1875	168.1 6.6184	2928 5) 658	49137 5) 11037
8238AAB	190 7.4803	340 13.3858	165 6.4961	3.0 .12	1.0 .04	572000 129000	1140000 256000	17	42.863 1.6875	265.9 10.4668	15356 5) 3454	72067 5) 16253
8308AAB	40 1.5748	90 3.5433	69 2.7165	1.5 .06	1.0 .04	97500 21900	91500 20600	10	16.669 .6563	65.0 2.5591	466 106	9750 2190
8309AAB	45 1.7717	100 3.9370	75 2.9528	1.5 .06	1.0 .04	124000 27900	122000 27400	11	18.256 .7188	72.5 2.8544	754 170	12400 2790
8310AAB	50 1.9685	110 4.3307	81 3.1890	2.0 .08	1.0 .04	143000 32100	143000 32100	11	19.844 .7813	80.0 3.1496	1074 242	14300 3210
8311AAB	55 2.1654	120 4.7244	87 3.4252	2.0 .08	1.0 .04	165000 37100	170000 38200	11	21.431 .8438	87.5 3.4449	1486 334	16500 3710
8312AAB	60 2.3622	130 5.1181	93 3.6614	2.0 .08	1.0 .04	186000 41800	193000 43400	11	23.019 .9063	95.0 3.7402	2004 452	18600 4180
8313AAB	65 2.5591	140 5.5118	99 3.8976	2.0 .08	1.0 .04	208000 46700	224000 50400	11	24.606 .9688	102.5 4.0355	2648 596	20800 4670
8314AAB	70 2.7559	150 5.9055	105 4.1339	2.0 .08	1.0 .04	242000 54400	270000 60700	11	26.988 1.0625	110.0 4.3307	3726 838	24200 5440
8315AAB	75 2.9528	160 6.2992	111 4.3701	2.0 .08	1.0 .04	260000 58400	300000 67400	11	28.575 1.1250	117.5 4.6260	4736 1066	26000 5840
8316AAB	80 3.1496	170 6.6929	117 4.6063	2.0 .08	1.0 .04	281000 63100	335000 75300	11	30.163 1.1875	125.0 4.9213	5940 1336	28100 6310
8317AAB	85 3.3465	180 7.0866	123 4.8425	2.5 .10	1.0 .04	302000 67900	375000 84300	11	31.750 1.2500	132.5 5.2166	7358 1654	30200 6790
8318AAB	90 3.5433	190 7.4803	129 5.0787	2.5 .10	1.0 .04	325000 73000	405000 91000	11	33.338 1.3125	140.0 5.5118	9016 2028	32500 7300
8319AAB	95 3.7402	200 7.8740	135 5.3150	2.5 .10	1.0 .04	345000 77500	455000 102000	11	34.925 1.3750	147.5 5.8071	10940 2460	34500 7750
8320AAB	100 3.9370	215 8.4646	141 5.5512	2.5 .10	1.0 .04	390000 87600	540000 121000	12	36.513 1.4375	157.5 6.2008	14650 3294	39000 8760
8322AAB	110 4.3307	240 9.4488	150 5.9055	2.5 .10	1.0 .04	436000 98000	640000 144000	12	39.688 1.5625	175.0 6.8898	5258 5) 1182	54932 5) 12348
8326AAB	130 5.1181	280 11.0236	174 6.8504	3.0 .12	1.0 .04	559000 126000	915000 206000	12	47.625 1.8750	205.0 8.0709	10572 5) 2378	70429 5) 15875
8330AAB	150 5.9055	320 12.5984	195 7.6772	3.0 .12	1.0 .04	663000 149000	1180000 265000	12	53.975 2.1250	235.0 9.2520	17698 5) 3980	83532 5) 18773
8336AAB	180 7.0866	380 14.9606	225 8.8583	3.0 .12	1.0 .04	824000 185000	1630000 366000	13	60.325 2.3750	280.0 11.0236	32438 5) 7294	103817 5) 23309

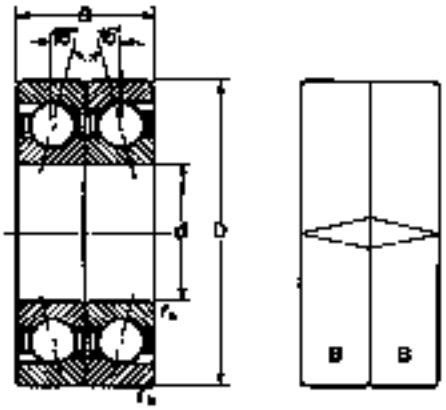
1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
2) For thrust rating of bearings (AA), multiply C by 1.75 and C_o by 3.85. For thrust rating of bearing (B), multiply C by 0.83 and C_o by 2.00
3) Values have been determined through historical application and practice
4) Rating for one million revolutions or 500 hours at 33⅓ RPM claculated according to actual bearing raceway geometry
5) Based on 1800 RPM for 8224AAB, 8238AAB, and 8322AAB through 8336AAB

15° (B) Bearing											
BASIC RADIAL LOAD RATING [2]		BALLS PER ROW		PITCH DIAMETER mm in	MIN. REQD. THRUST AT 3600 RPM N lbf [5]	THRUST FOR 25000 HRS L_{10} @ 3600 RPM N lbf [5]	SPEED RATING [3]		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
DYNAMIC [4] C N lbf	STATIC Co N lbf	NUMBER	DIAMETER mm in				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
124000 27900	108000 24300	15	22.225 .8750	125.4 4.9362	270 61	5890 1326	3400	4500	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992
133000 29900	118000 26500	16	22.225 .8750	133.4 5.2516	311 70	6318 1421	3200	4300	95.018 3.7409	95.003 3.7403	170.025 6.6939	170.000 6.6929
146000 32800	134000 30100	16	23.813 .9375	141.7 5.5768	405 91	6935 1558	3000	4000	100.018 3.9377	100.003 3.9371	180.025 7.0876	180.000 7.0866
182000 40900	170000 38200	16	26.988 1.0625	156.9 6.1754	649 146	8645 1943	2600	3600	110.018 4.3314	110.003 4.3308	200.029 7.8751	200.000 7.8740
199000 44700	193000 43400	16	28.575 1.1250	167.9 6.6096	207 [5] 47	11910 [5] 2676	2200	3200	120.018 4.7251	120.003 4.7245	215.029 8.4657	215.000 8.4646
377000 84800	500000 112000	17	42.863 1.6875	265.4 10.4500	1186 [5] 267	22562 [5] 5075	1400	1900	190.024 7.4812	190.004 7.4805	340.036 13.3872	340.000 13.3858
48800 11000	33500 7530	12	14.288 .5625	65.3 2.5719	28 7	2318 523	6700	9000	40.013 1.5753	40.002 1.5749	90.022 3.5442	90.000 3.5433
58500 13200	40500 9100	12	15.875 .6250	72.9 2.8687	43 10	2779 627	6000	8000	45.013 1.7722	45.002 1.7718	100.022 3.9379	100.000 3.9370
76100 17100	52000 11700	11	19.050 .7500	78.8 3.1025	71 16	3615 813	5300	7000	50.013 1.9690	50.002 1.9686	110.022 4.3316	110.000 4.3307
88400 19900	61000 13700	11	20.638 .8125	85.4 3.3610	97 22	4199 946	4800	6300	55.015 2.1660	55.002 2.1655	120.022 4.7253	120.000 4.7244
101000 22700	71000 16000	11	22.225 .8750	95.0 3.7401	137 31	4798 1079	4500	6000	60.015 2.3628	60.002 2.3623	130.025 5.1191	130.000 5.1181
108000 24300	80000 18000	12	22.225 .8750	103.0 4.0557	167 38	5130 1155	4300	5600	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
121000 27200	93000 20900	12	23.813 .9375	110.6 4.3524	221 50	5748 1292	3800	5000	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
146000 32800	114000 25600	13	25.400 1.0000	118.1 4.6491	310 70	6935 1558	3600	4800	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
159000 35700	129000 29200	13	26.988 1.0625	125.6 4.9459	395 89	7553 1696	3400	4500	80.015 3.1502	80.002 3.1497	170.025 6.6939	170.000 6.6929
174000 39100	146000 32800	13	28.575 1.1250	133.2 5.2427	497 112	8265 1858	3200	4300	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
186000 41800	160000 36000	13	30.163 1.1875	140.0 5.5118	614 138	8835 1986	3000	4000	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803
199000 44700	180000 40500	13	31.750 1.2500	148.2 5.8361	759 171	9453 2124	2800	3800	95.018 3.7409	95.003 3.7403	200.029 7.8751	200.000 7.8740
212000 47700	200000 45000	13	33.338 1.3125	158.3 6.2318	944 213	10070 2266	2600	3600	100.018 3.9377	100.003 3.9371	215.029 8.4657	215.000 8.4646
255000 57300	255000 57300	13	38.100 1.5000	175.9 6.9242	388 [5] 88	15261 [5] 3430	2200	3200	110.018 4.3314	110.003 4.3308	240.029 9.4499	240.000 9.4488
296000 66500	345000 77600	13	44.450 1.7500	203.8 8.0227	712 [5] 160	17715 [5] 3980	1800	2600	130.021 5.1189	130.003 5.1182	280.032 11.0249	280.000 11.0236
390000 87700	475000 107000	13	49.213 1.9375	233.6 9.1956	1120 [5] 252	23340 [5] 5249	1600	2200	150.021 5.9063	150.003 5.9056	320.036 12.5998	320.000 12.5984
475000 107000	640000 144000	14	57.150 2.2500	278.3 10.9561	2270 [5] 511	28427 [5] 6404	1300	1600	180.021 7.0874	180.003 7.0867	380.036 14.9620	380.000 14.9606


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8000BB series PumPac® Diamond 15°/15° angular contact ball bearings

The PumPac Diamond series consists of two "B" bearings from the regular PumPac series. These 15° angular contact ball bearings are placed back-to-back, so that the etching on the bearing outside diameters form a diamond. This bearing system is designed to carry primarily radial loads with light thrust loads in either direction. It incorporates all of the other PumPac features including the land-riding, machined brass cage and special heat treatment for optimum dimensional stability.



- ABEC-3 tolerances
- 15°/15° contact angles
- Land-riding, machined brass cage
- CB axial clearance
- Heat treated for dimensional stability
- "Diamond" etched O.D.

The PumPac Diamond is used in centrifugal pumps and motors where the thrust loads are light and radial loads predominate. Double suction impeller pumps, including the popular axially split case or "between bearings" design, and pumps with closed impellers usually benefit from this bearing solution. The 15° contact angle causes the bearings to run cooler in these types of pumps. Vibration is also substantially reduced. Even though the calculated life of the PumPac Diamond may be less than that for a 40° bearing solution, longer service life in a low thrust load application can be expected. PumPac Diamond bearing sets are supplied in pairs, strapped together, ready for assembly. PumPac Diamond can not be installed backwards, because both bearings are identical. In high temperature applications, it may be necessary to provide extra clearance in the set to avoid radial preload. Call 1-800-MRC-7000 for assistance in determining the correct clearance.

8000BB series PumPac® Diamond 15°/15° angular contact ball bearings

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		BASIC RADIAL LOAD RATING 2)		BALLS PER ROW	
				r_a mm in	r_b mm in	DYNAMIC 4) C N lbf	STATIC C_o N lbf	NUMBER	DIAMETER mm in
8218BB	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	203000 45600	216000 48600	15	22.225 .8750
8219BB	95 3.7402	170 6.6929	64 2.5197	2.0 .08	1.0 .04	216000 48600	236000 53100	16	22.225 .8750
8220BB	100 3.9370	180 7.0866	68 2.6772	2.0 .08	1.0 .04	238000 53500	270000 60700	16	23.813 .9375
8222BB	110 4.3307	200 7.8740	76 2.9921	2.0 .08	1.0 .04	296000 66500	340000 76400	16	26.988 1.0625
8224BB	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	319000 71800	390000 87700	16	28.575 1.1250
8238BB	190 7.4803	340 13.3858	110 4.3307	3.0 .12	1.0 .04	605000 136000	1000000 225000	17	42.863 1.6875
8308BB	40 1.5748	90 3.5433	46 1.8110	1.5 .06	1.0 .04	79300 17800	67000 15100	12	14.288 .5625
8309BB	45 1.7717	100 3.9370	50 1.9685	1.5 .06	1.0 .04	95600 21500	81500 18300	12	15.875 .6250
8310BB	50 1.9685	110 4.3307	54 2.1260	2.0 .08	1.0 .04	124000 27900	104000 23400	11	19.050 .7500
8311BB	55 2.1654	120 4.7244	58 2.2835	2.0 .08	1.0 .04	143000 32100	122000 27400	11	20.638 .8125
8312BB	60 2.3622	130 5.1181	62 2.4409	2.0 .08	1.0 .04	165000 37100	143000 32100	11	22.225 .8750
8313BB	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	174000 39100	160000 36000	12	22.225 .8750
8314BB	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	199000 44700	190000 42700	12	23.813 .9375
8315BB	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	238000 53500	228000 51300	13	25.400 1.0000
8316BB	80 3.1496	170 6.6929	78 3.0709	2.0 .08	1.0 .04	255000 57300	260000 58500	13	26.988 1.0625
8317BB	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	281000 63200	292000 65600	13	28.575 1.1250
8318BB	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	302000 67900	325000 73100	13	30.163 1.1875
8319BB	95 3.7402	200 7.8740	90 3.5433	2.5 .10	1.0 .04	325000 73100	360000 80900	13	31.750 1.2500
8320BB	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	345000 77600	400000 89900	13	33.338 1.3125
8322BB	110 4.3307	240 9.4488	100 3.9370	2.5 .10	1.0 .04	416000 93500	510000 115000	13	38.100 1.5000
8326BB	130 5.1181	280 11.0236	116 4.5669	3.0 .12	1.0 .04	475000 107000	695000 156000	13	44.450 1.7500
8330BB	150 5.9055	320 12.5984	130 5.1181	3.0 .12	1.0 .04	624000 140000	950000 214000	13	49.213 1.9375
8336BB	180 7.0866	380 14.9606	150 5.9055	3.0 .12	1.0 .04	780000 175000	1270000 286000	14	57.150 2.2500

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
2) For thrust rating, multiply C by 0.51 and C_0 by 1.00
3) Values have been determined through historical application and practice
4) Rating for one million revolutions or 500 hours at 33⅓ RPM claculated according to actual bearing raceway geometry.
5) Based on 1800 RPM for 8238BB, and 8326BB through 8336BB

	PITCH DIAMETER mm in	MIN. REQD. THRUST LOAD AT 3600 RPM N lbf [5]	THRUST FOR 25000 HRS L_{10} AT 3600 RPM N lbf [5]	SPEED RATING [3]		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	125.4 4.9362	270 61	5904 1327	3800	5400	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992
	133.4 5.2516	311 70	6282 1414	3600	5100	95.018 3.7409	95.003 3.7403	170.025 6.6939	170.000 6.6929
	141.7 5.5768	405 91	6922 1556	3400	4800	100.018 3.9377	100.003 3.9371	180.025 7.0876	180.000 7.0866
	156.9 6.1754	649 146	8609 1934	3000	4400	110.018 4.3314	110.003 4.3308	200.029 7.8751	200.000 7.8740
	167.9 6.6096	826 186	9277 2089	2800	4100	120.018 4.7251	120.003 4.7245	215.029 8.4657	215.000 8.4646
	265.4 10.4500	1186 [5] 267	22168 [5] 4984	1800	2600	190.024 7.4812	190.004 7.4805	340.036 13.3872	340.000 13.3858
	65.3 2.5719	28 7	2307 518	7500	11000	40.013 1.5753	40.002 1.5749	90.022 3.5442	90.000 3.5433
	72.9 2.8687	43 10	2781 626	6800	9600	45.013 1.7722	45.002 1.7718	100.022 3.9379	100.000 3.9370
	78.8 3.1025	71 16	3607 812	6300	9000	50.013 1.9690	50.002 1.9686	110.022 4.3316	110.000 4.3307
	85.4 3.3610	97 22	4159 934	5600	8100	55.015 2.1660	55.002 2.1655	120.022 4.7253	120.000 4.7244
	95.0 3.7401	137 31	4799 1079	5000	7200	60.015 2.3628	60.002 2.3623	130.025 5.1191	130.000 5.1181
	103.0 4.0557	167 38	5061 1138	4800	6800	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
	110.6 4.3524	221 50	5788 1300	4500	6300	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
	118.1 4.6491	310 70	6922 1556	4300	6000	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
	125.6 4.9459	395 89	7416 1667	3800	5400	80.015 3.1502	80.002 3.1497	170.025 6.6939	170.000 6.6929
	133.2 5.2427	497 112	8172 1838	3600	5100	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
	140.0 5.5118	614 138	8783 1975	3400	4800	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803
	148.2 5.8361	759 171	9452 2126	3300	4500	95.018 3.7409	95.003 3.7403	200.029 7.8751	200.000 7.8740
	158.3 6.2318	944 213	10034 2257	3000	4400	100.018 3.9377	100.003 3.9371	215.029 8.4657	215.000 8.4646
	175.9 6.9242	1550 349	12098 2720	2600	3900	110.018 4.3314	110.003 4.3308	240.029 9.4499	240.000 9.4488
	203.8 8.0227	712 [5] 160	17405 [5] 3921	2300	3300	130.021 5.1189	130.003 5.1182	280.032 11.0249	280.000 11.0236
	233.6 9.1956	1120 [5] 252	22864 [5] 5130	2000	2900	150.021 5.9063	150.003 5.9056	320.036 12.5998	320.000 12.5984
	278.3 10.9561	2270 [5] 511	28580 [5] 6413	1600	2400	180.021 7.0874	180.003 7.0867	380.036 14.9620	380.000 14.9606

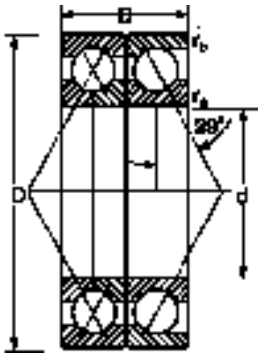

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97000U2 (and 9000U) series
29° angular contact split inner ring ball bearing sets

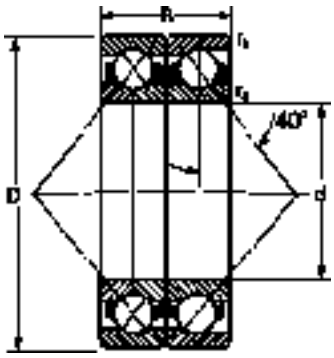
97000UP2 (and 9000UP) series
40° angular contact split inner ring ball bearing sets

The extraordinary feature of the MRC 9000U and 9000UP series angular contact ball bearings is the split inner ring that allows the assembly of an optimum ball complement while accommodating thrust in either direction. The thrust capacity in either direction is equal to the equivalent size 7000DU or 7000PDU bearing.

- ABEC-1 tolerances
- Split inner rings
- 9000U: 29° contact angle
- 9000UP: 40° contact angle
- Land-guided machined bronze cage



97000 U2



97000 UP2

The split inner ring bearing can be matched in tandem with a single 7000 or 7000P series type bearing with the same contact angle. This configuration yields two bearing shared thrust capacity in one direction and one bearing thrust capacity in the opposite direction.

The spilt inner ring bearing is usually paired with a 7000 or 7000P series bearing for use in pumps or motors, as a 97000U2 or 97000UP2 set. The letter “P” identifies the bearing or set as having a 40° contact angle.

- 97000U2: 29° set consisting of one 9000UDT and one 7000DT
- 97000UP2: 40° set consisting of one 9000UPDT and one 7000PDT

This bearing set is commonly used in vertical motors or pumps to handle the primary thrust load. Because two bearings acting in tandem share the thrust load, this solution offers an extremely high thrust carrying capacity. Reversing thrust load can be accommodated on the back side of the split inner ring bearing.

Another common application of this bearing system is stirrer motors for ethylene reactors. In this application, the bearing depends upon the reactor’s plasma for lubrication. MRC offers a variety of materials and cage designs to provide optimum service life with marginal lubrication.

For proper mounting orientation, please refer to the stuffer provided in the bearing box.

97000U2 (and 9000U) series 29° angular contact split inner ring ball bearing sets

97000UP2 (and 9000UP) series 40° angular contact split inner ring ball bearing sets

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		BASIC RADIAL LOAD RATING 2)		BALLS PER ROW	
				r_a mm in	r_b mm in	DYNAMIC 4) C N lbf	STATIC C_o N lbf	NUMBER	DIAMETER mm in
97218U2	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	190000 42700	236000 53100	16	22.225 .8750
97313U2	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	178000 40000	173000 38900	14	22.225 .8750
97315U2	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	225000 50600	228000 51300	14	25.400 1.0000
97317U2	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	265000 59600	285000 64100	14	28.575 1.1250
97222UP2	110 4.3307	200 7.8740	76 2.9921	2.0 .08	1.0 .04	251000 56400	310000 69700	15	28.575 1.1250
97224UP2	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	270000 60700	325000 73100	15	30.163 1.1875
97230UP2	150 5.9055	270 10.6299	90 3.5433	2.5 .10	1.0 .04	351000 78900	520000 117000	17	34.925 1.3750
97314UP2	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	190000 42700	186000 41800	11	26.988 1.0625
97318UP2	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	255000 57300	270000 60700	11	33.338 1.3125
97320UP2	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	307000 69000	380000 85400	12	36.513 1.4375

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

2) For thrust rating of 97000U2 series, multiply C by 1.32 and C_o by 2.94
For thrust rating of 97000UP2 series, multiply C by 1.76 and C_o by 3.86

3) Listed values are for machined bronze cage and have been determined through historical application and practice

4) Rating for one million revolutions or 500 hours at 33⅓ RPM

5) Based on 1800 RPM for 97222UP2 through 97230UP2 and 97318UP2 through 97320UP2

	PITCH DIAMETER mm in	MIN. REQD. THRUST LOAD AT 3600 RPM N lbf [5]	THRUST FOR 25000 HRS L_{10} AT 3600 RPM N lbf [5]	SPEED RATING [3]		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	124.5 4.9012	2048 462	14250 3203	2900	3800	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992
	103.0 4.0557	1410 318	13350 3000	3700	4800	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
	118.1 4.6491	2414 544	16875 3795	3100	4000	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
	133.2 5.2427	3880 872	19875 4470	2800	3600	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
	155.5 6.1204	2292 [5] 516	31624 [5] 7106	1900	2800	110.018 4.3314	110.003 4.3308	200.029 7.8751	200.000 7.8740
	167.5 6.5945	2916 [5] 656	34018 [5] 7648	1700	2400	120.018 4.7251	120.003 4.7245	215.029 8.4657	215.000 8.4646
	210.0 8.2677	6526 [5] 1468	44223 [5] 9941	1500	2000	150.021 5.9063	150.003 5.9056	270.032 10.6312	270.000 10.6299
	110.0 4.3307	3726 838	19000 4270	3000	4000	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
	140.0 5.5118	2254 [5] 508	32128 [5] 7220	2200	3200	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803
	157.5 6.2008	3664 [5] 824	38680 [5] 8694	1900	2800	100.018 3.9377	100.003 3.9371	215.029 8.4657	215.000 8.4646



MRC Bearing Services
1510 Gehman Road
Kulpsville, PA 19443
USA

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(215) 513-4400
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