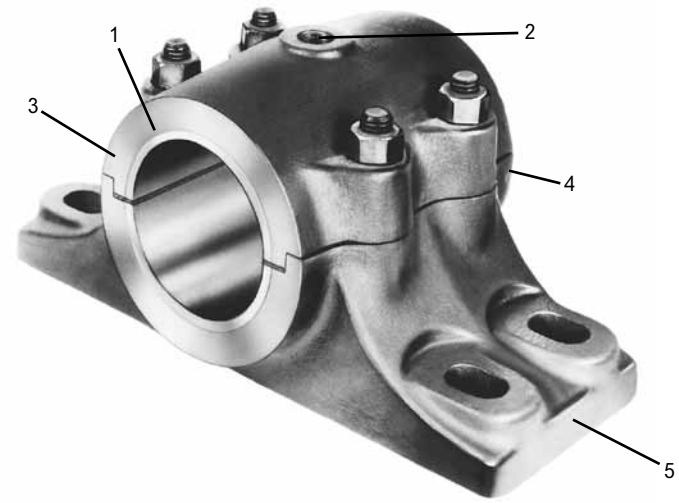
Link-Belt® *Rigid Sleeve Bearings*

Rigid sleeve bearing units provide compact and reliable usage in applications where continuous operation and uninterrupted service are required.

Rigid Sleeve Bearing Units and Takeups

Rigid sleeve bearing units provide compact and reliable usage in applications where continuous operation and uninterrupted service are required. Because the bearing material wears gradually, sudden breakdowns and costly maintenance, are minimized. Sleeve bearings can also operate extremely quietly. The standard bearing materials of babbitt, bronze and cast iron will handle a wide variety of applications such as on log decks, sewage treatment equipment, furnaces and ovens, quiet operating fans and blowers, power plant dampers and stokers, oscillating shaft applications and other general conveying and power transmission machinery. Babbitt bearings are used for moderate speeds and loads and ambient temperatures up to 130°F **(54°C)**. Babbitt has the ability to give excellent service with a minimum of maintenance.

Bronze bearings are recommended for heavier loads, impact, and temperatures beyond the limits of babbitt bearings. They can be operated at ambient temperatures up to 300°F **(149°C)** providing satisfactory lubrication is available. Bronze has excellent all-around bearing characteristics; it has a relatively low coefficient of friction and a remarkable resistance to shock and wear.



1. Bearing of babbitt or bronze is securely anchored in housing.
2. Housing is drilled and tapped for grease cup or lubrication fitting; grooves distribute lubricant over loaded area.
3. Finished ends permit flush mounting of pulley, sprocket, or collar against bearing when required.
4. Two-piece pillow block has shims to provide for adjustment and compensate for wear.
5. Mounting surface is finished to provide firm seating on flat support.

One-piece Pillow Blocks

One-piece pillow blocks are recommended for general applications where it is unnecessary to remove a bearing cap. They are available with babbitt, bronze or plain bore cast iron bearings.

Two-piece Pillow Blocks

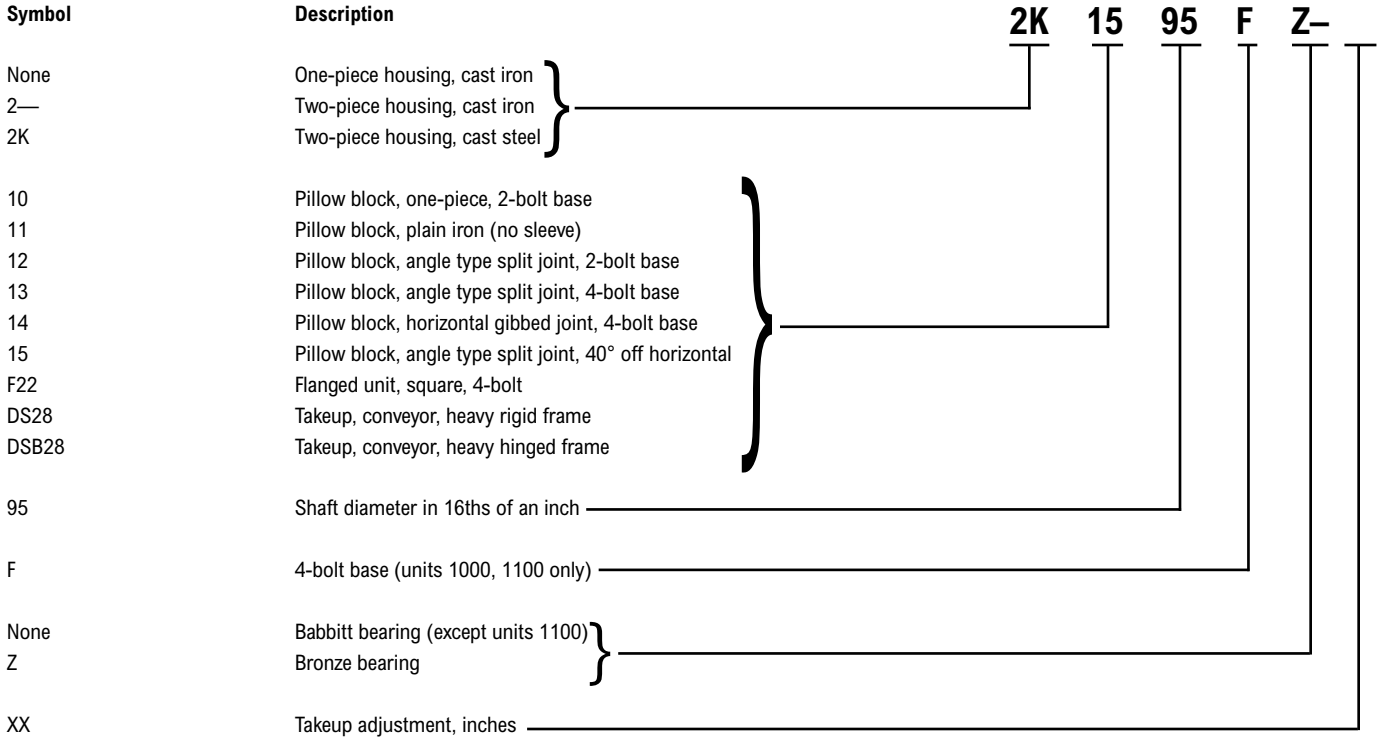
Two-piece pillow blocks are used whenever a bearing with a removable cap is required. They are available with babbitt or bronze bearings.

For heavy side pressures or angular loading, housings with gibbed joints provide greater strength. Cast steel housings are used where sudden shocks or heavy impact loads are encountered.

Flanged Units

Flanged units with square flanges have slotted mounting holes to make them interchangeable with most common ball and roller bearing bolting patterns. These units have either babbitt or bronze bearings.

Nomenclature



Rigid Sleeve Bearing Units

To select a rigid sleeve bearing, determine the applied radial load and the applicable operating conditions. The procedure shown here will aid in selecting an appropriate bearing.

The selection procedures and rating formulas used here are in agreement with industry standards for sleeve bearings established by the Mechanical Power Transmission Association. The bearing ratings apply when certain installation and operating conditions are met and when any other adverse ambient conditions such as high or low temperatures, extreme dirt or moisture, chemical contamination, shock or vibration loading direct or induced, oscillating shafts, intermittent operation and related factors are carefully considered.

The ratings used apply when the following conditions are met:

1. Align bearings with the shaft to provide uniform load distribution.
2. Normal running loads should not exceed the ratings shown in the tables. Starting and occasional peak loads should not exceed these ratings by more than 100%.
3. The direction of the load should not be within 30° (.53 radians) of either side of the grease groove and must further meet any load direction limitations imposed by Table 1.
4. The shaft finish through the bearing bore should be at least as smooth as that of normal commercial cold finished steel shafting (about 32 micro-inches or .82µm). There should also be no machined or ground spiral lead on the shaft journal. Shafting should be within the diameter tolerances listed on the next page.
5. Ambient temperatures should not exceed 130°F (54°C) for babbitt and 300°F (149°C) for bronze bearings. This temperature limit applies to shafts extending from ovens, high temperature fans, etc.
6. Sturdy, vibration-free supporting structures must be provided, along with adequate grease lubrication.

Selection

Step 1

From Table 1, select the bearing material and housing series and material suitable for the radial load direction.

Step 2

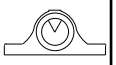
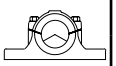
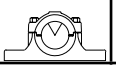
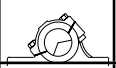
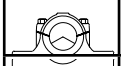
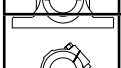
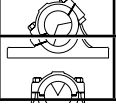
Refer to the radial load rating tables in the Load Ratings and Speed Limits section to determine the shaft diameter necessary to obtain the required radial rating at the given speed.

If the conditions described above cannot be met, the load should be increased by a service factor prior to selecting the bearing sizes from the tables shown in the Load Ratings and Speed Limits section. The service factor may be as high as 2.0 for conditions to the left of the "stair-step" line, or as high as 3.0 for conditions to the right of the line. Consult Rexnord Bearing Division.

Step 3

To position a shaft axially or where light thrust loads are present provide thick bronze washers backed by a shaft collar or a machined shaft shoulder against the end of the bearing. The bearing ends are already machined.

Table 1 – Bearing material and unit type selection

Material		Recommended loading range, degrees, radius for pillow block or flanged unit*		Available shaft sizes, inches	Rigid unit series		
					Pillow block		Flanged Unit
Bearing	Housing				2-bolt	4-bolt	Square
Babbitt	Cast iron one-piece		300° **5.2 rad**	1/2 - 2 15/16	1000		
				3/4 - 3 15/16			F2200
				3 7/16 - 3 15/16		1000F	
	Cast iron two-piece		120° **2.1 rad**	7/8 - 3 15/16	2-1200		
				3 7/16 - 4 15/16		2-1300	
			300° **5.2 rad**	1 15/16 - 8		2-1400	
			□ 120° **2.1 rad**	1 15/16 - 9		2-1500	
Bronze	Cast iron one-piece		300° **5.2 rad**	1/2 - 2 15/16	1000Z		
				3/4 - 3 15/16			F2200Z
				3 7/16 - 3 15/16		1000FZ	
	Cast iron two-piece		120° **2.1 rad**	7/8 - 3 15/16	2-1200Z		
			300° **5.2 rad**	1 15/16 - 8		2-1400Z	
			□ 120° **2.1 rad**	1 15/16 - 8		2-1500Z	
	Cast steel two-piece		300° **5.2 rad**	1 15/16 - 12		2K1400Z	

* Shaded portion of drawings represents recommended loading range with the grease groove horizontal and opposite the loaded area. For other positioning, consult Rexnord Bearing Division.

□ 300°(5.2 rad.) for housings with gibbed joint construction.

Additional Information

Sleeve Bearing Materials:

Plain bearings made of babbitt are universally accepted as providing reasonable capacity and dependable service, often under adverse conditions. Babbitt is a relatively soft bearing material and for this reason minimizes danger of scoring or damage to shafts or rotors. It can often be repaired quickly on the spot by rescraping, pouring of new metal, etc. Bearing operating temperature should not exceed 130°F (54°C) although occasional peaks to 200°F (93°C) may be tolerated. Babbitt bearings are usually restricted to applications involving light to moderate loads and mild shock.

Bronze bearings are suitable for heavier loads than babbitt (75% to 200% higher), depending upon specific conditions of load and speed. Bronze with stands higher shock loads and permits some what higher speed operation. It is usually restricted to 300°F (150°C) ambient temperature, although normal multi-purpose greases are limited to 200°-250°F (93°-121°C) operating temperature. Bronze is a harder material than babbitt and has a greater tendency to score or damage shafts in the event of malfunction such as lack of relubrication. Field repair of bronze bearings generally requires removing shims and scraping or replacement of bushings.

Cast iron bearings (series 1100) are low in cost and suitable for many slow moving shafts and oscillating or reciprocating arms supporting relatively light loads. The lubricating characteristics of cast iron are attributed to the free graphite flakes present in the material. With the use of cast iron bearings, higher shaft clearance is usually utilized. Thus any large wear particles or debris will not join or seize the bearing. This material has been used to temperatures as high as 1000°F (538°C) under light loads and slow speed intermittent operations, where ordinary lubricants are ineffective.

Additional Features:

By the very nature of their design, all rigid sleeve bearing units are expansion type, in that the shaft journal is free to slide axially through the bore of the bearing. To fix a unit, a combination of shaft shoulders and/or thrust collars with bronze washers can be utilized.

Rigid sleeve bearing units have cored mounting bolt holes suitable for the inch or metric bolts listed.

Bearings can be replaced in units with bronze sleeves. Care should be taken when replacing bronze sleeves, split or solid, to firmly anchor the sleeve to the housing.

Operation:

Rigid sleeve bearing units are not prelubricated. The service instructions packed with shipments provide guide lines for initial lubrication and relubrication intervals. As lack of lubrication results in bearing and shaft wear, care must be taken to assure an adequate supply of correct lubricant, especially during initial startup and until satisfactory relubrication intervals are determined. Very careful shaft alignment is necessary during installation. Shaft journals must turn freely without binding in the bearing or excessive heat and seizure can result. Any factor which may disrupt or remove the lubricant film should be eliminated as well. Sharp edges on the shaft or the bearing surface can act as scrapers to destroy lubricant films. Do not extend shaft keyways into bearing bores. When rigid sleeve bearings must carry light to medium thrust loads, thrust washers of bronze should be placed against the already machined face of the bearing and backed by substantial thrust collars, shaft shoulders, machined gear, sprocket or sheave faces, etc.

Takeups:

Rigid sleeve bearing pillow blocks can be mounted on the universal takeup frame LC, and LHD universal takeup frame. Alignment of rigid sleeve bearing takeups is difficult and must be carefully accomplished. Alignment must also be maintained during any further adjustment of the takeup after operation. Bolt takeup frames firmly to good supporting structure to prevent frame overload and distortion.

Shaft Tolerances:

Shaft diameters for rigid sleeve bearing units are usually held to the following regular commercial tolerances:

Shaft Diameters	Recommended Tolerance
through 2"	Nominal to –.003"
2 1/16" through 4"	Nominal to –.004"
4 1/16" through 6"	Nominal to –.005"
6 1/16" through 13"	Nominal to –.006"

Warning:

The reliability built in all Link-Belt bearings can be realized in service only when bearings are correctly selected, properly installed, protected and maintained.

The correct selection of rigid sleeve bearing mounted units requires that the magnitude and nature of all loads, speeds, alignment, mounting, operating requirements and maintenance be adequately considered. The selection of materials for and design of housings, shafting, fasteners, and accessories as well as provisions for installation and maintenance must follow good engineering principles.

Housings must be selected and installed with regard to the degree and direction of the forces that will occur. Housings should not be used under tension loads except with adequate safety factors. For this reason pillow blocks are best suited to withstand radial loads passing through the base. When heavy loads or shock loads are possible, it is most important to mount a unit so that the line of force passes directly into the base, or so that the unit is directly and substantially supported other than through its mounting bolts.

Where the line of force falls outside the base, serious housing and fastener deflection or failure may occur.

Takeups are best located where loads are moderate and no shock loads are present. As many mounting arrangements are possible with takeups, proper safety factors must always be considered on all items of the system, including shafts, housings, fasteners, and adjusting screws. Rexnord Bearing Division, should be consulted where unusual loading conditions exist.

Load Ratings – Babbitt Rigid Sleeve Bearing Units

Radial load ratings for 10 to 300 RPM (pounds/newtons) * ■

Shaft diameter, inches	Shaft speed, RPM													
	10		50		100		150		200		250		300	
1/2	100	**445**	100	**445**	100	**445**	95	**423**	95	**423**	95	**423**	95	**423**
5/8	150	**667**	150	**667**	145	**645**	145	**645**	140	**623**	140	**673**	135	**600**
3/4	180	**801**	175	**778**	175	**778**	170	**756**	170	**756**	165	**734**	160	**712**
7/8	260	**1 157**	255	**1 134**	250	**1 112**	245	**1 090**	240	**1 068**	235	**1 045**	230	**1 023**
15/16	280	**1 246**	275	**1 223**	265	**1 179**	260	**1 157**	255	**1 134**	250	**1 112**	245	**1 090**
1	295	**1 312**	290	**1 290**	285	**1 268**	280	**1 246**	270	**1 201**	265	**1 179**	260	**1 157**
1 1/8	415	**1 846**	410	**1 824**	400	**1 779**	390	**1 735**	380	**1 690**	370	**1 646**	355	**1 579**
1 3/16, 1 1/4	440	**1 957**	430	**1 913**	420	**1 868**	410	**1 824**	395	**1 757**	385	**1 713**	375	**1 668**
1 5/16, 1 3/8,	585	**2 602**	570	**2 535**	555	**2 469**	535	**2 380**	520	**2 313**	505	**2 246**	485	**2 157**
1 7/16, 1 1/2	640	**2 847**	625	**2 780**	605	**2 691**	585	**2 602**	565	**2 513**	545	**2 424**	525	**2 335**
1 11/16, 1 3/4	875	**3 892**	850	**3 781**	820	**3 648**	785	**3 492**	755	**3 358**	720	**3 203**	690	**3 069**
1 15/16, 2	1150	**5 120**	1110	**4 940**	1060	**4 720**	1010	**4 490**	965	**4 292**	915	**4 070**	865	**3 848**
2 3/16, 2 1/4	1460	**6 490**	1400	**6 230**	1330	**5 920**	1260	**5 600**	1190	**5 290**	1120	**4 980**	1050	**4 670**
2 7/16, 2 1/2	1800	**8 010**	1730	**7 690**	1630	**7 250**	1530	**6 810**	1430	**6 360**	1340	**5 960**	1240	**5 520**
2 11/16, 2 3/4	2190	**9 740**	2080	**9 250**	1950	**8 670**	1820	**8 100**	1690	**7 520**	1560	**6 940**	1150	**5 120**
2 15/16, 3	2600	**11 570**	2470	**10 990**	2300	**10 230**	2130	**9 470**	1960	**8 720**	1790	**7 960**	675	**3 002**
3 7/16, 3 1/2	3550	**15 790**	3330	**14 810**	3060	**13 610**	2790	**12 410**	2520	**11 210**	1200	**5 340**		
3 15/16, 4	4640	**20 640**	4310	**19 170**	3910	**17 390**	3500	**15 570**	2760	**12 280**				
4 7/8, 4 1/2	5870	**26 110**	5410	**24 060**	4830	**21 480**	4250	**18 900**	1410	**6 270**				
4 15/16, 5	7240	**32 210**	6600	**29 360**	5810	**25 840**	5010	**22 290**						
5 7/16, 5 1/2	8750	**38 920**	7900	**35 140**	6840	**30 430**	4360	**19 390**						
5 15/16, 6	10410	**46 310**	9300	**41 370**	7910	**35 190**	2390	**10 630**						
6 7/16, 6 1/2	12200	**54 270**	10790	**48 000**	9020	**40 120**								
6 15/16, 7	14120	**62 810**	12360	**54 980**	10150	**45 150**								
7 7/16, 7 1/2	17270	**76 820**	14950	**66 500**	12050	**53 600**								
7 15/16, 8	18390	**81 800**	15750	**70 060**	10710	**47 640**								
9	20750	**92 300**	17360	**77 220**	4140	**18 420**								
10	22950	**102 090**	18760	**83 450**										
12	30700	**136 560**	23910	**106 360**										

For speeds lower than 10 RPM consult Rexnord Bearing Division.

Radial load ratings for 350 to 1000 RPM (pounds/**newtons**) *

Shaft diameter, inches	Shaft speed, RPM															
	350		400		450		500		600		700		800		900		1000	
1/2	95	**423**	90	**400**	90	**400**	90	**400**	85	**378**	85	**378**	85	**378**	80	**356**	80	**356**
5/8	135	**600**	135	**600**	130	**587**	130	**587**	125	**556**	120	**534**	115	**512**	110	**489**	110	**489**
3/4	160	**712**	155	**689**	155	**689**	150	**667**	145	**645**	140	**623**	130	**578**	125	**556**	120	**534**
7/8	225	**1001**	220	**979**	215	**956**	210	**934**	200	**890**	190	**845**	180	**801**	150	**667**		
15/16	240	**1068**	235	**1045**	225	**1001**	220	**979**	210	**934**	200	**890**	185	**823**	105	**467**		
1	250	**1112**	245	**1090**	240	**1068**	230	**1023**	220	**979**	205	**912**						
1 1/8	345	**1535**	335	**1490**	325	**1446**	315	**1401**	295	**1312**	245	**1090**						
1 3/16, 1 1/4	360	**1601**	350	**1557**	340	**1512**	325	**1446**	305	**1357**	190	**845**						
1 5/16, 1 3/8,	470	**2091**	455	**2024**	435	**1935**	420	**1868**	345	**1535**								
1 7/16, 1 1/2	500	**2224**	480	**2135**	460	**2046**	440	**1957**	205	**912**								
1 11/16, 1 3/4	655	**2914**	625	**2780**	590	**2624**	340	**1512**										
1 15/16, 2	815	**3625**	730	**3247**	335	**1490**												
2 3/16, 2 1/4	975	**4337**	410	**1824**														
2 7/16, 2 1/2	645	**2869**																

■ Load ratings are based on industry standards established by the Mechanical Power Transmission Association.

* For plain bore Cast Iron Sleeve Bearing Units use radial load ratings at speeds to the left of the shaded area.

Load Ratings – Bronze Rigid Sleeve Bearing Units

Radial load ratings for 10 to 300 RPM (pounds/**newtons**) ■

Shaft diameter, inches	Shaft speed, RPM													
	10		50		100		150		200		250		300	
1/2	200	**890**	200	**890**	200	**890**	195	**867**	195	**867**	195	**867**	195	**867**
5/8	250	**1 112**	250	**1 112**	245	**1 090**	245	**1 090**	240	**1 090**	240	**1 068**	240	**1 068**
3/4	300	**1 334**	300	**1 334**	295	**1 312**	295	**1 312**	290	**1 290**	285	**1 268**	285	**1 268**
7/8	435	**1 935**	430	**1 913**	425	**1 890**	420	**1 868**	415	**1 846**	410	**1 824**	405	**1 802**
15/16	465	**2 068**	460	**2 046**	455	**2 024**	450	**2 002**	445	**1 979**	435	**1 935**	430	**1 913**
1	495	**2 202**	490	**2 180**	485	**2 157**	480	**2 135**	470	**2 091**	465	**2 068**	460	**2 046**
1 1/8	700	**3 114**	690	**3 069**	680	**3 025**	670	**2 980**	660	**2 936**	650	**2 891**	640	**2 847**
1 3/16, 1 1/4	735	**3 269**	730	**3 247**	715	**3 180**	705	**3 136**	695	**3 092**	680	**3 025**	670	**2 980**
1 5/16, 1 3/8,	980	**4 359**	965	**4 293**	950	**4 226**	930	**4 137**	915	**4 070**	895	**3 981**	880	**3 914**
1 7/16, 1 1/2	1070	**4 760**	1050	**4 670**	1030	**4 580**	1010	**4 490**	995	**4 426**	975	**4 337**	955	**4 248**
1 11/16, 1 3/4	1470	**6 540**	1440	**6 410**	1410	**6 270**	1370	**6 090**	1340	**5 960**	1310	**5 830**	1280	**5 690**
1 15/16, 2	1920	**8 540**	1880	**8 360**	1830	**8 140**	1790	**7 960**	1740	**7 740**	1690	**7 520**	1640	**7 300**
2 3/16, 2 1/4	2440	**10 850**	2390	**10 630**	2320	**10 320**	2240	**9 960**	2170	**9 650**	2100	**9 340**	2030	**9 030**
2 7/16, 2 1/2	3020	**13 430**	2940	**13 080**	2850	**12 680**	2750	**12 230**	2650	**11 790**	2560	**11 390**	2460	**10 940**
2 11/16, 2 3/4	3660	**16 280**	3560	**15 840**	3430	**15 260**	3300	**14 680**	3170	**14 100**	3040	**13 520**	2620	**11 650**
2 15/16, 3	4370	**19 440**	4230	**18 820**	4060	**18 060**	3890	**17 300**	3720	**16 550**	3550	**15 790**	2440	**10 850**
3 7/16, 3 1/2	5960	**26 510**	5740	**25 530**	5470	**24 330**	5200	**23 130**	4930	**21 930**	3610	**16 060**	1440	**6 410**
3 15/16, 4	7790	**34 650**	7460	**33 180**	7060	**31 400**	6650	**29 580**	5910	**26 290**				
4 7/8, 4 1/2	9860	**43 860**	9400	**41 810**	8820	**39 230**	8240	**36 650**	5400	**24 020**				
4 15/16, 5	12180	**54 180**	11540	**51 330**	10740	**47 770**	9950	**44 260**	4090	**18 190**				
5 7/16, 5 1/2	14740	**65 570**	13880	**61 740**	12820	**57 030**	10340	**45 990**	1820	**8 100**				
5 15/16, 6	17530	**77 980**	16420	**73 040**	15040	**66 900**	9520	**42 350**						
6 7/16, 6 1/2	20560	**91 460**	19150	**85 180**	17390	**77 350**	7900	**35 140**						
6 15/16, 7	23840	**106 050**	22070	**98 170**	19870	**88 390**	5350	**23 800**						
7 7/16, 7 1/2	29170	**129 750**	26850	**119 430**	23950	**106 530**	1880	**8 360**						
7 15/16, 8	31090	**138 300**	28450	**126 550**	23410	**104 130**								
9	35150	**156 360**	31760	**141 280**	18540	**82 470**								
10	38950	**172 260**	34760	**154 620**	12220	**54 360**								
12	52300	**232 640**	45520	**202 480**										

For speeds lower than 10 RPM consult Rexnord Bearing Division.

Radial load ratings for 350 to 1000 RPM (pounds/**newtons**)

Shaft diameter, inches	Shaft speed, RPM															
	350		400		450		500		600		700		800		900		1000	
1/2	195	**867**	190	**845**	190	**845**	190	**845**	185	**823**	185	**823**	185	**823**	180	**800**	180	**800**
5/8	235	**1045**	235	**1045**	235	**1045**	230	**1023**	225	**1001**	220	**979**	220	**979**	215	**956**	210	**934**
3/4	280	**1246**	280	**1246**	275	**1223**	270	**1201**	265	**1179**	260	**1157**	255	**1134**	250	**1112**	240	**1068**
7/8	400	**1779**	395	**1757**	390	**1735**	385	**1713**	375	**1668**	365	**1624**	355	**1579**	325	**1446**	245	**1090**
15/16	425	**1890**	420	**1868**	415	**1846**	410	**1824**	395	**1757**	385	**1713**	375	**1668**	295	**1312**	200	**890**
1	450	**2002**	445	**1979**	440	**1957**	430	**1913**	420	**1868**	405	**1802**	360	**1601**	255	**1134**	150	**667**
1 1/8	630	**2802**	620	**2758**	605	**2691**	595	**2647**	575	**2558**	525	**2335**	360	**1601**	195	**867**		
1 3/16, 1 1/4	660	**2936**	645	**2869**	635	**2825**	625	**2780**	600	**2669**	485	**2157**	300	**1334**	115	**512**		
1 5/16, 1 3/8,	865	**3848**	845	**3759**	830	**3692**	815	**3625**	735	**3269**	465	**2068**	195	**867**				
1 7/16, 1 1/2	935	**4159**	915	**4070**	895	**3981**	875	**3892**	635	**2825**	315	**1401**						
1 11/16, 1 3/4	1240	**5520**	1210	**5380**	1180	**5250**	930	**4137**	410	**1824**								
1 15/16, 2	1590	**7070**	1500	**6670**	1110	**4940**	715	**3180**										
2 3/16, 2 1/4	1960	**8720**	1390	**6180**	830	**3692**												
2 7/16, 2 1/2	1860	**8270**	1090	**4850**														
2 11/16, 2 3/4	1580	**7030**	545	**2424**														

■ Load ratings are based on industry standards established by the Mechanical Power Transmission Association.

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