RBC TRANSPORT DYNAMICS®

FibriloidCR™ Series

Cryogenic Rated Plain Bearings: Spherical, Rod Ends and Journals

RBC AEROSPACE®

Innovation. Commitment. Quality.

RBC BEARINGS®




RBC Bearings® provides global industrial, aerospace, and defense customers with unique design solutions to complex problems and an unparalleled level of service, quality, and support.

RBC manufactures highly engineered precision plain, roller and ball bearings, shaft collars, rigid couplings and keyless locking devices. While RBC designs and manufactures products in these major product categories, RBC excels at solving the most demanding and difficult applications with solutions that improve customers' products and process performance and deliver the lowest total cost of ownership. This has been achieved by providing products such as maintenance free bearings, components, and bearings designed to withstand environments with extreme temperature, high speed, contamination, corrosion, and severe shock loading.

RBC Bearings® has been providing engineered solutions to customers since 1919. RBC has significantly broadened our end markets, products, customer base and geographic reach through organic growth and acquisitions. These acquisitions fit well with |our philosophy of providing high-quality products and solutions to our customer base. They have enhanced our customer solutions and experience, further diversifying our offering to our target markets.

RBC currently has 53 facilities in five countries, with manufacturing capabilities in 31 locations.









What We Manufacture

RBC Transport Dynamics (TDC) a division of **RBC Bearings**®, was founded in 1955 and is located in Santa Ana, CA. RBC Transport Dynamics is recognized as the *World Leader in Self-Lubricating Liner Systems*™. TDC was the original inventor of the self-lubricating lined spherical bearing, with the first application developed in 1957 for the Chevrolet Corvette suspension joint. Boeing later adopted this newly developed self-lubricating liner technology, which was soon used extensively throughout the aerospace industry.

Transport Dynamics designs and manufactures a full line of plain bearings, rod ends, journal bearings (bushings), spherical bearings, links, and specialty assemblies.

Plain bearings are primarily offered with our proprietary PTFE self-lubricating liner systems, although metal-to-metal options are also available. Transport Dynamics offers over 50 different proprietary self-lubricating liner systems. The correct liner system is selected based on the load, wear, and temperature conditions in the application. These self-lubricating liners include TDC's Fibriloid® liner, universally recognized as the Gold Standard for self-lubricating liner systems. A TDC liner can be bonded to almost any metallic substrate to provide a fretting buffer as part of TDC's "Bond Only" service to our customers. Additionally, TDC liner performance can be enhanced using hard, smooth coatings that can be applied to mating bearing surfaces. For highly loaded applications the Fibriloid® liner which is SAE AS81820 and AS81934 Type A (100,000 cycles) approved is the preferred standard. The proprietary Fabroid®X liner system is the most widely specified self-lubricating liner for high temperature applications (in excess of 600°F).

TDC manufactures plain bearings in conventional swaged outer race configurations or as load slot entry configurations. The aerospace grade materials used include 440C, 17-4PH, 15-5PH, PH13-8Mo, Stellite,® Inconel,® titanium and aluminum. Other material options are readily available.

Experts in the Industry

The breadth of applications serviced includes aircraft gas turbine engines, commercial and military aircraft, helicopters, landing gear, space vehicles, alternative energy (ground power and wind) and military/defense, including hypersonic missiles. TDC is considered to be an Engineered Solutions Provider with extensive applications engineering and testing support.

The core competencies of TDC include milling, grinding, swaging, bonding, special processes (passivation, cadmium plate, dry film lubricant, High Velocity Oxy Fuel (HVOF) coatings), staking and extensive non-destructive testing (NDT). TDC is a multi-year Boeing Performance Excellence Award (BPEA) winning supplier to Boeing.

How We Can Serve You

TDC has implemented a total quality control system that uses statistical quality control at all facilities and manufactures in high volume to a just-in-time program.

To serve the ongoing needs of customers, we have a network of distributors and sales engineers throughout North and South America and Europe, with authorized agents worldwide.

For assistance with your bearing application:

Call Us:
714-546-3131 x1245

Email:
TDCRFQ@rbcbearings.com

Availability Notice

While we have the capability to produce the sizes listed in this catalog, they are not all currently in production. Please consult with the factory for minimum order requirements.

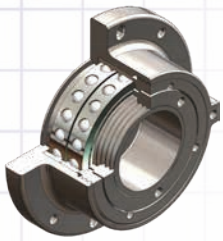
Innovation. Commitment. Quality.

SPACE APPLICATIONS:

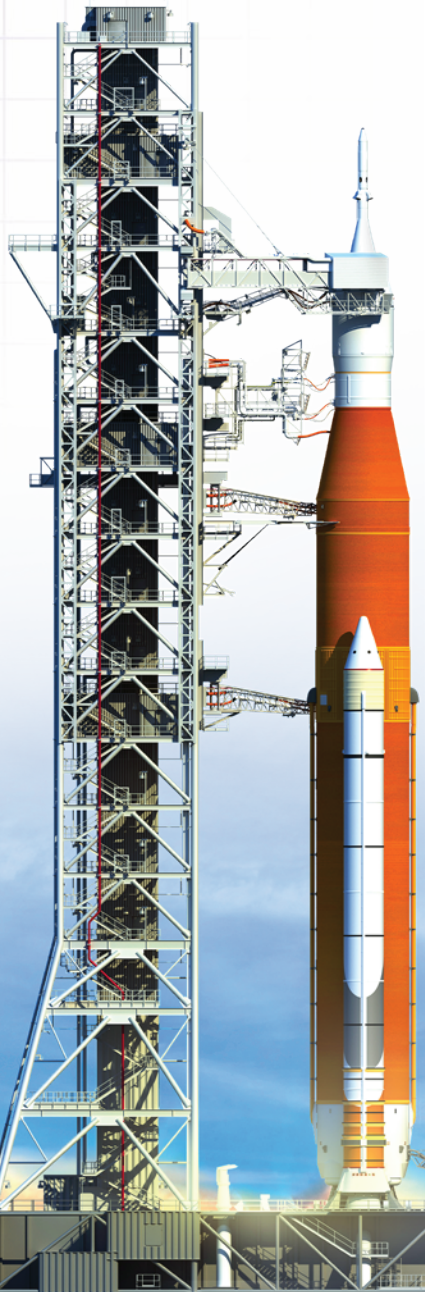
- Fins & Fin Actuation
- Propellant Tank Supports
- Control Valves & Valve Actuators
- Flight Control Actuators
- Struts & Fairings
- Rotary Gear Box
- Docking Hatch
- Landing Gear
- Launch Support Structures
- Rocket Engines
  - Turbo Pump Fuel Bearings
  - Gimbal Thrust Bearings
  - Manifolds
  - Engine Mounts / Hangers
- Payload Adapters
- Pressure Vessel

Satellite Applications:

- Structures
- Antennas
- Solar Arrays
- Coarse Positioning Assembly
- Reaction Wheels



▲ *Carriage Assembly*



Specialty Solutions:

- ✓ FibriloidCR™ Plain Bearings (Cryogenic Rated)
- ✓ High Friction Damping Liners
- ✓ Rocket Gimbal Assemblies
- ✓ Manifolds
- ✓ Door Actuators
- ✓ Control Valves
- ✓ Deploy/Retract Actuators

▲ *Deploy/Retract Actuators*

◀ *Rocket Gimbal Assemblies*

RBC has the design solutions for your application. Please give us the opportunity to put our extensive technical and manufacturing resources to work for you.

RBC AEROSPACE | RBC TRANSPORT DYNAMICS

ISO9001

www.rbcbearings.com

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03-882	Wide	Chamfered	10
03-884	Wide	Grooved	10
03-889	Light	Chamfered	11
03-890	Light	Grooved	11
03-891	Metric, Wide	Chamfered	12
03-892	Metric, Wide	Grooved	12
03-893	Metric, Narrow	Chamfered	12
03-894	Metric, Narrow	Grooved	12
03-888	High Misalignment	Chamfered	13
03-887	High Misalignment	Grooved	13

Rod End Bearings

Designation			
			14
02-885	Narrow	Female	15
02-884	Wide	Female	16
01-885	Narrow	Male	17
01-884	Wide	Male	18
01-889	Wide, EN Standard	Male	19
01-887	High Misalignment	Male	20

Journal Bearings

Designation			
			21
06-880	Straight		22
07-880	Flanged		23
06-890	Straight	Metric	24
07-890	Flanged	Metric	25
06-891	Straight	Metric	26
07-891	Flanged	Metric	27

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Introduction
Plain Bearing Types

Spherical Bearings

A self-aligning spherical bearing allows the same freedom of motion as provided by a journal bearing, but also permits a restricted movement in two operating axes (misalignment).

A spherical bearing consists of the ball (or inner race) contained by the outer race. The ball is allowed to pivot within the outer race, which in turn leads to the ability for movement. The design of the inner and outer race allows for varying degrees of allowed misalignment.

Spherical bearings are more complicated to manufacture than journal bearings because fitting the ball within the outer race is an additional and complex process. This can be accomplished by several methods, including swaging, snap-in, split race, split ball, Kaptor-type, or through a loader slot. Spherical bearings can use either a self-lubricating liner, oil, grease, or a dry film lubricant. The bearings in this catalog are swaged with a self-lubricating liner.

Spherical Rod End Bearings

Spherical rod ends consist of a threaded body that retains a spherical bearing insert. The body can have either external or internal threads, depending on the application.

Spherical rod ends can be either a three-piece or a two-piece. A three-piece rod end uses a complete spherical bearing insert to gain its movement, while in a two-piece rod end, the body itself serves as the outer race and thus may be swaged around the ball.

Rod ends are often used in linkages, and like the other bearings, spherical rod ends can be either lined or greased. If the bearing is a metal-to-metal type, a grease fitting is often used in order to facilitate regular lubrication. The spherical rod ends in this catalog are three-piece with a self-lubricating liner.

Journal Bearings

Journal bearings or bushings are used when loads are in the radial (normal to the axis) direction. They usually consist only of a cylindrical tube, in which a pin or similar device is allowed movement through.

Common materials used for plain journal bearings include aluminum bronze, aluminum-nickel-bronze, and beryllium copper. Flanged journal bearings contain a flange on one or both ends of the cylinder, allowing the bearing to support axial (parallel to the axis) loads.

Flanged bearings that are fabric-lined often contain a liner on the thrust face of the flange and within the cylinder. Applications often include landing gear shock struts and helicopter rotor head spindles. Journal bearings can either be self-lubricating or lubricated.

The journal bearings in this catalog are straight or flanged with the self-lubricating liner on the bore as well as on the flange.

Introduction

FibriloidCR™ Cryogenic Rated Liner System

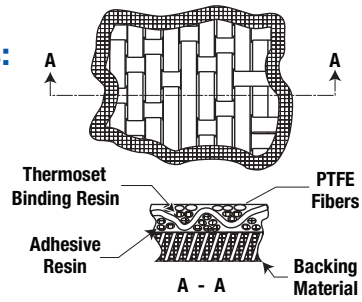
FibriloidCR™ Liner System

As the ***World Leader in Self-Lubricating Liner Systems***™, the **Transport Dynamics** Division of **RBC Aerospace** offers a full range of plain bearings (sphericals, rod ends, links and bushings). These bearings, featuring our proprietary liner systems, have been the preferred option for flight critical aerospace applications since they were originally developed by Transport Dynamics in 1957. We have vigorously tested and validated the use of the **FibriloidCR**™ series for cryogenic applications (-320°F). This series was specifically developed in support of space launch vehicles.

The use of the FibriloidCR™ series is an ideal cost-effective solution for most applications requiring reliability and long operational life without needing intervening maintenance.

FibriloidCR™ Series Performance Benefits:

- ✓ Superior wear performance
- ✓ Low coefficient of friction at temperature
- ✓ Wide temperature range (°F): -300° to +450°



Primary Market Served: Space Launch Vehicles

The FibriloidCR™ series of sphericals and rod ends are a space environment-compatible offering that features the Fibriloid® liner, which is widely recognized as the most versatile and best performing liner in the aerospace industry for these demanding applications.

Applications:

- ✓ Propulsion: Booster Engines
- ✓ Actuators
- ✓ Fuel Tanks
- ✓ Turbo Pumps
- ✓ Landing Gear

Cryogenic Rated Self-Lubricated Spherical Bearing

FibriloidCR™ Liner System

03-881 -03 K

- **03-881** → Base Models
- **-03** → Size
- **K** → Options (see datasheets)

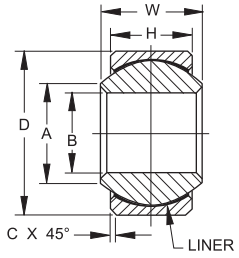
Base Models	Pg.
03-881 Narrow, Chamfered	9
03-885 Narrow, Grooved	9
03-882 Wide, Chamfered	10
03-884 Wide, Grooved	10
03-889 Light, Chamfered	11
03-890 Light, Grooved	11
03-891 Metric, Wide, Chamfered	12
03-892 Metric, Wide, Grooved	12
03-893 Metric, Narrrow, Chamfered	12
03-894 Metric, Narrrow, Grooved	12
03-888 High Misalignment, Chamfered	13
03-887 High Misalignment, Grooved	13

Cryogenic Rated Self-Lubricated Spherical Bearing

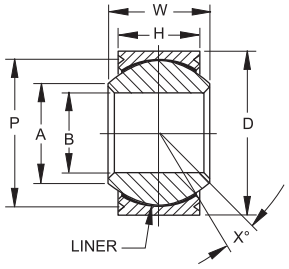
FibriloidCR™ Liner System, Narrow Series

- Narrow series, self-lubricated
- Low temperature — low wear
  -320°F to +450°F (-195.6°C to +232.2°C)

Materials:
Outer Ring: Inconel 718, HRC 37 min.
Inner Ring: Inconel 718, HRC 37 min.
Liner: FibriloidCR™ meets requirements of AS81820 Type A. Does not meet requirements of ASTM D2512.



Chamfered



Grooved

PART NUMBERS 03-881-XX Chamfered 03-885-XX Grooved	DIMENSIONS & TOLERANCES														
	B		D		H		W		A		C ❶		P ❷ Groove Pitch Diameter		X°
	+.0000 -.0005	+.000 -.013	+.0000 -.0005	+.000 -.013	±.005	±.13	+.000 -.002	+.00 -.05	Min.		+.010 -.000	+.25 -.00	+.000 -.008	+.00 -.20	Ref.
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	
-03	0.1900	4.826	0.5625	14.288	0.218	5.54	0.281	7.14	0.293	7.44	0.010	0.25	0.500	12.70	10
-04	0.2500	6.350	0.6562	16.667	0.250	6.35	0.343	8.71	0.364	9.25	0.010	0.25	0.594	15.09	10
-05	0.3125	7.938	0.7500	19.050	0.281	7.14	0.375	9.52	0.419	10.64	0.010	0.25	0.650	16.76	10
-05A	0.3125	7.938	0.7500	19.050	0.281	7.14	0.375	9.52	0.419	10.64	0.010	0.25	0.660	16.76	10
-06	0.3750	9.525	0.8125	20.638	0.312	7.92	0.406	10.31	0.475	12.06	0.020	0.51	0.712	18.08	9
-07	0.4380	11.113	0.9062	23.017	0.343	8.71	0.437	11.10	0.530	13.46	0.020	0.51	0.806	20.47	8
-08	0.5000	12.700	1.0000	25.400	0.390	9.91	0.500	12.70	0.600	15.24	0.020	0.51	0.876	22.25	8
-09	0.5625	14.288	1.0937	27.780	0.437	11.10	0.562	14.27	0.670	17.02	0.020	0.51	0.970	24.64	8
-10	0.6250	15.875	1.1875	30.162	0.500	12.70	0.625	15.88	0.739	18.77	0.020	0.51	1.063	27.00	8
-12	0.7500	19.050	1.4375	36.512	0.593	15.06	0.750	19.05	0.920	23.37	0.030	0.76	1.313	33.35	8
-14	0.8750	22.225	1.5625	39.688	0.703	17.86	0.875	22.22	0.980	24.89	0.030	0.76	1.438	36.53	8
-16	1.0000	25.400	1.7500	44.450	0.797	20.24	1.000	25.40	1.118	28.40	0.030	0.76	1.626	41.30	9

❶ Chamfered Type only. ❷ Grooved Type only.

PART NUMBERS 03-881-XX Chamfered 03-885-XX Grooved	LOAD RATINGS											
	Oscillating Radial Load Rating ❸		Radial Limit Load Rating ❸		Axial Limit Load Rating ❸		No-Load Rotational Breakaway Torque				Weight Approx.	
							Standard		"K" Type		Ref.	
	lbf.	N	lbf.	N	lbf.	N	in.-lbs.	N-m	in.-lbs.	N-m	lbs.	kg
-03	1500	6700	3975	17600	150	670	0.25-5	0.03-0.56	0-0.5	0-0.06	0.021	0.010
-04	3320	14600	6040	27000	430	1900	0.25-5	0.03-0.56	0-0.5	0-0.06	0.021	0.010
-05	5460	24500	8750	39000	700	3100	0.25-8	0.03-0.90	0-1.0	0-0.11	0.032	0.015
-05A	5460	24500	8750	39000	700	3100	0.25-8	0.03-0.90	0-1.0	0-0.11	0.032	0.015
-06	6600	29000	10540	46500	1100	4900	0.25-8	0.03-0.90	0-1.0	0-0.11	0.043	0.019
-07	8050	36000	13200	58500	1400	6200	0.25-8	0.03-0.90	0-1.0	0-0.11	0.053	0.024
-08	10400	46500	17900	80000	2100	9300	0.25-8	0.03-0.90	0-1.0	0-0.11	0.075	0.034
-09	13000	58500	23200	104000	3680	16300	0.25-8	0.03-0.90	0-1.0	0-0.11	0.096	0.044
-10	16450	73500	30500	137000	4720	20800	0.25-8	0.03-0.90	0-1.0	0-0.11	0.128	0.058
-12	23600	104000	46400	208000	6750	30000	0.25-8	0.03-0.90	0-1.0	0-0.11	0.224	0.102
-14	30250	134000	62200	275000	9350	41500	0.25-12	0.03-1.40	0-2.0	0-0.23	0.288	0.131
-16	38000	170000	82200	365000	12160	54000	0.25-12	0.03-1.40	0-2.0	0-0.23	0.416	0.189

❸ Load ratings based on AS81820. **-03** and **-04** sizes are limited by pin bending.

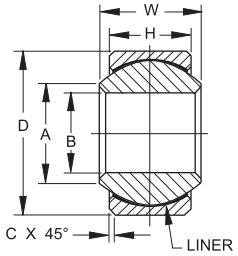
Example Bearing Configuration	Part Number designations for a 0.2500" bore, grooved spherical bearing
Base P/N (no options)	**03-885-04**
Low breakaway torque	**03-885-04K**
1st oversize O.D. (0.010")	**03-885-04T**
2nd oversize O.D. (0.020")	**03-885-04U**

Cryogenic Rated Self-Lubricated Spherical Bearing

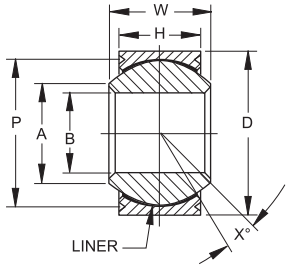
FibriloidCR™ Liner System, Wide Series

- Wide series, self-lubricated
- Low temperature — low wear
  -320°F to +450°F (-195.6°C to +232.2°C)

Materials:
Outer Ring: Inconel 718, HRC 37 min.
Inner Ring: Inconel 718, HRC 37 min.
Liner: FibriloidCR™ meets requirements of AS81820 Type A. Does not meet requirements of ASTM D2512.



Chamfered



Grooved

PART NUMBERS 03-882-XX Chamfered 03-884-XX Grooved	DIMENSIONS & TOLERANCES														
	B		D		H		W		A		C ❶		P ❷ Groove Pitch Diameter		X°
	+.0000 -.0005	+.000 -.013	+.0000 -.0005	+.000 -.013	±.005	±.13	+.000 -.002	+.00 -.05	Min.		+.010 -.000	+.25 -.00	+.000 -.008	+.00 -.20	Ref.
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	
-03	0.1900	4.826	0.6250	15.875	0.327	8.31	0.437	11.10	0.300	7.62	0.010	0.25	0.563	14.30	15
-04	0.2500	6.350	0.6250	15.875	0.327	8.31	0.437	11.10	0.300	7.62	0.010	0.25	0.563	14.30	15
-05	0.3125	7.938	0.6875	17.462	0.317	8.05	0.437	11.10	0.360	9.14	0.010	0.25	0.625	15.88	14
-06	0.3750	9.525	0.8125	20.638	0.406	10.31	0.500	12.70	0.466	11.84	0.020	0.51	0.712	18.08	8
-07A	0.4375	11.112	0.9062	23.017	0.442	11.23	0.562	14.27	0.537	13.64	0.020	0.51	0.806	20.47	10
-07	0.4375	11.112	0.9375	23.812	0.442	11.23	0.562	14.27	0.537	13.64	0.020	0.51	0.837	21.26	10
-08	0.5000	12.700	1.0000	25.400	0.505	12.83	0.625	15.88	0.607	15.42	0.020	0.51	0.900	22.86	9
-09	0.5625	14.288	1.1250	28.575	0.536	13.61	0.687	17.45	0.721	18.31	0.020	0.51	1.025	26.04	10
-10	0.6250	15.875	1.1875	30.162	0.567	14.40	0.750	19.05	0.747	18.97	0.020	0.51	1.087	27.61	12
-12	0.7500	19.050	1.3750	34.925	0.630	16.00	0.875	22.22	0.845	21.46	0.030	0.76	1.251	31.78	13
-14	0.8750	22.225	1.6250	41.275	0.755	19.18	0.875	22.22	0.995	25.27	0.030	0.76	1.501	38.13	6
-16	1.0000	25.400	2.1250	53.975	1.005	25.53	1.375	34.92	1.269	32.23	0.030	0.76	2.001	50.83	12

❶ Chamfered Type only. ❷ Grooved Type only.

PART NUMBERS 03-882-XX Chamfered 03-884-XX Grooved	LOAD RATINGS											
	Oscillating Radial Load Rating ❸		Radial Limit Load Rating ❸		Axial Limit Load Rating ❸		No-Load Rotational Breakaway Torque				Weight Approx.	
							Standard		"K" Type		Ref.	
	lbf.	N	lbf.	N	lbf.	N	in.-lbs.	N-m	in.-lbs.	N-m	lbs.	kg
-03	4900	21600	2500	11100	1770	7800	0.25-5	.03-.56	0-0.05	0-0.06	0.033	0.015
-04	4900	21600	5500	24400	1770	7800	0.25-5	.03-.56	0-0.05	0-0.06	0.033	0.015
-05	6050	27000	9400	41800	1640	7350	0.25-8	.03-.90	0-0.10	0-0.11	0.037	0.017
-06	8310	36500	13700	60900	2630	11600	0.25-8	.03-.90	0-0.10	0-0.11	0.064	0.029
-07A	11750	52000	19700	87600	3650	16300	0.25-8	.03-.90	0-0.10	0-0.11	0.085	0.039
-07	11750	52000	20700	92000	3650	16300	0.25-8	.03-.90	0-0.10	0-0.11	0.085	0.039
-08	14950	65500	21400	95000	4970	22000	0.25-8	.03-.90	0-0.10	0-0.11	0.107	0.048
-09	18100	80000	26600	118000	5370	24000	0.25-8	.03-.90	0-0.10	0-0.11	0.144	0.065
-10	20250	90000	29000	128500	6130	27500	0.25-8	.03-.90	0-0.10	0-0.11	0.171	0.077
-12	26200	116000	37000	164500	7730	34500	0.25-8	.03-.90	0-0.10	0-0.11	0.256	0.116
-14	33600	150000	65200	290000	10800	48000	0.25-12	.03-1.4	0-0.20	0-0.23	0.373	0.169
-16	56250	250000	104000	462500	19300	86500	0.25-12	.03-1.4	0-0.20	0-0.23	1.035	0.469

❸ Load ratings based on AS81820. **-03** and **-04** sizes are limited by pin bending.

Example Bearing Configuration	Part Number designations for a 0.2500" bore, grooved spherical bearing
Base P/N (no options)	**03-884-04**
Low breakaway torque	**03-884-04K**
1st oversize O.D. (0.010")	**03-884-04T**
2nd oversize O.D. (0.020")	**03-884-04U**

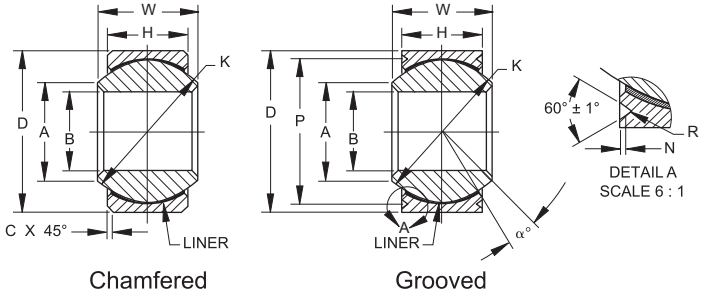
Cryogenic Rated Self-Lubricated Spherical Bearing

FibriloidCR™ Liner System, Light Series, Metric

European Standards similar to EN2022

- All dimensions in millimeters
- Low temperature — low wear
  -320°F to +450°F (-195.6°C to +232.2°C)

Materials:
Outer Ring: Inconel 718, HRC 37 min.
Inner Ring: Inconel 718, HRC 37 min.
Liner: FibriloidCR™ meets requirements of AS81820 Type A. Does not meet requirements of ASTM D2512.



Chamfered Grooved

PART NUMBERS 03-889-XX Chamfered 03-890-XX Grooved	Ball					Outer Race			Chamfer		V-Groove		
	ØB Bore		ØA	W Width	ØK	ØD 0. diam.		H Width	C		ØP	N	R
		Tot. (µm)	Mini	+0.00 - 0.06		Tot. (µm)		+ 0.1 - 0.1	Tot. (mm)		+ 0.1 - 0.0	+ 0.0 - 0.2	+ 0.1 - 0.0
-12	12	0 -8	14.3	10	17.5	22	0 -9	7	0.8	+0,4 -0,3	20.2	0.7	0.2
-15	15		18.7	12	22.2	26		9			24.2		
-17	17		21.2	14	25.4	30		10			28.2		
-20	20	0 -10	24.9	16	29.6	35	0 -11	12	1	+0.5 -0,4	33.2	0.9	0.3
-25	25		30.0	20	36.0	42		16			39.4		
-30	30		34,3	22	40.7	47		18			44.4		
-35	35	0 -12	40.5	25	47.6	55	0 -13	20	1.2	+0,5 -0,4	51.8	1.4	
-40	40		45.0	28	53.0	62		22			58.8		
-45	45		51.3	32	60.4	68		25			64.8		
-50	50		58.2	35	67.9	75		28			71.8		

PART NUMBERS 03-889-XX Chamfered 03-890-XX Grooved	Loads			Movement		
	Radial Cs	Axial Ca	Oscillating Load	Angle	No-Load Rotational Breakaway Torque	Weight
	kN			α	Nm	g
-12	40.5	1.5	16.2	11	0.12 to 0.80	17
-15	66.9	5.1	26.7	9	0.12 to 0.80	32
-17	87.4	7.1	34.9	10	0.12 to 0.80	49
-20	127.3	13.7	50.9	9	0.12 to 0.80	65
-25	216.7	28.6	86.7	7	0.25 to 1.00	115
-30	262.5	38.0	105.0	6	0.40 to 2.00	160
-35	348.1	49.0	139.0	7	0.40 to 2.00	229
-40	410.2	61.2	164.1	7	0.60 to 3.50	315
-45	545.5	81.9	218.2	7	0.60 to 3.50	460
-50	695.7	105.6	278.3	7	0.60 to 3.50	560

Example Bearing Configuration	Part number designations for a 12mm bore, wide series, spherical bearing
Chamfered outer ring	**03-889-12**
Grooved outer ring	**03-890-12**

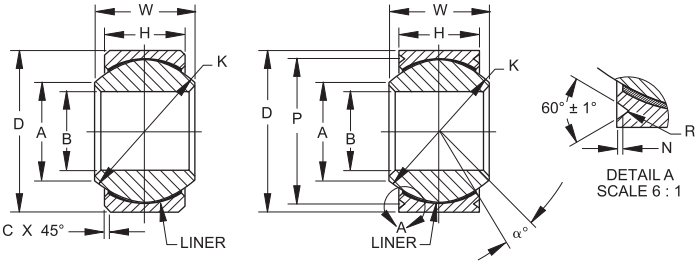
Cryogenic Rated Self-Lubricated Spherical Bearing

FibriloidCR™ Liner System, Normal Series, Metric

European Standards similar to EN2023

- All dimensions in millimeters
- Low temperature — low wear
  -320°F to +450°F (-195.6°C to +232.2°C)

Materials:
Outer Ring: Inconel 718, HRC 37 min.
Inner Ring: Inconel 718, HRC 37 min.
Liner: FibriloidCR™ meets requirements of AS81820 Type A. Does not meet requirements of ASTM D2512.



Chamfered
EN2023S

Grooved
EN2023R

PART NUMBERS		Ball					Outer Race			Chamfer		V-Groove		
03-891-XX Chamfered, Wide 03-892-XX Grooved, Wide 03-893-XX Chamfered, Narrow 03-894-XX Grooved, Narrow		ØB Bore		ØA	W Width	ØK	ØD 0. diam.		H Width	C		ØP	N	R
			Tot. (µm)					Tot. (µm)	+ 0.1 - 0.1	Tot. (mm)		+ 0.1 - 0.0	+ 0.0 - 0.2	+ 0.1 - 0.0
Wide Series	-06	6	+0 -8	7.7	11.0	13.5	16	+0 -8	8.5			14.2	0.7	0.2
	-08	8		10.3	11.0	15.0	18		8.0			16.2		
	-10	10		122	12.5	17.5	21	+0 -9	10.0	0.8	+0.0 -0.3	18.4	0.9	0.3
	-12	12		15.5	16.0	22.2	26		13.0			23.4		
	-15	15		18.9	17.0	25.4	29		13.5			26.4		
	-17	17		20.1	18.0	27.0	30		14.5			27.4		
	-20	20	+0 -10	23.5	20.0	30.9	35	+0 -11	16.0			31.8	1.4	
	-25	25		35.3	32.0	47.6	54	+0 -13	26.0	1.0	+0.0 -0.4	50.8		
	-30	30		40.9	34.0	53.2	60		28.0	1.2		56.8		
Narrow Series	-05	5	+0 -8	8.6	7.0	11.1	14	+0 -8	5.5	0.5	+0.1 -0.2	12.2	0.7	0.2
	-06	6		9.0	9.0	13.5	16		6.5			14.2		
	-10	10		11.9	10.5	15.9	21	+0 -9	8.0	0.8	+0.0 -0.3	18.4	0.9	0.3
	-12	12		15.0	13.0	19.8	25		10.0			22.4		
	-22	22	+0 -10	27.1	22.0	34.9	40	+0 -11	18.0	1.0	+0.0 -0.4	36.8	1.4	
	-25	25		29.6	25.0	38.8	45		20.0			41.8		
	-30	30		35.5	28.0	45.2	51	+0 -13	24.0			47.8		

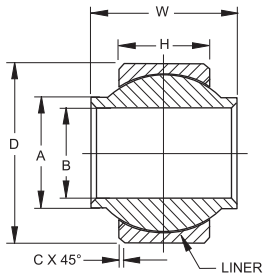
PART NUMBERS		Loads			Movement		
03-891-XX Chamfered, Wide 03-892-XX Grooved, Wide 03-893-XX Chamfered, Narrow 03-894-XX Grooved, Narrow		Radial Cs	Axial Ca	Osciating Load	Angle	No-Load Rotational Nreakaway Torque	Weight
		kN			α	Nm	g
Wide Series	-06	40	6.1	16.0	15	0.08 to 0.50	16
	-08	41	5.1	17.0	14	0.12 to 0.80	17
	-10	63	9.5	25.0	10	0.12 to 0.80	27
	-12	105	18.6	42.0	10	0.12 to 0.80	49
	-15	126	20.4	50.0	9	0.12 to 0.80	62
	-17	145	24.3	58.0	9	0.12 to 0.80	69
	-20	191	30.7	76.0	B	0.12 to 0.80	104
	-25	491	93.2	197.0	9	0.25 to 1.00	445
	-30	548	109.7	220.0	8	0.40 to 2.00	480
Narrow Series	-05	18	1.5	7.4	9	0.08 to 0.50	7
	-06	27	2.7	11.0	14	0.08 to 0.50	9
	-10	44	5.1	17.0	11	0.12 to 0.80	20
	-12	68	9.5	27.0	10	0.12 to 0.80	32
	-22	240	40.5	96.0	8	0.25 to 1.00	126
	-25	307	51.7	123.0	8	0.25 to 1.00	185
	-30	389	78.0	156.0	6	0.40 to 2.00	300

Cryogenic Rated Self-Lubricated Spherical Bearing

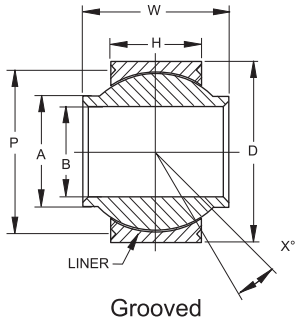
FibriloidCR™ Liner System, High Misalignment Series

- High Misalignment series, self-lubricated
- Low temperature — low wear
  -320°F to +450°F (-195.6°C to +232.2°C)

Materials:
Outer Ring: Inconel 718, HRC 37 min.
Inner Ring: Inconel 718, HRC 37 min.
Liner: FibriloidCR™ meets requirements of AS81820 Type A. Does not meet requirements of ASTM D2512.



Chamfered



Grooved

PART NUMBERS 03-888-XX Chamfered 03-887-XX Grooved	DIMENSIONS & TOLERANCES														
	B		D		H		W		A		C❶		P❷ Groove Pitch Diameter		X°
	+.0000 -.0005	+.000 -.013	+.0000 -.0005	+.000 -.013	±.005	±.13	+.000 -.002	+.00 -.05	Min.		+.010 -.000	+.25 -.00	+.000 -.008	+.00 -.20	Ref.
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	
-03	0.1900	4.826	0.5630	14.288	0.210	5.33	0.500	12.70	0.319	8.10	0.010	0.25	0.493	12.52	15
-04	0.2500	6.350	0.7400	18.796	0.255	6.48	0.593	15.06	0.390	9.91	0.010	0.25	0.670	17.02	24
-05	0.3130	7.938	0.6875	17.463	0.255	6.48	0.625	15.88	0.418	10.62	0.010	0.25	0.618	15.70	20
-06	0.3750	9.525	0.9060	23.012	0.345	8.76	0.813	20.65	0.512	13.00	0.020	0.51	0.836	21.23	23
-07	0.4375	11.113	1.0000	25.400	0.345	8.76	0.875	22.23	0.618	15.70	0.020	0.51	0.930	23.62	22
-08	0.5000	12.700	1.1250	28.575	0.401	10.19	0.937	23.80	0.730	18.54	0.020	0.51	1.055	26.80	20
-10	0.6250	15.875	1.3750	34.925	0.567	14.40	1.200	30.48	0.856	21.74	0.020	0.51	1.275	32.39	20
-12	0.7500	19.050	1.5625	39.688	0.620	15.75	1.280	32.51	0.970	24.64	0.030	0.76	1.438	36.53	18
-14	0.8750	22.225	1.7500	44.450	0.625	15.88	1.400	35.56	1.140	28.96	0.030	0.76	1.625	41.28	18
-16	1.0000	25.400	2.1250	53.975	0.835	21.21	1.875	47.62	1.278	32.46	0.030	0.76	2.000	50.80	21
-18	1.1250	28.575	2.3130	58.738	0.942	23.93	1.875	47.63	1.400	35.56	0.030	0.76	2.188	55.58	20
-20	1.2500	31.750	2.5000	63.500	1.005	25.53	1.875	47.63	1.523	38.68	0.030	0.76	2.375	60.33	21
-22	1.3750	34.925	2.7500	69.850	1.097	27.86	2.125	53.98	1.670	42.42	0.030	0.76	2.625	66.68	22
-24	1.5000	38.100	3.0000	76.200	1.175	29.85	2.250	57.15	1.800	45.72	0.030	0.76	2.875	73.03	21

❶ Chamfered Type only. ❷ Grooved Type only.

PART NUMBERS 03-888-XX Chamfered 03-887-XX Grooved	LOAD RATINGS							
	Oscillating Radial Load Rating ❸		Radial Limit Load Rating ❸		No-Load Rotational Breakaway Torque		Weight Approx. Ref.	
	lbf.	N	lbf.	N	in.-lbs.	N-m	lbs.	kg
-03	3700	16500	6400	28500	0.25-5	0.03-0.56	0.021	0.010
-04	5300	23600	10700	47600	0.25-5	0.03-0.56	0.032	0.015
-05	5300	23600	10700	47600	1-15	0.11-1.7	0.043	0.019
-06	9500	42300	19100	85000	1-15	0.11-1.7	0.075	0.034
-07	10800	48000	21700	96500	1-15	0.11-1.7	0.107	0.048
-08	14400	64100	28800	128100	1-15	0.11-1.7	0.171	0.077
-10	25100	111700	50600	225100	1-15	0.11-1.7	0.267	0.121
-12	30200	134300	60500	269100	1-15	0.11-1.7	0.341	0.155
-14	34300	152600	68600	305100	1-24	0.11-2.7	0.459	0.208
-16	55600	247300	111200	494600	1-24	0.11-2.7	0.885	0.402
-18	68900	306500	138100	614300	1-24	0.11-2.7	1.173	0.532
-20	80300	357200	160600	714400	1-24	0.11-2.7	1.408	0.639
-22	97500	433700	195300	868700	1-24	0.11-2.7	1.920	0.871
-24	111700	496900	223400	993700	1-24	0.11-2.7	2.368	1.074

❸ Load ratings based on AS81820 except limitations due to pin bending.

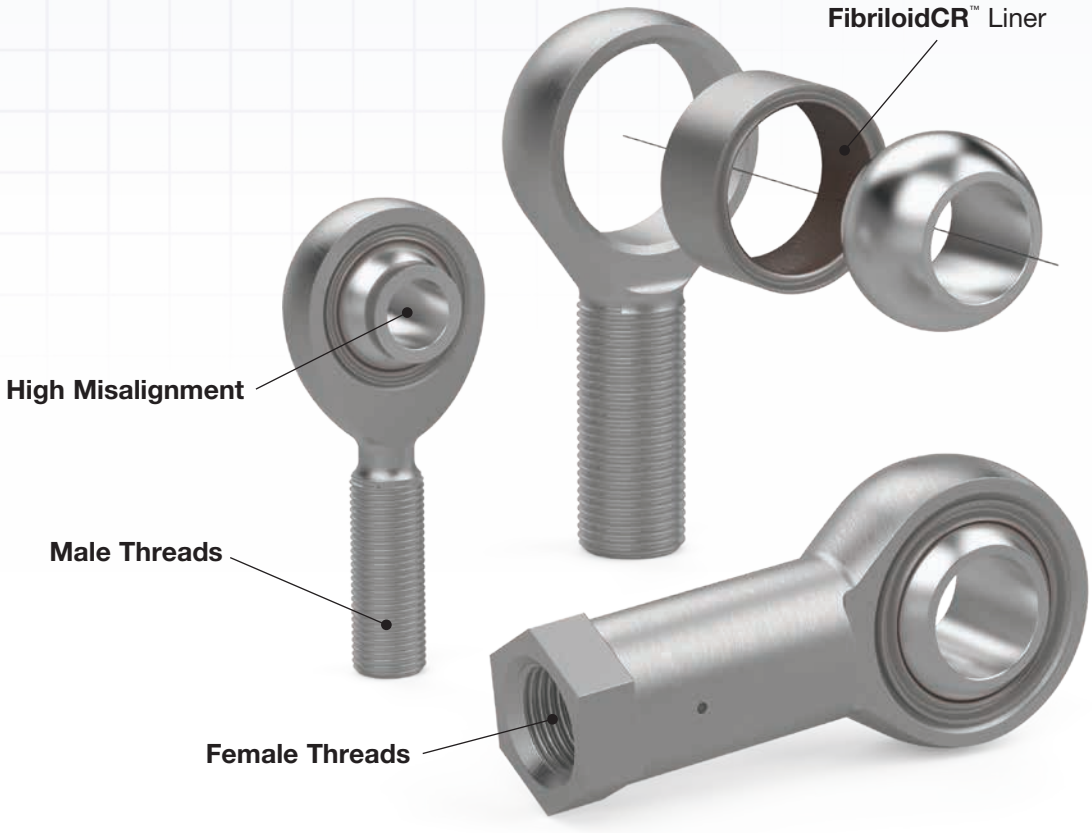
Cryogenic Rated Self-Lubricated Rod End Bearing

FibriloidCR™ Liner System

02-885 -03 K

- **02-885** → Base Models
- **-03** → Size
- **K** → Options (see datasheets)

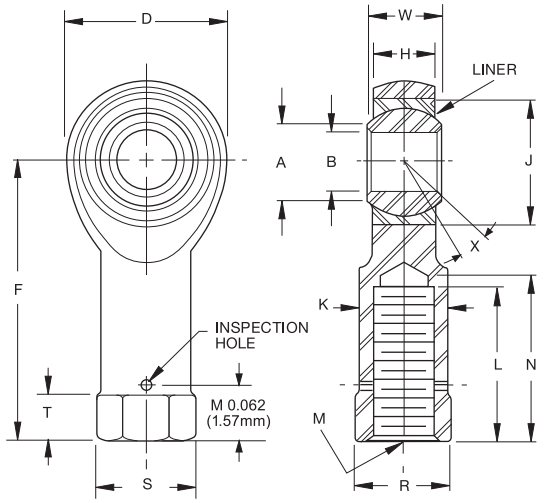
Base Models	Pg.
02-885 Narrow, Female	15
02-884 Wide, Female	16
01-885 Narrow, Male	17
01-884 Wide, Male	18
01-889 Wide EN Standard, Male	19
01-887 High Mislalignment, Male	20



Cryogenic Rated Self-Lubricated Rod End Bearing

FibriloidCR™ Liner System, Narrow Series, Female

- Female type, rod end
- Low temperature—low wear
  -320°F to +450°F (-195.6°C to +232.2°C)
- This rod end meets requirements of AS81935, except where noted.
- Threads conform to UNJF-3B per AS8879.
  For left hand thread replace "**02-**" designation with "**12-**" depending on part number ordered (see chart below).
- For rod end with keyway in end of shank add "**K**" (see chart below).
- For rod end with deep key slot on base add "**W**" (see chart below).



Materials:
Bearing Inner Ring: Inconel 718, HRC 37 min.
Bearing Outer Ring: Inconel 718, HRC 37 min.
Rod End Housing: Inconel 718, HRC 37 min.
Liner: FibriloidCR™ meets requirements of AS81820 Type A. Does not meet requirements of ASTM D2512.

DIMENSIONS & TOLERANCES

PART NUMBERS 02-885-XX	B		D		L		F		K		W		H		A		J		N		S		T			R		M	X°
	+.0000 -.0005	+.000 -.013	±.010	±.25	Min.		±.010	±.25	±.010	±.25	+.000 -.002	+.00 -.05	±.005	±.13	Min.		Max.		Max.		Ref.		+.010 -.062	+.25 -1.57	+.002 -.010	+.05 -.25		UNJF-3B PER AS8879	Min.
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm			
-03	0.1900	4.826	0.6800	17.27	0.625	15.88	1.210	30.73	0.329	8.36	0.281	7.14	0.228	5.79	0.293	7.44	0.5625	14.29	0.750	19.05	0.430	10.92	0.188	4.78	0.375	9.53		1/4-28	10
-04	0.2500	6.350	0.8270	21.01	0.625	15.88	1.338	33.99	0.329	8.36	0.343	8.71	0.260	6.60	0.364	9.25	0.6562	16.67	0.750	19.05	0.430	10.92	0.188	4.78	0.375	9.53		1/4-28	10
-05	0.3125	7.938	0.9840	24.99	0.750	19.05	1.566	39.78	0.413	10.49	0.375	9.53	0.291	7.39	0.419	10.64	0.7500	19.05	0.875	22.23	0.500	12.70	0.188	4.78	0.437	11.10		5/16-24	10
-06	0.3750	9.525	1.1310	28.73	1.000	25.40	1.908	48.46	0.501	12.73	0.406	10.31	0.322	8.18	0.475	12.07	0.8125	20.64	1.125	28.58	0.720	18.29	0.250	6.35	0.625	15.88		3/8-24	9
-07	0.4375	11.112	1.2940	32.87	1.125	28.58	2.125	53.98	0.584	14.83	0.437	11.10	0.353	8.97	0.530	13.46	0.9062	23.02	1.250	31.75	0.720	18.29	0.250	6.35	0.625	15.88		7/16-20	8
-08	0.5000	12.700	1.4590	37.06	1.250	31.75	2.356	59.84	0.672	17.07	0.500	12.70	0.400	10.16	0.600	15.24	1.0000	25.40	1.375	34.93	1.020	25.91	0.375	9.53	0.875	22.23		1/2-20	8
-10	0.6250	15.875	1.7630	44.78	1.375	34.93	2.707	68.76	0.845	21.46	0.625	15.88	0.510	12.95	0.739	18.77	1.1875	30.16	1.500	38.10	1.020	25.91	0.375	9.53	0.875	22.23		5/8-18	8
-12	0.7500	19.050	2.1400	54.36	1.625	41.28	3.193	81.10	1.017	.25.83	0.750	19.05	0.603	15.32	0.920	23.37	1.4375	36.51	1.750	44.45	1.300	33.02	0.500	12.70	1.125	28.58		3/4-16	8
-14	0.8750	22.225	2.3720	60.25	1.875	47.63	3.677	93.40	1.187	30.15	0.875	22.23	0.713	18.11	0.980	24.89	1.5625	39.69	2.062	52.37	1.375	34.93	0.500	12.70	1.250	31.75		7/8-14	8
-16	1.0000	25.400	2.6810	68.10	2.125	53.98	4.101	104.17	1.356	34.44	1.000	25.40	0.807	20.50	1.118	28.40	1.7500	44.45	2.312	58.72	1.590	40.39	0.500	12.70	1.375	34.93		1-12	9

DIMENSIONS & TOLERANCES

PART NUMBERS 02-885-XX	Ultimate Static Load		Fatigue Load		Axial Proof Load		Weight Approx. Ref.		No-Load Rotational Breakaway Torque Min.		No-Load Rotational Breakaway Torque Max.	
	lbf.	N	lbf.	N	lbf.	N	lbs.	kg	in.-lbs.	N-m	in.-lbs.	N-m
-03	3000	13320	1100	4884	150	666	0.047	0.021	0.5	0.06	6	0.68
-04	5500	24420	1300	5772	430	1909	0.055	0.025	0.5	0.06	6	0.68
-05	8900	39516	2000	8880	700	3108	0.093	0.042	1.0	0.11	15	1.70
-06	13400	59496	2645	11764	1100	4884	0.146	0.066	1.0	0.11	15	1.70
-07	18200	80808	4200	18648	1400	6216	0.206	0.093	1.0	0.11	15	1.70
-08	24600	109224	5700	25308	2040	9058	0.298	0.135	1.0	0.11	15	1.70
-10	39500	175380	9200	40848	2430	10789	0.538	0.244	1.0	0.11	15	1.70
-12	57200	253968	11500	51155	2940	13078	0.917	0.416	1.0	0.11	15	1.70
-14	77800	345432	18400	81696	3184	14164	1.350	0.613	1.0	0.11	24	2.71
-16	101000	448440	24000	106560	3563	15851	1.935	0.878	1.0	0.11	24	2.71

Notes:

Ultimate Static Load: No fracture of rod ending housing or bearing will occur when the ultimate static load is applied in the bearing along the shank center line.

Fatigue Load: The rod end housing will withstand 50,000 cycles of full tension to 10% tension loading at speeds up to 2800 cpm. Load is applied in line with the rod end shank putting the eye in tension.

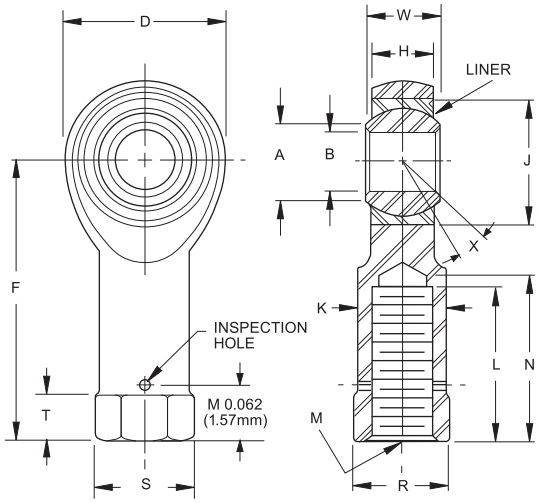
Axial Static Proof Load: Is the retention strength of the bearing within the eye of the rod end housing? No push out of the bearing cartridge will occur when the housing eye is supported and the axial proof load is applied to the face of insert bearing inner ring.

Example Bearing Configuration	Part Number designations for a 0.2500" bore, grooved spherical bearing
Base P/N (no options)	**02-885-04**
Keyway on threads	**02-885-04K**
Left hand thread	**12-885-04**
Deep key slot on base	**02-885-04W**

Cryogenic Rated Self-Lubricated Rod End Bearing

FibriloidCR™ Liner System, Wide Series, Female

- Female type, rod end
- Low temperature—low wear
  -320°F to +450°F (-195.6°C to +232.2°C)
- Threads conform to UNJF-3B per AS8879.
  For left hand thread replace "**02-**" designation with "**12-**" depending on part number ordered (see chart below).
- This rod end meets requirements of AS81935, except where noted.
- For rod end with keyway in end of shank add "**K**" (see chart below)
- For rod end with deep key slot on base add "**W**" (see chart below)



Materials:
Bearing Inner Ring: Inconel 718, HRC 37 min.
Bearing Outer Ring: Inconel 718, HRC 37 min.
Rod End Housing: Inconel 718, HRC 37 min.
Liner: FibriloidCR™ meets requirements of AS81820 Type A. Does not meet requirements of ASTM D2512.

DIMENSIONS & TOLERANCES

PART NUMBERS 02-884-XX	B		D		L		F		K		W		H		A		J		N		S		T		R		M	X°
	+.0000 -.0005	+.000 -.013	±.010	±.25	Min.		±.010	±.25	±.010	±.25	+.000 -.002	+.00 -.05	±.005	±.13	Min.		Max.		Max.		Ref.		+.010 -.062	+.25 -1.57	+.002 -.010	+.05 -.25	UNJF-3B PER AS8879	Min.
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		
-03	0.1900	4.826	0.806	20.47	0.750	19.05	1.375	34.92	0.422	10.72	0.437	11.10	0.337	8.56	0.30	7.60	0.625	15.875	0.875	22.22	0.500	12.70	0.188	4.78	0.437	11.10	5/16-24	15
-04	0.2500	6.350	0.806	20.47	0.750	19.05	1.469	37.31	0.422	10.72	0.437	11.10	0.337	8.56	0.30	7.60	0.625	15.875	0.875	22.22	0.500	12.70	0.188	4.78	0.437	11.10	5/16-24	15
-05	0.3125	7.938	0.900	22.86	0.875	22.22	1.625	41.28	0.485	12.32	0.437	11.10	0.327	8.31	0.36	9.10	0.688	17.462	1.000	25.40	0.580	14.73	0.250	6.35	0.500	12.70	3/8-24	14
-06	0.3750	9.525	1.025	26.04	1.000	25.40	1.812	46.02	0.547	13.89	0.500	12.70	0.416	10.57	0.47	11.90	0.813	20.638	1.125	28.58	0.660	16.76	0.250	6.35	0.562	14.27	3/18-24	8
-07	0.4375	11.112	1.150	29.21	1.125	28.58	2.000	50.80	0.610	15.49	0.562	14.27	0.452	11.48	0.54	13.70	0.906	23.017	1.250	31.75	0.720	18.29	0.250	6.35	0.625	15.88	7/16-20	10
-08	0.5000	12.700	1.337	33.96	1.250	31.75	2.250	57.15	0.735	18.67	0.625	15.88	0.515	13.08	0.61	15.50	1.0000	25.400	1.375	34.92	0.880	22.35	0.250	6.35	0.750	19.05	1/2-20	9
-10	0.6250	15.875	1.525	38.74	1.375	34.92	2.500	63.50	0.860	21.84	0.750	19.05	0.577	14.66	0.75	19.10	1.1875	30.162	1.500	38.10	1.020	25.91	0.375	9.52	0.875	22.22	5/8-18	12
-12	0.7500	19.050	1.775	45.09	1.625	41.28	2.875	73.03	0.985	25.02	0.875	22.23	0.640	16.26	0.85	21.60	1.3750	34.925	1.750	44.45	1.160	29.46	0.375	9.53	1.000	25.40	3/4-16	13
-14	0.8750	22.225	2.025	51.44	1.875	47.63	3.375	85.73	1.110	28.19	0.875	22.23	0.765	19.43	1.00	25.40	1.6250	41.275	2.062	52.37	1.300	33.02	.500	12.70	1.125	28.58	7/8-14	6
-16	1.0000	25.400	2.775	70.49	2.125	53.98	4.125	104.78	1.688	42.88	1.375	34.93	1.015	25.78	1.27	32.30	2.1250	53.975	2.312	58.72	2.020	51.31	.563	14.30	1.750	44.45	1 1/4-12	12

DIMENSIONS & TOLERANCES

PART NUMBERS 02-884-XX	Ultimate Static Load		Fatigue Load		Axial Proof Load		Weight Approx. Ref.		No-Load Rotational Breakaway Torque Min.		Max.	
	lbf.	N	lbf.	N	lbf.	N	lbs.	kg	in.-lbs.	N-m	in.-lbs.	N-m
-03	2360	10400	1470 ❶	6550 ❷	1000	4400	0.085	0.039	0.5	0.06	6	0.68
-04	4860	21600	2380	10600	1000	4400	0.090	0.041	0.5	0.06	6	0.68
-05	7180	32000	3020	13400	1100	4900	0.109	0.049	1.0	0.11	15	1.70
-06	8550	38000	3570	16000	1660	7350	0.172	0.078	1.0	0.11	15	1.70
-07	12000	53000	4800	21200	1850	8300	0.226	0.103	1.0	0.11	15	1.70
-08	19500	86500	8260	36500	2040	9000	0.347	0.157	1.0	0.11	15	1.70
-10	21900	98000	9180	40500	2430	10800	0.513	0.233	1.0	0.11	15	1.70
-12	29300	130000	11600	51500	1810	11500	0.718	0.326	1.0	0.11	15	1.70
-14	34500	151000	11100	58000	1320	14800	1.023	0.464	1.0	0.11	24	2.71
-16	80300	357000	30400	135000	4340	19300	2.898	1.315	1.0	0.11	24	2.71

❶ Based on bolt bending fatigue strength 180000 psi
❷ Based on bolt bending fatigue strength 127kg/mm²

Notes:

Ultimate Static Load: No fracture of rod ending housing or bearing will occur when the ultimate static load is applied in the bearing along the shank center line.

Fatigue Load: The rod end housing will withstand 50,000 cycles of full tension to 10% tension loading at speeds up to 2800 cpm. Load is applied in line with the rod end shank putting the eye in tension.

Axial Static Proof Load: Is the retention strength of the bearing within the eye of the rod end housing? No push out of the bearing cartridge will occur when the housing eye is supported and the axial proof load is applied to the face of insert bearing inner ring.

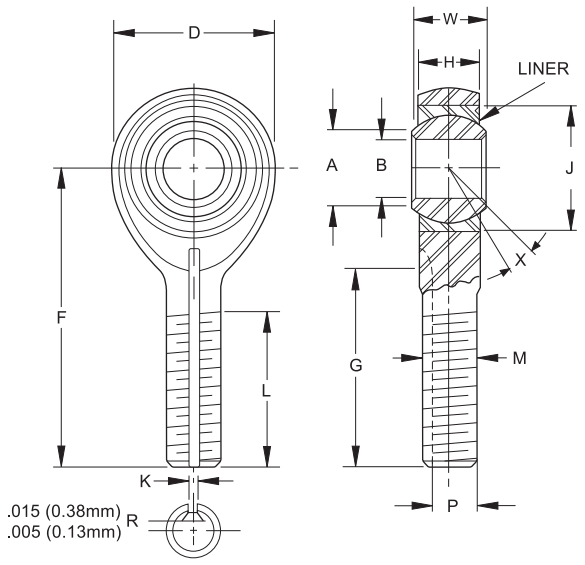
Example Bearing Configuration	Part Number designations for a 0.2500" bore, grooved spherical bearing
Base P/N (no options)	**02-884-04**
Keyway on threads	**02-884-04K**
Left hand thread	**12-884-04**
Deep key slot on base	**02-884-04W**

Cryogenic Rated Self-Lubricated Rod End Bearing

FibriloidCR™ Liner System, Narrow Series, Male

- Male type, rod end
- Low temperature—low wear
  -320°F to +450°F (-195.6°C to +232.2°C)
- Rolled threads conform to UNJF-3A per AS8879
- This rod end meets requirements of AS81935, except where noted.
- For rod ends with left hand thread replace "**01-**" designation with "**11-**" depending on part number ordered (see chart below).
- For rod ends with slotted shank or "keyway" add "**K**" per AS81935 (see chart below).

Materials:
Bearing Inner Ring: Inconel 718, HRC 37 min.
Bearing Outer Ring: Inconel 718, HRC 37 min.
Rod End Housing: Inconel 718, HRC 37 min., passivated
Liner: FibriloidCR™ meets requirements of AS81820 Type A. Does not meet requirements of ASTM D2512.



PART NUMBERS 01-885-XX	DIMENSIONS & TOLERANCES																							
	B		D		L		F		W		H		A		J		G		K[1]		P[1]		M	X°
	+.0000 -.0005	+.000 -.013	±.010	±.25	Min.		±.010	±.25	+.000 -.002	+.00 -.05	±.005	±.13	Min.		Max.		Keyway Flat		Ref.		+.010 -.062	+.25 -1.57	UNJF-3B PER AS8879	Min.
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		
-03	0.1900	4.826	0.680	17.27	0.775	19.69	1.315	33.40	0.281	7.14	0.228	5.79	0.293	7.44	0.563	14.288	0.896	22.76	0.062	1.57	0.207	5.26	1/4-28	10
-04	0.2500	6.350	0.827	21.01	0.775	19.69	1.443	36.65	0.343	8.71	0.260	6.60	0.364	9.25	0.656	16.667	0.896	22.76	0.062	1.57	0.207	5.26	1/4-28	10
-05	0.3125	7.938	0.984	24.99	1.187	30.15	1.948	49.48	0.375	9.53	0.291	7.39	0.419	10.64	0.750	19.050	1.308	33.22	0.062	1.57	0.268	6.81	5/16-24	10
-06	0.3750	9.525	1.131	28.73	1.187	30.15	2.030	51.56	0.406	10.31	0.322	8.18	0.475	12.07	0.813	20.638	1.308	33.22	0.093	2.36	0.319	8.10	3/8-24	9
-07	0.4375	11.112	1.294	32.87	1.281	32.54	2.250	57.15	0.437	11.10	0.353	8.97	0.530	13.46	0.906	23.017	1.402	35.61	0.093	2.36	0.383	9.73	7/16-20	8
-08	0.5000	12.700	1.459	37.06	1.468	37.29	2.544	64.62	0.500	12.70	0.400	10.16	0.600	15.24	1.000	25.400	1.589	40.36	0.093	2.36	0.445	11.30	1/2-20	8
-10	0.6250	15.875	1.763	44.78	1.562	39.67	2.832	71.93	0.625	15.88	0.510	12.95	0.739	18.77	1.188	30.162	1.683	42.75	0.125	3.18	0.541	13.74	5/8-18	8
-12	0.7500	19.050	2.140	54.36	1.687	42.85	3.193	81.10	0.750	19.05	0.603	15.32	0.920	23.37	1.438	36.513	1.808	45.92	0.125	3.18	0.663	16.84	3/4-16	8
-14	0.8750	22.225	2.372	60.25	2.000	50.80	3.677	93.40	0.875	22.23	0.713	18.11	0.980	24.89	1.563	39.688	2.121	53.87	0.156	3.96	0.777	19.74	7/8-14	8
-16	1.0000	25.400	2.681	68.10	2.100	53.34	3.968	101.30	1.000	25.40	0.807	20.50	1.118	28.40	1.750	44.450	2.221	56.41	0.156	3.96	0.900	22.86	1-12	9

PART NUMBERS 01-885-XX	DIMENSIONS & TOLERANCES											
	Ultimate Static Load		Fatigue Load		Axial Proof Load		Weight Approx. Ref.		No-Load Rotational Breakaway Torque			
									Min.		Max.	
	lbf.	N	lbf.	N	lbf.	N	lbs.	kg	in.-lbs.	N-m	in.-lbs.	N-m
-03	2600	13320	1100	4884	150	666	0.041	0.018	0.5	0.06	6	0.68
-04	5300	23532	1500	6660	430	1909	0.048	0.022	0.5	0.06	6	0.68
-05	8600	38184	1400	10656	700	3108	0.086	0.039	1.0	0.11	15	1.70
-06	11000	57720	1600	15984	1100	4884	0.128	0.058	1.0	0.11	15	1.70
-07	17800	79032	5000	21200	1400	6216	0.183	0.083	1.0	0.11	15	1.70
-08	24200	107448	6800	30192	2040	9058	0.271	0.123	1.0	0.11	15	1.70
-10	38500	170940	10800	47952	2430	10789	0.485	0.220	1.0	0.11	15	1.70
-12	56600	251304	16000	71040	2940	13054	0.826	0.374	1.0	0.11	15	1.70
-14	77400	341656	21900	97236	3190	14164	1.217	0.552	1.0	0.11	24	2.71
-16	101400	450216	28600	126984	3570	15851	1.756	0.796	1.0	0.11	24	2.71

Notes:

Ultimate Static Load: No fracture of rod ending housing or bearing will occur when the ultimate static load is applied in the bearing along the shank center line.

Fatigue Load: The rod end housing will withstand 50,000 cycles of full tension to 10% tension loading at speeds up to 2800 cpm. Load is applied in line with the rod end shank putting the eye in tension.

Axial Static Proof Load: Is the retention strength of the bearing within the eye of the rod end housing? No push out of the bearing cartridge will occur when the housing eye is supported and the axial proof load is applied to the face of insert bearing inner ring.

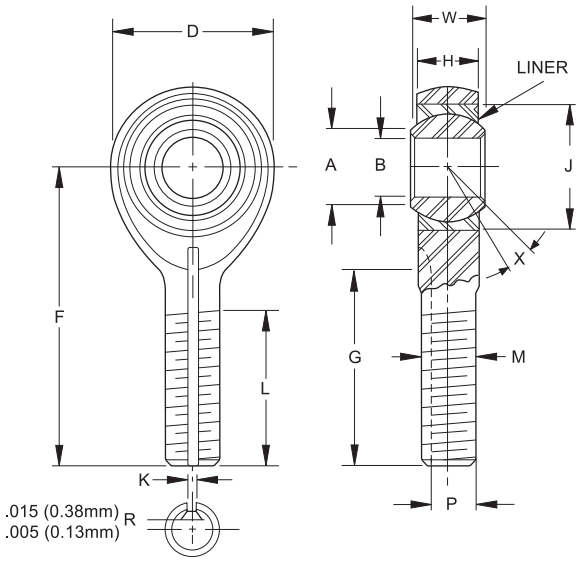
Example Bearing Configuration	Part Number designations for a 0.2500" bore, grooved spherical bearing
Base P/N (no options)	**01-885-04**
Keyway on threads	**01-885-04K**
Left hand thread	**11-885-04**

Cryogenic Rated Self-Lubricated Rod End Bearing

FibriloidCR™ Liner System, Wide Series, Male

- Male type, rod end
- Low temperature—low wear
  -320°F to +450°F (-195.6°C to +232.2°C)
- Rolled threads conform to UNJF-3A per AS8879
- This rod end meets requirements of AS81935, except where noted.
- For rod ends with left hand thread replace "**01-**" designation with "**11-**" depending on part number ordered (see chart below).
- For rod ends with slotted shank or "keyway" add "**K**" per AS81935 (see chart below).

Materials:
Bearing Inner Ring: Inconel 718, HRC 37 min.
Bearing Outer Ring: Inconel 718, HRC 37 min.
Rod End Housing: Inconel 718, HRC 37 min., passivated
Liner: FibriloidCR™ meets requirements of AS81820 Type A. Does not meet requirements of ASTM D2512.



PART NUMBERS 01-884-XX	DIMENSIONS & TOLERANCES																							
	B		D		L		F		W		H		A		J		G		K❶		P❶		M	X°
	+.0000 -.0005	+.000 -.013	±.010	±.25	±.031	±.79	±.010	±.25	+.000 -.002	+.00 -.05	±.005	±.13	Min.		Max.		+.000 -.020	+.00 -.51	+.005 -.000	+.00 -.13	+.000 -.005	+.00 -.13	UNJF-3B PER AS8879	Min.
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm								
-03	0.1900	4.826	0.806	20.47	0.968	24.59	1.562	39.67	0.437	11.10	0.337	8.56	0.30	7.60	0.625	15.875	0.980	24.89	0.062	1.57	0.268	6.81	5/16-24	15
-04	0.2500	6.350	0.806	20.47	0.968	24.59	1.562	39.67	0.437	11.10	0.337	8.56	0.30	7.60	0.625	15.875	0.980	24.89	0.062	1.57	0.268	6.81	5/16-24	15
-05	0.3125	7.938	0.900	22.86	1.187	30.15	1.875	47.62	0.437	11.10	0.337	8.56	0.36	9.10	0.688	17.462	1.270	32.26	0.062	1.57	0.268	6.81	5/16-24	14
-06	0.3750	9.525	1.025	26.04	1.187	30.15	1.938	49.23	0.500	12.70	0.416	10.57	0.47	11.90	0.813	20.638	1.235	31.37	0.093	2.36	0.319	8.10	3/8-24	8
-07	0.4375	11.112	1.150	29.21	1.281	32.54	2.125	53.98	0.562	14.27	0.452	11.48	0.54	13.70	0.906	23.017	1.402	35.61	0.093	2.36	0.383	9.73	7/16-20	10
-08	0.5000	12.700	1.337	33.96	1.468	37.29	2.438	61.93	0.625	15.88	0.515	13.08	0.61	15.50	1.000	25.400	1.589	40.36	0.093	2.36	0.445	11.30	1/2-20	9
-10	0.6250	15.875	1.525	38.74	1.562	39.67	2.625	66.68	0.750	19.05	0.577	14.66	0.75	19.10	1.188	30.162	1.683	42.75	0.125	3.18	0.541	13.74	5/8-18	12
-12	0.7500	19.050	1.775	45.08	1.687	42.85	2.875	73.02	0.875	22.22	0.640	16.26	0.85	21.60	1.375	34.925	1.808	45.92	0.125	3.18	0.663	16.84	3/4-16	13
-14	0.8750	22.225	2.025	51.44	2.000	50.80	3.375	85.72	0.875	22.22	0.765	19.43	1.06	27.00	1.625	41.275	2.121	53.87	0.156	3.96	0.777	19.74	7/8-14	6
-16	1.0000	25.400	2.775	70.48	2.343	59.51	4.125	104.78	1.375	34.92	1.015	25.78	1.27	32.30	2.125	53.975	2.464	62.59	0.187	4.75	1.136	28.85	1 1/4-12	12

❶ Keyway when specified, is compatible with locking devices, AS81935/3 for sizes 3 thru 8, and NAS559 for sizes 10 thru 16. Keyway tolerances not specified shall be in accordance with AS81935/3 or NAS513 as applicable.

PART NUMBERS 01-884-XX	DIMENSIONS & TOLERANCES											
	Ultimate Static Load		Fatigue Load		Axial Proof Load		Weight Approx. Ref.		No-Load Rotational Breakaway Torque Min.		Max.	
	lbf.	N	lbf.	N	lbf.	N	lbs.	kg	in.-lbs.	N-m	in.-lbs.	N-m
-03	2360	10400	1470❶	6550❷	1000	4400	0.077	0.035	0.5	0.06	6	0.68
-04	4860	21600	2380	10600	1000	4400	0.077	0.035	0.5	0.06	6	0.68
-05	7180	32000	2770	12200	1100	4900	0.093	0.042	1.0	0.11	15	1.70
-06	8550	38000	3570	16000	1660	7350	0.145	0.066	1.0	0.11	15	1.70
-07	12000	53000	4800	21200	1850	8300	0.195	0.089	1.0	0.11	15	1.70
-08	19500	86500	7680	34000	2040	9000	0.297	0.135	1.0	0.11	15	1.70
-10	21900	98000	9180	40500	2430	10800	0.452	0.205	1.0	0.11	15	1.70
-12	29300	129000	11600	52000	2810	12500	0.682	0.309	1.0	0.11	15	1.70
-14	34500	153000	13100	58500	3320	14600	1.027	0.466	1.0	0.11	24	2.71
-16	80300	355000	30400	134000	4340	19300	2.716	1.232	1.0	0.11	24	2.71

❶ Based on bolt bending fatigue strength 180000 psi
❷ Based on bolt bending fatigue strength 127kg/mm²

Notes:

Ultimate Static Load: No fracture of rod ending housing or bearing will occur when the ultimate static load is applied in the bearing along the shank center line.

Fatigue Load: The rod end housing will withstand 50,000 cycles of full tension to 10% tension loading at speeds up to 2800 cpm. Load is applied in line with the rod end shank putting the eye in tension.

Axial Static Proof Load: Is the retention strength of the bearing within the eye of the rod end housing? No push out of the bearing cartridge will occur when the housing eye is supported and the axial proof load is applied to the face of insert bearing inner ring.

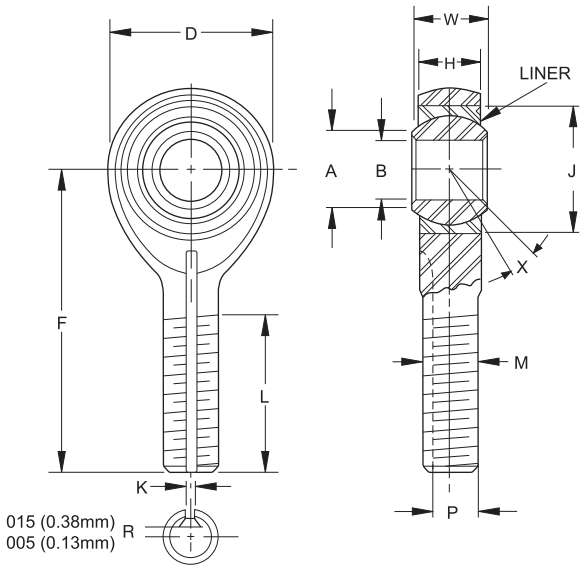
Example Bearing Configuration	Part number designations for a 0.2500 in. bore rod end
Base P/N (no options)	**01-884-04**
Keyway on threads	**01-884-04K**
Left hand thread	**11-884-04**

Cryogenic Rated Self-Lubricated Rod End Bearing

FibriloidCR™ Liner System, Wide, EN Standard

European Standard similar to EN2023

- Male type, rod end
- Low temperature—low wear
  -320°F to +450°F (-195.6°C to +232.2°C)
- Rolled threads conform to UNJF-3A per AS8879.
- This rod end meets requirements of AS81935, except where noted.
- For rod ends with left hand thread replace "**01-**" designation with "**11-**" depending on part number ordered (see chart below).
- For rod ends with slotted shank or "keyway" add "**K**" per AS81935 (see chart below).
- For rod ends with reduced starting torque add "**R**."



Materials:
Bearing Inner Ring: Inconel 718, HRC 37 min.
Bearing Outer Ring: Inconel 718, HRC 37 min.
Rod End Housing: Inconel 718, HRC 37 min., passivated
Liner: FibriloidCR™ meets requirements of AS81820 Type A. Does not meet requirements of ASTM D2512.

DIMENSIONS & TOLERANCES

PART NUMBERS 01-889-XX	B		D		L		F		W		H		A		J		K		P		M	X°
	+.0000 -.0005	+.000 -.013	±.010	±.25	±.031	±.79	±.010	±.25	+.000 -.002	+.00 -.05	±.005	±.13	Min.		Max.		+.005 -.000	+.13 -.00	+.000 -.005	+.00 -.13	UNJF-3B PER AS8879	Min.
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm						
-03	0.1900	4.826	0.806	20.47	0.968	24.59	1.562	39.67	0.437	11.10	0.337	8.56	0.300	7.62	0.625	15.875	0.062	1.575	0.260	6.604	0.3125-24	15
-04	0.2500	6.350	0.806	20.47	0.968	24.59	1.562	39.67	0.437	11.10	0.337	8.56	0.300	7.62	0.625	15.875	0.062	1.575	0.260	6.604	0.3125-24	15
-041	0.2500	6.350	0.806	20.47	1.787	45.39	2.442	62.03	0.437	11.10	0.337	8.56	0.300	7.62	0.625	15.875	0.062	1.575	0.260	6.604	0.3125-24	15
-05	0.3125	7.938	0.900	22.86	1.187	30.15	1.875	47.63	0.437	11.10	0.327	8.31	0.360	9.14	0.688	17.463	0.062	1.575	0.260	6.604	0.3125-24	14
-051	0.3125	7.938	0.900	22.86	1.457	37.01	2.270	57.66	0.437	11.10	0.327	8.31	0.360	9.14	0.688	17.463	0.062	1.575	0.260	6.604	0.3125-24	14
-06	0.3750	9.525	1.025	26.04	1.187	30.15	1.938	49.23	0.500	12.70	0.416	10.57	0.466	11.84	0.813	20.638	0.093	2.362	0.311	7.899	0.3750-24	8
-061	0.3750	9.525	1.025	26.04	1.654	42.01	2.422	61.52	0.500	12.70	0.416	10.57	0.466	11.84	0.813	20.638	0.093	2.362	0.311	7.899	0.3750-24	8
-07	0.4375	11.113	1.150	29.21	1.281	32.54	2.125	53.98	0.562	14.27	0.452	11.48	0.537	13.64	0.938	23.813	0.093	2.362	0.370	9.398	0.4375-20	10
-08	0.5000	12.700	1.337	33.96	1.468	37.29	2.438	61.93	0.625	15.88	0.515	13.08	0.607	15.42	1.000	25.400	0.093	2.362	0.436	11.074	0.5000-20	9
-081	0.5000	12.700	1.337	33.96	2.216	56.29	3.144	79.86	0.625	15.88	0.515	13.08	0.607	15.42	1.000	25.400	0.093	2.362	0.436	11.074	0.5000-20	9
-10	0.6250	15.875	1.525	38.74	1.562	39.67	2.625	66.68	0.750	19.05	0.577	14.66	0.747	18.97	1.188	30.163	0.125	3.175	0.541	13.741	0.6250-18	12
-101	0.6250	15.875	1.525	38.74	2.110	53.59	3.190	81.03	0.750	19.05	0.577	14.66	0.747	18.97	1.188	30.163	0.125	3.175	0.541	13.741	0.6250-18	12
-12	0.7500	19.050	1.775	45.09	1.687	42.85	2.875	73.03	0.875	22.23	0.640	16.26	0.845	21.46	1.375	34.925	0.125	3.175	0.663	16.840	0.7500-16	13
-14	0.8750	22.225	2.025	51.44	2.000	50.80	3.375	85.73	0.875	22.23	0.785	19.94	0.995	25.27	1.625	41.275	0.156	3.962	0.777	19.736	0.8750-14	6
-16	1.0000	25.400	2.775	70.49	2.343	59.51	4.125	104.78	1.375	34.93	1.015	25.78	1.269	32.23	2.125	53.975	0.187	4.750	1.136	28.854	1.2500-12	13

DIMENSIONS & TOLERANCES

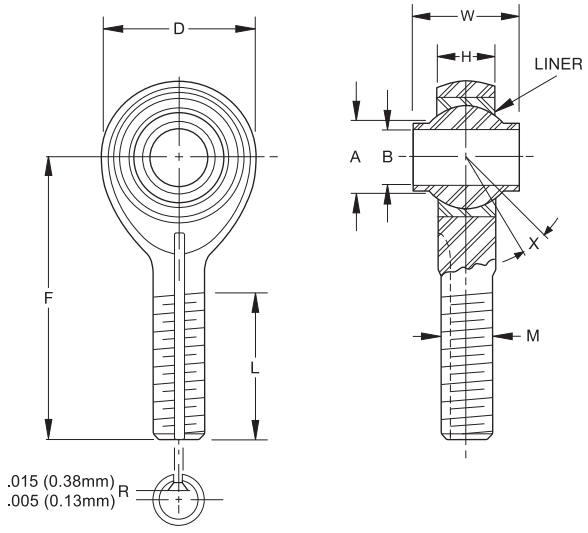
PART NUMBERS 01-889-XX	Radial Loads				Axial Proof Load		Fatigue Load		Starting Torque				Weight Approx. Ref.	
	Limit Load		Ultimate Load						Normal		Reduced			
	lbf.	kN	lbf.	kN	lbf.	kN	lbf.	kN	in.-lbs.	Nm	in.-lbs.	Nm	lbs.	kg
-03	4500	20.0	6700	30.0	1800	7.9	1100	4.7	0.5- 5.0	0.06- 0.56	0.0-1.0	0.0-0.11	0.07	0.033
-04	4500	20.0	6700	30.0	1800	7.9	1100	4.7	1.0- 5.0	0.11- 0.56	0.0-1.0	0.0-0.11	0.07	0.033
-041	4500	20.0	6700	30.0	1800	7.9	1100	4.7	1.0- 5.0	0.11- 0.56	0.0-1.0	0.0-0.11	0.09	0.041
-05	4500	20.0	6700	30.0	1600	7.3	1100	4.9	1.0- 5.0	0.11- 0.56	0.0-1.0	0.0-0.11	0.09	0.039
-051	4500	20.0	6700	30.0	1600	7.3	1100	4.9	1.0- 5.0	0.11- 0.56	0.0-1.0	0.0-0.11	0.09	0.043
-06	6500	29.1	9800	43.6	2600	11.7	1500	6.7	1.0- 5.0	0.11- 0.56	0.0-1.0	0.0-0.11	0.14	0.062
-061	6500	29.1	9800	43.6	2600	11.7	1500	6.7	1.0- 5.0	0.11- 0.56	0.0-1.0	0.0-0.11	0.15	0.068
-07	7100	31.4	10600	47.1	3200	14.4	1900	8.5	1.0- 5.0	0.11- 0.56	0.3-1.3	0.03-0.15	0.18	0.083
-08	12900	57.2	19300	85.8	3500	15.4	3100	13.7	1.0- 5.0	0.11- 0.56	0.3-1.3	0.03-0.15	0.28	0.126
-081	12900	57.2	19300	85.8	3500	15.4	3100	13.7	1.0- 5.0	0.11- 0.56	0.3-1.3	0.03-0.15	0.31	0.141
-10	15000	66.9	22600	100.4	4100	18.3	3500	15.5	1.0- 5.0	0.11- 0.56	0.3-1.3	0.03-0.15	0.42	0.192
-101	15000	66.9	22600	100.4	4100	18.3	3500	15.5	1.0- 5.0	0.11- 0.56	0.3-1.3	0.03-0.15	0.47	0.212
-12	19800	88.2	29700	132.2	5100	22.9	4600	20.4	1.0- 5.0	0.11- 0.56	0.3-1.3	0.03-0.15	0.64	0.290
-14	23100	102.8	34700	154.2	6100	27.1	5400	23.8	2.0- 8.0	0.23- 0.90	0.4-2.2	0.04-0.25	0.96	0.437
-16	51900	230.9	78400	348.9	8000	35.4	12000	53.3	2.0- 8.0	0.23- 0.90	0.4-2.2	0.04-0.25	2.54	1.150

Example Bearing Configuration	Part number designations for a 0.2500 in. bore rod end
Base P/N (no options)	**01-889-04**
Keyway on threads	**01-889-04K**
Left hand thread	**11-889-04**
Reduced starting torque	**01-889-04R**

Cryogenic Rated Self-Lubricated Rod End Bearing

FibriloidCR™ Liner System, High Misalignment Series

- High misalignment male type, rod end
- Low temperature—low wear
  -320°F to +450°F (-195.6°C to +232.2°C)
- Rolled threads conform to UNJF-3A per AS8879
- This rod end meets requirements of AS81935, except where noted.
- For rod ends with left hand thread replace "**01-**" designation with "**11-**" depending on part number ordered. Example: see below.
- For rod ends with slotted shank or "keyway" add "**K**" per AS81935. Example: see below.



Materials:
Bearing Inner Ring: Inconel 718, HRC 37 min.
Bearing Outer Ring: Inconel 718, HRC 37 min.
Rod End Housing: Inconel 718, HRC 37 min., passivated
Liner: FibriloidCR™ meets requirements of AS81820 Type A. Does not meet requirements of ASTM D2512.

PART NUMBERS 01-887-XX	DIMENSIONS & TOLERANCES															
	B		D		L		F		W		H		A		M	X°
	+.0000 -.0005	+.000 -.013	±.010	±.25	±.031	±.79	±.010	±.25	+.000 -.002	+.00 -.05	±.005	±.13	Min.		UNJF-3B PER AS8879	Min.
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		
-03	0.1900	4.826	0.781	19.84	1.000	25.40	1.562	39.67	0.560	14.22	0.337	8.56	0.301	7.65	5/16-24	16
-03A	0.1900	4.826	0.750	19.05	1.000	25.40	1.500	38.10	0.500	12.70	0.220	5.59	0.319	8.10	5/16-24	15
-04	0.2500	6.350	1.000	25.40	1.250	31.75	1.938	49.23	0.593	15.06	0.265	6.73	0.390	9.91	5/16-24	23
-05	0.3125	7.938	1.125	25.58	1.375	34.93	2.125	53.98	0.813	20.65	0.355	8.89	0.512	13.00	5/16-24	23
-05A	0.3125	7.938	0.875	22.23	1.062	26.97	1.875	47.63	0.625	15.88	0.265	6.73	0.418	10.62	5/16-24	16
-06	0.3750	9.525	1.125	28.58	1.375	34.93	2.125	53.98	0.813	20.65	0.355	8.89	0.512	13.00	3/8-24	23
-07	0.4375	11.112	1.312	33.32	1.500	38.10	2.437	61.90	0.875	22.23	0.355	8.89	0.618	15.70	7/16-20	22
-08	0.5000	12.700	1.500	38.10	1.625	41.28	2.625	66.68	0.937	23.80	0.411	10.44	0.730	18.54	1/2-20	20
-10	0.6250	15.875	1.750	44.45	1.750	44.45	2.875	73.03	1.200	30.48	0.577	14.66	0.856	21.74	5/8-18	20
-12	0.7500	19.050	2.000	50.80	1.875	47.63	3.375	85.73	1.280	32.51	0.630	16.00	0.970	24.64	3/4-16	18
-14	0.8750	22.225	2.200	55.88	2.000	50.80	3.750	95.25	1.400	35.56	0.635	16.13	1.140	28.96	7/8-14	18
-16	1.0000	25.400	2.725	69.85	2.125	53.98	4.125	104.78	1.875	47.63	0.845	21.46	1.278	32.46	11/4-12	21
-20	1.2500	31.750	3.125	79.38	2.875	73.03	5.000	127.00	1.875	47.63	1.015	25.78	1.523	38.68	11/4-12	21

PART NUMBERS 01-887-XX	DIMENSIONS & TOLERANCES							
	Static Radial Limit Load		Weight Approx. Ref.		No-Load Rotational Breakaway Torque			
					Min.		Max.	
	lbf.	N	lbs.	kg	in.-lbs.	N-m	in.-lbs.	N-m
-03	4060 ❶	18059	0.085	0.039	0.5	0.06	6	0.68
-03A	4060 ❶	18059	0.064	0.029	0.5	0.06	6	0.68
-04	7040 ❶	31314	0.117	0.053	1.0	0.11	15	1.70
-05	8260	36874	0.192	0.087	1.0	0.11	15	1.70
-05A	5300	23574	0.107	0.048	1.0	0.11	15	1.70
-06	8260	36740	0.181	0.082	1.0	0.11	15	1.70
-07	12420	55244	0.277	0.126	1.0	0.11	15	1.70
-08	17430	77529	0.427	0.194	1.0	0.11	15	1.70
-10	23620	105062	0.672	0.305	1.0	0.11	15	1.70
-12	30550	135886	0.928	0.421	1.0	0.11	24	2.71
-14	31970	142203	1.077	0.489	1.0	0.11	24	2.71
-16	59510	264700	2.464	1.118	1.0	0.11	24	2.71
-20	70060	313869	3.360	1.524	1.0	0.11	24	2.71

❶ Based on pin limitation. Notes: Available with lubricators, solid film lubricant and lubrication holes and groove in ball. Please see engineering section or contact RBC Aerospace Bearings.

Example Bearing Configuration	Part number designations for a 0.2500 in. bore rod end
Base P/N (no options)	**01-887-04**
Keyway on threads	**01-887-04K**
Left hand thread	**11-887-04**

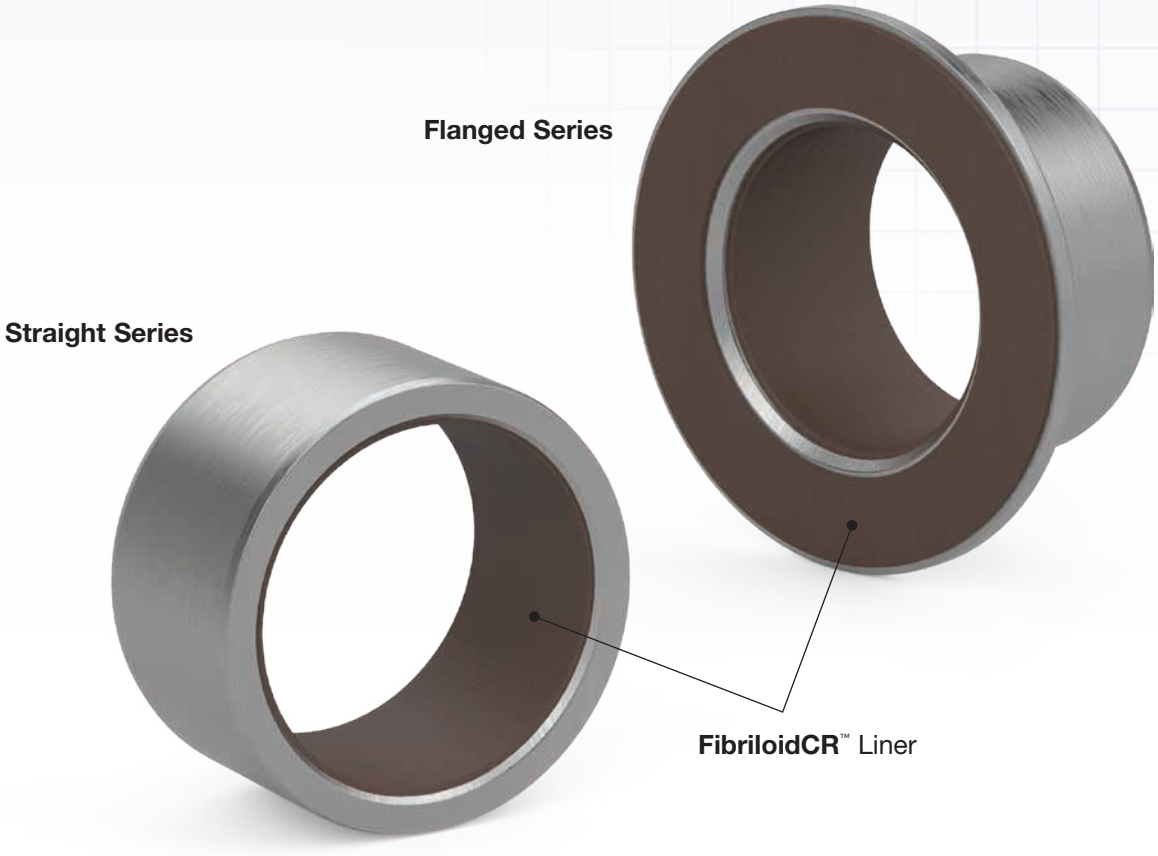
Cryogenic Rated Self-Lubricated Journal Bearing

FibriloidCR™ Liner System

06-880 -04 0 08 T

- **Options** (see datasheets)
- **Length Designator**
- **Bore Size**

Base Models	Pg.
06-880 Straight Series	22
07-880 Flanged Series	23
06-890 Metric, Straight Series	24
07-890 Metric, Flanged Series	25
06-891 Metric, Straight Series	26
07-891 Metric, Flanged Series	27



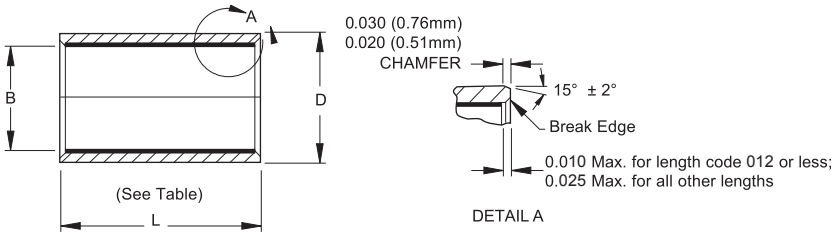
Cryogenic Rated Self-Lubricated Journal Bearing

FibriloidCR™ Liner System, Straight Series

- Journal type
- Low temperature — low wear
  -320°F to +450°F (-195.6°C to +232.2°C)

Materials:
Journal: Inconel 718, HRC 37 min.
Liner: FibriloidCR™ meets requirements of AS81934. Does not meet requirements of ASTM D2512.

Note: For best performance at cryogenic temperatures an Inconel 718 shaft with a less than 8 Ra surface finish should be used.



PART NUMBERS 06-880-XX	DIMENSIONS & TOLERANCES							
	Nominal Size		B		D		Weight	
	in.	mm	+.0000 -.0010 in.	+.000 -.025 mm	+.0000 -.0005 in.	+.000 -.013 mm	L= 1.000 in. lbs-in	L= 25.4mm kg-mm
-04	1/4	6.350	0.2515	6.388	0.3760	9.550	0.006	0.003
-05	5/16	7.938	0.3140	7.976	0.4386	11.140	0.009	0.004
-06	3/8	9.525	0.3765	9.563	0.5012	12.730	0.010	0.004
-07	7/16	11.112	0.4390	11.151	0.5638	14.321	0.011	0.005
-08	1/2	12.700	0.5015	12.738	0.6265	15.913	0.012	0.005
-09	9/16	14.288	0.5640	14.326	0.6892	17.506	0.014	0.006
-10	5/8	15.875	0.6265	15.913	0.8142	20.681	0.023	0.011
-11	11/16	17.462	0.6890	17.501	0.8767	22.268	0.025	0.011
-12	3/4	19.050	0.7515	19.088	0.9393	23.858	0.027	0.012
-14	7/8	22.225	0.8765	22.263	1.0645	27.038	0.031	0.014
-16	1	25.400	1.0015	25.438	1.1898	38.221	0.035	0.016
-18	1 1/8	28.575	1.1265	28.613	1.3148	33.396	0.039	0.018
-20	1 1/4	31.750	1.2515	31.788	1.4398	38.571	0.043	0.019
-22	1 3/8	34.925	1.3765	34.963	1.5648	39.746	0.047	0.021
-24	1 1/2	38.100	1.5015	38.138	1.7523	44.508	0.069	0.031
-26	1 5/8	41.275	1.6265	41.313	1.8773	47.683	0.075	0.034
-28	1 3/4	44.450	1.7515	44.488	2.0023	50.858	0.080	0.036
-32	2	50.800	2.0015	50.838	2.2523	57.208	0.091	0.041

Add length designation in 1/32 in. increments. (See below.)

Example Bearing Configuration	Part number designations for a 0.250 in. bore and 0.250 in. long journal bearing*
Base P/N (no options)	06-880-04-008
1st oversize O.D. (0.010 in.)	06-880-04-008T

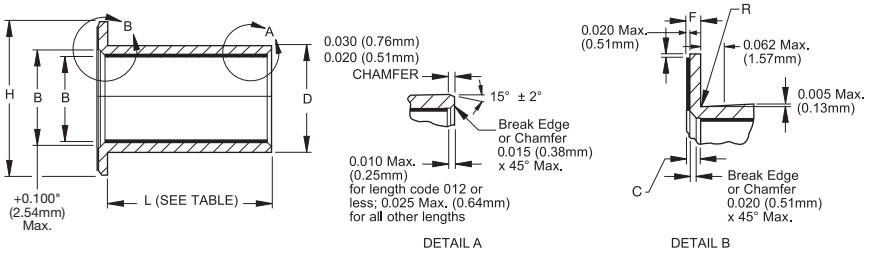
PART NUMBERS 06-880-XX	Length Designators Length: + 000, -0.010 in. / +00, -0.25mm																											
	1/4 6.35	9/32 7.14	5/16 7.94	11/32 8.73	3/8 9.52	7/16 11.11	1/2 12.70	9/16 14.29	5/8 15.88	11/16 17.46	3/4 19.05	7/8 22.22	1 25.40	1 1/8 28.58	1 1/4 31.75	1 3/8 34.92	1 1/2 38.10	1 5/8 41.28	1 3/4 44.45	1 7/8 47.62	2 50.80	2 1/8 53.98	2 1/4 57.15	2 3/8 60.32	2 1/2 63.50	2 3/4 69.85	3 76.20
-04	008	009	010	011	012	014																						
-05	008	009	010	011	012	014	016	018																				
-06	008	009	010	011	012	014	016	018	020	022																		
-07	008	009	010	011	012	014	016	018	020	022	024	028																
-08	008	009	010	011	012	014	016	018	020	022	024	028																
-09	008	009	010	011	012	014	016	018	020	022	024	028	032	036														
-10	008	009	010	011	012	014	016	018	020	022	024	028	032	036	040	044												
-11	008	009	010	011	012	014	016	018	020	022	024	028	032	036	040	044	048	052										
-12	008	009	010	011	012	014	016	018	020	022	024	028	032	036	040	044	048	052										
-14	008	009	010	011	012	014	016	018	020	022	024	028	032	036	040	044	048	052										
-16	008	009	010	011	012	014	016	018	020	022	024	028	032	036	040	044	048	052	056	060								
-18			010	011	012	014	016	018	020	022	024	028	032	036	040	044	048	052	056	060								
-20					012	014	016	018	020	022	024	028	032	036	040	044	048	052	056	060	064	068						
-22					012	014	016	018	020	022	024	028	032	036	040	044	048	052	056	060	064	068						
-24					012	014	016	018	020	022	024	028	032	036	040	044	048	052	056	060	064	068	072	076	080	088		
-26							016	018	020	022	024	028	032	036	040	044	048	052	056	060	064	068	072	076	080	088	096	
-28							016	018	020	022	024	028	032	036	040	044	048	052	056	060	064	068	072	076	080	088	096	
-32							016	018	020	022	024	028	032	036	040	044	048	052	056	060	064	068	072	076	080	088	096	

Cryogenic Rated Self-Lubricated Journal Bearing

FibriloidCR™ Liner System, Flanged Series

- Flanged journal type
- Low temperature — low wear
  -320°F to +450°F (-195.6°C to +232.2°C)

Materials:
Journal: Inconel 718, HRC 37 min.
Liner: FibriloidCR™ meets requirements of AS81934. Does not meet requirements of ASTM D2512.



PART NUMBERS 07-880-XX	DIMENSIONS & TOLERANCES													
	Nominal Size		B		D		F		H		Journal Weight*		Flange Weight*	
	in.	mm	+.0000 -.0010 in.	+.000 -.025 mm	+.0000 -.0005 in.	+.000 -.013 mm	+.000 -.005	+.00 -.13	+.000 -.020	+.000 -.051	L= 1.000 in. lbs-in	L= 25.4mm kg-mm	*Approx. Ref.	
-04	1/4	6.350	0.2515	6.388	0.3760	9.550	0.063	1.588	0.750	19.05	0.010	0.004	0.003	0.001
-05	5/16	7.938	0.3140	7.976	0.4386	11.140	0.063	1.588	0.812	20.62	0.012	0.005	0.003	0.001
-06	3/8	9.525	0.3765	9.563	0.5012	12.730	0.063	1.588	0.875	22.22	0.013	0.006	0.003	0.001
-07	7/16	11.112	0.4390	11.151	0.5638	14.321	0.063	1.588	0.937	23.80	0.014	0.006	0.003	0.001
-08	1/2	12.700	0.5015	12.738	0.6265	15.913	0.063	1.588	1.000	25.40	0.016	0.007	0.004	0.002
-09	9/16	14.288	0.5640	14.326	0.6892	17.506	0.063	1.588	1.125	28.58	0.018	0.008	0.004	0.002
-10	5/8	15.875	0.6265	15.913	0.8142	20.681	0.063	1.588	1.250	31.75	0.029	0.013	0.005	0.002
-11	11/16	17.462	0.6890	17.501	0.8767	22.268	0.063	1.588	1.375	34.92	0.032	0.015	0.007	0.003
-12	3/4	19.050	0.7515	19.088	0.9393	23.858	0.063	1.588	1.500	38.10	0.036	0.016	0.010	0.004
-14	7/8	22.225	0.8765	22.263	1.0645	27.038	0.063	1.588	1.625	41.28	0.041	0.018	0.010	0.004
-16	1	25.400	1.0015	25.438	1.1898	30.221	0.063	1.588	1.750	44.45	0.046	0.021	0.011	0.005
-18	1 1/8	28.575	1.1265	28.613	1.3148	33.396	0.094	2.380	1.875	47.62	0.054	0.025	0.015	0.007
-20	1 1/4	31.750	1.2515	31.788	1.4398	36.571	0.094	2.380	2.000	50.80	0.062	0.028	0.019	0.009
-22	1 3/8	34.925	1.3765	34.963	1.5648	39.746	0.094	2.380	2.125	53.98	0.067	0.030	0.020	0.009
-24	1 1/2	38.100	1.5015	38.138	1.7523	44.508	0.094	2.380	2.250	57.15	0.090	0.041	0.019	0.009
-26	1 5/8	41.275	1.6265	41.313	1.8773	47.683	0.094	2.380	2.375	60.32	0.096	0.044	0.021	0.010
-28	1 3/4	44.450	1.7515	44.488	2.0023	50.858	0.094	2.380	2.500	63.50	0.105	0.047	0.025	0.011
-32	2	50.800	2.0015	50.838	2.2523	57.208	0.094	2.380	2.750	69.85	0.118	0.054	0.028	0.013

Add length designation in 1/32 in. increments. (See below.)

PART NUMBERS 07-880-XX	Length Designators																												
	L Length: + 000, -0.010 in. / +00, -0.25mm																												
	1/4 6.35	9/32 7.14	5/16 7.94	11/32 8.73	3/8 9.52	7/16 11.11	1/2 12.70	9/16 14.29	5/8 15.88	11/16 17.46	3/4 19.05	7/8 22.22	1 25.40	1 1/8 28.58	1 1/4 31.75	1 3/8 34.92	1 1/2 38.10	1 5/8 41.28	1 3/4 44.45	1 7/8 47.62	2 50.80	2 1/8 53.98	2 1/4 57.15	2 3/8 60.32	2 1/2 63.50	2 3/4 69.85	3 76.20		
-04	008	009	010	011	012	014																							
-05	008	009	010	011	012	014	016	018																					
-06	008	009	010	011	012	014	016	018	020	022																			
-07	008	009	010	011	012	014	016	018	020	022	024	028																	
-08	008	009	010	011	012	014	016	018	020	022	024	028																	
-09	008	009	010	011	012	014	016	018	020	022	024	028	032	036															
-10	008	009	010	011	012	014	016	018	020	022	024	028	032	036	040	044													
-11	008	009	010	011	012	014	016	018	020	022	024	028	032	036	040	044	048	052											
-12	008	009	010	011	012	014	016	018	020	022	024	028	032	038	040	044	048	052											
-14	008	009	010	011	012	014	016	018	020	022	024	028	032	036	040	044	048	052											
-16	008	009	010	011	012	014	016	018	020	022	024	028	032	036	040	044	048	052	056	060									
-18			010	011	012	014	016	018	020	022	024	028	032	036	040	044	048	052	056	060									
-20					012	014	016	018	020	022	024	028	032	036	040	044	048	052	056	060	064	068							
-22					012	014	016	018	020	022	024	028	032	036	040	044	048	052	056	060	064	068							
-24					012	014	016	018	020	022	024	028	032	036	040	044	048	052	056	060	064	068	072	076	080	088			
-26							016	018	020	022	024	028	032	036	040	044	048	052	056	060	064	068	072	076	080	088	096		
-28							016	018	020	022	024	028	032	036	040	044	048	052	056	060	064	068	072	076	080	088	096		
-32							016	018	020	022	024	028	032	036	040	044	048	052	056	060	064	068	072	076	080	088	096		

Example Bearing Configuration	Part number designations for a 0.250 in. bore and 0.250 in. long journal bearing*
Base P/N (no options)	06-880-04-008
1st oversize O.D. (0.010 in.)	06-880-04-008T
2nd oversize O.D. (0.020 in.)	06-880-04-008U

Note: For best performance at cryogenic temperatures an Inconel 718 shaft with a less than 8 Ra surface finish should be used.

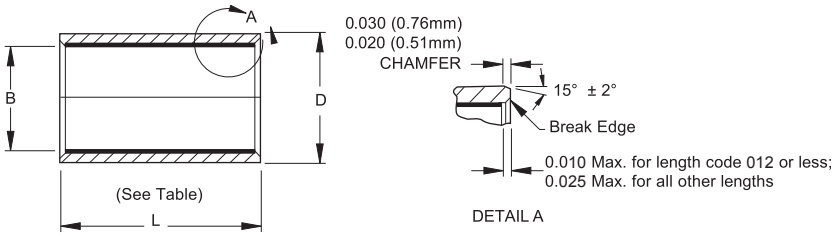
Cryogenic Rated Self-Lubricated Journal Bearing

FibriloidCR™ Liner System, Straight Series, Metric

European Standards similar to EN2285

- All dimensions in millimeters
- Journal Type
- Low temperature — low wear
  -320°F to +450°F (-195.6°C to +232.2°C)

Materials:
Journal: Inconel 718, HRC 37 min.
Liner: FibriloidCR™ meets requirements of AS81934. Does not meet requirements of ASTM D2512.



PART NUMBERS 06-890-XX	B Nom.	B Tolerance	D Nom.	D Tolerance p6	Length Designators 06	08	10	12	15	16	18	20	22	25	28	30	32	35	40	45	50
					L Length: -0.1 -0.4 Mass in kg/1000 pcs																
-06	6	+0.022 +0.004	10	+0.024 -0.015	0.9																
-08	8	+0.027 +0.005	12	+0.029 +0.018	1.1	1.4															
-10	10	+0.027 +0.005	14	+0.029 +0.018	1.3	1.7	2.1														
-12	12	+0.027 +0.005	16	+0.029 +0.018	1.5	2.0	2.5	3.0													
-15	15	+0.033 +0.006	19	+0.035 +0.022		2.4	3.0	3.6	4.6												
-16	16	+0.033 +0.006	20	+0.035 +0.022		2.6	3.2	3.8	4.8	5.1											
-18	18	+0.033 +0.006	22	+0.035 +0.022			3.6	4.3	5.5		6.6										
-20	20	+0.040 +0.007	25	+0.035 +0.022			5.0	6.0	7.5			10.0									
-22	22	+0.040 +0.007	26	+0.035 +0.022				5.1	6.4			8.5	9.4								
-25	25	+0.040 +0.007	30	+0.035 +0.022				7.4	9.2			12.5	13.5	15.3							
-28	28	+0.040 +0.007	34	+0.042 +0.026					12.4			16.6	18.2	20.7	23.2						
-30	30	+0.040 +0.007	36	+0.042 +0.026					13.3			17.7	19.5	22.1		26.5					
-32	32	+0.048 +0.009	38	+0.042 +0.026					14.0			18.7	20.5	23.5		28.0	29.9				
-35	35	+0.048 +0.009	42	+0.042 +0.026								24.0	26.5	30.1		36.0		42.2			
-40	40	+0.048 +0.009	48	+0.051 +0.032								31.0		39.0		46.9		54.9	62.8		
-45	45	+0.048 +0.009	52	+0.051 +0.032										38.0		45.6		53.1	60.7	68.2	
-50	50	+0.048 +0.009	58	+0.051 +0.032										48.7		58.2		67.7	77.3	86.8	96.4

Load Calculations

Static radial limit load = 0.206**B** x (**L**-2) kN
Permissible dynamic load = Static radial limit load / 1.2 kN
Where:
B = Bush bore
L = Bush length

Example Bearing Configuration	Part number designations for a 6.00mm bore and 8.00mm long journal bearing*
Base P/N (no options)	**06-890-06-008**
1st oversize O.D. (+0.250 mm)	**06-880-06-008T**

Note: For best performance at cryogenic temperatures an Inconel 718 shaft with a less than 8 Ra surface finish should be used.

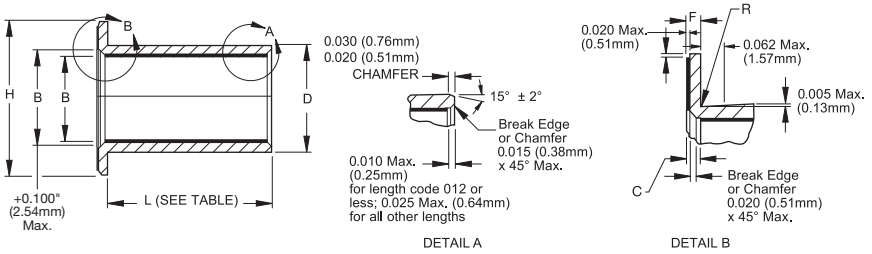
Cryogenic Rated Self-Lubricated Journal Bearing

FibriloidCR™ Liner System, Flanged Series, Metric

European Standards similar to EN2286

- All dimensions in millimeters
- Flanged Journal Type
- Low temperature — low wear
  -320°F to +450°F (-195.6°C to +232.2°C)

Materials:
Journal: Inconel 718, HRC 37 min.
Liner: FibriloidCR™ meets requirements of AS81934. Does not meet requirements of ASTM D2512.



PART NUMBERS 07-890-XX	B		D		H	F	R	C	Length Designators																	
	Nom.	Tolerance	Nom.	Tolerance p6	+0.00 -0.25	+0.00 -0.15		Max	06	08	10	12	15	16	18	20	22	25	28	30	32	35	40	45	50
									L Length: -0.1 -0.4																
									Mass in kg/1000 pcs																
-06	6	+0.022 +0.004	10	+0.024 -0.015	12	1.5	0.1 to 0.4	0.9	1.0																
-08	8	+0.027 +0.005	12	+0.029 +0.018	14	1.5	0.1 to 0.4	0.9	1.3	1.6															
-10	10	+0.027 +0.005	14	+0.029 +0.018	16	1.5	0.1 to 0.4	0.9	1.5	1.9	2.3														
-12	12	+0.033 +0.006	16	+0.029 +0.018	22	1.5	0.5 to 0.8	0.9	2.3	2.7	3.2	3.7													
-15	15	+0.033 +0.006	19	+0.035 +0.022	25	1.5	0.5 to 0.8	0.9		3.3	3.8	4.5	5.0												
-16	16	+0.033 +0.006	20	+0.035 +0.022	26	1.5	0.5 to 0.8	0.9		3.4	4.1	4.7	5.7	6.0											
-18	18	+0.033 +0.006	22	+0.035 +0.022	28	1.5	0.5 to 0.8	1.2			4.6	5.3	6.3		7.4										
-20	20	+0.040 +0.007	25	+0.035 +0.022	30	1.5	0.5 to 0.8	1.2			5.9	6.9	8.4			11.0									
-22	22	+0.040 +0.007	26	+0.035 +0.022	32	1.5	0.5 to 0.8	1.2				6.3	7.6			9.7	10.6								
-25	25	+0.040 +0.007	30	+0.035 +0.022	35	1.5	0.5 to 0.8	1.2				8.4	10.3			13.3	14.5	16.4							
-28	28	+0.040 +0.007	34	+0.042 +0.026	40	2.5	0.5 to 0.8	1.2					14.9			19.0	20.6	23.1	25.4						
-30	30	+0.040 +0.007	36	+0.042 +0.026	42	2.5	0.5 to 0.8	1.2					15.8			20.3	22.0	24.6		29.1					
-32	32	+0.048 +0.009	38	+0.042 +0.026	44	2.5	0.5 to 0.8	1.2					16.7			21.4	23.3	26.1		30.8	32.6				
-35	35	+0.048 +0.009	42	+0.042 +0.026	47	2.5	0.5 to 0.8	1.2								26.5	28.9	32.5		38.5		44.5			
-40	40	+0.048 +0.009	48	+0.051 +0.032	52	2.5	0.5 to 0.8	1.2								33.6		41.4		49.0		57.1	64.0		
-45	45	+0.048 +0.009	52	+0.051 +0.032	57	2.5	0.5 to 0.8	1.2										40.8		48.3		56.0	63.5	71.0	
-50	50	+0.048 +0.009	58	+0.051 +0.032	62	2.5	0.5 to 0.8	1.2										50.7		60.3		69.9	79.6	79.6	98.8

Load Calculations

Static radial limit load = 0.206**B** x (**L**- 1.2 - **R**max -**F**max) kN
Static axial limit load = 0.16[(**A**-1.5)2 - (**B**+2.5)2] kN
Permissible dynamic load = Static radial limit load / 1.2 kN

Where:
B = Bush bore diameter
L = Bush length
R = Corner radius
F = Flange width
A = Flange diameter

Example Bearing Configuration	Part number designations for a 6.00mm bore and 8.00mm long journal bearing*
Base P/N (no options)	**07-890-06-008**
1st oversize O.D. (0.250 mm)	**07-880-06-008T**
2nd oversize O.D. (0.500 mm)	**07-880-06-008U**

Note: For best performance at cryogenic temperatures an Inconel 718 shaft with a less than 8 Ra surface finish should be used.

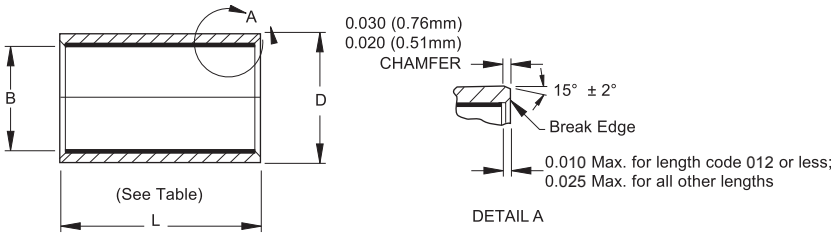
Cryogenic Rated Self-Lubricated Journal Bearing

FibriloidCR™ Liner System, Straight Series, Metric

European Standards similar to EN2287

- All dimensions in millimeters
- Journal Type
- Low temperature — low wear
  -320°F to +450°F (-195.6°C to +232.2°C)

Materials:
Journal: Inconel 718, HRC 37 min.
Liner: FibriloidCR™ meets requirements of AS81934. Does not meet requirements of ASTM D2512.



PART NUMBERS 06-891-XX	B Nom.	B Tolerance	D Nom.	D Tolerance p6	Length Designators 06	08	10	12	15	16	18	20	22	25	28	30	32	35	40	45	50
					L Length: -0.1 -0.4 Mass in kg/1000 pcs																
-06	6	+0.022 +0.004	10	+0.024 -0.015	2.4																
-08	8	+0.027 +0.005	12	+0.029 +0.018	3.0	4.0															
-10	10	+0.027 +0.005	14	+0.029 +0.018	3.5	4.7	5.9														
-12	12	+0.027 +0.005	16	+0.029 +0.018	4.1	5.5	6.9	8.3													
-15	15	+0.033 +0.006	19	+0.035 +0.022		6.7	8.4	10.1	12.6												
-16	16	+0.033 +0.006	20	+0.035 +0.022		7.1	8.9	10.7	13.4	14.3											
-18	18	+0.033 +0.006	22	+0.035 +0.022			9.9	11.8	14.8		17.8										
-20	20	+0.040 +0.007	25	+0.035 +0.022			13.9	16.7	20.9			27.8									
-22	22	+0.040 +0.007	26	+0.035 +0.022				14.2	17.8			23.7	26.1								
-25	25	+0.040 +0.007	30	+0.035 +0.022				20.4	25.5			34.0	37.4	42.5							
-28	28	+0.040 +0.007	34	+0.042 +0.026					34.5			46.0	50.6	57.5	64.4						
-30	30	+0.040 +0.007	36	+0.042 +0.026					36.7			49.0	53.8	61.2		73.4					
-32	32	+0.048 +0.009	38	+0.042 +0.026					39.0			51.9	57.1	64.9		77.9	83.1				
-35	35	+0.048 +0.009	42	+0.042 +0.026								66.6	73.5	83.6		100.3		117.0			
-40	40	+0.048 +0.009	48	+0.051 +0.032								87.0		108.8		130.0		152.2	174.0		
-45	45	+0.048 +0.009	52	+0.051 +0.032										105.0		126.0		147.0	168.0	189.0	
-50	50	+0.048 +0.009	58	+0.051 +0.032										133.5		160.0		186.9	214.0	240.3	267.0

Load Calculations

Static radial limit load = 0.43**B** x (**L**-2) kN
Permissible dynamic load = Static radial limit load / 2.5 kN
Where:
B = Bush bore
L = Bush length

Example Bearing Configuration	Part number designations for a 6.00mm bore and 8.00mm long journal bearing*
Base P/N (no options)	**06-891-06-008**
1st oversize O.D. (+0.250 mm)	**06-881-06-008T**

Note: For best performance at cryogenic temperatures an Inconel 718 shaft with a less than 8 Ra surface finish should be used.

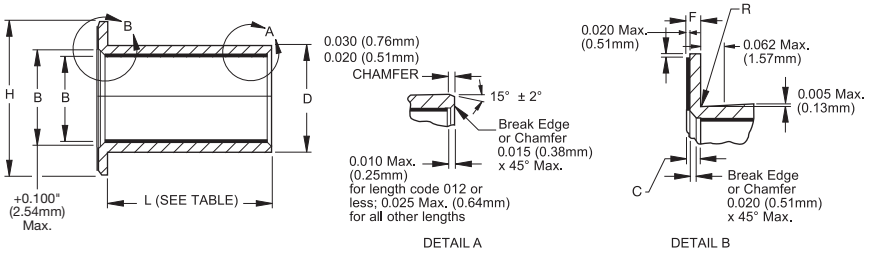
Cryogenic Rated Self-Lubricated Journal Bearing

FibriloidCR™ Liner System, Flanged Series, Metric

European Standards similar to EN2288

- All dimensions in millimeters
- Flanged Journal Type
- Low temperature — low wear
  -320°F to +450°F (-195.6°C to +232.2°C)

Materials:
Journal: Inconel 718, HRC 37 min.
Liner: FibriloidCR™ meets requirements of AS81934. Does not meet requirements of ASTM D2512.



PART NUMBERS 07-891-XX	B		D		H	F	R	C	Length Designators																	
	Nom.	Tolerance	Nom.	Tolerance p6	+0.00 -0.25	+0.00 -0.15		Max	06	08	10	12	15	16	18	20	22	25	28	30	32	35	40	45	50
									Length: -0.1 -0.4 Mass in kg/1000 pcs																
-06	6	+0.022 +0.004	10	+0.024 -0.015	12	1.5	0.1 to 0.4	0.9	2.8																
-08	8	+0.027 +0.005	12	+0.029 +0.018	14	1.5	0.1 to 0.4	0.9	3.5	4.4															
-10	10	+0.027 +0.005	14	+0.029 +0.018	16	1.5	0.1 to 0.4	0.9	4.1	5.3	6.5														
-12	12	+0.033 +0.006	16	+0.029 +0.018	22	1.5	0.5 to 0.8	0.9	6.3	7.6	9.0	10.4													
-15	15	+0.033 +0.006	19	+0.035 +0.022	25	1.5	0.5 to 0.8	0.9		9.2	10.8	12.5	15.6												
-16	16	+0.033 +0.006	20	+0.035 +0.022	26	1.5	0.5 to 0.8	0.9		9.7	11.5	13.2	15.9	16.8											
-18	18	+0.033 +0.006	22	+0.035 +0.022	28	1.5	0.5 to 0.8	1.2			12.7	14.7	17.6		20.8										
-20	20	+0.040 +0.007	25	+0.035 +0.022	30	1.5	0.5 to 0.8	1.2			16.5	19.2	23.4			30.4									
-22	22	+0.040 +0.007	26	+0.035 +0.022	32	1.5	0.5 to 0.8	1.2				17.5	21.0			27.0	29.3								
-25	25	+0.040 +0.007	30	+0.035 +0.022	35	1.5	0.5 to 0.8	1.2				23.4	28.5			37.0	40.4	45.5							
-28	28	+0.040 +0.007	34	+0.042 +0.026	40	2.5	0.5 to 0.8	1.2					41.4			52.8	57.4	64.3	71.2						
-30	30	+0.040 +0.007	36	+0.042 +0.026	42	2.5	0.5 to 0.8	1.2					43.9			56.2	61.1	68.4		80.7					
-32	32	+0.048 +0.009	38	+0.042 +0.026	44	2.5	0.5 to 0.8	1.2					46.5			59.5	61.7	72.5		85.5	90.7				
-35	35	+0.048 +0.009	42	+0.042 +0.026	47	2.5	0.5 to 0.8	1.2								73.5	80.2	90.2		106.8		123.5			
-40	40	+0.048 +0.009	48	+0.051 +0.032	52	2.5	0.5 to 0.8	1.2								93.2		115.0		136.0		158.5	180.0		
-45	45	+0.048 +0.009	52	+0.051 +0.032	57	2.5	0.5 to 0.8	1.2										113.3		138.3		155.3	176.3	197.3	
-50	50	+0.048 +0.009	58	+0.051 +0.032	62	2.5	0.5 to 0.8	1.2										140.9		167.6		194.3	221	247.4	274.4

Load Calculations

Static radial limit load = 0.206**B** x (**L**- 1.2 - **R**max -**F**max) kN
Static axial limit load = 0.16[(**A**-1.5)2 - (**B**+2.5)2] kN
Permissible dynamic load = Static radial limit load / 1.2 kN

Where:
B = Bush bore diameter
L = Bush length
R = Corner radius
F = Flange width
A = Flange diameter

Example Bearing Configuration	Part number designations for a 6.00mm bore and 8.00mm long journal bearing*
Base P/N (no options)	**07-891-06-008**
1st oversize O.D. (0.250 mm)	**07-881-06-008T**
2nd oversize O.D. (0.500 mm)	**07-881-06-008U**

Note: For best performance at cryogenic temperatures an Inconel 718 shaft with a less than 8 Ra surface finish should be used.

Appendix

FibriloidCR™ Liner System: Bearings for the New Space Mission

Testing for Space

Typical plain bearing and rod end qualification testing is performed every two years and overseen by NAVAIR (Naval Air Systems Command) and ACBG (Airframe Control Bearings Group). This testing defines strict performance criteria with regard to oscillatory wear at multiple temperatures, torque, adhesive performance, fatigue, and static loading. **Table 1** describes a typical AS81820 & AS81935 retention of the qualification test matrix.

However, despite the rigor of this testing, the space mission requires yet another layer of examination.

Table 2 outlines a typical test matrix for bearings and rod ends dedicated to space applications. As illustrated by this table, space requirements include most of the standard qualifications, the difference being a reduction in contamination concerns and an increased focus on tribology, fatigue, and static loading properties under cryogenic conditions (T ≤ -300°F).

In order to collect data under cryogenic conditions, many special adaptations were required:

Test Frame Upgrades:

- Structural reinforcement to accommodate higher loads and larger bearings
- In-line torque sensors to capture real-time torque/friction data
- LVDT (radial play) sensors actuated remotely by ceramic indices
- Precision-directed, forced air warming circuit to protect steel frames from cryogenic embrittlement
- Custom-built urethane foam and fiberglass/ epoxy environmental chambers

Data Collection Upgrades:

- System deflection versus temperature calibration curves established per test frame for enhanced data filtration
- PID-controlled, negative-feedback liquid nitrogen delivery system custom-built
- Sensors, LN2 delivery system, and control system integrated into a single LabVIEW administrator program

Test Tooling

- Over 80 pieces of custom tooling fabricated from superalloys, high-strength steels, aerospace-grade aluminum, and engineering ceramics

Specification	Test Type	Sub-Category	Parts
AS81820 D	Radial Static Limit & Utimate Load	Ambient	3
	Axial Static Limit & Utimate Load		3
	Oscillation Under Radial Load	Ambient	3
		Contaminant	3
		325° F	3
	No-Load Rotational Breakaway Torque	Ambient	3
	Liner Condition	Bond Integrity	6
		Peel Strength	
	Conformity	n/a	1
AS81935 C	Radial Ultimate Static Load	Ambient	3
	Axial Static Proof Load	Ambient	3
	Fatigue Load	Ambient	3

Table 1. Typical aerospace bearing & rod end "Retention of Qualification" test matrix

Specification	Test Type	Sub-Category	Parts
Patterned after AS81820 D	Radial Static Limit & Ultimate Load	Cryo	6
		Ambient	6
		325° F	6
	Axial Static Limit Load	Cryo	6
		Ambient	6
	Oscillation Under Radial Load	Cryo	6
		Ambient	6
		325° F	6
	No-Load Rotational Breakaway Torque	Cryo	6
		Ambient	6
	Liner Conditioned	Bond Integrity	12
		Peel Strength	
	Loaded Rotational Breakaway Torque	Cryo	12
	Conformity	n/a	2
Patterned after AS81935 C	Radial Static Limit & Ultimate Load	Cryo	6
		Ambient	6
	Axial Static Proof Load	Ambient	6
	Fatigue Load	Cryo	6
		Ambient	6
	Loaded Rotational Breakaway Torque	Cryo	6

Table 2. Test matrix for space applications

Conclusion

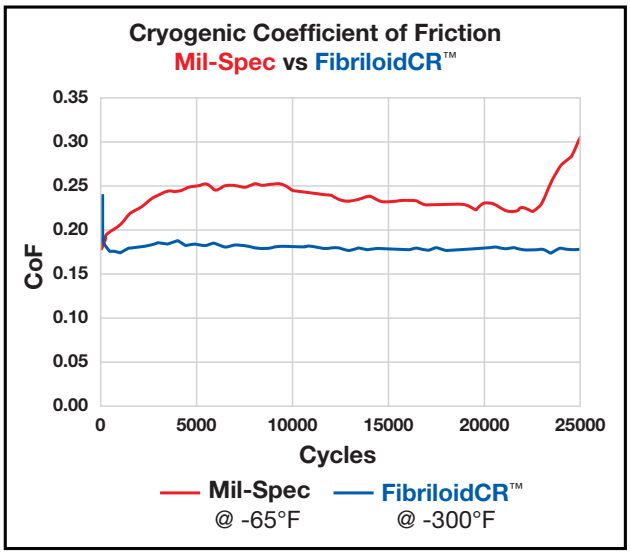
In general, standard testing takes between 12-16 weeks depending on the quantity of bearings requiring recertification. However, comprehensive testing for space applications spanned an entire year.

The final product, known as **FibriloidCR**™, combines cutting edge nano-composites technology, superalloys, and some specialized processing into the first high performance bearing dedicated solely to the space industry. When tested against the Mil-Spec standard bearing under high loads and cryogenic temperatures, the test results confirmed that conventional bearing materials do not suffice in this demanding new environment. **Figure 1** illustrates the contrasting performance of the Mil-Spec and **FibriloidCR**™ bearings when subjected to bearing stress of 40 ksi. The Mil-Spec is tested at a temperature of -65F, while the **FibriloidCR**™ is tested at a temperature of -300F.

In **Figure 1 (Top)**, the Mil-Spec bearing demonstrates an inconsistent coefficient of friction caused by abrasive wear continually altering the surface finish of the mating couple. This is further evidenced by the shape of the wear curve in **Figure 1 (Bottom)**. In this graph, the Mil-Spec bearing remains in the abrasive wear regime (positive slope), never entering the optimal adhesive wear regime and achieving a steady state (horizontal slope). However, under the same test conditions, **FibriloidCR**™ exhibited a uniform coefficient of friction and achieved adhesive wear (steady state) in about 15,000 cycles.

A post-test examination of the Mil-Spec samples showed both accelerated wear of the composite liner and severe damage to the counterface; as the counterface becomes damaged by abrasive wear, the resultant increase in surface finish synergistically increases the wear rate on the composite. This results in reduced bearing life and increased coefficient of friction (recorded as torque). In contrast, the **FibriloidCR**™ bearing (composite) retained more than 25% of its usable life and the metallic counterface remained pristine.

FibriloidCR™ bearings and rod ends meet AS81820 & AS81935 requirements, operate with high tribological performance under cryogenic conditions, and excel at both high load + low frequency vibration & low load + high-frequency vibration.



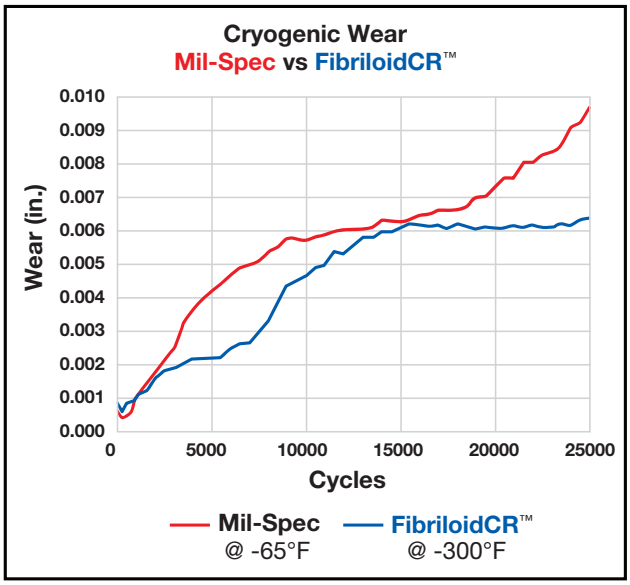


Figure 1. Test data from cryogenic oscillation under radial load, 40 ksi bearing stress, 20 cycles per minute, ± 25° angle of oscillation (Top) Coefficient of friction data; (Bottom) Wear data

Appendix
Bearing Installation

Proper installation of plain bearings will help to assure that maximum life will be obtained. Improper assembly may damage liners, cause excessive loading—or in other ways—decrease the useful life of the bearing.

HOUSING FIT:

Spherical Bearings (Metal-to-Metal)

Housing fit for a metal-to-metal spherical bearing is recommended to be from 0.0000 to 0.0010 in. (0.025mm) loose. Press fitting these bearings into the housing may remove the initial radial clearance causing the bearings to lock up. Thermal expansions of materials must also be considered.

Spherical Bearings (Self-lubricated)

Housing fit for a self-lubricating spherical bearing is recommended to be from 0.0002 in. tight to 0.0008 in. loose or 0.005mm tight to 0.020mm loose for a metric bearing. For example, a bearing with an outside diameter of 1.0000 in. to 0.9995 in. should be inserted into a housing with an inside diameter of 0.9998 in. to 1.0003 in. A bearing with an outside diameter of 25.000mm to 24.987mm should be inserted into a housing with an inside diameter of 24.995mm to 25.020mm. Where tighter than recommended fits are used, the bearing will become radially pre-loaded. This will result in increased bearing starting torque. The recommended fit is applicable for bearings with outside diameters up to 2.500 in. (63.5mm). For larger bearings or for special materials or applications consult the appropriate RBC Aerospace Bearings sales engineer.

An increase in pre-load torque is beneficial in high frequency vibration conditions and solid particle-contaminated environments. Pre-load torque is not additive to the frictional torque due to an applied load.

Journal Bearings

The housing fit for journal bearings should be 0.0005 in. (0.013 mm) tight to 0.0020 in. (0.050 mm) tight for bearings up to 4.0 in. or (100mm) in diameter. Care must be taken in selecting housing and shaft diameters to ensure that there is not an interference fit between the bearing bore and the shaft.

The following formulas may be used to determine the reduction in bore diameter due to a tight housing fit:

$$y_a = \frac{2\Delta\left(\frac{a}{b}\right)}{\left[\left(\frac{b}{a}\right)^2+1\right]+k_2\left[\left(\frac{b}{a}\right)^2-1\right]}$$

Case 1. Different housing and bearing materials

$$y_a = \Delta\left(\frac{a}{b}\right)$$

Case 2. Same housing and shaft material

Where:

a = bearing bore
b = housing bore
d_1 = Poission's ratio for bearing material
d_2 = Poission's ratio for housing material
y_a = amount of reduction in bore size
Δ = amount of interference fit
E_1 = modulus of elasticity of bearing material
E_2 = modulus of elasticity of housing material

$$K_2 = \text{constant} = \frac{E_1}{E_2}(1 + d_2) - d_1$$

In both of the above cases a massive housing is assumed.

Dissimilar materials must be considered when operating **at low or high temperatures** or when a large bearing is being used. When the materials for the housing and bearing backing or the shaft and the inner ring are not the same, loss of fit in the housing and contraction of the bearing bore must be considered. Calculations of loss of fit and bearing bore contraction are necessary to prevent the bearings from turning in the housing and also to prevent a tight fit between the bearing and the shaft.

To determine how much a housing bore or a bearing diameter changes in size as a result of temperature change, use the following formula:

$$\delta = \alpha \times \Delta \times \Delta T$$

Where:

δ = change in diameter
α = coefficient of thermal expansion
Δ = housing or bearing diameter
ΔT = temperature change

Contraction of the bearing may be calculated using the formulas shown above in the housing fits for journal bearings section.

SHAFT FIT:

Spherical Bearings (Metal-to-Metal)

Shaft fit for metal-to-metal spherical bearings is not to be less than 0.0005 in. (0.013mm) loose at operating temperature.

Spherical Bearings (Self-lubricated)

Shaft fit for self-lubricating spherical bearings with unlined bores is recommended to be 0.0001 in. to 0.0010 in. loose (0.003mm to 0.025mm loose) in standard applications. For example, a bearing with a bore diameter of 0.7495 in. to 0.7500 in. should be assembled onto a shaft with an outside diameter of 0.7494 in. to 0.7490 in. Similarly, a bearing with a bore diameter of 20.003mm to 19.991mm should be assembled onto a shaft with an outside diameter of 19.978mm to 19.988mm. This is applicable for bearings, which have unlined bores and with bore diameters up to 1.500 in. (38mm). If the bore of the bearing inner ring is lined a shaft fit of 0.0000 in. to 0.0015 in. loose (0.000mm to 0.038mm loose for metric bearings) is recommended. For special applications or for bearings with bores larger than 1.500 in. (38mm) consult RBC Engineering.

Journal Bearings

Shaft fits for journal bearings, where slow oscillating or low rotational speeds are coupled with high loads, are recommended to be from 0.0005 in. (0.013 mm) loose to 0.0030 in. (0.76 mm) loose. Contraction of the bearing bore caused by a heavy press fit in the housing or by thermal contraction must be considered. See housing on the previous page.

INSTALLATION:

A hammer or other mechanism that induces a shock load on the bearing should never be used. The corner of the housing bore should have a radius or chamfer that has a smooth transition to the housing bore. The bearing should be aligned to the bore, and a constant steady force should be applied to seat the bearing. A tool which pilots on the bearing bore and applies load to the outer ring face is recommended. See **Figures 11** and **12**.

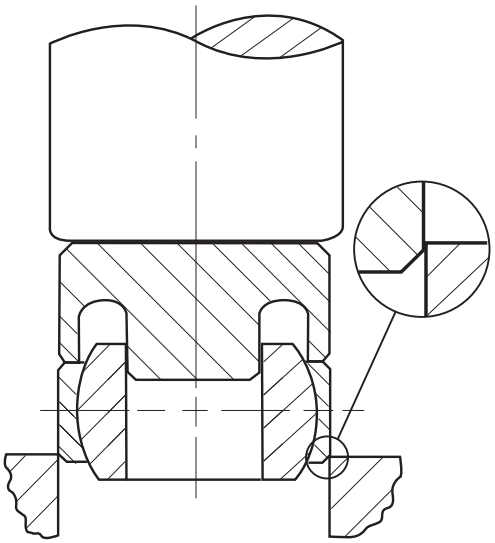


FIGURE 11: Spherical bearing assembly tool

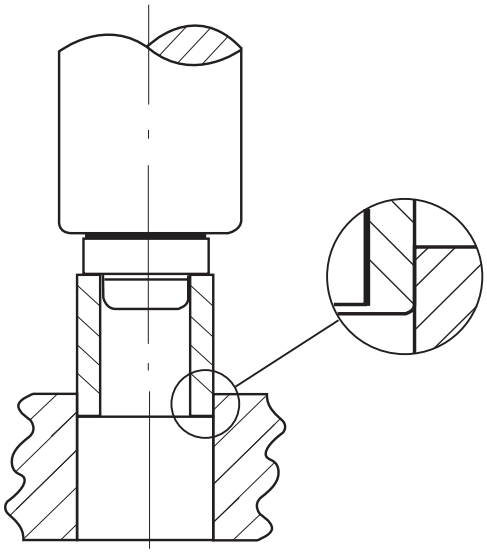


FIGURE 12: Journal bearing assembly tool

Bearing installations per the specification NAS 0331 are recommended.

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RBC Bearings® has been producing bearings in the USA since 1919. In addition to unique custom bearings, RBC Bearings® offers a full line of standard industrial and aerospace bearings, including:

Spherical Bearings

- MS approved to AS81820 (formerly MIL-B-81820)
- Self-lubricating • Metal-to-Metal
- Loader slots • High temperature
- Low coefficient of friction
- Special configurations and materials

Thin Section Ball Bearings

- Standard cross sections to one inch
- Stainless steel and other materials are available
- Sizes to 40"
- Seals available on all sizes and standard cross sections
- Super duplex configurations

Journal Bearings

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- High temperature • High loads
- Available in inch and metric sizes

Airframe Control Ball Bearings

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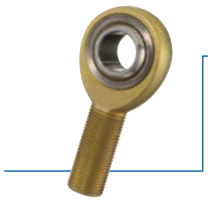
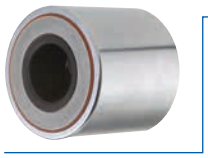


Rod End Bearings

- MS approved to AS81935 (formerly MIL-B-81935)
- Self-lubricating • Metal-to-Metal
- Loader slots • High temperature
- Low coefficient of friction
- Special configurations and materials



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- Advanced AeroCres® materials available
- Maximum corrosion resistance
- Superior lubricants & seals to reduce maintenance

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- Superior ball-to-race conformity
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