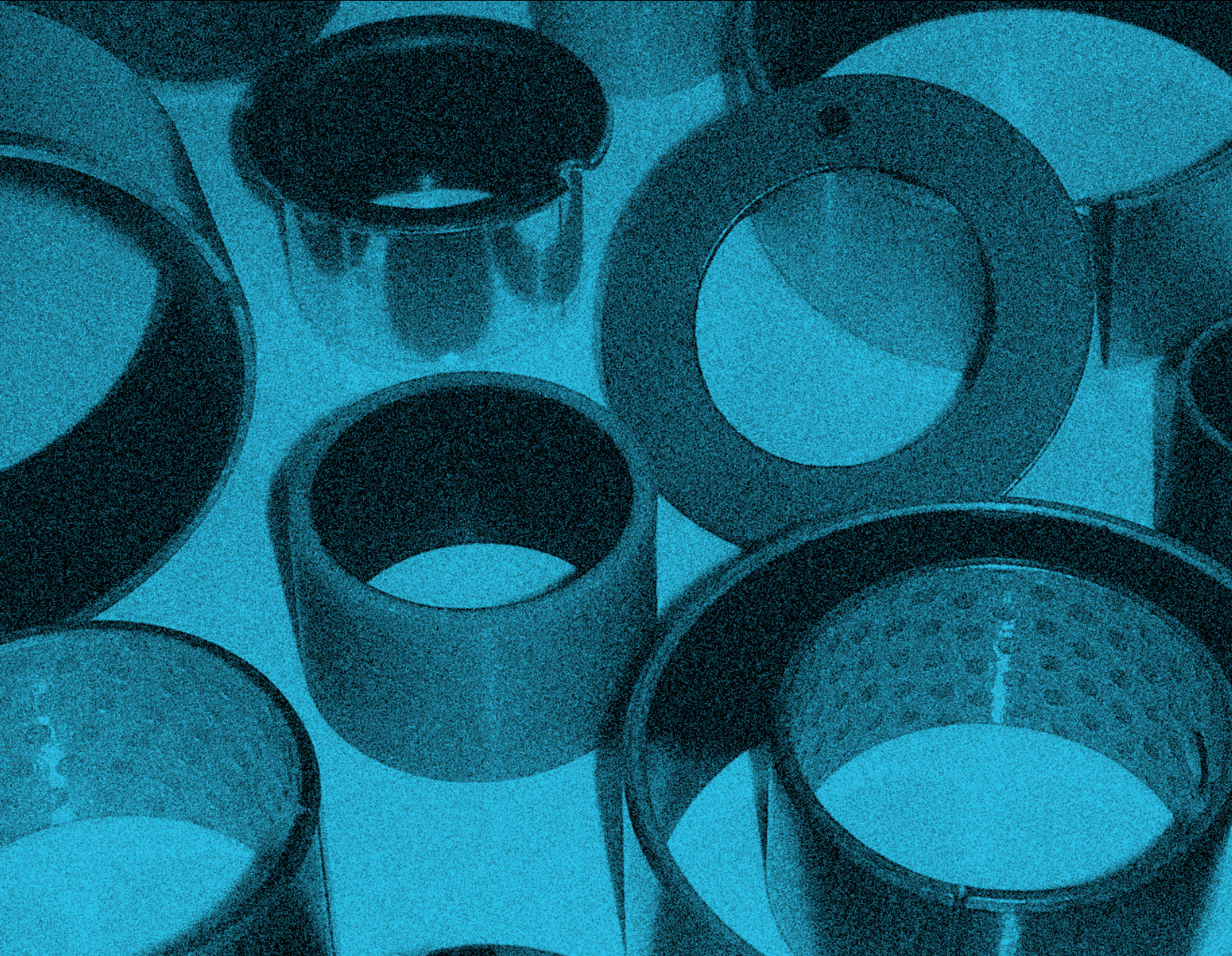




Essential  
components  
for industry



# Bushings



For over 40 years Daemar® Inc. has remained focused on partnering with our customers to deliver precision component solutions that meet their business challenges. Whether the application is a new design or a maintenance requirement, Daemar's global partnerships offer you one of the most complete sources of supply for Bushings. To ensure that Daemar® consistently meets or exceeds customer requirements, Daemar® is ISO-9001 registered and most suppliers have either TS16949-2000, QS-9000 or ISO-9001 quality registrations.

Daemar® has developed all of the capabilities required to support your lean manufacturing initiatives – providing JIT delivery, vendor managed inventories and computer systems integration. Supported by the Daemar® regional warehousing network you experience fast, courteous service throughout the world. All of Daemar's locations are fully stocked and staffed with experienced and knowledgeable sales & service professionals.

We trust that you will find this catalogue a valuable resource for selecting the appropriate Bushings for your applications. For further selection assistance, pricing and product availability please contact the Daemar® location nearest you.



Quality - ISO 9001 Certification .....	2
Interchange .....	3
Dryslide™	
TH - Self-Lubricating Bearings Introduction.....	4
TH - Self-Lubricating Bearings – Inch Sizes.....	5-8
FTH - Self-Lubricating Bearings – Inch Sizes .....	9
TS & TW - Self-Lubricating Bearings – Inch Sizes.....	10
TH - Self-Lubricating Bearings – Metric Sizes.....	11-13
FTH - Self-Lubricating Bearings – Metric Sizes .....	14
TS & TW - Self-Lubricating Bearings – Metric Sizes.....	15
THX - Pre-Lubricating Bearings Introduction.....	16
THX - Pre-Lubricating Bearings – Inch Sizes.....	17
THX Thrust Washers & THX Flat Strips - Inch Sizes.....	18
THX - Pre-Lubricating Bearings – Metric Sizes.....	19-21
THX Thrust Washers & THX Flat Strips - Metric Sizes.....	22
Design Notes	
Technical Information.....	23-24
PV Calculations .....	25
Operating Life .....	26-27
Installation Guide.....	28
Checking Methods.....	29
Fiber-Lube™	
Fiber-Lube Introduction.....	30
Fiber-Lube™ - CJ Series & FCJ Series .....	31-35
Ultracomp Series.....	36
Fiber-Lube™ - Inch Sizes .....	37-41
Fiber-Lube™- Metric Sizes .....	42-43
Application Data Sheet .....	44

## ISO-9001: REGISTERED

To consistently meet and exceed our customers' expectations, Daemar®Inc. is ISO-9001 registered and most of our suppliers are QS-9000 and/or ISO-9000 quality registered.



Interchange				
Daemar®	GGB	KS Permaglide	Federal Mogul - Glycodur®	SKF®
TH	DU	PAPZ-P10	PGZ	PC-Z
MB-TH	MB-DU	PAP-P10	PG	PCM
FTH	FDU	PAF-P10	PBG	PCMF
TW-TH	G-DU		PXG	PCZW
TW-M	WC-DU	PAW-P10	PXG	PCMW
THX	DXR			PCM
THXD	DX	P20		
FLXXFXX	GAR-MAX (GM)			PWM
FLXXTXX	GAR-FIL (GF)			



The Dryslide trademark identifies a whole range of self-lubricated dry sliding bearings. A composite structure, TH consists of a carbon steel backing, an intermediate

layer of sintered bronze, PTFE based sliding lining. The main items in the TH range are the wrapped cylindrical bushings (DIN 1494) and the flanged cylindrical bushings. Moreover, the range also includes thrust washers, strips and special parts made to customer specifications. From a technical point of view, the product is already widely known and new applications are constantly being identified to take advantage of the high load capacity, the self-lubricated feature and the excellent ratio between cost and performance of the whole range.

Technical Data		
Max. Load	Static	250 N/mm <sup>2</sup> (36,000 psi)
	Very Slow Speeds	140 N/mm <sup>2</sup> (20,000 psi)
	Rotating / Oscillating	60 N/mm <sup>2</sup> (8,400 psi)
Max. PV Dry Running	Short term Operation	3.6 N/mm <sup>2</sup> *m/s (102,000 psi-fpm)
	Continuous Operation	1.8 N/mm <sup>2</sup> *m/s (51,000 psi-fpm)
Temperature Range (°C)		-195°C to +280°C (-319°F to +536°F)
Max. Speed	Dry Running	2 m/s (400 fpm)
	Hydrodynamic Operation	> 2 m/s (> 400 fpm)
Thermal Conductivity		42 W(m*K) <sup>-1</sup> 302 BTU/(hr)(ft <sup>2</sup> )(°F/in)
Coefficient of Thermal Expansion		11*10 <sup>-6</sup> *K <sup>-1</sup>
Coefficient of Friction		0.03 - 0.20

## PRODUCT STRUCTURE

### Steel bronze powder with PTFE/Fibres mixture (Lead Free)

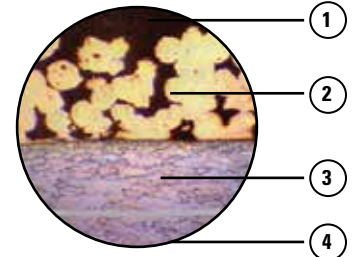
**1. PTFE based mixture 0.01-0.03mm:** provides an excellent initial transfer film, which effectively coats the mating surface of the bearing assembly, forming an oxide type solid lubricant film.

**2. Sintered bronze powder 0.20-0.35mm:** provides maximum thermal conductivity away from the bearing surface, also serves as a reservoir for the PTFE based mixture.

**3. Low-Carbon Steel:** provides exceptionally high load carrying capacity.

**4. Copper/Tin plating 0.002mm:** provides good corrosion resistance.

A dry running bearing with a low coefficient of friction, good wear properties and sliding characteristics. It can be used in both rotary and oscillating applications.



## TYPICAL APPLICATIONS

Can meet the demanding criteria for long life and trouble-free performance with or without lubrication.

**Automotive:** tractors, combines, crop sprayers, earthmovers, and road graders. Specific uses in power steering cylinders, steering gear thrust washers, disc brakes, callipers, pistons, shock absorbers, governor linkage, windshield wiper motor, and tilt gear assemblies...

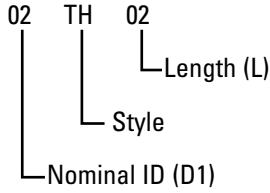
**Office Equipment:** photocopy machines, mail sorters, postage meter systems, computer printers, peripheral equipment, automatic printing devices, and mail processing machinery...

**Hydraulics and valves:** pumps including gear, rotary, water, axial piston, and other types, ball, butterfly, poppet steam, and other valves and valve trunnions...

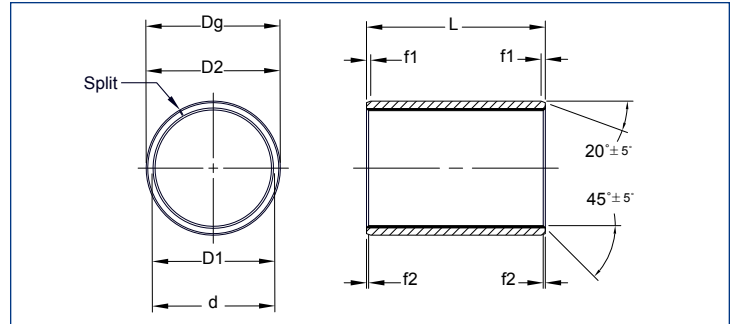
**Home Appliances:** refrigerators, air conditioners, vacuum cleaners, polishers, sewing machines, ovens, dishwashers, and washing machines...

**Materials handling:** pallet trucks, scissor lifts, packaging machinery and textile equipment...

## Part Numbering



Part numbers are represented in 1/16" increments



Part Number	D1	D2	Length (+/- 0.010")	Shaft Diameter (d)	Housing Bore (Dg)	Installed ID (D1E)			
02TH02	0.1250	0.1875	0.1250	0.1243	0.1878	0.1268			
02TH03			0.1875	0.1236	0.1873	0.1243			
025TH025	0.1563	0.2188	0.1563	0.1554	0.2191	0.1581			
025TH04			0.2500	0.1547	0.2186	0.1556			
03TH03	0.1875	0.2500	0.1875	0.1865	0.2503	0.1893			
03TH04			0.2500				0.1858		
03TH06			0.3750						
04TH04	0.2500	0.3125	0.2500	0.2490	0.3128	0.2518			
04TH06			0.3750	0.2481	0.3122	0.2492			
05TH06	0.3125	0.3750	0.3750	0.3115	0.3753	0.3143			
05TH08			0.5000	0.3106	0.3747	0.3117			
06TH03	0.3750	0.4688	0.1875	0.3740	0.4691	0.3769			
06TH04			0.2500						
06TH06			0.3750						
06TH08			0.5000				0.3731	0.4684	0.3742
06TH10			0.6250						
06TH12			0.7500						
07TH08	0.4375	0.5313	0.5000	0.4365	0.5316	0.4394			
07TH12			0.7500	0.4355	0.5309	0.4367			
08TH04	0.5000	0.5938	0.2500	0.4990	0.5941	0.5019			
08TH06			0.3750						
08TH08			0.5000				0.4980	0.5934	0.4992
08TH10			0.6250						
08TH12			0.7500						
08TH14			0.8750						
09TH06			0.5625				0.6563	0.3750	0.5615
09TH08	0.5000	0.5605		0.6566	0.5617				
09TH10	0.6250								
09TH12	0.7500								
10TH04	0.6250	0.7188	0.2500	0.6240	0.7192	0.6270			
10TH08			0.5000	0.6230	0.7184	0.6242			
10TH10			0.6250						

Part Number	D1	D2	Length (+/- 0.010")	Shaft Diameter (d)	Housing Bore (Dg)	Installed ID (D1E)			
10TH12	0.6250	0.7188	0.7500	0.6240	0.7192	0.6270			
10TH14			0.8750				0.6230	0.7184	0.6242
10TH16			1.0000						
11TH14	0.6875	0.7813	0.8750	0.6865	0.7817	0.6895			
12TH04	0.7500	0.8750	0.2500	0.7491	0.8755	0.7525			
12TH06			0.3750						
12TH08			0.5000				0.7479	0.8747	0.7493
12TH10			0.6250						
12TH12			0.7500						
12TH16			1.0000						
13TH12	0.8125	0.9375	0.7500	0.8116	0.9380	0.8150			
13TH18			1.1250	0.8104	0.9372	0.8118			
14TH04	0.8750	1.0000	0.2500	0.8741	1.0005	0.8775			
14TH06			0.3750						
14TH12			0.7500				0.8729	0.9997	0.8743
14TH14			0.8750						
14TH16			1.0000						
14TH20			1.2500						
16TH06	1.0000	1.1250	0.3750	0.9991	1.1256	1.0026			
16TH08			0.5000						
16TH12			0.7500				0.9979	1.1246	0.9992
16TH16			1.0000						
16TH20			1.2500						
16TH24			1.5000						
18TH06			1.1250				1.2813	0.3750	1.1238
18TH10	0.6250	1.1226		1.2808	1.1240				
18TH12	0.7500								
18TH16	1.0000								
20TH06	1.2500	1.4063	0.3750	1.2488	1.4068	1.2528			
20TH12			0.7500				1.2472	1.4058	1.2490
20TH14			0.8750						

Part Number	D1	D2	Length (+/- 0.010")	Shaft Diameter (d)	Housing Bore (Dg)	Installed ID (D1E)	Part Number	D1	D2	Length (+/- 0.010")	Shaft Diameter (d)	Housing Bore (Dg)	Installed ID (D1E)								
20TH16	1.2500	1.4063	1.0000	1.2488	1.4068	1.2528	40TH48	2.5000	2.6875	3.0000	2.5011	2.6881	2.5077								
20TH20			1.2500				1.2472			1.4058				1.2490	40TH56	3.5000					
20TH28			1.7500				1.4068			1.4058				1.2490	40TH60	3.7500					
22TH12	1.3750	1.5313	0.7500	1.3738	1.5318	1.3778	40TH64			2.7500				2.9375	4.0000	2.7500	2.9370	2.7566			
22TH16			1.0000				1.3722								1.5308				1.3740	40TH72	4.5000
22TH22			1.3750				1.3722								1.5308				1.3740	40TH76	4.7500
22TH24			1.5000				1.3722								1.5308				1.3740	44TH32	2.0000
22TH28			1.7500				1.3722	1.5308	1.3740		44TH36	2.2500									
24TH08	1.5000	1.6563	0.5000	1.4988	1.6568	1.5028	44TH40	2.7500	2.9375	2.5000	2.7500	2.9370	2.7566								
24TH16			1.0000				1.4972			1.6558				1.4990	44TH48	3.0000					
24TH18			1.1250				1.4972			1.6558				1.4990	44TH56	3.5000					
24TH20			1.2500				1.4972			1.6558				1.4990	44TH60	3.7500					
24TH24			1.5000				1.4972			1.6558				1.4990	44TH64	4.0000					
24TH32			2.0000				1.4972			1.6558				1.4990	44TH72	4.5000					
26TH16			1.6250				1.7813			1.0000				1.6238	1.7818	1.6278	44TH76	2.7500	2.9375	4.7500	2.7500
26TH24	1.5000	1.6222		1.7808	1.6240	44TH80		5.0000													
28TH16	1.7500	1.9375	1.0000	1.7487	1.9381	1.7535	46TH32	2.8750	3.0625	2.0000	2.8752	3.0623	2.8819								
28TH24			1.5000				1.7471			1.9371				1.7489	46TH36	2.2500					
28TH28			1.7500				1.7471			1.9371				1.7489	46TH40	2.5000					
28TH32			32.0000				1.7471			1.9371				1.7489	46TH48	3.0000					
30TH12	1.8750	2.0625	0.7500	1.8737	2.0633	1.8787	46TH56	2.8750	3.0625	3.5000	2.8752	3.0610	2.8754								
30TH16			1.0000				1.8721			2.0621				1.8739	46TH60	3.7500					
30TH30			1.8750				1.8721			2.0621				1.8739	46TH64	4.0000					
30TH36			2.2500				1.8721			2.0621				1.8739	46TH72	4.5000					
32TH08	2.0000	2.1875	0.5000	1.9987	2.1883	2.0037	46TH76	3.0000	3.1875	4.7500	3.0000	3.1872	3.0068								
32TH16			1.0000				1.9969			2.1871				1.9989	46TH80	5.0000					
32TH24			1.5000				1.9969			2.1871				1.9989	48TH32	2.0000					
32TH28			1.7500				1.9969			2.1871				1.9989	48TH36	2.2500					
32TH32			2.0000				1.9969			2.1871				1.9989	48TH40	2.5000					
32TH40	2.5000	1.9969	2.1871	1.9989	48TH48	3.0000															
34TH48	2.1250	2.3125	3.0000	2.1257	2.3127	2.1323	48TH56	3.0000	3.1875	3.5000	3.0000	3.1872	3.0068								
36TH28	2.2500	2.4375	1.7500	2.2507	2.4377	2.2573	48TH60			3.7500											
36TH32			2.0000				2.2489			2.4365				2.2509	48TH64	4.0000					
36TH36			2.2500				2.2489			2.4365				2.2509	48TH72	4.5000					
36TH40			2.5000				2.2489			2.4365				2.2509	48TH76	4.7500					
36TH48			3.0000				2.2489			2.4365				2.2509	48TH80	5.0000					
36TH56			3.5000				2.2489			2.4365				2.2509	52TH32	2.0000					
36TH60			3.7500				2.2489	2.4365	2.2509	52TH38	2.3750										
36TH64			4.0000				2.2489	2.4365	2.2509	52TH40	2.5000										
36TH72			4.5000				2.2489	2.4365	2.2509	52TH48	3.0000										
40TH16			2.5000				2.6875	1.0000	2.5011	2.6881	2.5077	52TH56	3.2500	3.4375	3.5000	3.2500	3.4372	3.2568			
40TH26	1.6250	2.4993		2.6869	2.5013	52TH60		3.7500													
40TH32	2.0000	2.4993		2.6869	2.5013	52TH64		4.0000													
40TH40	2.5000	2.4993		2.6869	2.5013	52TH72		4.5000													
						52TH76		4.7500													



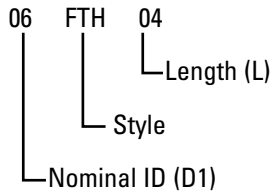
Part Number	D1	D2	Length (+/- 0.010")	Shaft Diameter (d)	Housing Bore (Dg)	Installed ID (D1E)	Part Number	D1	D2	Length (+/- 0.010")	Shaft Diameter (d)	Housing Bore (Dg)	Installed ID (D1E)				
52TH80	3.2500	3.4375	5.0000	3.2500 3.2480	3.4372 3.4358	3.2568 3.2502	68TH48	4.2500	4.4375	3.0000	4.2500 4.2478	4.4372 4.4358	4.2568 4.2502				
56TH32	3.5000	3.6875	2.0000	3.5000 3.4978	3.6872 3.6858	3.5068 3.5002	68TH56			3.5000							
56TH38			2.3750				68TH60			3.7500							
56TH40			2.5000				68TH64			4.0000							
56TH48			3.0000				68TH72			4.5000							
56TH56			3.5000				68TH76			4.7500							
56TH60			3.7500				68TH80	5.0000									
56TH64			4.0000				70TH32	2.0000	4.3750 4.3728	4.5625	4.3750 4.3728	4.5622 4.5608					
56TH72			4.5000				70TH36	2.2500									
56TH76			4.7500				70TH40	2.5000									
56TH80			5.0000				70TH48	3.0000									
58TH32			3.6250				3.8125	2.0000					3.6250 3.6228	3.8122 3.8108	3.6318 3.6258	70TH56	3.5000
58TH36								2.2500								70TH60	3.7500
58TH40								2.5000								70TH64	4.0000
58TH48			3.6250				3.8125	3.0000					3.6250 3.6228	3.8122 3.8108	3.6318 3.6258	70TH72	4.5000
58TH56	3.5000	70TH76		4.7500													
58TH60	3.7500	70TH80		5.0000													
58TH64	4.0000	72TH32		2.0000	4.5000 4.4978	4.6875		4.5000 4.4978	4.6872 4.6858								
58TH72	4.5000	72TH36		2.2500													
58TH76	4.7500	72TH40		2.5000													
58TH80	5.0000	72TH48		3.0000													
60TH32	3.7500	3.9375		2.0000						3.7500 3.7478	3.9372 3.9358	3.7568 3.7502				72TH56	3.5000
60TH36			2.2500	72TH60			3.7500										
60TH40			2.5000	72TH64			4.0000										
60TH48			3.0000	72TH72			4.5000										
60TH56			3.5000	72TH76	4.7500												
60TH60			3.7500	72TH80	5.0000												
60TH64			4.0000	76TH32	2.0000	4.7500 4.7475	4.9375	4.7500 4.7475	4.9374 4.9358								
60TH72			4.5000	76TH36	2.2500												
60TH76			4.7500	76TH40	2.5000												
60TH80			5.0000	76TH48	3.0000												
64TH32	4.0000	4.1875	2.0000	4.0000 3.9978	4.1872 4.1858					4.0068 4.0002	76TH56	3.5000					
64TH36			2.2500								76TH60	3.7500					
64TH40			2.5000								76TH64	4.0000					
64TH48			3.0000								76TH72	4.5000					
64TH56			3.5000			76TH76	4.7500										
64TH60			3.7500			76TH80	5.0000										
64TH64			4.0000			80TH32	2.0000	5.0000 5.1875	5.1875		4.9986 4.9961	5.1860 5.1844					
64TH72			4.5000			80TH36	2.2500										
64TH76			4.7500			80TH40	2.5000										
64TH80			5.0000			80TH48	3.0000										
68TH32	4.2500	4.4375	2.0000	4.2500 4.2478	4.4372 4.4358	4.2568 4.2502	80TH56			3.5000							
68TH36			2.2500				80TH60			3.7500							
68TH40			2.5000				80TH64			4.0000							
							80TH72			4.5000							

Part Number	D1	D2	Length (+/- 0.010")	Shaft Diameter (d)	Housing Bore (Dg)	Installed ID (D1E)
80TH76	5.0000	5.1875	4.7500	4.9986	5.1860	5.0056
80TH80			5.0000	4.9961	5.1844	4.9988
84TH32	5.2500	5.4375	2.0000	5.2500	5.4374	5.2570
84TH36			2.2500			
84TH40			2.5000			
84TH48			3.0000			
84TH56			3.5000			
84TH60			3.7500			
84TH64			4.0000			
84TH72			4.5000			
84TH76			4.7500			
84TH80			5.0000			
88TH32	5.5000	5.6875	2.0000	5.5000	5.6874	5.5070
88TH36			2.2500			
88TH40			2.5000			
88TH48			3.0000			
88TH56			3.5000			
88TH60			3.7500			
88TH64			4.0000			
88TH72			4.5000			
88TH76			4.7500			
88TH80			5.0000			
92TH32	5.7500	5.9375	2.0000	5.7500	5.9374	5.7570
92TH36			2.2500			
92TH40			2.5000			
92TH48			3.0000			
92TH56			3.5000			
92TH60			3.7500			
92TH64			4.0000			
92TH72			4.5000			
92TH76			4.7500			
92TH80			5.0000			
96TH32	6.0000	6.1875	2.0000	6.0000	6.1874	6.0070
96TH36			2.2500			
96TH40			2.5000			
96TH48			3.0000			
96TH56			3.5000			
96TH60			3.7500			
96TH64			4.0000			
96TH72			4.5000			
96TH76			4.7500			
96TH80			5.0000			
100TH32	6.2500	6.4375	2.0000	6.2500	6.4374	6.2570
100TH36			2.2500			
100TH40			2.5000			

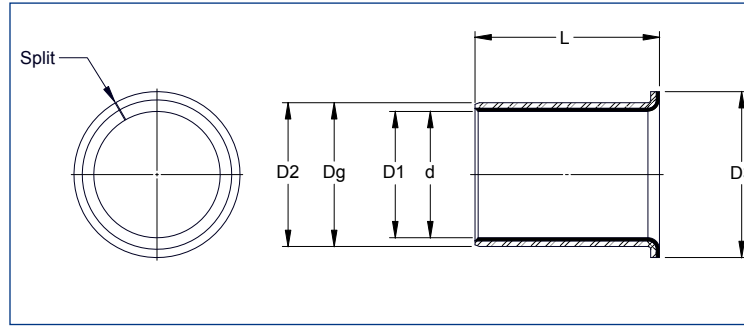
Part Number	D1	D2	Length (+/- 0.010")	Shaft Diameter (d)	Housing Bore (Dg)	Installed ID (D1E)					
100TH48	6.2500	6.4375	3.0000	6.2500	6.4374	6.2570					
100TH56			3.5000								
100TH60			3.7500								
100TH64			4.0000								
100TH72			4.5000								
100TH76			4.7500								
100TH80			5.0000								
104TH32			6.5000				6.6875	2.0000	6.5000	6.6874	6.5070
104TH36								2.2500			
104TH40								2.5000			
104TH48	3.0000										
104TH56	3.5000										
104TH60	3.7500										
104TH64	4.0000										
104TH72	4.5000										
104TH76	4.7500										
104TH80	5.0000										
108TH32	6.7500	6.9375	2.0000	6.7500	6.9374	6.7570					
108TH36			2.2500								
108TH40			2.5000								
108TH48			3.0000								
108TH56			3.5000								
108TH60			3.7500								
108TH64			4.0000								
108TH72			4.5000								
108TH76			4.7500								
108TH80			5.0000								
112TH32	7.0000	7.1875	2.0000	6.9954	7.1830	7.0026					
112TH36			2.2500								
112TH40			2.5000								
112TH48			3.0000								
112TH56			3.5000								
112TH60			3.7500								
112TH64			4.0000								
112TH72			4.5000								
112TH76			4.7500								
112TH80			5.0000								

Chamfer Dimensions		
D1	f1	f2
0.125 to 0.3125	.0078 to .0314	.0039 to .0157
0.375 to 0.6875	.0078 to .0939	.0039 to .0196
0.750 to 1.000	.0078 to .0939	.0039 to .0275
1.125 to 1.625	.0314 to .0629	.0039 to .0275
1.750 to 7.000	.0472 to .0944	.0078 to .0393

## Part Numbering



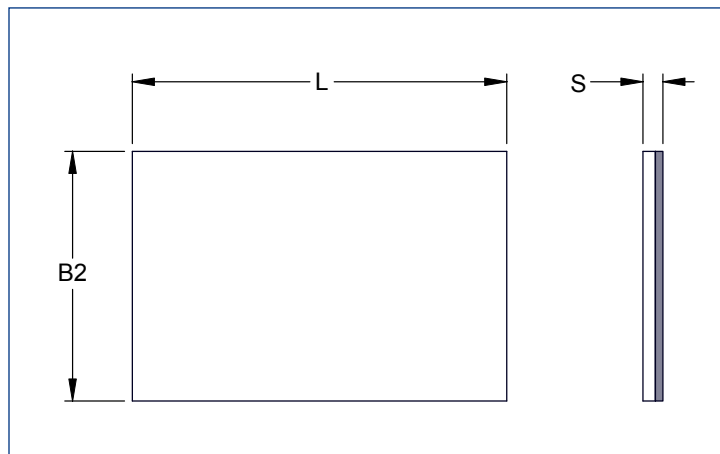
Part numbers are represented in 1/16" increments



Part Number	D1	D2	D3 (+/- 0.020)	Length (+/- 0.010)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)
06FTH04	0.3750	0.4688	0.6875	0.2500	0.3740 0.3731	0.4691 0.4684	0.3769 0.3742
06FTH06				0.3750			
06FTH08				0.5000			
06FTH112				0.7500			
08FTH04	0.5000	0.5938	0.8125	0.2500	0.4990 0.4980	0.5941 0.5934	0.5019 0.4992
08FTH06				0.3750			
08FTH08				0.5000			
08FTH12				0.7500			
10FTH06	0.6250	0.7188	0.9375	0.3750	0.6240 0.6230	0.7192 0.7184	0.6270 0.6242
10FTH08				0.5000			
10FTH10				0.6250			
10FTH12				0.7500			
12FTH06	0.7500	0.8750	1.1250	0.375	0.7491 0.7479	0.8755 0.8747	0.7525 0.7493
12FTH08				0.5000			
12FTH12				0.7500			
12FTH16				1.0000			
14FTH08	0.8750	1.0000	1.2500	0.5000	0.8741 0.8729	1.0005 0.9997	0.8775 0.8743
14FTH12				0.7500			
14FTH16				1.0000			
14FTH20				1.2500			
16FTH08	1.0000	1.1250	1.3750	0.5000	0.9991 0.9979	1.1256 1.1246	1.0026 0.9992
16FTH12				0.7500			
16FTH16				1.0000			
16FTH20				1.2500			
20FTH16	1.2500	1.4063	1.7500	1.0000	1.2488 1.2472	1.4068 1.4058	1.2528 1.2490
20FTH20				1.2500			
20FTH24				1.5000			
24FTH16	1.5000	1.6563	2.0000	1.0000	1.4988 1.4988	1.6568 1.6568	1.5028 1.5028
24FTH24				1.5000			
24FTH32				2.0000			
28FTH16	1.7500	1.9375	2.3750	1.0000	1.7487 1.7471	1.9381 1.9371	1.7535 1.7489
28FTH24				1.5000			
28FTH32				2.0000			

## TH FLAT STRIPS

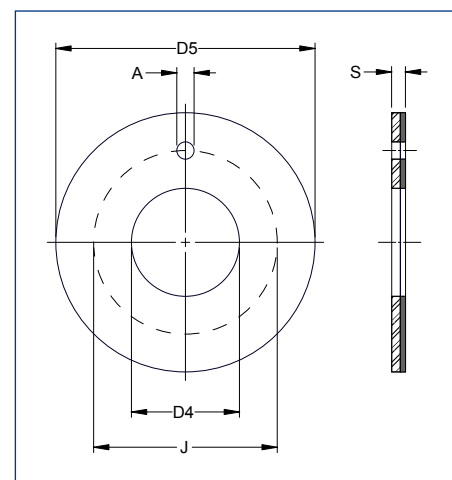
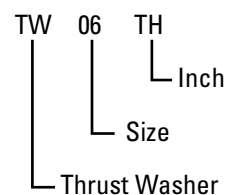
Part Number	S	B2	L
TS-0-TH	0.0277 0.0293	2.75	18
TS-1-TH	0.0431 0.0447	4	18
TS-2-TH	0.0586 0.0602	4	18
TS-3-TH	0.0740 0.0756	4	18
TS-4-TH	0.0897 0.0913	4	18
TS-5-TH	0.1190 0.1210	4	18



## TH THRUST WASHERS

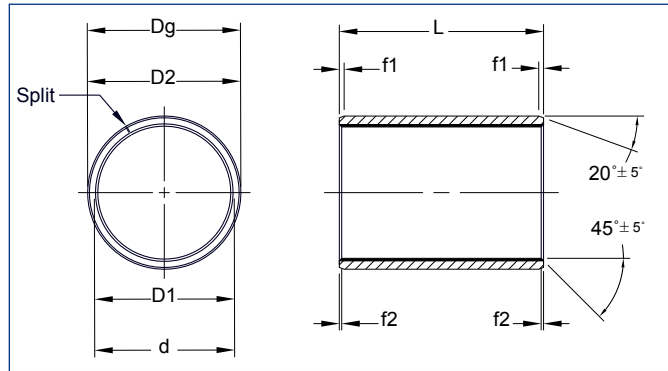
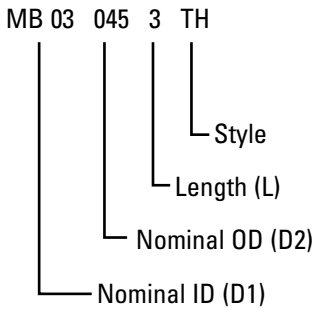
Part Number	D4 (+ 0.010)	D5 (- 0.010)	S (+ 0.0020)	Dowel Hole J (- 0.010)	A (+ 0.010)
TW-06-TH	0.500	0.875	0.0585	0.692	0.067
TW-07-TH	0.562	1.000		0.786	
TW-08-TH	0.625	1.125		0.880	0.099
TW-09-TH	0.687	1.187		0.942	
TW-10-TH	0.750	1.125		1.005	
TW-11-TH	0.812	1.375		1.099	
TW-12-TH	0.875	1.500	1.192	0.130	
TW-14-TH	1.000	1.750	0.0895	1.380	0.161
TW-16-TH	1.125	2.000		1.567	
TW-18-TH	1.250	2.125		1.692	0.192
TW-20-TH	1.375	2.250		1.817	
TW-22-TH	1.500	2.500		2.005	
TW-24-TH	1.625	2.625		2.130	
TW-26-TH	1.750	2.750	2.255	0.192	
TW-28-TH	2.000	3.000	2.505		
TW-30-TH	2.125	3.125	2.630		
TW-32-TH	2.250	3.250	2.755		

### Part Numbering





## Part Numbering



Part Number	D1	D2	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)
MB030453-TH	3	4.5	3	2.994	4.500	3.000
MB030454-TH			4			
MB030455-TH			5			
MB030456-TH			6			
MB040553-TH	4	5.5	3	3.992	5.000	4.000
MB040554-TH			4			
MB040556-TH			6			
MB0405510-TH			10			
MB05075-TH	5	7	5	4.978	7.000	4.990
MB05078-TH			8			
MB050710-TH			10			
MB06084-TH	6	8	4	5.978	8.000	5.990
MB06086-TH			6			
MB06088-TH			8			
MB060810-TH			10			
MB070910-TH	7	9	10	6.972	9.000	6.990
				6.987	9.015	7.055
MB08106-TH	8	10	6	7.972	10.000	7.990
MB08108-TH			8			
MB081010-TH			10			
MB081012-TH			12			
MB10128-TH	10	12	8	9.972	12.000	9.990
MB101210-TH			10			
MB101212-TH			12			
MB101215-TH			15			
MB101220-TH			20			
MB12148-TH	12	14	8	11.966	14.000	11.990
MB121410-TH			10			
MB121412-TH			12			
MB121415-TH			15			
MB121420-TH			20			
MB121425-TH	25					

Part Number	D1	D2	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)
MB131510-TH	13	15	10	12.966	15.000	12.990
MB131520-TH			20	12.984	15.018	13.058
MB14165-TH	14	16	5	13.966	16.000	13.990
MB141610-TH			10			
MB141612-TH			12			
MB141615-TH			15			
MB141620-TH			20			
MB141625-TH	25					
MB151710-TH	15	17	10	14.966	17.000	14.990
MB151712-TH			12			
MB151715-TH			15			
MB151720-TH			20			
MB151725-TH	25					
MB161810-TH	16	18	10	15.966	18.000	15.990
MB161812-TH			12			
MB161815-TH			15			
MB161820-TH			20			
MB161825-TH	25					
MB171915-TH	17	19	15	16.966	19.000	16.990
MB171920-TH			20	16.984	19.021	17.061
MB182010-TH	18	20	10	17.966	20.000	17.990
MB182015-TH			15			
MB182020-TH			20			
MB182025-TH			25			
MB202210-TH	20	22	10	19.959	22.000	19.990
MB202215-TH			15	19.980	22.021	20.061
MB202220-TH			20			
MB202310-TH	20	23	10	19.959	23.000	19.990
MB202315-TH			15			
MB202320-TH			20			
MB202325-TH			25			
MB202330-TH			30			

Part Number	D1	D2	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)	Part Number	D1	D2	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)
MB222515-TH	22	25	15	21.959 21.980	25.000 25.021	21.990 22.071	MB455040-TH	45	50	40	44.950 44.975	50.000 50.025	44.990 45.105
MB222520-TH			20				MB455045-TH			45			
MB222525-TH			25				MB455050-TH			50			
MB222530-TH			30				MB505520-TH	20	50	55	49.950 49.975	55.000 55.030	49.990 50.110
MB222715-TH	22	27	15	23.959 23.980	27.000 27.021	23.990 24.071	MB505525-TH	25					
MB222720-TH			20				MB505530-TH	30					
MB222725-TH			25				MB505540-TH	40					
MB222730-TH			30				MB505550-TH	50					
MB242815-TH	24	28	15	23.959 23.980	28.000 28.021	23.990 24.071	MB505560-TH	60	55	60	54.940 54.970	60.000 60.030	54.990 55.110
MB242820-TH			20				MB556020-TH	20					
MB242825-TH			25				MB556025-TH	25					
MB242830-TH	30	MB556030-TH	30										
MB252812-TH	25	28	12	24.959 24.980	28.000 28.021	24.990 25.071	MB556040-TH	40					
MB252815-TH			15				MB556050-TH	50					
MB252820-TH			20				MB556055-TH	55					
MB252825-TH			25				MB556060-TH	60					
MB252830-TH			30				MB606520-TH	20	60	65	59.940 59.970	65.000 65.030	59.990 60.110
MB252850-TH			50				MB606530-TH	30					
MB283215-TH	28	32	15	27.959 27.980	32.000 32.025	27.990 28.085	MB606540-TH	40					
MB283220-TH			20				MB606550-TH	50					
MB283225-TH			25				MB606560-TH	60					
MB283230-TH			30				MB606570-TH	70					
MB303410-TH	30	34	10	29.959 29.980	34.000 34.025	29.990 30.085	MB657030-TH	30	65	70	64.940 64.970	70.000 70.030	64.990 65.110
MB303415-TH			15				MB657040-TH	40					
MB303420-TH			20				MB657050-TH	50					
MB303425-TH			25				MB657070-TH	70					
MB303430-TH			30				MB707540-TH	40	70	75	69.940 69.970	75.000 75.030	69.990 70.110
MB303440-TH			40				MB707550-TH	50					
MB323620-TH	20	MB707560-TH	60										
MB323630-TH	32	36	30	31.950 31.975	36.000 36.025	31.990 32.085	MB707570-TH	70	75	80	74.940 74.970	80.000 80.030	74.990 75.110
MB323640-TH			40				MB758040-TH	40					
MB353920-TH	35	39	20	34.950 34.975	39.000 39.025	34.990 35.085	MB758050-TH	50					
MB353930-TH			30				MB758060-TH	60					
MB353935-TH			35				MB758070-TH	70					
MB353940-TH			40				MB758080-TH	80					
MB353950-TH			50				MB808560-TH	60	80	85	79.954 80.000	85.000 85.035	80.020 80.155
MB374120-TH	37	41	20	36.950 36.975	41.000 41.025	36.990 37.085	MB808580-TH	80					
MB404420-TH			20				MB8085100-TH	100					
MB404430-TH	40	44	30	39.950 39.975	44.000 44.025	39.990 40.085	MB859030-TH	30	85	90	94.946 85.000	90.000 90.035	85.020 85.155
MB404440-TH			40				MB859060-TH	60					
MB404445-TH			45				MB8590100-TH	100					
MB404450-TH			50				MB909560-TH	60	90	95	89.946 90.000	95.000 95.035	90.020 90.155
MB455020-TH			45				50	20					
MB455030-TH	30	MB9510060-TH		60	95	100		94.946 95.000	100.000 100.035	95.020 95.155			
												MB95100100-TH	100

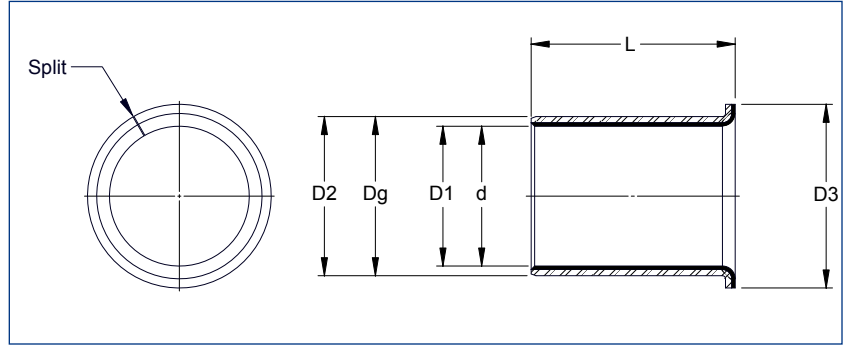
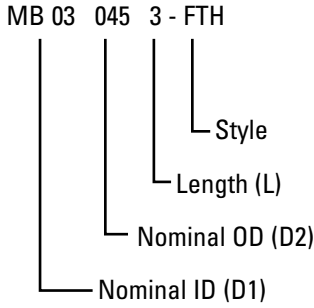
Part Number	D1	D2	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)
MB10010550-TH	100	105	50	99.946 100.000	105.000 105.035	100.020 100.155
MB10010560-TH			60			
MB10010570-TH			70			
MB10010580-TH			80			
MB100105100-TH			100			
MB100105115-TH			115			
MB10511060-TH	105	110	60	104.946 105.000	110.000 110.035	105.020 105.155
MB105110100-TH			100			
MB105110115-TH			115			
MB11011560-TH	110	115	60	109.946 110.000	115.000 115.035	110.020 110.155
MB110115100-TH			100			
MB110115115-TH			115			
MB11512050-TH	115	120	50	114.946 115.000	120.000 120.035	115.020 115.155
MB11512060-TH			60			
MB11512070-TH			70			
MB115120115-TH			115			
MB12012550-TH	120	125	50	119.946 120.000	125.000 125.040	120.070 120.210
MB12012560-TH			60			
MB120125100-TH			100			
MB12513060-TH	125	130	60	124.937 125.000	130.000 130.040	125.070 125.210
MB125130100-TH			100			
MB13013560-TH	130	135	60	129.937 130.000	135.000 135.040	130.070 130.210
MB130135100-TH			100			
MB13514060-TH	135	140	60	134.937 135.000	140.000 140.040	135.070 135.210
MB13514080-TH			80			
MB135140100-TH			100			
MB14014560-TH	140	145	60	139.937 140.000	145.000 145.040	140.070 140.210
MB140145100-TH			100			
MB14515060-TH	145	150	60	144.937 145.000	150.000 150.040	145.070 145.210
MB145150100-TH			100			
MB15015560-TH	150	155	60	149.937 150.000	155.000 155.040	150.070 150.210
MB15015580-TH			80			
MB150155100-TH			100			
MB15516060-TH	155	160	60	154.937 155.000	160.000 160.040	155.070 155.210
MB155160100-TH			100			
MB16016560-TH	160	165	60	159.937 160.000	165.000 165.040	160.070 160.210
MB16016580-TH			80			
MB160165100-TH			100			
MB16517060-TH	165	170	60	164.937 165.000	170.000 170.040	165.070 165.210
MB165170100-TH			100			
MB17017560-TH	170	175	60	169.937 170.000	175.000 175.040	175.070 170.210
MB170175100-TH			100			
MB17518060-TH	175	180	60	174.937 175.000	180.000 180.040	175.070 175.210
MB175180100-TH			100			

Part Number	D1	D2	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)
MB18018560-TH	180	185	60	179.937 180.000	185.000 185.046	180.070 180.216
MB18018580-TH			80			
MB180185100-TH			100			
MB19019560-TH	190	195	60	189.928 190.000	195.000 195.046	190.070 190.216
MB190195100-TH			100			
MB20020560-TH	200	205	60	199.928 200.000	205.000 205.046	200.070 200.216
MB200205100-TH			100			
MB20521060-TH	205	210	60	204.928 205.000	210.000 210.046	205.070 205.216
MB205210100-TH			100			
MB21021560-TH	210	215	60	209.928 210.000	215.000 215.046	210.070 210.216
MB210215100-TH			100			
MB21522060-TH	215	220	60	214.928 215.000	220.000 220.046	215.070 215.216
MB215220100-TH			100			
MB22022560-TH	220	225	60	219.928 220.000	225.000 225.046	220.070 220.216
MB220225100-TH			100			
MB23023560-TH	230	235	60	229.928 230.000	235.000 235.046	230.070 230.216
MB230235100-TH			100			
MB24024560-TH	240	245	60	239.928 240.000	245.000 245.046	240.070 240.216
MB240245100-TH			100			
MB25025560-TH	250	255	60	249.928 250.000	255.000 255.052	250.070 250.222
MB250255100-TH			100			
MB28028560-TH	280	285	60	279.928 280.000	285.000 285.052	280.070 280.222
MB280285100-TH			100			
MB30030560-TH	300	305	60	299.919 300.000	305.000 305.052	300.070 300.222
MB300305100-TH			100			

Chamfer Dimensions		
D1	f1	f2
3 to 18	.20 to 1.00	.10 to .50
20 to 28	.20 to 1.00	.10 to .70
28 to 40	.80 to 1.60	.10 to .70
45 to 300	1.20 to 2.40	.20 to 1.00

## TH FLANGED BEARINGS

### Part Numbering



Part Number	D1	D3 (+/- 0.50)	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)
MB06084-FTH	6	12	4	5.990	8.000	5.990
MB06087-FTH			7			
MB06088-FTH			8			
MB081055-FTH	8	15	5.5	7.972	10.000	7.990
MB081075-FTH			7.5			
MB081095-FTH			9.5			
MB10127-FTH	10	18	7	9.972	12.000	9.990
MB10129-FTH			9			
MB101212-FTH			12			
MB101217-FTH			17			
MB12147-FTH	12	20	7	11.966	14.000	11.990
MB12149-FTH			9			
MB121412-FTH			12			
MB121417-FTH			17			
MB141612-FTH	14	22	12	13.966	16.000	13.990
MB141617-FTH			17			
MB15179-FTH	15	23	9	14.966	17.000	14.990
MB151712-FTH			12			
MB151717-FTH			17			
MB161812-FTH	16	24	12	15.966	18.000	15.990
MB161817-FTH			17			
MB182012-FTH	18	26	12	17.966	20.000	17.990
MB182017-FTH			17			
MB182022-FTH			22			
MB2023115-FTH	20	30	11.5	19.959	23.000	19.990
MB2023165-FTH			16.5			
MB2023215-FTH			21.5			
MB2528115-FTH	25	35	11.5	24.959	28.000	24.990
MB2528165-FTH			16.5			
MB2528215-FTH			21.5			

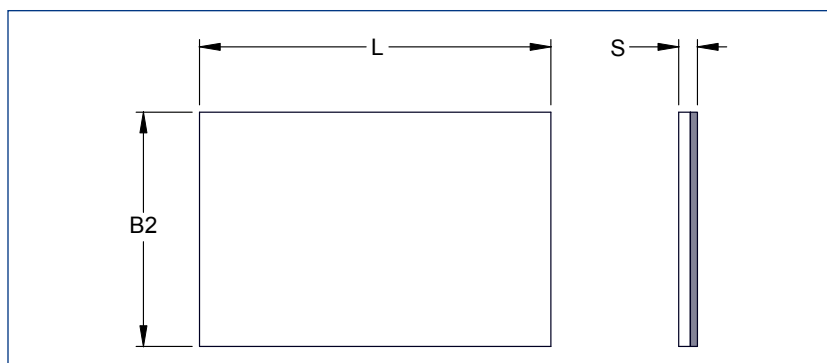
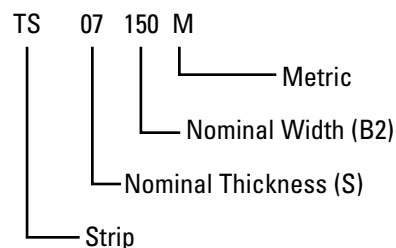
Part Number	D1	D3 (+/- 0.50)	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)
MB303416-FTH	30	42	16	29.959	34.000	29.990
MB303426-FTH			26			
MB353916-FTH	35	47	16	34.950	39.000	34.990
MB353926-FTH			26			
MB404416-FTH	40	53	16	39.950	44.000	39.990
MB404426-FTH			26			
MB455016-FTH	45	58	16	44.950	50.000	44.990
MB455026-FTH			26			



## TH FLAT STRIPS

Part Number	S	B2	L
TS-07150-M	0.744 0.704	150	500
TS-10200-M	0.99 0.95	215	500
TS-15240-M	1.51 1.47	245	500
TS-20240-M	2 1.96	245	500
TS-25240-M	2.5 2.46	245	500
TS-30240-M	3.06 3.02	245	500

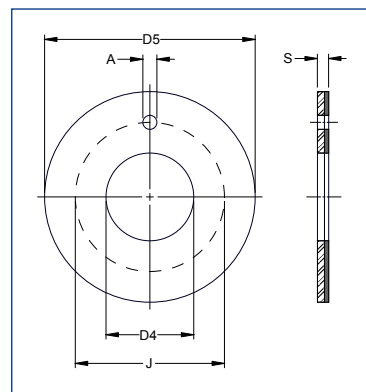
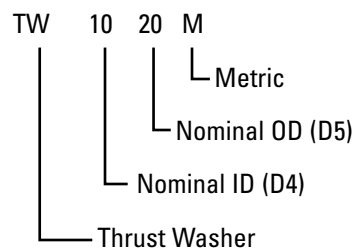
### Part Numbering

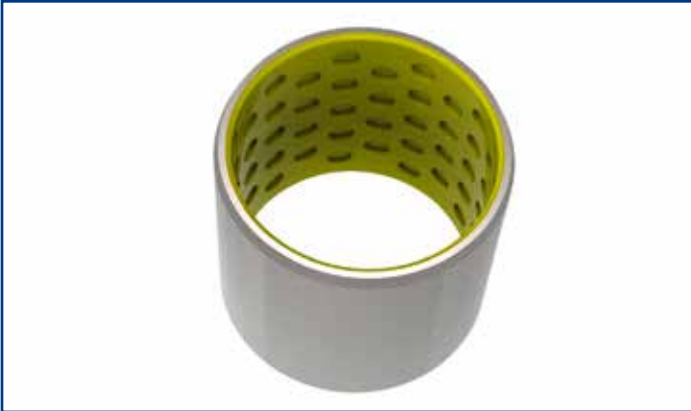


## TH THRUST WASHERS

Part Number	D4 (+/- 0.25)	D5 (+/- 0.25)	S	Dowel Hole J (+/- 0.12)	A
TW-1020-M	10	20	1.500 1.450		
TW-1224-M	12	24		18	1.87 1.62
TW-1426-M	14	26		20	2.37 2.12
TW-1630-M	16	30		22	
TW-1832-M	18	32		25	
TW-2036-M	20	36		28	3.37 3.12
TW-2238-M	22	38		30	
TW-2442-M	24	42		33	
TW-2644-M	26	44		35	
TW-2848-M	28	48		38	4.37 4.12
TW-3254-M	32	54	2.000 1.950	43	
TW-3862-M	38	62		50	
TW-4266-M	42	66		54	
TW-4874-M	48	74		61	
TW-5278-M	52	78		65	
TW-6290-M	62	90		76	

### Part Numbering





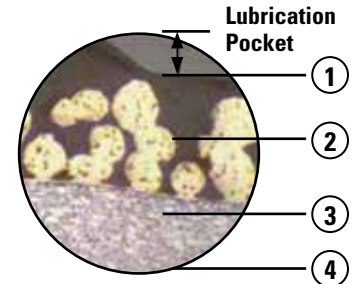
The THX trademark denotes a range of sliding bearings produced from a material with a composite structure. The backing consists of carbon steel onto which a porous layer of bronze is sintered and then impregnated with a co-acetal plastic. The polymeric surface has indentations in which the lubricating grease lies and protects the mating surface. The main products in the THX range are the cylindrical bushings (DIN 1494), but thrust washers and strips are also available as well as special parts made to customer specifications.

Technical Data		
Max. Load	Static	250 N/mm <sup>2</sup> (36,000 PSI)
	Load Capacity	140 N/mm <sup>2</sup> (20,000 PSI)
Max. PV		3.0 N/mm <sup>2</sup> *m/s (85,000 PSI-FPM)
Temperature Range		-40°C to +130°C (-40°F to +260°F)
Max. Speed	Greased	0.5 m/s (100 FPM)
	Oiled	2.5 m/s (500 FPM)
Coefficient of Friction		0.05 - 0.20

## PRODUCT STRUCTURE

### Steel bronze powder with Acetal Marginal bearings

**1. POM (Acetal) 0.30-0.50mm:** has high wear resistance and low friction. The bearing surface has a pattern of circular indents, which should be filled with grease on assembly.



### 2. Sintered bronze powder

0.20-0.35mm: provides maximum thermal conductivity away from the bearing surface, also serves as a reservoir for the resin mixture.

**3. Low-Carbon Steel:** provides exceptionally high load carrying capacity.

**4. Copper/Tin plating 0.002mm:** provides good corrosion resistance.

The THX bushing can be used in rotary and oscillating applications. Less maintenance requirements due to the long re-lubrication intervals. Less wear, less susceptibility to edge loading, and no absorption of water. The THX has good damping qualities and is resistant to shock loads.

## TYPICAL APPLICATIONS

Recommended for applications involving intermittent operation or boundary lubrication.

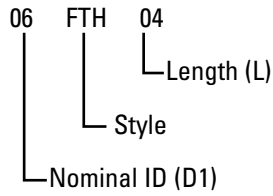
**Automotive:** suspension joints, kingpin assemblies, automobile driving joint hinges, steering and other linkages, articulation joints, and rear chassis hinges.

**Machine Tools:** spindles in drill, grinding, and milling machines, and ram guide plates in multi ram presses.

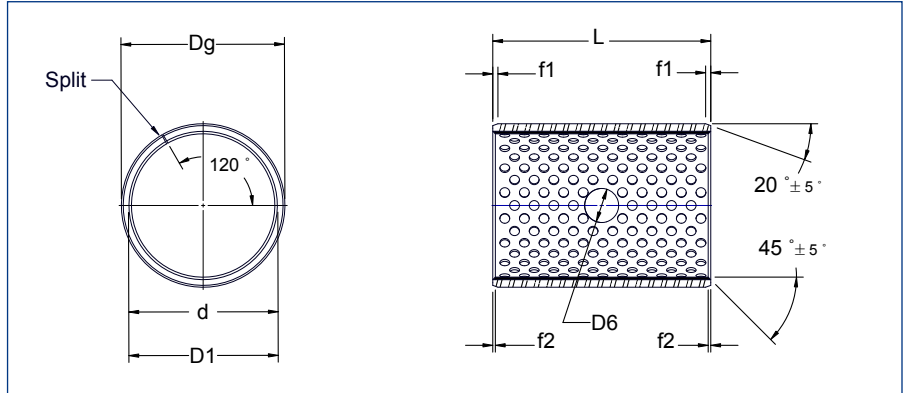
**Agricultural Equipment:** gearboxes, clutch assemblies, bale trips and wheel caster swivels for bale accumulators, front axle pivot bearings, steering idler box bearings and kingpin bearings for harvesters...

The THX bushing is especially well suited for applications where lubricant cannot be supplied continuously or repeatedly.

### Part Numbering



Part numbers are represented in 1/16" increments



Part Number	D1	D6	Length (L)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)			
06THX06	1/2	5/32	3/8	0.5000	0.6352	0.5038			
06THX08			1/2	0.4990	0.6345	0.5007			
10THX10	5/8	5/32	1/2	0.6250	0.7604	0.6290			
10THX12			3/4	0.6240	0.7596	0.6258			
12THX12	3/4	5/32	3/4	.7500	.8854	.7540			
12THX16			1	.7488	.8846	.7508			
14THX12	7/8	5/32	3/4	.8750	1.0105	.8791			
14THX16			1	.8738	1.0097	.8759			
16THX12	1	5/16	3/4	1.0000	1.1356	1.0042			
16THX16			1	0.9988	1.1348	1.0010			
18THX12	1 1/8	5/16	3/4	1.1250	1.2606	1.1292			
18THX16			1	1.1238	1.2598	1.1260			
20THX12	1 1/4	5/16	3/4	1.2500	1.4170	1.2550			
20THX16			1	1.2484	1.4160	1.2512			
22THX16	1 3/8	5/16	1	1.3750	1.5420	1.3800			
22THX24			1 1/2	1.3743	1.5410	1.3762			
24THX16	1 1/2	5/16	1	1.5000	1.6670	1.5050			
24THX24			1 1/2		1.4984	1.6660	1.5012		
24THX32			2						
26THX16	1 5/8	5/16	1	1.6250	1.7920	1.6300			
26THX24			1 1/2		1.6234	1.7910	1.6262		
26THX32			2						
28THX16	1 3/4	5/16	1	1.7500	1.9381	1.7577			
28THX24			1 1/2		1.7484	1.9371	1.7515		
28THX32			2						
30THX16	1 7/8	5/16	1	1.8750	2.0633	1.8829			
30THX24			1 1/2				1.8734	2.0621	1.8765
30THX32			2						
30THX36			2 1/4						

Part Number	D1	D6	Length (L)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)			
32THX16	2	5/16	1	2.0000	2.1883	2.0079			
32THX24			1 1/2				1.9982	2.1871	2.0015
32THX32			2						
40THX24	2 1/2	5/16	1 1/2	2.5000	2.6883	2.5079			
40THX32			2				2.4982	2.6871	2.5015
40THX40			2 1/2						
48THX24	3	5/16	1 1/2	3.0000	3.1889	3.0085			
48THX32			2				2.9982	3.1875	3.0019
48THX40			2 1/2						
48THX48			3						

### General Tolerances:

Length (L) = ±0.010

Lubrication Hole (D6) = ±0.011

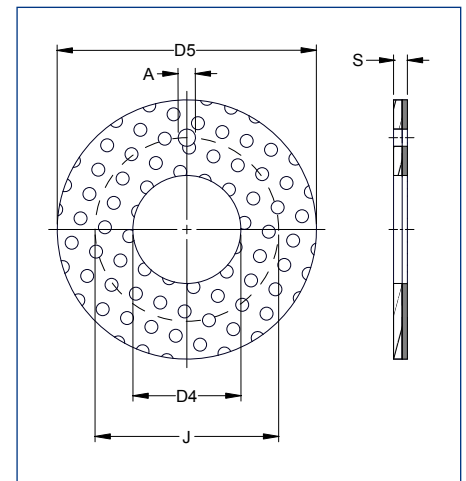
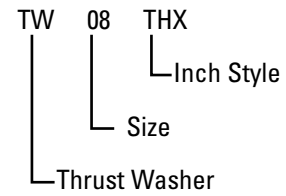
### Chamfer Dimensions

D1	f1	f2
1/2 to 1 1/8	.0078 to .0393	.0039 to .0275
1 1/4 to 1 5/8	.0314 to .0629	.0039 to .0275
1 3/4 to 1.000	.0472 to .0944	.0078 to .0393

## THX THRUST WASHERS

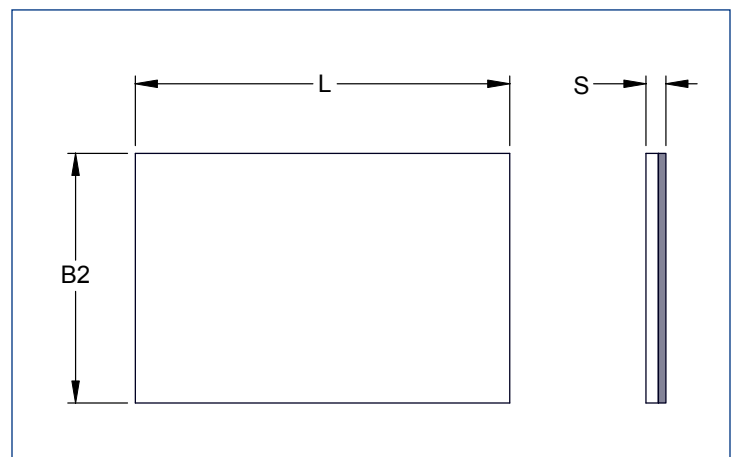
Part Number	D4 (+ 0.010)	D5 (- 0.010)	S	Dowel Hole J	A	
TW-08-THX	0.625	1.125	0.0625 0.0660	0.880 0.870	0.099 0.109	
TW-10-THX	0.750	1.125		1.005 0.995		
TW-12-THX	0.875	1.500		1.192 1.182	0.130 0.140	
TW-14-THX	1.000	1.750		1.380 1.370		
TW-16-THX	1.125	2.000		1.567 1.557	0.161 0.171	
TW-18-THX	1.250	2.125		1.692 1.682		
TW-20-THX	1.375	2.250		0.0895 0.0930	1.817 1.807	0.192 0.202
TW-22-THX	1.500	2.500			2.005 1.995	
TW-24-THX	1.625	2.625			2.130 2.120	
TW-26-THX	1.750	2.750			2.255 2.245	
TW-28-THX	2.000	3.000	2.505 2.495			
TW-30-THX	2.125	3.125	2.630 2.620			
TW-32-THX	2.250	3.250	2.755 2.745			

### Part Numbering



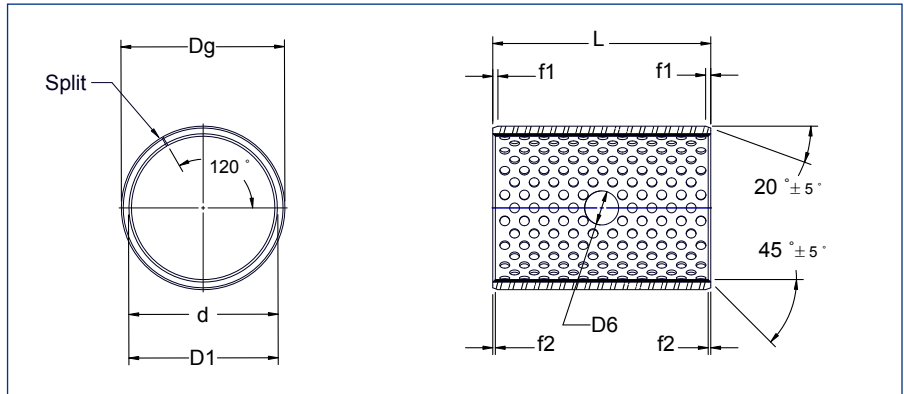
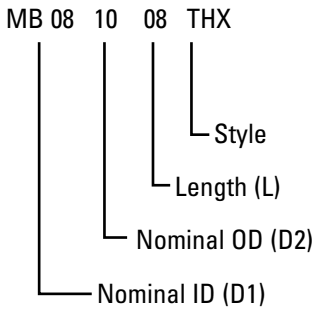
## THX FLAT STRIPS

Part Number	S	B2	L
TS-0-THX	0.0480 0.0492	2.75	18
TS-1-THX	0.0630 0.0642	4	18
TS-2-THX	0.0783 0.0795	4	18
TS-3-THX	0.0937 0.0949	4	18





### Part Numbering



Part Number	D1	D2	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)		
MB08108-THX	8	10	8	7.978	10.000	8.040		
MB081010-THX			10				8.000	8.105
MB081012-THX			12					
MB101210-THX	10	12	10	9.978	12.000	10.040		
MB101212-THX			12				10.000	10.108
MB101215-THX			15					
MB101220-THX			20					
MB121410-THX	12	14	10	11.973	14.000	12.040		
MB121412-THX			12				12.000	12.108
MB121415-THX			15					
MB121420-THX			20					
MB121425-THX			25					
MB141615-THX	14	16	15	13.973	16.000	14.040		
MB141620-THX			20				14.000	14.108
MB141625-THX			25					
MB151710-THX	15	17	10	14.973	17.000	15.040		
MB151712-THX			12				15.000	15.108
MB151715-THX			15					
MB151720-THX			20					
MB161815-THX	16	18	15	15.973	18.000	16.040		
MB161820-THX			20				16.000	16.108
MB161825-THX			25					
MB182015-THX	18	20	15	17.973	20.000	18.040		
MB182020-THX			20				18.000	18.111
MB182025-THX			25					
MB202310-THX	20	23	10	19.967	23.000	20.050		
MB202315-THX			15				20.000	20.131
MB202320-THX			20					
MB202325-THX			25					
MB202330-THX			30					

Part Number	D1	D2	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)		
MB222515-THX	22	25	15	21.967	25.000	22.050		
MB222520-THX			20				22.000	22.131
MB222525-THX			25					
MB222530-THX			30					
MB242715-THX	24	27	15	23.967	27.000	24.050		
MB242720-THX			20				24.000	24.131
MB242725-THX			25					
MB242730-THX			30					
MB252815-THX	25	28	15	24.967	28.000	25.050		
MB252820-THX			20				25.000	25.131
MB252825-THX			25					
MB252830-THX			30					
MB283130-THX	28	31	30	27.967	31.000	28.050		
				28.000	31.025	28.135		
MB283220-THX	28	32	20	27.967	32.000	28.060		
MB283225-THX			25				28.000	28.155
MB283230-THX			30					
MB303420-THX	30	34	20	29.967	34.000	30.060		
MB303430-THX			30				30.000	30.155
MB303440-THX			40					
MB323620-THX	32	36	20	31.961	36.000	32.060		
MB323630-THX			30				32.000	32.155
MB323635-THX			35					
MB323640-THX			40					
MB353920-THX	35	39	20	34.961	39.000	35.060		
MB353930-THX			30				35.000	35.155
MB353935-THX			35					
MB353940-THX			40					
MB364035-THX	36	40	35	35.961	40.000	36.060		
				36.000	40.025	36.155		
MB374120-THX	37	41	20	36.961	41.000	37.060		
				37.000	41.025	37.155		

Part Number	D1	D2	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)	Part Number	D1	D2	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)
MB404420-THX	40	44	20	39.961 40.000	44.000 44.025	40.060 40.155	MB909540-THX	90	95	40	89.946 90.000	95.000 95.035	90.080 90.205
MB404430-THX			30				MB909560-THX			60			
MB404440-THX			40				MB909580-THX			80			
MB404450-THX			50				MB909590-THX			90			
MB455020-THX	45	50	20	44.961 45.000	50.000 50.025	45.080 45.195	MB9095100-THX			95			
MB455030-THX			30				MB9510060-THX	60					
MB455040-THX			40				MB95100100-THX	100					
MB455045-THX			45				MB10010550-THX	50					
MB455050-THX	50	55	50	49.961 50.000	55.000 55.030	50.080 50.200	MB10010560-THX	100	105	60	99.946 100.000	105.000 105.035	100.080 100.205
MB505540-THX			55				MB10010580-THX			80			
MB505550-THX			55				MB10010595-THX			95			
MB505560-THX			60				MB100105115-THX			115			
MB556020-THX	55	60	20	54.954 55.000	60.000 60.030	55.080 55.200	MB10511060-THX			105			
MB556025-THX			25				MB105110100-THX	100					
MB556030-THX			30				MB105110115-THX	115					
MB556040-THX			40				MB11011560-THX	60					
MB556050-THX			50				MB110115100-THX	100					
MB556060-THX			60				MB110115115-THX	115					
MB606530-THX	60	65	30	59.954 60.000	65.000 65.030	60.080 60.200	MB11512050-THX	115	120	50	114.946 115.000	120.000 120.035	115.080 115.205
MB606540-THX			40				MB11512070-THX			70			
MB606560-THX			60				MB12012560-THX	60					
MB606570-THX			70				MB120125100-THX	100					
MB657040-THX	65	70	40	64.954 65.000	70.000 70.030	65.080 65.200	MB120125110-THX	120	125	110	119.946 120.000	125.000 125.040	120.080 120.210
MB657050-THX			50				MB12513060-THX			60			
MB657060-THX			60				MB125130100-THX			100			
MB657070-THX			70				MB1251301100-THX	110					
MB707540-THX	70	75	40	69.954 70.000	75.000 75.030	70.080 70.200	MB13013550-THX	130	135	50	129.937 130.000	135.000 135.040	130.080 130.210
MB707550-THX			50				MB13013560-THX			60			
MB707565-THX			65				MB13013580-THX			80			
MB707570-THX			70				MB130135100-THX			100			
MB707580-THX	75	80	40	74.954 75.000	80.000 80.030	75.080 75.200	MB13514060-THX	135	140	60	134.937 135.000	140.000 140.040	135.080 135.210
MB758040-THX			80				MB13514080-THX			80			
MB758060-THX			60				MB14014550-THX	50					
MB758080-THX			80				MB14014560-THX	60					
MB808540-THX	80	85	40	79.954 80.000	85.000 85.035	80.080 80.205	MB14014580-THX	140	145	80	139.937 140.000	145.000 145.040	140.080 140.210
MB808550-THX			50				MB140145100-THX			100			
MB808560-THX			60				MB15015550-THX			50			
MB808580-THX			80				MB15015560-THX	60					
MB8085100-THX			100				MB15015580-THX	80					
MB859030-THX	85	90	30	84.946 85.000	90.000 90.035	85.080 85.205	MB150155100-THX	150	155	100	149.937 150.000	155.000 155.040	150.080 150.210
MB859040-THX			40				MB16016550-THX			50			
MB859060-THX			60				MB16016560-THX			60			
MB859080-THX			80				MB16016580-THX	80					
MB8590100-THX			100				MB160165100-THX	100					

Part Number	D1	D2	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)
MB17017550-THX	170	175	50	169.937 170.000	175.000 175.040	170.080 170.210
MB17017560-THX			60			
MB17017580-THX			80			
MB170175100-THX			100			
MB18018550-THX	180	185	50	179.937 180.000	185.000 185.046	180.080 180.216
MB18018560-THX			60			
MB18018580-THX			80			
MB180185100-THX			100			
MB19019550-THX	190	195	50	189.928 190.000	195.000 195.046	190.080 190.216
MB19019560-THX			60			
MB19019580-THX			80			
MB190195100-THX			100			
MB190195120-THX			120			
MB20020550-THX	200	205	50	199.928 200.000	205.000 205.046	200.080 200.216
MB20020560-THX			60			
MB20020580-THX			80			
MB200205100-THX			100			
MB200205120-THX			120			
MB22022550-THX	220	225	50	219.928 220.000	225.000 225.046	220.080 220.216
MB22022560-THX			60			
MB22022580-THX			80			
MB220225100-THX			100			
MB220225120-THX			120			
MB24024550-THX	240	245	50	239.928 240.000	245.000 245.046	240.080 240.216
MB24024560-THX			60			
MB24024580-THX			80			
MB240245100-THX			100			
MB240245120-THX			120			
MB25025550-THX	250	255	50	249.928 250.000	255.000 255.052	250.080 250.222
MB25025560-THX			60			
MB25025580-THX			80			
MB250255100-THX			100			
MB250255120-THX			120			
MB26026550-THX	260	265	50	259.919 260.000	265.000 265.052	260.080 260.222
MB26026560-THX			60			
MB26026580-THX			80			
MB260265100-THX			100			
MB260265120-THX			120			
MB28028550-THX	280	285	50	279.919 280.000	285.000 285.052	280.080 280.222
MB28028560-THX			60			
MB28028580-THX			80			
MB280285100-THX			100			
MB280285120-THX			120			

Part Number	D1	D2	Length (+/- 0.25)	Shaft Dia. (d)	Housing Bore (Dg)	Installed ID (D1E)
MB30030550-THX	300	305	50	299.919 300.000	305.000 305.052	300.080 300.222
MB30030560-THX			60			
MB30030580-THX			80			
MB300305100-THX			100			
MB300305120-THX			120			

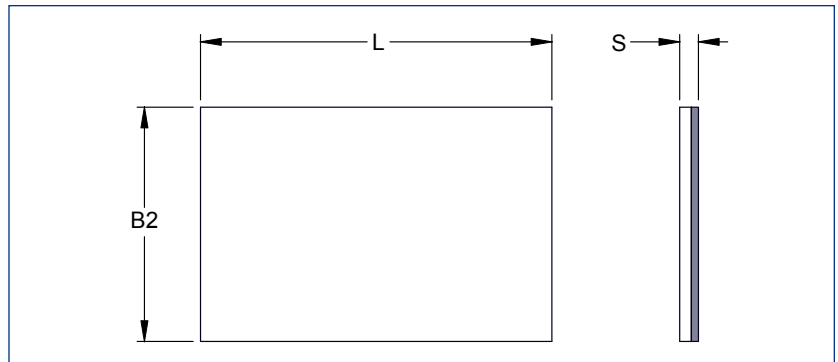
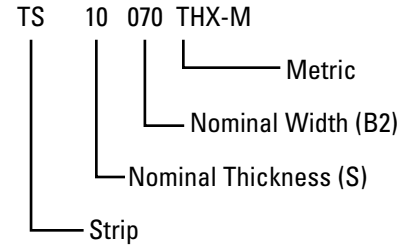
Chamfer Dimensions		
D1	f1	f2
8 to 18	.20 to 1.00	.10 to .50
20 to 28	.20 to 1.00	.10 to .70
28 to 40	.80 to 1.60	.10 to .70
45 to 300	1.20 to 2.40	.20 to 1.00

Oil Hole Diameter (D6)		
D1	D6 (mm)	tolerance
8	no hole	
10 to 22	3	±0.30
24 to 40	4	±0.30
45 to 50	5	±0.30
55 to 100	6	±0.30
105 to 300	8	±0.30

## THX FLAT STRIPS

Part Number	S	B2	L
TS-10070-THX-M	1.030 1.060	70	460
TS-15100-THX-M	1.520 1.550	100	460
TS-20100-THX-M	2.020 2.050	100	460
TS-25100-THX-M	2.530 2.560	100	460

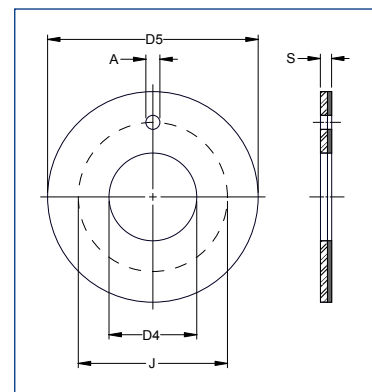
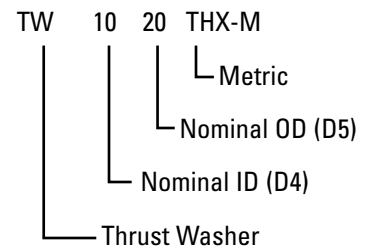
### Part Numbering



## THX THRUST WASHERS

Part Number	D4 (+/- 0.25)	D5 (+/- 0.25)	S	Dowel Hole J (+/- 0.12)	A
TW-1224-THX-M	12	24	1.577 1.487	18	1.870 1.620
TW-1426-THX-M	14	26		20	2.370 2.120
TW-1630-THX-M	16	30		22	
TW-1832-THX-M	18	32		25	3.375 3.125
TW-2036-THX-M	20	36		28	
TW-2238-THX-M	22	38		30	
TW-2442-THX-M	24	42		33	4.375 4.125
TW-2644-THX-M	26	44		35	
TW-2848-THX-M	28	48		38	2.600 2.510
TW-3254-THX-M	32	54		43	
TW-3862-THX-M	38	62	50		
TW-4266-THX-M	42	66	54		
TW-4874-THX-M	48	74	61		
TW-5278-THX-M	52	78	65		

### Part Numbering



## CHEMICAL PROPERTIES

The PTFE sliding layer is resistant to most chemical products, while the corrosion resistance of TH bushing depends on the steel backing which does not oxidize when:

- Immersed in water, alcohols or glycols
- In the presence of mineral and synthetic oils
- In acid substances with a pH level of > 5
- In alkali substances with a pH level of < 9

Corrosion is triggered off in the case of repeated wet/dry cycles, the presence of oxygen and when the temperature exceeds 90°C.

The chemical resistance of TH bushing is improved by tin-plating, but the problems of corrosion must be overcome by further protection such as special tin-plating, by sealing the bearings or by using the bronze-backed bearings (TH-B) or stainless steel-backed bearings (TH30).

## THERMAL CONDUCTIVITY

During operation heat is generated by the friction between the bearing and the shaft. The heat is partly dissipated by the fluids present (gas or liquids) and partly absorbed by the mating parts.

Under normal operating conditions, the bearing must be able to dissipate the heat generated and not give rise to thermal dilations that may compromise the working of the two parts. Under both aspects, TH bushing performs very well as it features:

Perpendicular thermal conductivity which is linked to the steel backing and the close contact of the bronze and the polymer layer. Both factors lead to a high level of thermal conductivity between the layers that enables the heat to be eliminated without causing a sharp rise in the temperature (on average + 20° to 25°C compared to the temperature of the environment).

Volumetric expansion: the increase in temperature gives rise to an expansion in the volume of the materials. Given the composition of the product, TH bushing expands in a way very similar to that of metals normally used for the housing and the counterpart. This similar behaviour prevents seizure during

heating and movement of the bearing in the housing during cooling which sometimes arises when plastic bearings are used.

## ELECTRICAL CONDUCTIVITY

TH bushing not only offers a high level of thermal conductivity, but also a high level of electrical conductivity that is perpendicular to the layers. However, this electrical conductivity only appears after the first running-in period, when the bronze starts to be exposed and comes into contact with the mating surface. The perpendicular electrical conductivity increases with the specific load applied on the bearing and with the degree of wear. Typical values of specific electrical resistance for units-surface are the following:

Perpendicular electrical resistance:  $R = 1 - 10W \times cm^2$

## FRICITION

The TH bushing sliding layer has a PTFE base that gives an excellent slide quality due to the low coefficient of friction. The amount of friction cannot be defined exactly as it is influenced by the following parameters:

- Load factor  $p \times v$  on the surface
- Operating temperature
- Presence of liquids and lubricants
- Material and finish of the mating surface

The load factor  $p \times v$  is the result of the specific load  $p$  (N/mm<sup>2</sup>) and the speed  $v$  (m/s) and represents the reference parameter for checking the performance of this type of bearing.  $p \times v$  being equal, the coefficient of friction decreases as the specific load increases, while the coefficient of friction increases as the speed increases.

Sliding Speed $v$ (m/s)	Specific Load $p$ (N/mm <sup>2</sup> )	Coefficient of Friction $\mu$
up to 0.001	140	0.03
0.001 to 0.005	140 to 62	0.04 to 0.07
0.005 to 0.05	62 to 11	0.07 to 0.1
0.05 to 0.5	11 to 1	0.1 to 0.15
0.5 to 2	1	0.15 to 0.20

## TEMPERATURE

The temperature has a very slight effect on the coefficient of friction if it remains within a range of 0° to 100°C. Once these limits are exceeded, the coefficient of friction increases rapidly by 50% or more. It should be noted that very high temperatures reduce the useful life of TH bearings. Under equal load factors, the useful life is reduced by 80% at a temperature of over 200°C compared to that noted at 25°C.

## LIQUIDS AND LUBRICANTS

TH bearings have been designed for dry operations, but despite this, the presence of clean fluids in the working area can facilitate the dissipation of heat and prolong the useful life of the bearing.

The presence of liquids, whether lubricants or other, may lead to hydrodynamic operating conditions which enable a considerable increase in the sliding speed at the same specific load. Hydrodynamic operating conditions are influenced by the following parameters:

- Sliding speed
- Specific load
- Tolerance of the mating surfaces
- Viscosity of the liquid
- Operating temperature

## OPERATION IN THE PRESENCE OF LIQUIDS AND LUBRICANTS

In practise, even the self-lubricated bearings (TH Series) can be used in the presence of liquids and/or lubricating fluids.

In these situations, the behaviour of the bearings are modified and the following considerations apply:

- The presence of a clean fluid on the bearing (whether lubricating or not) usually has a positive effect as it improves the dissipation of the heat caused by the friction and also improves the contact between the sliding surfaces.
- It is necessary to check the compatibility of the bearing with the fluid. Most problems arise with THX bearings as the acetal co-polymer is not recommended for use in water, glycols or synthetic oils with phosphoric esters. The other TH Series does not have any particular contraindications in the presence of widely used liquids and lubricants.

If in doubt and in case of special applications, it is advisable to carry out a simple test by immersing half of a sample bearing in the liquid in question. If, after two weeks, the bearing shows non signs of alteration in any part it can be considered to be compatible with the fluid.

- For the TH Series of bearings, the positive effects of the presence of fluids are confirmed only if alternating dry and wet cycles are avoided. In the presence of repeated cycles, the result is a premature decline in the product compared to dry operating conditions.
- For the bearings subject to lubrication, just the initial greasing may be sufficient as long as the application is subject to limited specific load and speed values.

## LUBRICATION SYSTEMS

In the presence of fluids and under certain speed and specific load conditions, hydrodynamic lubrication occurs. This involves a thin film of fluid being generated permanently between the mating surfaces. During a hydrodynamic regime, the coefficient of friction and the wear of the parts falls to such a level that the life of the bearing depends more on the number of stop-start operations rather than the actual running time.

If a hydrodynamic operating regime is provided for during the design phase, steps must be taken to increase the clearance of the mating parts to facilitate the formation and maintenance of the separating film.

## MATERIAL AND FINISH OF THE MATING SURFACE

The material of the mating surface, whether it is a shaft or a shoulder, has a considerable effect on the results of the application. The metals which may corrode in the presence of humidity or pollutants, accelerate the deterioration of the mating surface.

For applications with no protection, it is advisable to use stainless steel, chromium-plated steel or anodized aluminum mating surfaces.

Bronze, non-anodized aluminum, phosphated or nickel-plated steel mating surfaces are not suitable. The roughness of the mating surface must be quite low to permit a good operating life. The recommended value for the best performance is 0.4mm Ra.



## PV CALCULATIONS

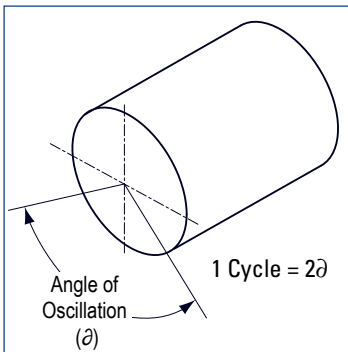
The load factor PV has a considerable influence on determining the bearings useful operating life. PV is determined by multiplying the specific bearing load or pressure (P) by the sliding speed (V). Bearing materials are rated by a PV limit, with the PV limit representing the highest combination of load and speed under which the bearing material will operate. The PV unit of measure is N/mm<sup>2</sup> x m/s.

To determine P in an application: The specific bearing load (P) is determined by dividing the bearing load by the pressure supporting area of the bearing. The units for P are N/mm<sup>2</sup>. The pressure supporting area depends on the specific geometry of the bearing, the following are formula for the most common types of bearing geometry.

Sleeve Bushing		
	<p><b>Specific Bearing Load (N/mm<sup>2</sup>)</b></p> $p = \frac{W_r}{d \times b}$	<p><b>Sliding Speed (m/s) Rotation</b></p> $v = \frac{\pi \times d \times N}{60 \times 10^3}$
		<p><b>Sliding Speed (m/s) Oscillation</b></p> $v = \frac{\pi \times d \times \partial \times N_{os}}{60 \times 10^3 \times 360}$

Thrust Washer		
	<p><b>Specific Bearing Load (N/mm<sup>2</sup>)</b></p> $p = \frac{4W_t}{\pi (D^2 - d^2)}$	<p><b>Sliding Speed (m/s) Rotation</b></p> $v = \frac{\pi \times D \times N}{60 \times 10^3}$
		<p><b>Sliding Speed (m/s) Oscillation</b></p> $v = \frac{\pi \times D}{60 \times 10^3} \times \frac{2\partial \times N_{os}}{360}$

p	specific bearing load	N/mm <sup>2</sup>	psi
W <sub>r</sub>	load on bushing	N	pounds
d	inside diameter	mm	inches
D	outside diameter	mm	inches
W <sub>t</sub>	load on thrust washer	N	pounds
N	speed of rotation	rpm	rpm
∂	angle of oscillation	degrees	degrees
N <sub>os</sub>	frequency of oscillation	cycles/min	cycles/min
v	sliding speed	m/s	fpm


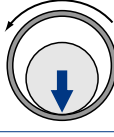
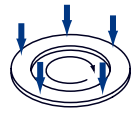


### CALCULATION OF THE USEFUL LIFE

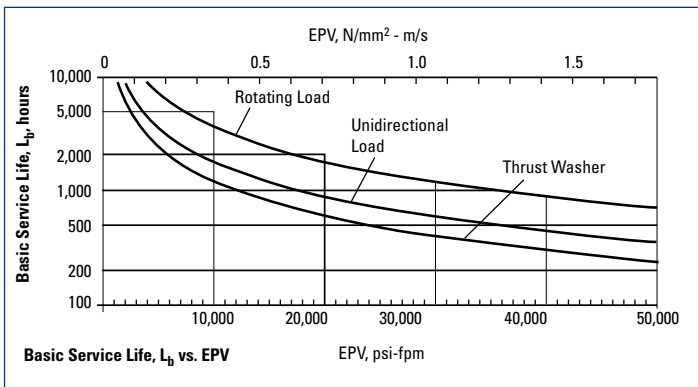
The operating life of a dry application TH sliding bushing is inversely proportional to the load factor (p x v) but, in order to achieve a close approximation of the figure, the following corrective factors must be introduced:

$$L_h = L_b \times f_h \times f_b \times f_m - f_a$$

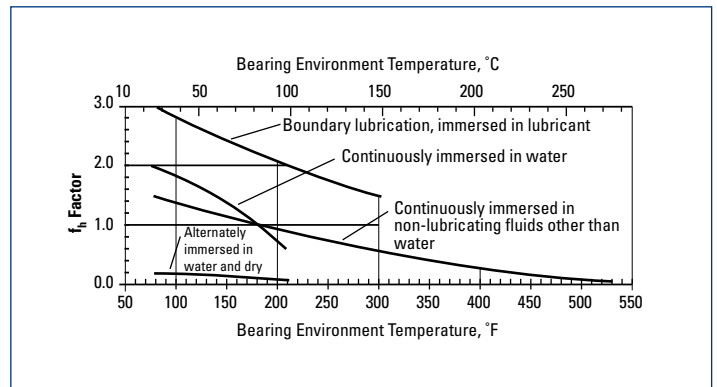
- $L_h$  = bushing life (hours)
- $L_b$  = basic service life (hours)
- $f_h$  = heat dissipation factor
- $f_b$  = bushing size factor
- $f_m$  = mating surface factor
- $f_a$  = life adjustment factor (hours)

UNIDIRECTIONAL LOAD	ROTATING LOAD	THRUST LOAD
		
<b>400</b>	<b>800</b>	<b>250</b>

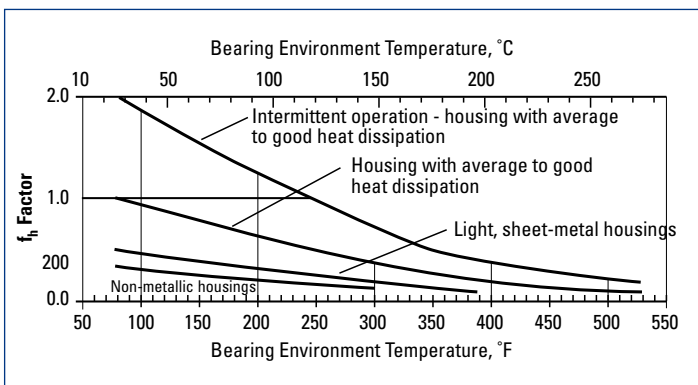
#### Dryslide Basic Surface life, $L_b$ (hours)



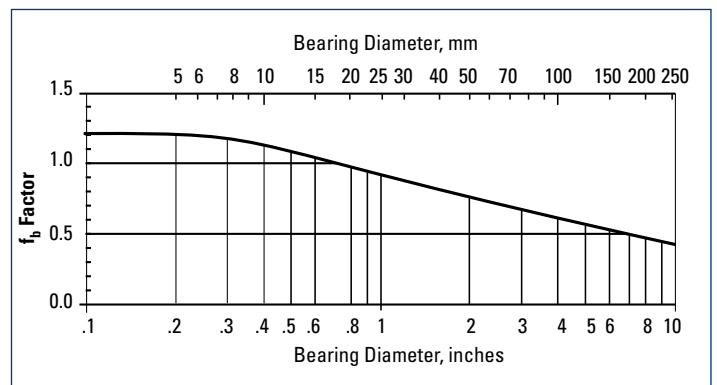
#### Dryslide Heat Dissipation Factor, $f_h$ - for fluid applications



#### Dryslide Heat Dissipation Factor, $f_h$ - for dry applications



#### Bushing Size Factor, $f_b$



## Mating Surface ( $f_m$ ) and Life Adjustment ( $f_a$ ) Factors

Material	Mating Surface Factor $f_m$	Life Adjustment Factor $f_a$ (hours)
<b>Steel and Cast Iron</b>		
Case-hardened steel	1.0	200
Cast iron-12 microinches (0.3 micrometers)	1.0	200
Mild steel	1.0	200
Nitrided steel	1.0	200
Sprayed stainless steel	1.0	200
Stainless steel	2.0	200
<b>Plated Steel with 0.0005 inch, (0.013 mm) minimum plating thickness</b>		
Hard chrome	2.0	600
Nickel	0.2	600
Phosphated	0.2	300
Tin nickel	1.2	600
Tungsten carbide flame	3.0	600
Zinc	0.2	600
<b>Non-Ferrous Metals</b>		
Anodized aluminum (decorative)	0.4	200
Bronze and copper base alloys	0.1-0.4	200
Hard anodized aluminum, 0.001 inch (0.025 mm) thick	3.0	600

## RUNNING-IN PERIOD

In order to complete the information and the calculations concerning the operating life of the bearings, consideration must be given to the operating method and the degree of wear on the bearings. The bearings have an initial running-in period during which the outer layer of the sliding surface is transferred onto the mating surface, compensating for the non-flatness of the contact and making the coefficient of friction stable.

After the running-in phase, the porous bronze layer is gradually exposed. The surface of the exposed bronze increases with the number of operating hours until it reaches 90% of the contact surface. At this point, the bearing is considered to have reached the end of its useful life.

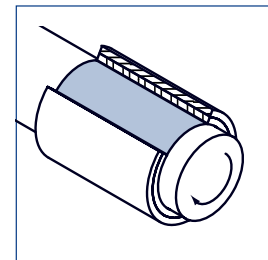
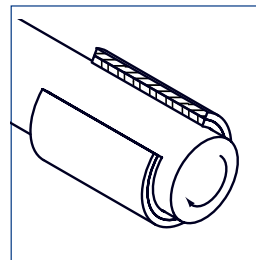
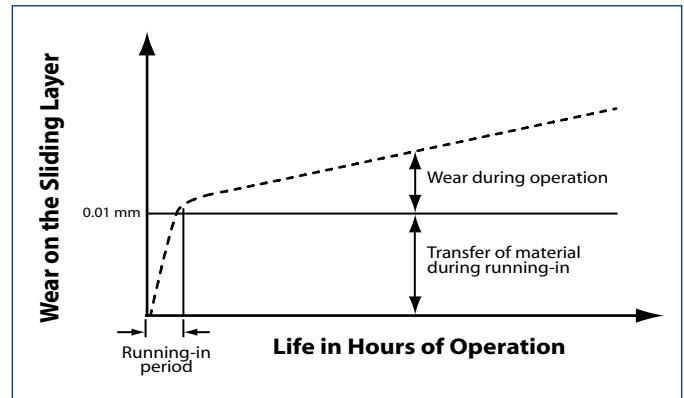
If, after the running-in period, the bronze is exposed regularly over all the contact area, it confirms that the application was correct.

## APPLICATION

Having calculated the life of the bushing ( $L_n$ ), the engineer has to decide whether to accept or reject the data obtained. If the estimated life is not acceptable, the sizes of the bushing are modified and a new check is made following the sequence previously adopted.

For a more detailed estimation of the operating life of DMR bushings and other products in the series, please complete the Application Data Sheet at the back of the catalogue and fax it to your local Daemar Technical Sales Representative.

For applications that come close to the design limits, it is always advisable to carry out prototype testing.



## FITTING METHODS

The most commonly used method for fitting the bushings is to press them into the housing. Having created the correct housing (H7), the following steps should be taken:

- Chamfer the lead-in to the housing by  $20^\circ \pm 5^\circ$  to a depth of 1-2mm
- Deburr and clean the mating surfaces
- Lubricate the outside surface of the bushing before fitting it (do not apply excessive lubricant as it may cause the bushing to move about when fitted in the housing)
- Check the alignment of the axes between the bushing and the housing
- Where several bushings are necessary, align the butt joints
- It is always advisable to use a guiding mandrel to insert the bushings in their housing

Press fitting is usually carried out using hydraulic, pneumatic or mechanical equipment (fig 1).

To fit bushings with a diameter or more than 55mm, it is advisable to use a retaining ring with a diameter that is 0.3/0.4mm larger (fig. 2)

For flange bushings (fig. 3), the chamfer on the lead-in must have an angle of  $45^\circ$  and a depth of at least 2mm (2.55 for a bushing with a wall thickness of 2.5mm).

Approximate Values of the Pressing Force "F" in Newtons	
Bushing Thickness 1 mm	$F = 300 \times L$
Bushing Thickness 1.5 mm	$F = 500 \times L$
Bushing Thickness 2 mm	$F = 700 \times L$
Bushing Thickness 2.5 mm	$F = 900 \times L$

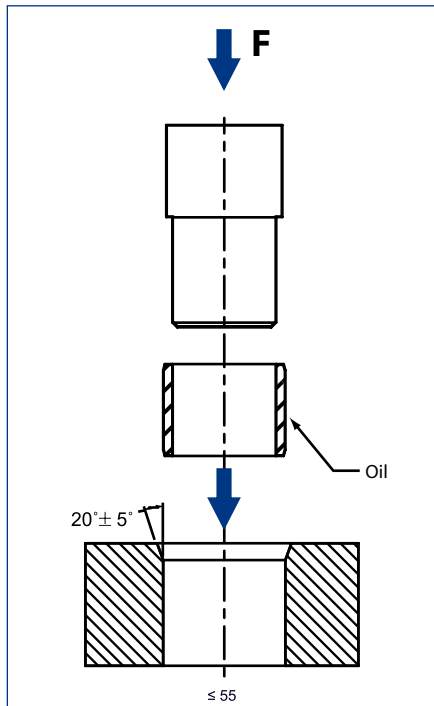


Fig. 1

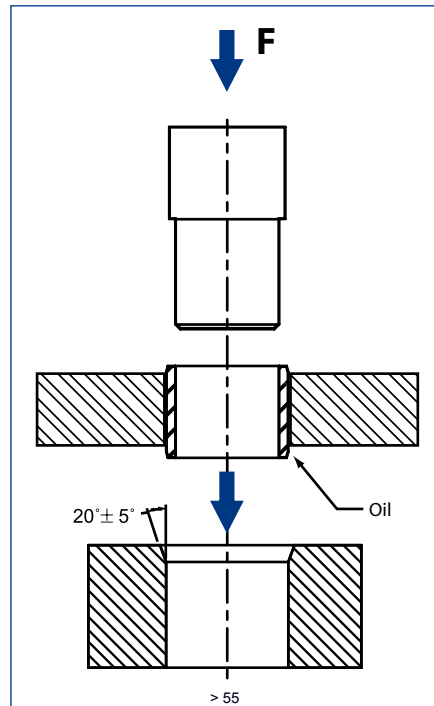


Fig. 2

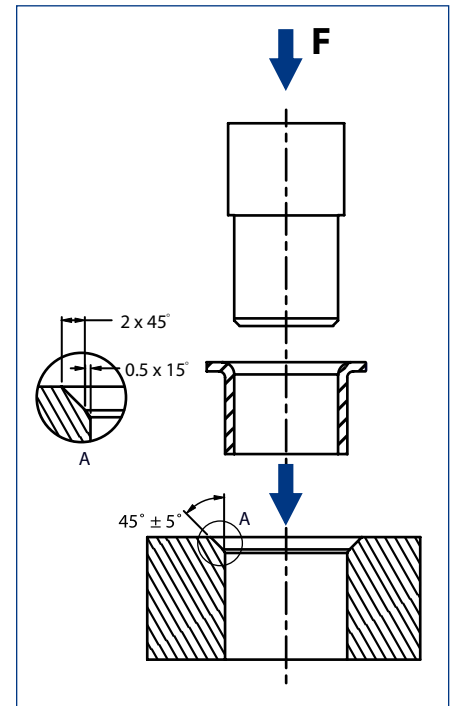


Fig. 3

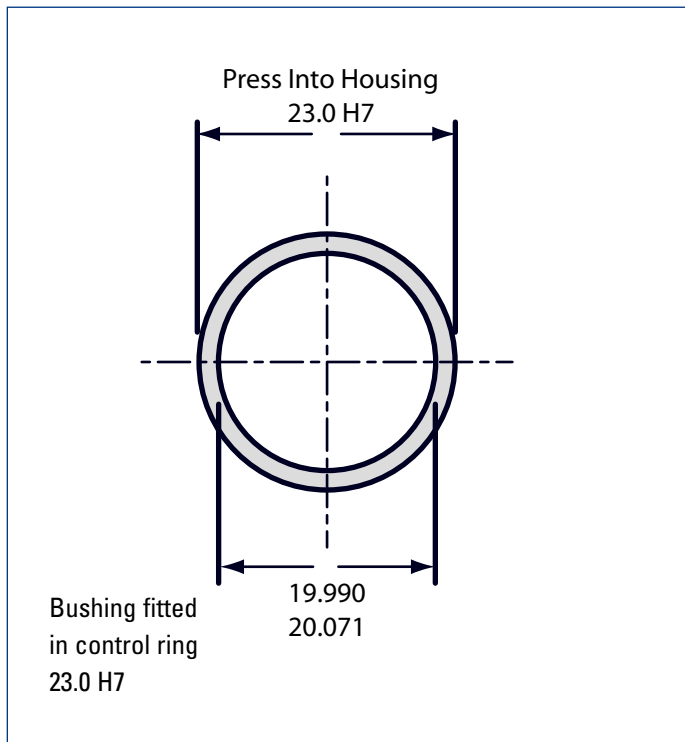
## CHECKING METHODS

The main method for checking the wrapped bushings supplied by Daemar is to check the measurements of the internal and external diameters. Neither of the diameters can be checked before the bushing is fitted as an imperfect contact of the two edges leads to incorrect measurements.

The standard (DIN 1494) specifies the valid methods for measuring the internal and external diameters. The two methods are summarized below:

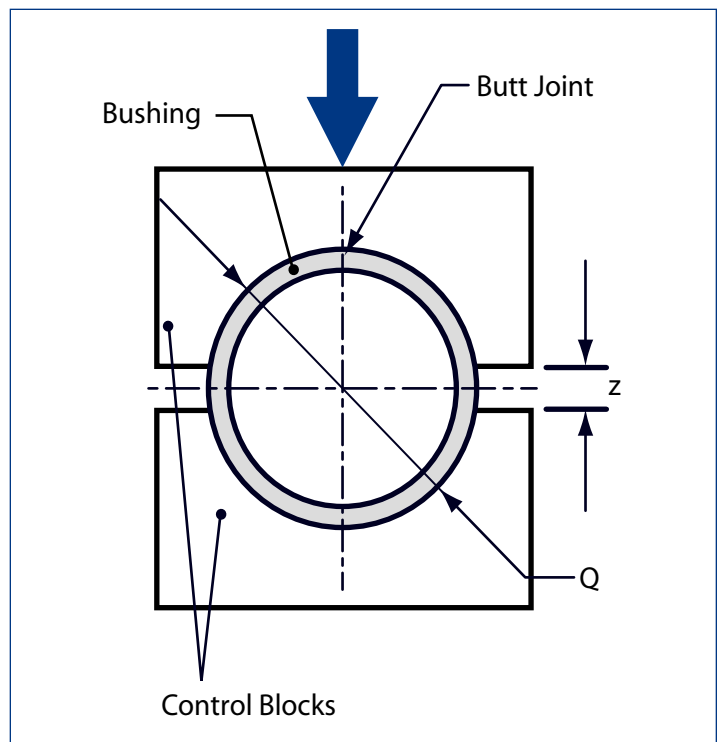
### Internal Diameter - Test C

The bushing to be checked is fitted in the housing corresponding to the nominal external diameter with the H7 tolerance. Once the bushing has been fitted, the internal diameter is measured and must fall within the tolerance field shown on the relevant table of this catalogue.



### External Diameter - Test A

To carry out this test, it is necessary to have the testing equipment as provided for by the standard (DIN 1494). The device consists of two half-shell shaped blocks in which the bushing is inserted and then pressed. The test consists of loading the outside of the bushing and measuring how much the bushing yields. If the amount of yield falls within a certain range, the external diameter of the bushing can be said to be correct.



#### Test A DIN 1494 Part 2 (Ref. TFP 20 20)

<b>Test Housing and Mandrel</b>	<b>Q = 23.062 mm</b>
<b>Load</b>	<b>Fb = 4500N</b>
<b>Limits of <math>\Delta z</math></b>	<b><math>-0.065 \leq \Delta z \leq 0</math></b>
<b>Bushing Thickness 2.5 mm</b>	<b>F = 900 x L</b>

CJ composites are ideal for non-lubricated, high-load applications in a variety of climates and operating environments, exhibit a high load capacity similar to bronze, powdered metal and steel, and provide longer wear and extended operating life without the costs associated with lubrication. CJ composites are available with thick walls for drop in replacement of steel and bronze bearings. CJ composites also don't rust like metal components, so you can use them in environments where traditional metals corrode and fail. You'll find CJ bearing materials in heavy-duty agricultural, automotive, construction, industrial, marine, railway, and material handling equipment.

CJ composites possess a modulus of elasticity that falls between rigid metals and soft plastics. CJ components are rigid enough to support heavy loads, yet compliant enough to tolerate moderate amounts of shaft misalignment without highly stressing the ends. The composite wall acts like a spring and the thicker the wall section of the bearing the greater the deflection for a given load. Thick wall bearings tolerate greater shaft misalignment and provide better shock absorbency.



Light-weight, high-strength, fatigue-resistant CJ composites are the ideal bearing choice for nonlubricated high-load/low-speed applications. CJ bearings provide excellent resistance to impact and shock loads and are capable of with standing a high degree of shaft misalignment.

FCJ bearings are the ideal choice for combination motion-oscillatory, linear, and/or rotary applications. Their ability to run successfully against mild steel shafting makes for a cost-competitive system. Their versatility makes them excellent general purpose self-lubricating bearings.

The self-lubricating wear surface of CJ and FCJ composites are capable of reducing both equipment costs and the need for maintenance. Use CJ bearings in applications where:

- Conventional lubricants will not function.
- Shock loads are present.
- Stick-slip operation is undesirable.
- Low cost is an issue, particularly when taking into consideration the bearing, lubrication system, or maintenance.

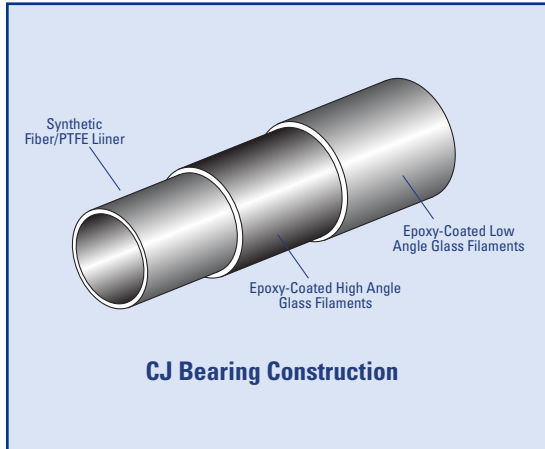
Use CJ when your application requires:

- High-load capacity.
- Resistance to chemical, galvanic, or fretting corrosion.
- Minimal galling and scoring.
- Reduced weight.
- Electrical insulation.

Use FCJ in applications where you would normally use low-speed porous and cast bronze. It is corrosion resistant, practically chemically inert and electrically insulative. FCJ bearings are more tolerant of small contaminants than standard CJ bearings. They are also easily machined using standard techniques. Standard FCJ sizes interchange with standard bronze bearings. That means FCJ is not only an ideal alternative to metal, it's also a perfect fit.







## GENERAL DESCRIPTION

The CJ composite bearing is a multi-layer structure. The inner-most layer consists of a synthetic fiber/PTFE layer. The second layer consists of epoxy-coated high-angle glass filaments. The outer-most layer consists of epoxy-coated low-angle glass filaments.

The synthetic and PTFE fibers used in the liner have a long history of successful use as a bearing wear surface for rod end and aircraft spherical bearings. The high-load capacity and reliability of these bearings has made them the preferred design for many applications.

Fiberglass/epoxy filament wound composites, when used to make a bearing, allow the selection of fiber angles to provide optimum strength and rigidity. The resulting structure has a modulus of elasticity of approximately 2 x 10<sup>6</sup> psi (13.79 GPa) placing it in an intermediate area between rigid metals and soft plastic. It is rigid enough to support heavy loads, and at the same time compliant enough to tolerate moderate amounts of shaft misalignment without highly stressing the bearing corners. The composite wall acts like a spring and the thicker the wall section of the bearing the greater the deflection for a given load (See Figure C). This allows thick wall bearings to tolerate greater shaft misalignment. The wear surface will support the shaft primarily

## TYPICAL SPECIFICATIONS

### Recommended Operating Limits and Engineering Information

Properties		CJ	FCJ
Maximum Pressure (P) (static)	psi	35,000 <sup>(1)</sup>	20,000
	MPa	241	138
Maximum Velocity (V) (no load)	ft/min	150	500
	m/sec	.76	2.54
Lubrication		No	No
Temperature —Typical Range	°F	-320/+350	-320/+350
	°C	-195/+176	-195/+176
Shaft Hardness —Minimum, Rockwell Scale		Rc 50	Rb 25
Shaft Finish Recommended Ra (Microinches)		8-16	8-16
Shaft Material Steel Steel			
Coefficient of Friction (Static/Dynamic Range)		.02 - .25	.01 - .20
Water Absorption ASTM D570		<.5%	<.5%
Corrosion Resistance		Excellent	Excellent
Linear Coefficient of Thermal Expansion  (ASTM D696) 78°F to 300°F 26°C to 149°C	in/in/°F	7 x 10-6	7 x 10-6
	cm/cm/°C	13 x 10-6	13 x 10-6

<sup>(1)</sup> 15,000 psi maximum dynamic

as a function of the load rather than the shaft clearance. As load is applied, the wear surface will conform to the shaft assuring a large contact area. In contrast, the contact area of metal bearings decreases sharply as shaft clearances increase, and increase only slightly with load.

## BEARING WEAR

Figure A depicts the typical wear behavior of a CJ or FCJ bearing. There is an initial break-in period during which a transfer film is established on the mating surface. In some situations, up to .001" (.03mm) of wear may occur at break-in and in other situations the wear may be negligible. After the break-in period, the wear rate stabilizes and remains relatively constant for the life of the bearing.

There is a transfer film of PTFE, epoxy, and some synthetic fiber that clings tenaciously to the metal surface, and acts as a lubricant between the shaft and the bearing.

The equilibrium wear rate depends on a number of factors including loads, speeds, shaft hardness, and shaft surface finish. Under laboratory conditions, radial wear is approximately proportional to both sliding distance and load. The wear rate is often reported as a factor K. This relationship can be expressed as follows:

$$W = KPVT$$

**W = Radial wear in inches**

**K = Wear factor**

**P = Load in psi**

**V = Sliding velocity (ft/min)**

**T = Time in hours**

The following tables show the actual measured wear factor for a number of conditions of oscillation and rotation. These values were obtained using Rc 50 shafts with a surface finish of 16 Ra (.4 μm). The wear factor would

increase if the shaft material was softer or the surface finish rougher. The performance using the softer shafts was significantly lower, especially at the higher load condition. While performance is lower, it is adequate for many less demanding applications.

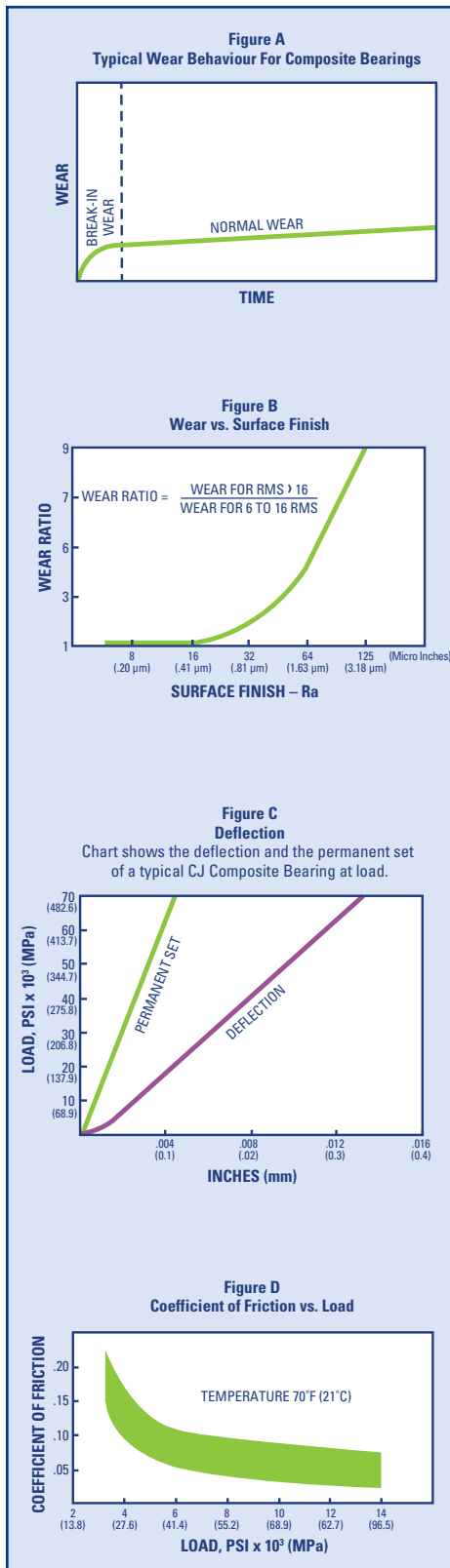
### Measured Wear Factor for CJ Composite Bushings

Type of Operations	P lbs/ in <sup>2</sup>	V ft/min	K in <sup>3</sup> x min/ lbs x ft x hr
Oscillation ±25°	229	43.6	9.6x10 <sup>-10</sup>
	4,900	2.0	1.9x10 <sup>-10</sup>
	15,000	.73	2.0x10 <sup>-9</sup>
Rotation	64	78.5	39.8x10 <sup>-10</sup>
	64	157.0	24.9x10 <sup>-10</sup>
	256	39.3	14.9x10 <sup>-10</sup>
	512	39.3	12.4x10 <sup>-10</sup>

### Measured Wear Factors for FCJ Composite Bearings

Type of Operations	P lbs/ in <sup>2</sup>	V ft/min	K in <sup>3</sup> x min/ lbs x ft x hr
Oscillation ±25°	229	43.6	7.4x10 <sup>-10</sup>
	4,900	2.0	1.6x10 <sup>-10</sup>
	14,000	.73	5.52x10 <sup>-10</sup>
Rotation	64	78.5	33.1x10 <sup>-10</sup>
	64	157.00	19.9x10 <sup>-10</sup>
	256	39.3	14.6x10 <sup>-10</sup>
	512	39.3	12.41x10 <sup>-10</sup>

Using wear factors, the radial wear of a CJ bearing can be estimated by calculating W and adding .001" (.025 mm) for break-in wear. The liner can sustain .015-.020" (.38mm-.51mm) wear and still operate normally. Bearings having an inside diameter of over 2-1/2" have a thicker liner capable of sustaining .025"



to .030" (.64mm - .76mm) wear. Surface finish affects wear rate as shown in (See Figure B) Field experience has shown that hard chrome plating gives excellent wear performance and protects the shaft from corrosion. Softer coatings such as cadmium and zinc will not stand up in service and quickly wear off.

## LOAD CAPACITY

Normal application of load will cause a simple elastic deflection of the CJ bearing along with some permanent set. The set is primarily due to compaction of the synthetic fiber/PTFE liner.

We do not typically recommend subjecting the bearings to over 35,000 psi (241 MPa) load. In common with other materials, fiberglass/epoxy composites can undergo fatigue after repeated application of stress. Fatigue has not been a limiting factor in the use of the CJ bearing.

In fact, laboratory tests have shown that in many cases the bearing is more fatigue-resistant than the shaft. Laboratory tests show that the bearings fail by a gradual crushing action rather than a rapid catastrophic failure. This is consistent with typical composite behavior in which stress is supported by many fibers.

If one fiber breaks, the load is redistributed among the others. Breakage of the entire structure will not occur until a large number of the individual fibers are broken. CJ composite bearings can easily withstand over 35,000 psi (241 MPa) static load or 15,000 psi (103 MPa) dynamic load with a great deal of reliability.

In many cases, higher loading can be tolerated if the design and conditions

of service are discussed fully with a technical representative.

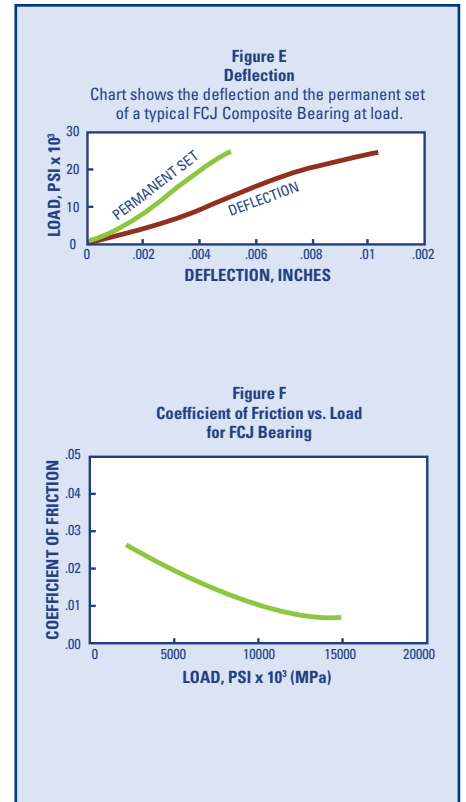
Length to diameter ratio is also an important design consideration. Test results from the laboratory and the field have shown that the optimum performance can be attained by specifying a length to inside diameter ratio (L/D) ranging from .5 to 2. When the L/D ratio of less than .5 is used, it is possible to create highly stressed areas at the corner of the bearing and cracking will occur at this location prematurely. If the L/D ratio is over 2, with any amount of shaft misalignment, cross corner jamming will occur and unit stresses can exceed the 15,000 psi (103 MPa) safe dynamic limit or the 35,000 psi (241 MPa) static limit of the bearings.

Bearings built with the proper L/D ratio will accept misalignment and shock load without premature failure.

## COEFFICIENT OF FRICTION

The coefficient of friction of a synthetic fiber/PTFE lined composite journal bearing running against a hardened Rc 50 steel shaft with a 16 Ra (.4 μm) surface, or less, varies from .02 to .25 depending on the load, the relative sliding velocity, and the bearing surface temperature. Generally, the coefficient of friction decreases with increasing load (See Figure D).

This information indicates that if the lowest coefficient of friction is desired, the smallest bearing capable of sustaining the load should be used, and that the bearings are capable of performing best under peak operating conditions when temperatures and loads may be higher.



## LUBRICATION

The synthetic fiber/PTFE fabric wear surface of the CJ bearing is a self-contained boundary lubrication system; however, the addition of conventional lubricants often improves the overall performance of the CJ bearing.

“Lubricant” is a very general term, and it is often said that any liquid will act as a lubricant.

To some extent, this is true if hydrodynamic conditions are established, and the surfaces have minimal contact. The composite bearing, in earth moving equipment, operates generally in a state of boundary lubrication. Hydrocarbon oils are advantageous and can produce tenfold reductions in wear rates. Liquid lubricants can carry away heat and

reduce the coefficient of friction. Greases can be used for lubrication, to prevent corrosion, and keep contamination out of the journal. In oscillating motion, the synthetic fiber/PTFE liner acts as a true boundary lubricant when the direction of motion changes and the lubrication film collapses. In rotation, with oil lubrication, the wear rate of the CJ

composite has been found equal to sintered or cast bronze bearings. Fluorocarbon oils and greases should be avoided because they have been found to soften the synthetic fibers and greatly increase the rate of wear.

It is possible to add lubrication holes to the CJ bearing, but grooves are impractical. The abrasion resistance of the synthetic fibers makes groove fabrication difficult and costly.

## THERMAL PROPERTIES

The operating temperature range for CJ bearings is -320°F to +300°F (-195°C to +149°C).



The bearing has been heat stabilized at a temperature above 300°F (149°C) and very little dimensional change will occur in the bearing during operation. In the free state, the coefficient of expansion of the CJ bearing in the radial direction is approximately  $7 \times 10^{-6}$  in/in/°F.

When press fit into a housing, the CJ bearing assumes the coefficient of expansion of the housing material, as long as the press fit is maintained, and thus the elastic modulus of the bearing is maintained, because the elastic modulus of the bearing is lower than the elastic modulus of most metals.

The CJ composite is a thermal insulator and when heat is generated from running friction, the bearing wear surface may be hotter than the adjacent housing due to the thermal lag.

Since the installed bearing cannot expand outward, it grows inward, reducing the shaft clearance. For this reason, the shaft clearance should be increased for dry running applications that have high running velocities.

Naturally, fluid cooling and lubricants will reduce the operating temperatures.

Heat transfer through the bearing wall is proportional to the wall thickness, and the thinner the composite wall, the greater the transfer of heat.



## MEASURING OPERATING PV

PV is a means of measuring the performance capabilities of bearings. P is expressed as pressure or pounds per square inch on the projected bearing area. V is the velocity in feet per minute of the wear surface.

For sleeve bearings the surface speed V is  $.262 \times \text{RPM} \times \text{diameter in inches}$ . P is equal to the load on the bearing in pounds divided by the projected area in square inches. For sleeve bearings the projected area is the length times the diameter of the bearing. PV is then obtained by multiplying the P x V as shown in the following example:

3/4" Shaft @ 341 RPM;  
90 lb. total load, bearing length 1"

$V = .262 \times \text{RPM} \times \text{Diameter}$   
or  $.262 \times 341 \times .750 = 67 \text{ ft/min}$

$P = \text{Total load} \div \text{projected area}$   
area =  $.750 \times 1.0 = .75 \text{ in}^2$

$P = 90 \text{ lbs} \div .75 = 120 \text{ psi}$   
 $PV = 120 \text{ psi} \times 67 \text{ fpm} = 8040 \text{ PV}$

## MECHANICAL PROPERTIES

The CJ bearing has withstood static loads in excess of 50,000 psi (345 MPa) at room temperature. However, we do not generally recommend static loads in excess of 35,000 psi (241 MPa). At the recommended load limits, minimal crushing will occur. As the temperature increases, the load capacity of the bearing decreases. The composite backing tends to act as a shock absorber and reduces vibration. The maximum speed is 150 surface feet per minute for dry running applications.

## CORROSION RESISTANCE

The CJ bearing is not affected by corrosive environments. Some solutions of highly concentrated acids will attack the backing material.

Specific information can be obtained from our Technical Service Department. The shaft should be stainless steel or chrome-plated if an alloy steel is used. The CJ bearing cannot rust, but when using a lubricant, it should contain a rust inhibitor to protect the shaft.



Ultracomp Bearing Grade Composites meet the rigorous needs of high load, low speed plane bearing applications. Ultracomp is self lubricating, easy to machine, has exceptional resistance to vibration and impact, and an ultimate compressive strength of up to 54,400 psi. Ultracomp is produced using synthetic resins and reinforcing fibers with a series of internal lubricants. Therefore, it is an excellent choice for wet or dry, dirty or clean applications, and where loads exceed all other non-metallic bearing materials. Ultracomp excels in linear, oscillating, and rotary applications that require high load and low speed conditions. It is available in tube, sheet stock, or can be fabricated into custom bearings to your specifications.

**UC-200** - Bearing Grade Polyester/ Graphite Composite Designed for high load, high impact, slow speed, and vibratory applications. UC200 has excellent abrasion resistance, does not require lubrication, and has extremely low moisture absorption. Runs best on shafts with RC30 or higher.

**UC-300** - Bearing Grade Polyester/ Graphite Composite Similar in construction to UC-200, PTFE lubricant added to resin matrix for rotary or linear applications to reduce its coefficient of friction. Runs well against stainless and aluminum.

**U-400** - Bearing Grade Polyester/MOS2 Composite Similar in construction to UC-200 with moly lubricant for slow rotary, salt water, and dry oscillation applications.

**UC-500** - Bearing Grade Polyester/Graphite Composite Unique interwoven laminate using PTFE, polyester fibers, and graphite lubricant. Excellent material for full rotary applications where self-lubricated low friction and long wear is required.

## Technical Specifications

### Recommended Operating Limits and Engineering Information

Properties	Units	UC200	UC300	UC400	UC500
Specific Gravity	g/cc	1.35	1.35	1.32	1.35
Tensile Strength	psi	17,500	17,500	9,500	17,500
Elongation	%	26	26	26	26

### Compressive Strength Perpendicular to Laminate

Yield	psi	18,500	14,000	16,000	18,000
Ultimate	psi	54,400	45,000	52,000	50,000
Modulus	psi	750,000	650,000	730,000	750,000
Impact Strength, Notched	ft.lbs./in. of notch	>20	>20	>20	>20
Flexural Strength	psi	13,500	14,000	13,000	13,500

### Operating Temperature

Minimum	-	Cryogenic	Cryogenic	Cryogenic	Cryogenic
Maximum - Continuous	°F Max.	266	266	266	266
Maximum - Short Term	°F Max.	360	360	360	360
Coefficient of Friction - Dry	-	0.15	0.08	0.12	0.15
Water Absorption, 24 Hours Saturation	%	<0.1	<0.1	<0.1	<0.1





# Fiber -Lube™ Inch Sizes

Identification	ID	Selected Liner	OD	Length	Style
FL	XX	T = Tape F=Fibre	XX	XX	XXX

Example: FL14F16-24-CJ

I.D. = 0.875" Fibre Liner O.D. = 1.000" Length = 1.500"

## STANDARD SIZES FOR FIBER-LUBE™ BEARINGS: 1/16" THIN WALL

Bearing Number	Nominal ID X OD	ID	OD	Recommended Housing Bore	Press Fit	Recommended Shaft Size	Running Clearance	Length ±0.010
FL08F10-04	1/2 X 5/8	0.5020 0.5040	0.6255 0.6265	0.6245 0.6250	0.0005 0.0020	0.4985 0.4990	0.0010 0.0055	1/4
FL08F10-08								1/2
FL08F10-16								1
FL10F12-04	5/8 X 3/4	0.6270 0.6290	0.7505 0.7515	0.7495 0.7500	0.0005 0.0020	0.6235 0.6240	0.0010 0.0075	1/4
FL10F12-08								1/2
FL10F12-16								1
FL12F14-08	3/4 X 7/8	0.7525 0.7555	0.8755 0.8765	0.8745 0.8750	0.0005 0.0020	0.7485 0.7490	0.0010 0.0075	1/2
FL12F14-12								3/4
FL12F14-16								1
FL14F16-	7/8 X 1	0.8775 0.8805	1.0005 1.0025	0.9995 1.0000	0.0005 0.0030	0.8740 0.8745	0.0010 0.0075	Up to 12"
FL16F18-16	1 X 1-1/8	1.0025 1.0055	1.1255 1.1275	1.1245 1.1250	0.0005 0.0030	0.9985 0.9990	0.0010 0.0075	1
FL16F18-20								1-1/4
FL16F18-24								1-1/2
FL18F20-	1-1/8 X 1-1/4	1.1305 1.1335	1.2505 1.2525	1.2495 1.2500	0.0005 0.0030	1.1245 1.1250	0.0010 0.0075	Up to 12"
FL20F22-	1-1/4 X 1-3/8	1.2525 1.2555	1.3765 1.3785	1.3745 1.3750	0.0010 0.0040	1.2485 1.2490	0.0010 0.0075	Up to 12"
FL22F24-	1-3/8 X 1-1/2	1.3790 1.3830	1.5005 1.5025	1.4995 1.5000	0.0005 0.0030	1.3735 1.3745	0.0010 0.0085	Up to 18"
FL24F26-	1-1/2 X 1-5/8	1.5040 1.5080	1.6265 1.6285	1.6245 1.6250	0.0015 0.0040	1.4990 1.4995	0.0010 0.0085	Up to 18"
FL26F28-	1-5/8 X 1-3/4	1.6290 1.6330	1.7515 1.7535	1.7495 1.7500	0.0015 0.0040	1.6240 1.6245	0.0010 0.0085	Up to 18"
FL28F30-	1-3/4 X 1-7/8	1.7540 1.7580	1.8765 1.8785	1.8745 1.8750	0.0015 0.0040	1.7490 1.7495	0.0010 0.0085	Up to 18"
FL32F34-	2 X 2-1/8	2.0040 2.0080	2.1265 2.1285	2.1245 2.1255	0.0010 0.0040	1.9985 1.9995	0.0010 0.0085	Up to 18"

Length tolerance is +.005"/-.005" up to 2-1/2" I.D.; +.008"/-.007" on I.D. 2-1/2" and over. Sizes not listed above may be quoted upon request. All measurements in inches.

## STANDARD SIZES FOR FIBER-LUBE™ BEARINGS: 1/8" STANDARD WALL

Bearing Number	Nominal ID	ID	OD	Recommended Housing Bore	Press Fit	Recommended Shaft Size	Running Clearance	Length ±0.010
FL08F12-08	1/2 X 3/4	0.5020	0.7505	0.7495	0.0005	0.5155	0.0010	1/2
FL08F12-12		0.5040	0.7515	0.7500	0.0020	0.5160	0.0055	3/4
FL08F12-16								1
FL10F14-08	5/8 X 7/8	0.6270	0.8755	0.8745	0.0005	0.6235	0.0010	1/2
FL10F14-12		0.6290	0.8765	0.8750	0.0020	0.6240	0.0055	3/4
FL10F14-16								1
FL12F16-08	3/4 X 1	0.7525	1.0005	0.9995	0.0005	0.7485	0.0010	1/2
FL12F16-12		0.7555	1.0025	1.0000	0.0030	0.7490	0.0075	3/4
FL12F16-16								1
FL14F18-	7/8 X 1-1/8	0.8775 0.8805	1.1255 1.1275	1.1245 1.1250	0.0005 0.0030	0.8740 0.8745	0.0010 0.0075	Up to 12"
FL16F20-08	1 X 1-1/4	1.0025 1.0055	1.2505 1.2525	1.2495 1.2500	0.0005 0.0030	0.9985 0.9990	0.0010 0.0075	1/2
FL16F20-10								5/8
FL16F20-12								3/4
FL16F20-16								1
FL16F20-20								1-1/4
FL18F22-08	1-1/8 X 1-3/8	1.1305	1.3765	1.3745	0.0015	1.2445	0.0010	1/2
FL18F22-16		1.1335	1.3785	1.3750	0.0040	1.2450	0.0080	1
FL18F22-32								2
FL20F24-16	1-1/4 X 1-1/2	1.2525	1.5005	1.4995	0.0005	1.2485	0.0010	1
FL20F24-24		1.2555	1.5025	1.5000	0.0030	1.2490	0.0080	1-1/2
FL20F24-32								2
FL22F26-	1-3/8 X 1-5/8	1.3790 1.3830	1.6265 1.6285	1.6245 1.6250	0.0015 0.0040	1.3735 1.3745	0.0010 0.0075	Up to 18"
FL24F28-24	1-1/2 X 1-3/4	1.5040	1.7515	1.7495	0.0015	1.4990	0.0010	1-1/2
FL24F28-32		1.5080	1.7535	1.7500	0.0040	1.4995	0.0085	2
FL24F28-48								3
FL26F30-	1-5/8 X 1-7/8	1.6290 1.6330	1.8765 1.8785	1.8745 1.8750	0.0015 0.0040	1.6240 1.6245	0.0010 0.0085	Up to 18"
FL28F32-	1-3/4 X 2	1.7540 1.7580	2.0015 2.0035	1.9995 2.0000	0.0015 0.0040	1.7490 1.7495	0.0010 0.0095	Up to 18"
FL32F36-24	2 X 2-1/4	2.0040	2.2515	2.2495	0.0010	1.9985	0.0020	1-1/2
FL32F36-32		2.0080	2.2535	2.2505	0.0040	1.9995	0.0110	2
FL32F36-48								3
FL36F40-	2-1/4 X 2-1/2	2.2540 2.2580	2.5020 2.5040	2.4995 2.5005	0.0015 0.0045	2.2485 2.2490	0.0020 0.0110	Up to 18"

Length tolerance is +.005"/-.005" up to 2-1/2" I.D.; +.008"/-.007" on I.D. 2-1/2" and over. Sizes not listed above may be quoted upon request. All measurements in inches.

## STANDARD SIZES FOR FIBER-LUBE™ BEARINGS: 1/8" STANDARD WALL

Bearing Number	Nominal ID	ID	OD	Recommended Housing Bore	Press Fit	Recommended Shaft Size	Running Clearance	Length ±0.010
FL38F42-	2-3/8 X 2-5/8	2.3810 2.3850	2.6270 2.6290	2.6245 2.6255	0.0015 0.0045	2.3740 2.3750	0.0020 0.0110	Up to 18"
FL40F44-24	2-1/2 X 2-3/4	2.5060 2.5100	2.7520 2.7540	2.7495 2.7505	0.0015 0.0045	2.4985 2.4995	0.0020 0.0110	1-1/2
FL40F44-32								2
FL40F44-48								3
FL42F46-	2-5/8 X 2-7/8	2.6330 2.6370	2.8770 2.8790	2.8745 2.8755	0.0015 0.0045	2.6235 2.6245	0.0020 0.0110	Up to 18"
FL44F48-	2-3/4 X 3	2.7580 2.7620	3.0020 3.0040	2.9990 3.0005	0.0015 0.0050	2.7485 2.7495	0.0020 0.0110	Up to 18"
FL48F52-	3 X 3-1/4	3.0100 3.0140	3.2520 3.2540	3.2490 3.2505	0.0015 0.0050	2.9985 2.9995	0.0020 0.0110	Up to 18"
FL52F56-	3-1/4 X 3-1/2	3.2600 3.2640	3.5020 3.5040	3.4990 3.5010	0.0010 0.0050	3.2485 3.2495	0.0020 0.01105	Up to 18"
FL56F60-	3-1/2 X 3-3/4	3.5100 3.5140	3.7520 3.7540	3.7490 3.7510	0.0010 0.0050	3.4985 3.4995	0.0020 0.0110	Up to 18"
FL60F64-	3-3/4 X 4	3.7600 3.7640	4.0020 4.0040	3.9990 4.0010	0.0010 0.0050	3.7485 3.7495	0.0020 0.0110	Up to 18"
FL64F68-	4 X 4-1/4	4.0100 4.0140	4.2520 4.2540	4.2490 4.2510	0.0010 0.0050	3.9985 3.9995	0.0030 0.0120	Up to 18"
FL68F72-	4-1/4 X 4-1/2	4.2600 4.2640	4.5020 4.5040	4.4990 4.5010	0.0015 0.0050	4.2485 4.2495	0.0030 0.0120	Up to 18"
FL72F76-	4-1/2 X 4-3/4	4.5100 4.5140	4.7520 4.7540	4.7490 4.7510	0.0010 0.0050	4.4985 4.4995	0.0030 0.0120	Up to 18"
FL76F80-	4-3/4 X 5	4.7600 4.7640	5.0020 5.0040	4.9990 5.0010	0.0010 0.0050	4.7485 4.7495	0.0030 0.0120	Up to 18"
FL80F84-	5 X 5-1/4	5.0100 5.0140	5.2520 5.2540	5.2490 5.2510	0.0010 0.0050	4.9985 4.9995	0.0030 0.0120	Up to 18"

Length tolerance is +.005"/-.005" up to 2-1/2" I.D.; +.008"/-.007" on I.D. 2-1/2" and over. Sizes not listed above may be quoted upon request. All measurements in inches.

## STANDARD SIZES FOR FIBER-LUBE™ BEARINGS: 1/4" HEAVY WALL

Bearing Number	Nominal ID	ID	OD	Recommended Housing Bore	Press Fit	Recommended Shaft Size	Running Clearance	Length
FL08F16-	1/2 X 1	0.5020 0.5040	1.0005 1.0025	0.9995 1.0000	0.0005 0.0030	0.4985 0.4990	0.0010 0.0065	Up to 12"
FL10F18-	5/8 X 1-1/8	0.6270 0.6290	1.1255 1.1275	1.1245 1.1250	0.0005 0.0030	0.6235 0.6240	0.0010 0.0065	Up to 12"
FL12F20-	3/4 X 1-1/4	0.7525 0.7555	1.2505 1.2525	1.2495 1.2500	0.0005 0.0030	0.7485 0.7490	0.0010 0.0075	Up to 12"
FL14F22-	7/8 X 1-3/8	0.8775 0.8805	1.3765 1.3785	1.3745 1.3750	0.0005 0.0040	0.8740 0.8745	0.0010 0.0075	Up to 12"
FL16F24-16	1 X 1-1/2	1.0025	1.5005	1.4995	0.0005	0.9985	0.0010	1
FL16F24-24		1.0055	1.5025	1.5000	0.0030	0.9990	0.0075	1-1/4
FL18F26-	1-1/8 X 1-5/8	1.1305 1.1335	1.6265 1.6285	1.6245 1.6250	0.0015 0.0040	1.2445 1.2450	0.0010 0.0075	Up to 12"
FL20F28-16	1-1/4 X 1-3/4	1.2525	1.7515	1.7495	0.0015	1.2485	0.0010	1
FL20F28-32		1.2555	1.7535	1.7500	0.0040	1.2490	0.0075	2
FL22F30-	1-3/8 X 1-7/8	1.3790 1.3830	1.8765 1.8785	1.8745 1.8750	0.0015 0.0040	1.3740 1.3745	0.0010 0.0085	Up to 18"
FL24F32-24	1-1/2 X 2	1.5040	2.0015	1.9995	0.0010	1.4990	0.0010	1-1/2
FL24F32-32		1.5080	2.0035	2.0005	0.0040	1.4995	0.0085	2
FL26F34-	1-5/8 X 2-1/8	1.6290 1.6330	2.1265 2.1285	2.1245 2.1255	0.0010 0.0040	1.6240 1.6246	0.0010 0.0085	Up to 18"
FL28F36-	1-3/4 X 2-1/4	1.7540 1.7580	2.2515 2.2535	2.2495 2.2505	0.0010 0.0040	1.7490 1.7495	0.0010 0.0085	Up to 18"
FL32F40-24	2 X 2-1/2	2.0040	2.5020	2.4995	0.0015	1.9985	0.0020	1-1/2
FL32F40-32		2.0080	2.5040	2.5005	0.0045	1.9995	0.0105	2
FL36F44-	2-1/4 X 2-3/4	2.2540 2.2580	2.7520 2.7540	2.7495 2.7505	0.0015 0.0045	2.2480 2.2490	0.0020 0.0105	Up to 18"

Length tolerance is  $\pm .005/- .005$ " up to 2-1/2" I.D.;  $\pm .008/- .007$ " on I.D. 2-1/2" and over. Sizes not listed above may be quoted upon request. All measurements in inches.

## STANDARD SIZES FOR FIBER-LUBE™ BEARINGS: 1/4" HEAVY WALL DIMENSIONS

Bearing Number	Nominal ID	ID	OD	Recommended Housing Bore	Press Fit	Recommended Shaft Size	Running Clearance	Length
FL38F46-	2-3/8 X 2-7/8	2.3810 2.3850	2.8770 2.8790	2.8745 2.8755	0.0015 0.0045	2.3740 2.3750	0.0020 0.0105	Up to 18"
FL40F48-	2-1/2 X 3	2.5060 2.5100	3.0020 3.0040	2.9990 3.0005	0.0015 0.0050	2.4990 2.4995	0.0020 0.0105	Up to 18"
FL42F50-	2-5/8 X 3-1/8	2.6330 2.6370	3.1270 3.1290	3.1240 3.1255	0.0015 0.0050	2.6240 2.6245	0.0020 0.0105	Up to 18"
FL44F52-	2-3/4 X 3-1/4	2.7580 2.7620	3.2520 3.2540	3.2490 3.2505	0.0015 0.0050	2.7485 2.7495	0.0020 0.0105	Up to 18"
FL48F56-	3 X 3-1/2	3.0100 3.0140	3.5020 3.5040	3.4990 3.5010	0.0010 0.0050	2.9985 2.9995	0.0020 0.0105	Up to 18"
FL52F60-	3-1/4 X 3-3/4	3.2600 3.2640	3.7520 3.7540	3.7490 3.7510	0.0010 0.0050	3.2485 3.2495	0.0020 0.0105	Up to 18"
FL56F64-	3-1/2 X 4	3.5100 3.5140	4.0020 4.0040	3.9990 4.0010	0.0010 0.0050	3.4985 3.4995	0.0020 0.0105	Up to 18"
FL0F68-	3-3/4 X 4-1/4	3.7600 3.7640	4.2520 4.2540	4.2490 4.2510	0.0010 0.0050	3.7485 3.7495	0.0020 0.0105	Up to 18"
FL64F72-	4 X 4-1/2	4.0100 4.0140	4.5020 4.5040	4.4990 4.5010	0.0010 0.0050	3.9985 3.9995	0.0030 0.0120	Up to 18"
FL68F76-	4-1/4 X 4-3/4	4.2600 4.2640	4.7520 4.7540	4.7490 4.7510	0.0010 0.0050	4.2485 4.2495	0.0030 0.0120	Up to 18"
FL72F80-	4-1/2 X 5	4.5100 4.5140	5.0020 5.0040	4.9990 5.0010	0.0010 0.0050	4.4985 4.4995	0.0030 0.0120	Up to 18"
FL76F84-	4-3/4 X 5-1/4	4.7600 4.7640	5.2520 5.2540	5.2490 5.2510	0.0010 0.0050	4.7485 4.7495	0.0030 0.0120	Up to 18"
FL80F88-	5 X 5-1/2	5.0100 5.0140	5.5020 5.5040	5.4990 5.5010	0.0010 0.0050	4.9985 4.9995	0.0030 0.0120	Up to 18"

Length tolerance is +.005"/-.005" up to 2-1/2" I.D.; +.008"/-.007" on I.D. 2-1/2" and over. Sizes not listed above may be quoted upon request. All measurements in inches.

Identification	ID	Selected Liner	OD	Length	Style
FLM	XXX	T = Tape F=Fibre	XXX	XX	XXX

Example: FLM040F048-40-CJ

I.D. = 40mm    O.D. = 48mm    Length = 40mm

## STANDARD SIZES FOR FIBER-LUBE™ METRIC BEARINGS: 2.5MM WALL

Bearing Number	Nominal ID X OD	ID	OD	Recommended Housing Bore	Press Fit	Recommended Shaft Size	Length Tolerance
FLM012F017-	12 X 17	12.093 12.143	17.043 17.068	17.000 17.018	.025 .068	11.982 12.000	+0.00 / -.25
FLM015F020-	15 X 20	15.096 15.146	20.046 20.071	20.000 20.021	.025 .071	14.982 15.000	+0.00 / -.25
FLM018F023-	18 X 23	18.121 18.201	23.046 23.096	23.000 23.021	.025 .096	17.928 18.000	+0.00 / -.25
FLM020F025-	20 X 25	20.121 20.201	25.046 25.096	25.000 25.021	.025 .096	19.979 20.010	+0.00 / -.25
FLM022F027-	22 X 27	22.121 22.201	27.046 27.096	27.000 27.021	.025 .096	21.979 22.000	+0.00 / -.25
FML025F030-	25 X 30	25.125 25.205	30.050 35.100	30.000 30.025	.029 .100	24.979 25.000	+0.00 / -.25
FLM030F035-	30 X 35	30.125 30.205	35.050 35.100	35.000 35.025	.025 .100	29.797 30.000	+0.00 / -.25
FLM035F040-	35 X 40	35.125 35.225	40.050 40.100	40.000 40.025	.025 .100	34.975 35.000	+0.00 / -.25
FLM040F045-	40 X 45	40.125 40.225	45.050 45.100	45.000 45.025	.025 .100	39.975 40.000	+0.00 / -.25
FLM045F050-	45 X 50	45.130 45.230	50.055 50.105	50.000 50.025	.030 .105	44.975 45.000	+0.00 / -.25
FLM050F055-	50 X 55	50.155 50.225	55.055 55.105	55.000 55.030	.025 .105	49.975 50.000	+0.00 / -.25

Housing bore and shaft diameter tolerances: H7/H8 and h7/h8 respectively. Smaller tolerance in length is available on request. Measurements in millimeters.



## STANDARD SIZES FOR FIBER-LUBE™ METRIC BEARINGS: 5MM WALL

Bearing Number	Nominal ID X OD	ID	OD	Recommended Housing Bore	Press Fit	Recommended Shaft Size	Length Tolerance
FLM030F040-	30 X 40	30.125 30.205	40.050 40.100	40.000 40.025	.025 .100	29.979 30.000	+0.00 / -.25
FLM035F045-	35 X 45	35.125 35.225	45.050 45.100	45.000 45.025	.025 .100	34.975 35.000	+0.00 / -.25
FLM040F050-	40 X 50	40.125 40.225	50.050 50.100	50.000 50.025	.025 .100	39.975 40.000	+0.00 / -.25
FLM045F055-	45 X 55	45.130 45.230	55.055 55.105	55.000 55.030	.025 .105	44.975 45.000	+0.00 / -.25
FLM050F060-	50 X 60	50.155 50.225	60.055 60.105	60.000 60.030	.025 .105	49.975 50.000	+0.00 / -.25
FML055F065-	55 X 65	55.155 55.255	65.055 65.105	65.000 65.030	.025 .105	54.970 55.000	+0.00 / -.25
FLM060F070-	60 X 70	60.155 60.255	70.055 70.105	70.000 70.030	.025 .105	59.970 60.000	+0.00 / -.40
FLM065F075-	65 X 75	65.155 65.255	75.055 75.105	75.000 75.030	.025 .105	64.970 65.000	+0.00 / -.40
FLM070F080-	70 X 80	70.205 70.305	80.055 80.105	80.000 80.030	.025 .105	69.970 70.000	+0.00 / -.40
FLM075F085-	75 X 85	75.210 75.310	85.060 85.110	85.000 85.035	.025 .110	74.970 75.000	+0.00 / -.40
FLM080F090-	80 X 90	80.210 80.310	90.060 90.110	90.000 90.035	.025 .110	79.970 80.000	+0.00 / -.40
FLM085F095-	85 X 95	85.260 85.360	95.060 95.110	95.000 95.035	.025 .110	84.965 85.000	+0.00 / -.40
FLM090F100-	90 X 100	90.260 90.360	100.060 100.110	100.000 100.035	.025 .110	89.965 90.000	+0.00 / -.40
FLM100F110-	100 X 110	100.260 100.360	110.060 110.110	110.000 110.035	.025 .110	99.965 100.000	+0.00 / -.40
FLM110F120-	110 X 120	110.260 110.360	120.060 120.110	120.000 120.035	.025 .110	109.965 110.000	+0.00 / -.40
FLM120F130-	50 X 55	120.265 120.365	130.065 130.115	130.000 130.040	.025 .115	119.965 120.000	+0.00 / -.40

Housing bore and shaft diameter tolerances: H7/H8 and h7/h8 respectively. Smaller tolerance in length is available on request. Measurements in millimeters.



# Application Data Sheet

Date: \_\_\_\_\_

Customer: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Contact: \_\_\_\_\_

Title: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

Bearing to be used for \_\_\_\_\_  New Design  Existing Design

If not new, what type of bearing has been used? \_\_\_\_\_

Part Number \_\_\_\_\_ I.D. \_\_\_\_\_ O.D. \_\_\_\_\_ Length \_\_\_\_\_

Was it satisfactory? \_\_\_\_\_ If not, why not? \_\_\_\_\_

## SERVICE CONDITIONS

Speeds (Max., Min., Average Rpm Or Cycles Per Minute) \_\_\_\_\_

Loads (Lbs, Or Psi) Radial \_\_\_\_\_ Axial \_\_\_\_\_

Constant \_\_\_\_\_ Fluctuating \_\_\_\_\_

Shock \_\_\_\_\_ Vibratory \_\_\_\_\_

Motion  Rotating Shaft With Unidirectional Load  Rotating Load With Stationary Shaft

Oscillating Shaft Angle \_\_\_\_\_  Reciprocating Stroke \_\_\_\_\_

Shaft Drawing Number \_\_\_\_\_  Horizontal  Vertical

Diameter \_\_\_\_\_ Misalignment Anticipated \_\_\_\_\_

Material \_\_\_\_\_ Hardness \_\_\_\_\_ Surface Finish \_\_\_\_\_

Housing Length \_\_\_\_\_ I.d. \_\_\_\_\_ O.d. \_\_\_\_\_ Material \_\_\_\_\_

Construction:  Light  Heavy

## SERVICE LIFE REQUIRED

Total Life (operating hours) \_\_\_\_\_ Total Allowable Wear (inches) \_\_\_\_\_

Continuous

Intermittent (describe) \_\_\_\_\_

## ENVIRONMENTAL CONDITIONS

Air  Clean  Contaminated-Type \_\_\_\_\_

Gas  Clean  Contaminated-Type \_\_\_\_\_

Liquid-Type \_\_\_\_\_ Concentration \_\_\_\_\_

Lubrication properties \_\_\_\_\_

Is sealing available? \_\_\_\_\_ Type \_\_\_\_\_

## ENVIRONMENTAL TEMPERATURE

Maximum \_\_\_\_\_ Minimum \_\_\_\_\_ Normal \_\_\_\_\_

Quantity required per year? \_\_\_\_\_

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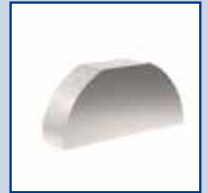
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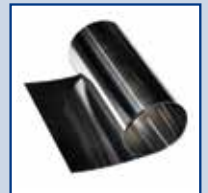
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