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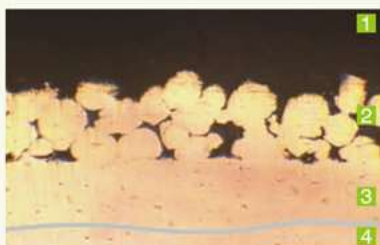
SF-1 自润滑卷制轴承

SF-1 Self-Lubricating Bearing



金相图片 Metallography

1. 聚四氟乙烯 PTFE+Filler
2. 球形青铜粉 Porous bronze sinter
3. 钢背 Steel backing
4. 镀铜/锡层 Copper-plating/tin-plating



注：图中产品还可根据不同工况条件选择不同的基体材料，如：青铜基板（SF-1B）、不锈钢基板（SF-1S）、以及无铅（SF-1W）等配方产品。（详见 P03-04）

Note: Various materials are suitable for SF-1 Series products according to different working conditions, such as bronze backing (SF-1B), stainless steel backing (SF-1S) and lead-free material (SF-1W). (Detailed see P03-04)

结构特性 Structure Characteristics

金属复合自润滑材料以优质低碳钢为基板，中间烧结球形多孔铜粉层，表面轧制以 PTFE 为主的耐磨润滑材料作为轴承工作层，这种材料具有优异的机械承载能力，中间铜粉层不但可以及时传递轴承运行过程中产生的热量，同时也提高了塑料层与基板的结合强度。PTFE 设计适用于完全干摩擦状态，并根据润滑情况、摩擦系数和耐久性要求开发了多种材料。昌盛的 PTFE 金属复合材料在外部润滑或者不润滑的情况下，都能在最广泛的载荷、速度以及温度范围内提供最好的表现。

Metal-polymer self-lubricating composite materials consist of metal backing sintered porous bronze with PTFE polymer as working layer. The metal backing provides mechanical strength, while the bronze sintered layer provides a strong mechanical bonding between the backing and the bearing lining, the PTFE polymer offers exceptional low friction even under dry condition and the thermoplastic polymer is generally designed to operate with marginal lubrication. The construction promotes dimensional stability and improves the thermal conductivity. This material meets the demanding criteria for long life and trouble-free performance with or without lubrication.

产品应用 Application

汽车行业：动力转向泵、转向器推力垫片、盘式制动器、减震器、门铰链、雨刮器、椅子调角器、空气阀以及电磁阀等；

农业机械：拖拉机、联合收割机、农作物喷雾器、推土机、平地机等；

办公商务机械：复印机、传真机、打印机、邮件处理机等；

液压元件和阀门：齿轮泵、柱塞泵、叶片泵，球阀、蝶阀，气缸、油缸以及其他液压元件等；

家用电器：冰箱、空调、吸尘器、缝纫机、清洗机、微波炉和健身器材等；

以及其它物流机械、包装机械、纺织机械、港口机械、矿产机械、森林机械和各类工程机械设备。

Automotive: tractors, crop sprayers, earthmovers, auto machines, specific uses in power steering cylinders, steering gear thrust washers, disc brakes, shock absorbers, windshield wiper motor...

Business machines: duplicator, fax machine, automatic printing devices, 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: tape recorders, refrigerators, air conditioners, cleaners, polishers, sewing machines, ovens, dishwashers, clothes washing machines...And materials handling, marine engine, packaging, textile equipment, tools...etc.

SF-1 自润滑卷制轴承

SF-1 Self-Lubricating Bearing

实际运用中根据使用环境、工况和环保要求的不同，低碳钢板可以改为铜板或不锈钢板，内表面塑料层可以选择 PTFE 含铅或者不含铅材料以及其他高分子填充物，外表可以镀锡或者镀铜。产品范围包括：SF-1、SF-1B、SF-1S、SF-1T、SF-1P、SF-1D、SF-DB、SF-DS、SF-1W、SF-ZQ。

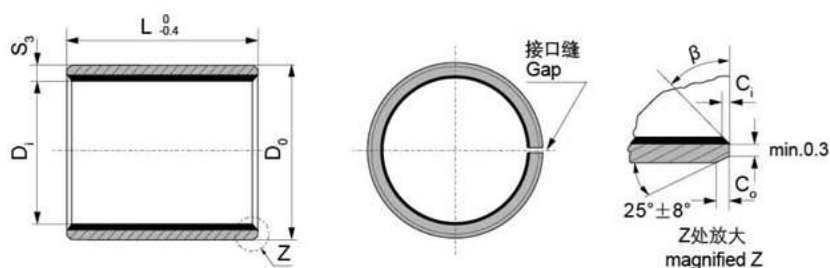
有关数据 Data	代号 Grade	SF-1	SF-1B	SF-1S	SF-1T	
	材料 Material	碳钢/Steel+铜粉/ Bronze+(PTFE+填料/ Filler)	铜板/Bronze+铜粉/ Bronze+(PTFE+填料/ Filler)	不锈钢/Stainless+铜粉/ Bronze+(PTFE+填料/ Filler)	碳钢/Steel+铜粉/ Bronze+(PTFE+填料/ Filler)	
主要运用领域 Typical application		产品应用于印刷机械、纺织机械、烟草机械、健身器等。 Application: the printing, woven, tobacco and gymnastic machinery, etc.	产品应用于冶金机械、连铸机械、水泥机械等。 Application: metallurgical industry, continuous casting and rolling mill, concrete machinery and spiral conveyers, etc.	产品适用于印染机械、海洋工业耐腐蚀部位等。 Application: the corrosion resistant part in dyeing machinery and ocean industry, etc.	产品主要应用于中、高压齿轮油泵、柱塞泵、叶片泵等。 Application: medium, high-pressure gear pump, ram pump, vane pumps, etc.	
最大承载压力P Load capacity P (Dry friction) (干摩擦)	静载 N/mm ² Static load	250	250	250	250	
	动载 N/mm ² Dynamic load	140	140	140	140	
	摇摆 N/mm ² Oscillation Load	60	60	60	60	
最大线速度V Max line speed V	干摩擦 m/s Dry friction	2.5	2.5	2.5	2.5	
	油润滑 m/s Oil lubrication	> 5	> 5	> 5	> 5	
最高PV值 PV value limit	干摩擦 N/mm ² ·m/s Dry friction	1.8	1.8	1.8	1.0	
	油润滑 N/mm ² ·m/s Oil lubrication	3.6	3.6	3.6	10	
摩擦系数u Friction coef u	干摩擦 Dry friction	0.08~0.20	0.08~0.20	0.08~0.20	0.08~0.25	
	油润滑 Oil lubrication	0.02~0.12	0.02~0.12	0.02~0.12	0.02~0.08	
相配轴径 Mating shaft	硬度 HB Hardness	> 220	> 220	> 220	> 220	
	粗糙度 Ra Roughness	0.4~1.25	0.4~1.25	0.4~1.25	0.4~1.25	
工作温度 °C Working temperature		-200~+280	-200~+280	-200~+280	-200~+280	
导热系数 W/mk Thermal conductivity		40	60	40	40	
线膨胀系数 (轴向) Coefficient of linear expansion		11×10 ⁻⁶ /K	18×10 ⁻⁶ /K	11×10 ⁻⁶ /K	11×10 ⁻⁶ /K	
外表面镀层 Outside surface Plating		铜或锡 copper/tin	无 /No	无 /No	铜或锡 copper/tin	

According to the different working conditions and environmental protection, there are steel backing, bronze backing, stainless steel backing can be chosen, different type of alloy can be chosen, the PTFE layer with polymer filler and can be without lead, the Surface with tin or copper plating. product range includes SF-1、SF-1B、SF-1S、SF-1T、SF-1P、SF-1D、SF-DB、SF-DS、SF-1W、SF-ZQ.

	SF-1P (without lead)	SF-1D (without lead)	SF-DB (without lead)	SF-DS (without lead)	SF-1W (without lead)	SF-ZQ (without lead)
	碳钢/Steel+铜粉/ Bronze+(PTFE+填料/ Filler)	碳钢/Steel+铜粉/ Bronze+(PTFE+填料/ Filler)	铜板/Bronze+铜粉/ Bronze+(PTFE+填料/ Filler)	不锈钢Stainless+铜粉 /Bronze+(PTFE+填料/ Filler)	碳钢/Steel+铜粉/ Bronze+(PTFE+填料/ Filler)	碳钢/Steel+铜粉/ Bronze+(PTFE+ PPTA/Filler)
	该产品主要用于汽车减 震器、摩托车减震 器、液压油缸等。 Application: shock absorber of automobiles, motorcycles and pneumatic cylinder. etc	产品应用于印刷机 械、纺织机械、减震 器、烟草机械、健身 器等。 Application: Printing machinery, woven, tobacco and gymnastic machinery, shock absorber etc..	产品应用于冶金机 械、连铸机械、水泥 机械。 Application: metallurgical industry, continuous casting and rolling mill, concrete machinery and spiral conveyers, etc.	产品适用于印染机 械、海洋工业耐腐蚀 部位等。 Application: the corrosion resistant part in dyeing machinery and ocean industry, etc.	产品主要应用于中、 高压齿轮油泵、柱塞 泵、叶片泵等。 Application: medium, high- pressure gear pump, ram pump, vane pumps, etc.	产品主要应用于汽车 减震器、摩托车减震 器、液压油缸等。 Application: shock absorber of automobiles, motorcycles and pneumatic cylinder. etc
	250	250	250	250	250	250
	140	140	140	140	140	140
	60	60	60	60	60	60
	2	2.5	2.5	2.5	2.5	2.5
	> 5	> 5	> 5	> 5	> 5	> 5
	1.8	1.8	1.8	1.8	1.0	1.8
	3.6	3.6	3.6	3.6	10	3.6
	0.08~0.20	0.08~0.20	0.08~0.20	0.08~0.20	0.08~0.25	0.08~0.20
	0.02~0.08	0.02~0.08	0.02~0.08	0.02~0.08	0.02~0.08	0.02~0.08
	> 220	> 220	> 220	> 220	> 220	> 220
	0.4~1.25	0.4~1.25	0.4~1.25	0.4~1.25	0.4~1.25	0.4~1.25
	-200~+280	-200~+280	-200~+280	-200~+280	-200~+280	-200~+280
	40	40	60	40	40	40
	11×10 ⁻⁶ /K	11×10 ⁻⁶ /K	18×10 ⁻⁶ /K	11×10 ⁻⁶ /K	11×10 ⁻⁶ /K	11×10 ⁻⁶ /K
	铜或锡 copper/tin	铜或锡 copper/tin	无 /No	无 /No	铜或锡 copper/tin	铜或锡 copper/tin

SF-1 自润滑卷制轴承标准公制尺寸

SF-1 Self-Lubricating Bearing Standard Metric Size



内外倒角 ID and OD chamfers

S_3	C_o	C_i	β
0.75	0.5 ± 0.3	0.25 ± 0.2	$30^\circ \pm 5^\circ$
1.00	0.6 ± 0.3	0.30 ± 0.2	$30^\circ \pm 5^\circ$
1.50	0.7 ± 0.3	0.50 ± 0.3	$30^\circ \pm 5^\circ$

S_3	C_o	C_i	β
2.00	1.2 ± 0.4	0.50 ± 0.3	$30^\circ \pm 5^\circ$
2.50	1.8 ± 0.6	0.60 ± 0.3	$45^\circ \pm 5^\circ$

单位Unit: mm

轴径(f7) Shaft D _s	座孔(H7) Housing D _H	(OD) 外径公差 Tolerance D _O	(ID)压装后 内孔公差 After assembled D _I	配合间隙 Clearance D _O	壁厚 Wall thick- ness S ₃	长度 L 0 -0.40 (d≤Φ28 L-0.30 d>Φ30 L-0.40)									
						6	8	10	12	15	20	25	30	40	50
6 -0.010 -0.022	8 +0.015	8 +0.055 +0.025	6.055 5.990	0.077 0.000	1.005 0.970	0606	0608	0610							
8 -0.013 -0.028	10 +0.015	10 +0.055 +0.025	8.055 7.990	0.083 0.003		0806	0808	0810	0812	0815					
10 -0.013 -0.028	12 +0.018	12 +0.065 +0.030	10.058 9.990	0.086 0.003		1006	1008	1010	1012	1015	1020				
12 -0.016 -0.034	14 +0.018	14 +0.065 +0.030	12.058 11.990	0.092 0.006		1206	1208	1210	1212	1215	1220	1225			
13 -0.016 -0.034	15 +0.018	15 +0.065 +0.030	13.058 12.990					1310	1312	1315	1320	1325			
14 -0.016 -0.034	16 +0.018	16 +0.065 +0.030	14.058 13.990					1410	1412	1415	1420	1425			
15 -0.016 -0.034	17 +0.018	17 +0.065 +0.030	15.058 14.990					1510	1512	1515	1520	1525			
16 -0.016 -0.034	18 +0.018	18 +0.065 +0.030	16.058 15.990					1610	1612	1615	1620	1625			
17 -0.016 -0.034	19 +0.021	19 +0.075 +0.035	17.061 16.990	0.095 0.006				1710	1712	1715	1720	1725			
18 -0.016 -0.034	20 +0.021	20 +0.075 +0.035	18.061 17.990					1810	1812	1815	1820	1825			
20 -0.020 -0.041	23 +0.021	23 +0.075 +0.035	20.071 19.990	0.112 0.010			2010	2012	2015	2020	2025	2030			
22 -0.020 -0.041	25 +0.021	25 +0.075 +0.035	22.071 21.990				2210	2212	2215	2220	2225	2230			
24 -0.020 -0.041	27 +0.021	27 +0.075 +0.035	24.071 23.990				2410	2412	2415	2420	2425	2430			
25 -0.020 -0.041	28 +0.021	28 +0.075 +0.035	25.071 24.990				2510	2512	2515	2520	2525	2530	2540	2550	
28 -0.020 -0.041	32 +0.025	32 +0.085 +0.045	28.085 27.990	0.126 0.010				2812	2815	2820	2825	2830	2840	2850	
30 -0.020 -0.041	34 +0.025	34 +0.085 +0.045	30.085 29.990					3012	3015	3020	3025	3030	3040	3050	
32 -0.025 -0.050	36 +0.025	36 +0.085 +0.045	32.085 31.990	0.135 0.015				3212	3215	3220	3225	3230	3240	3250	
35 -0.025 -0.050	39 +0.025	39 +0.085 +0.045	35.085 34.990					3512	3515	3520	3525	3530	3540	3550	
38 -0.025 -0.050	42 +0.025	42 +0.085 +0.045	38.085 37.990					3812	3815	3820	3825	3830	3840	3850	
40 -0.025 -0.050	44 +0.025	44 +0.085 +0.045	40.085 39.990					4012	4015	4020	4025	4030	4040	4050	

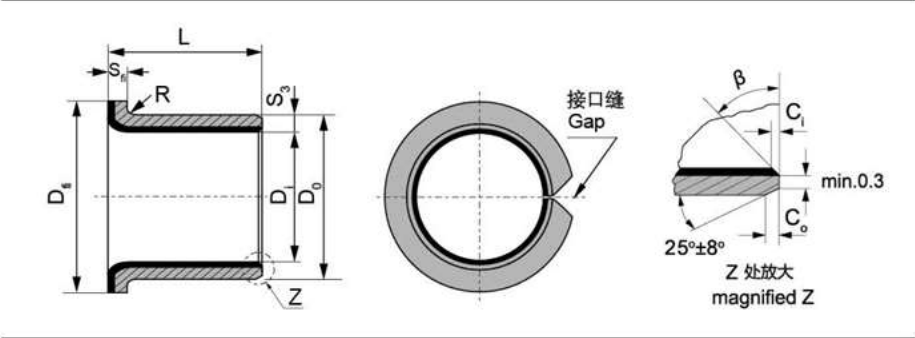
SF-1 自润滑卷制轴承标准公制尺寸

SF-1 Self-Lubricating Bearing Standard Metric Size

单位Unit: mm

轴径(f7) Shaft D _s	座孔(H7) Housing D _H	(OD) 外径公差 Tolerance D _O	(ID)压装后 内孔公差 After assembled D _I	配合间隙 Clearance D _O	壁厚 Wall thick- ness S _j	长度 L ⁰ -0.40											
						20	25	30	40	50	60	70	80	100	115		
45 -0.050 -0.025	50 +0.025	50 +0.085 +0.045	45.105 44.990	0.155 0.015	2.505 2.460	4520	4525	4530	4540	4550							
50 -0.050 -0.025	55 +0.030	55 +0.100 +0.055	50.110 49.990	0.160 0.015		5020	5025	5030	5040	5050	5060						
55 -0.060 -0.030	60 +0.030	60 +0.100 +0.055	55.110 54.990	0.170 0.020				5530	5540	5550	5560						
60 -0.060 -0.030	65 +0.030	65 +0.100 +0.055	60.110 59.990					6030	6040	6050	6060	6070					
65 -0.060 -0.030	70 +0.030	70 +0.100 +0.055	65.110 64.990					6530	6540	6550	6560	6570					
70 -0.060 -0.030	75 +0.030	75 +0.100 +0.055	70.110 69.990					7030	7040	7050	7060	7070	7080				
75 -0.060 -0.030	80 +0.030	80 +0.100 +0.055	75.110 74.990					7530	7540	7550	7560	7570	7580				
80 -0.045	85 +0.035	85 +0.120 +0.070	80.155 80.020	0.201 0.020	2.490 2.440				8040	8050	8060	8070	8080	80100			
85 -0.054	90 +0.035	90 +0.120 +0.070	85.155 85.020	0.209 0.020					8540	8550	8560	8570	8580	85100			
90 -0.054	95 +0.035	95 +0.120 +0.070	90.155 90.020						9040	9050	9060	9070	9080	90100			
95 -0.054	100 +0.035	100 +0.120 +0.070	95.155 95.020							9550	9560	9570	9580	95100			
100 -0.054	105 +0.035	105 +0.120 +0.070	100.155 100.020							10050	10060	10070	10080	100100	100115		
105 -0.054	110 +0.035	110 +0.120 +0.070	105.155 105.020								10560	10570	10580	105100	105115		
110 -0.054	115 +0.035	115 +0.120 +0.070	110.115 110.020								11060	11070	11080	110100	110115		
120 -0.054	125 +0.040	125 +0.170 +0.100	120.210 120.070	0.264 0.070	2.465 2.415						12060	12070	12080	120100	120115		
125 -0.063	130 +0.040	130 +0.170 +0.100	125.210 125.070	0.273 0.070							12560	12570	12580	125100	125115		
130 -0.063	135 +0.040	135 +0.170 +0.100	130.210 130.070								13060	13070	13080	130100	130115		
140 -0.063	145 +0.040	145 +0.170 +0.100	140.210 140.070								14060	14070	14080	140100	140115		
150 -0.063	155 +0.040	155 +0.170 +0.100	150.210 150.070								15060	15070	15080	150100	150115		
160 -0.063	165 +0.040	165 +0.170 +0.100	160.210 160.070								16060	16070	16080	160100	160115		
180 -0.063	185 +0.046	185 +0.210 +0.130	180.216 180.070		0.279 0.070	2.465 2.415						18060	18070	18080	180100		
190 -0.072	195 +0.046	195 +0.210 +0.130	190.216 190.070	0.288 0.070							19060	19070	19080	190100			
200 -0.072	205 +0.046	205 +0.210 +0.130	200.016 200.070								20060	20070	20080	200100			
220 -0.072	225 +0.046	225 +0.210 +0.130	220.216 220.070								22060	22070	22080	220100			
250 -0.072	255 +0.052	255 +0.260 +0.170	250.222 250.070		0.294 0.070	2.465 2.415								25080	250100		
260 -0.081	265 +0.052	265 +0.260 +0.170	260.222 260.070	0.303 0.070										26080	260100		
280 -0.081	285 +0.052	285 +0.260 +0.170	280.222 280.070											28080	280100		
300 -0.081	305 +0.052	305 +0.260 +0.170	300.222 300.070											30080	300100		

SF-1F 自润滑卷制翻边轴承标准公制尺寸
SF-1F Self-Lubricating Flanged Bearing Standard Metric Size

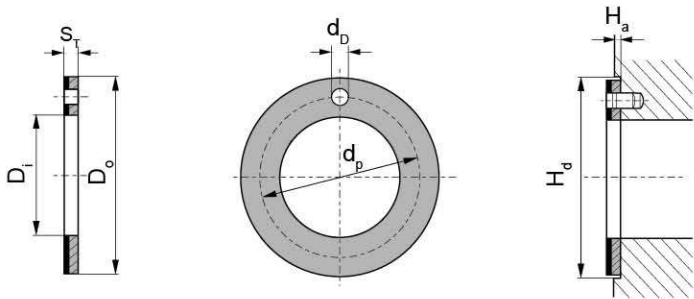


S_3	1.0	1.5	2.0	2.5
R	$1^{+0.5}$	1 ± 0.5	1.5 ± 0.5	2 ± 0.5

单位Unit: mm

轴径(f7) Shaft D _s	座孔(H7) Housing D _H	(OD) 外径公差 Tolerance D _O	(ID)压装后 内孔公差 After assembled D _I	配合间隙 Clearance C _O	Designation 型号规格	Wall thickness 壁厚 S ₃	尺寸 Dimension				
							D _I	D _O	D _s ±0.5	L±0.25	S _s -0.2
6 -0.013 -0.028	8 +0.015	8 +0.055 +0.025	6.055 5.990	0.077 0.000	SF-1F06040	1.005 0.970	6	8	12	4	1
					SF-1F06070					7	
8 -0.013 -0.028	10 +0.015	10 +0.055 +0.025	8.055 7.990	0.083 0.003	SF-1F08055		8	10	15	5.5	
					SF-1F08075					7.5	
10 -0.016 -0.034	12 +0.018	12 +0.055 +0.025	10.058 9.990	0.086 0.003	SF-1F10070		10	12	18	7	
					SF-1F10090					9	
					SF-1F10120					12	
12 -0.016 -0.034	14 +0.018	14 +0.065 +0.030	12.058 11.990	0.092 0.006	SF-1F12070		12	14	20	7	
					SF-1F12090					9	
					SF-1F12120					12	
14 -0.016 -0.034	16 +0.018	16 +0.065 +0.030	14.058 13.990		SF-1F14120		14	16	22	12	
					SF-1F14170					17	
					SF-1F15090					9	
15 -0.016 -0.034	17 +0.018	17 +0.065 +0.030	15.058 14.990		SF-1F15120		15	17	23	12	
					SF-1F15170					17	
					SF-1F16120					12	
16 -0.016 -0.034	18 +0.018	18 +0.065 +0.030	16.058 15.990	SF-1F16170	16		18	24	17		
				SF-1F18120					12		
18 -0.016 -0.034	20 +0.021	20 +0.075 +0.035	18.061 17.990	0.095 0.006	SF-1F18170		18	20	26	17	
				SF-1F18200	20						
				20 -0.020 -0.041	23 +0.021	23 +0.075 +0.035				20.071 19.990	0.112 0.010
SF-1F20165	16.5										
SF-1F20215	21.5										
22 -0.020 -0.041	25 +0.021	25 +0.075 +0.035	22.071 21.990	SF-1F22150	22	25	32	15			
				SF-1F22200				20			
25 -0.020 -0.041	28 +0.021	28 +0.075 +0.035	25.071 24.990	SF-1F25115	25	28	35	11.5			
				SF-1F25165				16.5			
				SF-1F25215				21.5			
30 -0.025 -0.050	34 +0.025	34 +0.075 +0.035	30.085 29.990	0.126 0.010	SF-1F30160	2.005 1.970	30	34	42	16	
				SF-1F30260	26						
35 -0.025 -0.050	39 +0.025	39 +0.085 +0.045	35.085 34.990	0.135 0.015	SF-1F35160		35	39	47	16	
					SF-1F35260					26	
40 -0.025 -0.050	44 +0.025	44 +0.085 +0.045	40.085 39.990		SF-1F40260		40	44	53	26	
					SF-1F40400					40	

SF-1WD/SF-2WD 自润滑垫片标准公制尺寸
SF-1WD/SF-2WD Self-Lubricating Thrust Washer Standard Metric Size



单位Unit: mm

轴径 Shaft D _s	型号规格 Standard No.	垫片尺寸 Washer size				安装尺寸 Assemble size		H _a +0.12
		D ₁ +0.25	D ₀ -0.25	S _T -0.05	d _p ±0.125	d ₀ +0.4 +0.1	H _a ±0.2	
8	WD 10	10	20	1.5	15	1.5	1	20
10	WD 12	12	24		18			24
12	WD 14	14	26		20			26
14	WD 16	16	30		23	2		30
16	WD 18	18	32		25			32
18	WD 20	20	36		28			36
20	WD 22	22	38		30	3		38
22	WD 24	24	42		33			42
24	WD 26	26	44		35			44
26	WD 28	28	48		38	4		48
30	WD 32	32	54		43			54
36	WD 38	38	62		50			62
40	WD 42	42	66		54			66
46	WD 48	48	74	2	61		1.5	74
50	WD 52	52	78		65			78
60	WD 62	62	90		76	90		

SF-1SP/SF-2SP 自润滑板材标准公制尺寸
SF-1SP/SF-2SP Self-Lubricating Strip/Sheet Standard Metric Size



单位Unit: mm

型号规格 Standard No.	长度 $L\pm1$	宽度 $W\pm1$	壁厚 Wall thickness $S_s-0.05$
SP	500	150	1.0
SP	500	150	1.5
SP	500	150	2.0
SP	500	150	2.5

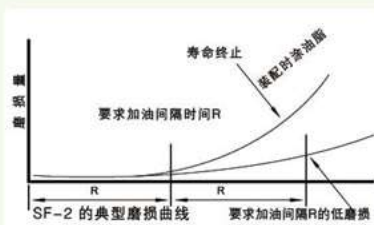
SF-2 边界润滑轴承

SF-2 Marginal-Lubrication Bearing



金相图片 Metallography

1. 改性聚甲醛 POM with lead 0.3-0.5mm
2. 球形青铜粉 Porous bronze sintere
3. 钢背 Steel backing (可选铜板 Ro 304, 316)
4. 镀铜层 Copper plating



注：SF-2系列产品还可根据不同工况条件选择不同的基体材料，如：青铜基板、不锈钢基板、以及“无铅”等配方产品。SF-2Y属环保无铅产品，颜色为桔黄色。

Note: Various materials are suitable for SF-2 series products according to different working conditions, such as bronze-backing, stainless steel backing and lead-free material. SF-2Y is an environmental friendly lead-free product and its color is yellow.

SF-2 应用特点 Characteristic of preformance

SF-2型材料是以填充四氟改性的聚甲醛塑料为表面三层复合自润滑材料，它是一种良性的边界润滑材料，因此特别适用与高载低速下的旋转运动，摇摆运动以及经常在载荷下启闭而不易形成流体动力润滑的轴承，止推垫片、滑块、球座等摩擦零件。SF-2能够充分地利用微量润滑脂，在边界润滑条件下可以长期的不用加油保养。在完全无油润滑条件下，SF-2磨擦性能及允许PV值较低，因此通常在塑料表面轧出储油坑，装配时涂上锂基润滑油脂或硅脂等。

SF-2 is triple-layer self lubricating material that can fill modified POM plastic as surface layer; it is benignant boundary lubrication material, therefore, it is particularly applicable high-load low-speed rotating and wing movement, as well as in the condition that frequent loaded start-stop is the requirement while hydrodynamic lubrication membrane is difficult to form, in the parts such as bearing, thrust washer, sliding block, ball socket and so on. SF-2 can take full advantage of less grease to work long time without lubrication maintenance under boundary lubrication condition. But under oil-free condition, SF-2 the frictional behavior and permissible PV value is relatively low, so generally storage pit can be formed on the plastic surface, where lithiumbased lubricant grease or silicone grease and so on should be applied when being installed.

SF-2 磨损规律 Wear Rules

SF-2型材料有其特殊的磨损规律，如图4所示在安装时涂油脂的情况下，能在R阶段内极微量的磨损。经过R阶段时间后失去边界润滑条件，磨损就开始加剧。如果在此时重新加油，可保持无显著磨损，其寿命亦可以大大地延长。所以SF-2材料的优点就在于需要间隔R阶段时间加油一次，其间隔时间R较其它材料特别是金属材料的间隔时间显著地长。约为五倍左右。

SF-2 material follows special wearing rule as shown in Fig. 4, infinitesimal abrasion can occur in R phase when being applied with grease and then being installed. But after the R phase, the boundary lubrication condition will disappear and wearing will be exaggerated. If you do refill with oil, the product can be drastically held by non-remarkable wearing and its life will also be greatly extended. Therefore the advantage of SF-2 material is that oil shall be added with an interval of R, which is remarkably longer that that of R other metal materials. It is approximately five times as long.

当装配时涂以润滑脂(如锂基脂或硅脂等)，SF-2衬套的使用寿命，随工作时所处的PV值而上下，如当PV值在2.5MPa·m/s左右时，其使用寿命约为200小时，而当PV值在0.1MPa·m/s时，其使用寿命可在10000小时以上(详见表)

SF-2衬套的加油保养周期R约为寿命的一半左右。例如当PV=2.5MPa·m/s时，要求每隔100小时必须加油保养一次。

When SF-2 bush is installed with application of grease such as lithium-based or silicone grease, its service life varies from the PV value under working condition, for instance, when PV value is about 2.5MPa·m/s, its service life will be about 200hr; when PV value is 0.1MPa·m/s, its service life can be above 10,000hr (see the table for details)

The cycle R of lubrication maintenance of SF-2 bush is about the half of its service life. For instance, when PV=2.5MPa·m/s, it is required to be oil-lubricated every 100hr.

SF-2 边界润滑轴承

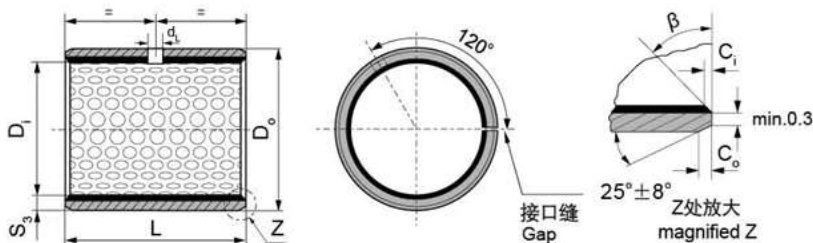
SF-2 Marginal-Lubrication Bearing

实际运用中根据使用环境、工况和环保要求的不同，表面塑料层 POM/PEEK 里可以添加不同的填充材料。产品范围包括：SF-2（黑）、SF-2Y（黄）、SF-2S（橙）、SF-2L（蓝）、SF-2P（PEEK）。

According to the different working conditions and environmental protection, the POM or PEEK layer with different polymer filler, Surface tin or copper plating, product range includes SF-2 (black)、SF-2S (yellow)、SF-2S (orange)、SF-2L (blue)、SF-2 (PEEK) .

有关数据 Data	代号 Grade	SF-2（黑）	SF-2Y（黄） (lead free)	SF-2S（橙） (lead free)	SF-2L（蓝） (lead free)	SF-2P（PEEK）
	材料 Material	碳钢/Steel+铜粉/ Bronze+POM	碳钢/Steel+铜粉/ Bronze+POM	碳钢/Steel+铜粉/ Bronze+POM	碳钢/Steel+铜粉/ Bronze+POM	碳钢/Steel+铜粉/ Bronze+(PTFE+PEEK)
最大承载压力P Max load capacity P	静载 N/mm ² Static load	140	140	140	110	140
	动载 N/mm ² Dynamic load	70	70	70	45	100
最大线速度V Max line speed V	脂润滑 Greases lubrication	2.5	2.5	2.5	2.5	2.5
最高PV值 N/mm ² ·m/s PV value limit		2.8	2.8	2.8	2.8	2.5
摩擦系数u Friction coef u		0.06~0.12	0.06~0.12	0.06~0.12	0.05~0.1	0.08~0.12
相配轴径 Matching Shaft	硬度 HB Hardness	>270	>270	>270	>270	>270
	粗糙度 Ra Roughness	0.4~1.25	0.4~1.25	0.4~1.25	0.4~1.25	0.4~1.25
工作温度 °C Working temperature		-60~+120	-40~+120	-40~+120	-60~+120	-150~+250
导热系数 W/mk Thermal conductivity		52	52	52	52	52
线膨胀系数（轴向） Coefficient of linear xpansion		11×10 ⁻⁶ /K	11×10 ⁻⁶ /K	11×10 ⁻⁶ /K	11×10 ⁻⁶ /K	11×10 ⁻⁶ /K
针对性运用领域 Pertinence application			产品应用于汽车底盘、锻压机床、冶金机械、矿山机械、水利行业、轧钢行业等。 It's used in vehicle chassis, forming machine tools, steel metallurgical machinery, mineral mountain machinery, hydraulic industry and rolling steel industry, etc.			产品应用于锻压机床、冶金机械、矿山机械、液压马达等高端应用。 The product is applied in forging press, metallurgy machine, mine machine, irrigation industry, hydraulic moto high-end application, etc.

SF-2 边界润滑轴承标准公制尺寸
SF-2 Marginal-Lubrication Bearing Standard Metric Size



内外倒角 ID and OD chamfers

S_3	C_0	C_1	β
1.0	0.6 ± 0.3	0.30 ± 0.2	$30^\circ \pm 5^\circ$
1.5	0.7 ± 0.3	0.50 ± 0.2	$30^\circ \pm 5^\circ$

S_3	C_0	C_1	β
2.00	1.2 ± 0.4	0.50 ± 0.3	$30^\circ \pm 5^\circ$
2.50	1.8 ± 0.6	0.80 ± 0.3	$45^\circ \pm 5^\circ$

单位Unit: mm

轴径 Shaft D _s h8	座孔 Housing H7 D _H	(OD) 外径公差 Tolerance D ₀	(ID)压装后 内孔公差 After assembled D ₁	配合间隙 Clearance D ₀	壁厚 Wall thick- ness S ₃	油孔 Oil hole d _L	长度 L ⁰ -0.40											
							10	15	20	25	30	35	40	45	50	60		
10 -0.022	12 +0.018	12 +0.065 +0.030	10.108 10.040	0.130 0.040	0.980 0.955	4	1010	1015	1020									
12 -0.027	14 +0.018	14 +0.065 +0.030	12.108 12.040	0.135 0.040			1210	1215	1220									
14 -0.027	16 +0.018	16 +0.065 +0.030	14.108 14.040					1415	1420									
15 -0.027	17 +0.018	17 +0.065 +0.030	15.108 15.040					1515	1520	1525								
16 -0.027	18 +0.018	18 +0.065 +0.030	16.108 16.040					1615	1620	1625								
18 -0.027	20 +0.021	20 +0.075 +0.035	18.111 18.040	0.138 0.040				1815	1820	1825								
20 -0.033	23 +0.021	23 +0.075 +0.035	20.131 20.050	0.164 0.050	1.475 1.445	6		2015	2020	2025	2030							
22 -0.033	25 +0.021	25 +0.075 +0.035	22.131 22.050					2215	2220	2225	2230							
25 -0.033	28 +0.021	28 +0.075 +0.035	25.131 25.050					2515	2520	2525	2530							
28 -0.033	32 +0.025	32 +0.085 +0.045	28.155 28.060	0.188 0.060	1.970 1.935	6			2820	2825	2830							
30 -0.033	34 +0.025	34 +0.085 +0.045	30.155 30.060						3020	3025	3030	3035	3040					
35 -0.039	39 +0.025	39 +0.085 +0.045	35.155 35.060	0.194 0.060						3520	3525	3530	3535	3540				
40 -0.039	44 +0.025	44 +0.085 +0.045	40.155 40.060	0.234 0.080 0.239 0.080 0.246 0.080	2.460 2.415	8			4020	4025	4030	4035	4040	4045	4050			
45 -0.039	50 +0.025	50 +0.085 +0.045	45.195 45.080						4520	4525	4530	4535	4540	4545	4550			
50 -0.039	55 +0.030	55 +0.100 +0.055	50.200 50.080								5030	5035	5040	5045	5050	5060		
55 -0.046	60 +0.030	60 +0.100 +0.055	55.200 55.080								5530	5535	5540	5545	5550	5560		
60 -0.046	65 +0.030	65 +0.100 +0.055	60.200 60.080								6030	6035	6040	6045	6050	6060		

SF-2 边界润滑轴承标准公制尺寸

SF-2 Marginal-Lubrication Bearing Standard Metric Size

单位Unit: mm

轴径 Shaft D _s h8	座孔 Housing H7 D _H	(OD) 外径公差 Tolerance D _O	(ID)压装后 内孔公差 After assembled D _I	配合间隙 Clearance D _O	壁厚 Wall thick- ness S _J	油孔 Oil hole d _L	长度 L ⁰ -0.40									
							40	50	60	80	90	95	100	110	120	
65 -0.046	70 +0.030	70 +0.100 +0.055	65.200 65.080	0.246 0.080	2.460 2.415	8	6540	6550	6560							
70 -0.046	75 +0.030	75 +0.100 +0.055	70.200 70.080				7040	7050	7060	7080						
75 -0.046	80 +0.030	80 +0.100 +0.055	75.200 75.080				7540	7550	7560	7580						
80 -0.046	85 +0.035	85 +0.120 +0.070	80.265 80.100	0.313 0.100	2.450 2.385	9.5	8040	8050	8060	8080						
85 -0.054	90 +0.035	90 +0.120 +0.070	85.265 85.100	0.321 0.100			8540	8550	8560	8580						
90 -0.054	95 +0.035	95 +0.120 +0.070	90.265 90.100				9040	9050	9060	9080	9090					
100 -0.054	105 +0.035	105 +0.120 +0.070	100.265 100.100					10050	10060	10080	10090	10095				
105 -0.054	110 +0.035	110 +0.120 +0.070	105.265 105.100					10550	10560	10580	10590	10595	105100	105110		
110 -0.054	115 +0.035	115 +0.120 +0.070	110.265 110.110					11050	11060	11080	11090	11095	110100	110110		
120 -0.054	125 +0.040	125 +0.170 +0.100	120.270 120.110	0.324 0.100				12050	12060	12080	12090	12095	120100	120110		
125 -0.063	130 +0.040	130 +0.170 +0.100	125.270 125.110					12550	12560	12580	12590	12595	125100	125110		
130 -0.063	135 +0.040	135 +0.170 +0.100	130.270 130.110					13050	13060	13080	13090	13095	130100	130110		
140 -0.063	145 +0.040	145 +0.170 +0.100	140.270 140.110					14050	14060	14080	14090	14095	140100	140110		
150 -0.063	155 +0.040	155 +0.170 +0.100	150.270 150.110					15050	15060	15080	15090	15095	150100	150110		
160 -0.063	165 +0.040	165 +0.170 +0.100	160.270 160.110					16050	16060	16080	16090	16095	160100	160110		
170 -0.063	175 +0.040	175 +0.170 +0.100	170.270 170.110					17050	17060	17080	17090	17095	170100	170110		
180 -0.063	185 +0.046	185 +0.210 +0.130	180.276 180.110	0.339 0.110			9.5		18050	18060	18080	18090	18095	180100	180110	
190 -0.072	195 +0.046	195 +0.210 +0.130	190.276 190.110						19050	19060	19080	19090	19095	190100	190110	190120
200 -0.072	205 +0.046	205 +0.210 +0.130	200.276 200.110						20050	20060	20080	20090	20095	200100	200110	200120
220 -0.072	225 +0.046	225 +0.210 +0.130	220.276 220.110						22050	22060	22080	22090	22095	220100	220110	220120
240 -0.072	245 +0.046	245 +0.210 +0.130	240.276 240.110			0.354 0.110	9.5		24050	24060	24080	24090	24095	240100	240110	240120
250 -0.072	255 +0.052	255 +0.260 +0.170	250.282 250.110						25050	25060	25080	25090	25095	250100	250110	250120
260 -0.081	265 +0.052	265 +0.260 +0.170	260.282 260.110						26050	26060	26080	26090	26095	260100	260110	260120
280 -0.081	285 +0.052	285 +0.260 +0.170	280.282 280.110					28050	28060	28080	28090	28095	280100	280110	280120	
300 -0.081	305 +0.052	305 +0.260 +0.170	300.282 300.110					30050	30060	30080	30090	30095	300100	300110	300120	

JF 双金属复合轴承

JF Bi-metallic composite bearing



结构特性 Structure Characteristics

JF 双金属复合轴承以优质低碳钢为基体，表面烧结具有低摩擦特性的铜合金（CuSn6.5P0.1、CuPb10Sn10、CuSn8Ni、CuPb24Sn4、AlSn20Cu）作为轴承的耐磨层，铜合金表面可以根据使用工况需要加工出各种类型的油槽、油孔、油穴等，以适合于无法持续加油或者难以加油的场合。材料通过二次烧结二次挤压可以得到很好的接合强度和最佳的承载能力。

JF Bi-metallic composite bearing material consists of steel backing with lead bronze or lead-free copper alloy (CuSn6.5P0.1、CuPb10Sn10、CuSn8Ni、CuPb24Sn4、AlSn20Cu) lining, bearing material for oil/grease lubricated applications. The copper alloy forms a continuously frame for thermal conductivity. These bearing structures are with high load capacity and good fatigue property. Higher tolerance can be achieved after re-machined from the customers. Lead-free bronze lining bearing material conforms to the European RoHS certificate.

JF 双金属内孔加工与不可加工厚度公差

Wall Thickness of The Machinable and Non-machinable Bore of Bushes and Their Tolerances

公称厚度 Nominal Thickness	内孔不可加工厚度公差 Tolerances of Series B (non-machinable)	内孔可加工厚度公差 Tolerances of Series C (non-machinable)
1.0	-0.025	+0.25 +0.15
1.5	-0.030	+0.25 +0.15
2.0	-0.035	+0.25 +0.15
2.5	-0.040	+0.30 +0.15
3.0	-0.045	+0.30 +0.15
3.5	-0.050	+0.30 +0.15

产品应用 Application

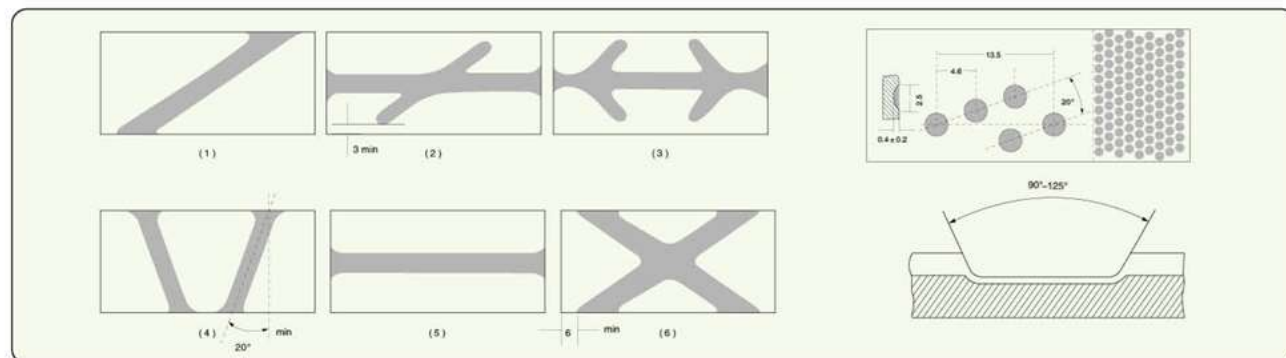
工程机械：底盘行走机构支重轮轴套、拖带轮轴套、张紧轮轴套；
汽车行业：平衡轴衬套、钢板销衬套、转向节主销轴套、连杆轴套、气门摇臂轴套、凸轮轴轴套、差速器轴套、变速箱轴套、内燃机主轴瓦、止推垫片；
以及柱塞泵侧片，齿轮泵侧片等。

Engineering machine: underpan, thrust wheel, Towing wheel, Steering knuckle, tension pulley...

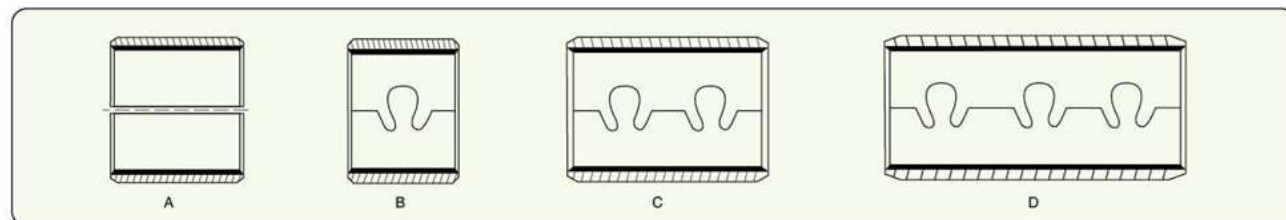
Automotive: trunnion shaft, connecting rod, valve rocker, camshaft, gear box, internal-combustion engine,

And Plunger pump friction plate, gear pump friction plate...

双金属自润滑轴承的油槽油穴形式 Type for Bi-Metallic Bushing Grooves and Indents



双金属轴承的搭扣形式 Lock Types for Bi-Metallic Bushing



JF 双金属复合轴承

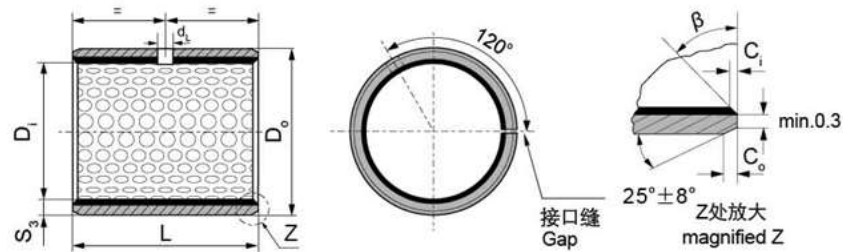
JF Bi-metallic composite bearing

实际运用中根据使用工况的不同，表面可以烧结不同牌号的合金，产品范围包括：JF-930、JF-800、JF-820、JF-720、JF-20。

According to the different working conditions, different alloy material (CuSn6.5P0.1、CuPb10Sn10、CuSn8Ni、CuPb24Sn4、AlSn20Cu) can be sintered on steel backing. product range includes JF-930、JF-800、JF-820、JF-720、JF-20.

有关数据 Data	代号 Grade	JF-930 (lead free)	JF-800	JF-820	JF-720	JF-20
	材料 Material	碳钢/Steel CuSn6.5P0.1	碳钢/Steel CuPb10Sn10	碳钢/Steel CuSn8Ni	碳钢/Steel CuPb24Sn4	碳钢/Steel AlSn20Cu
最大动载 P N/mm ² Max dynamic Load P		140	140	140	140	120
最大线速度 (脂润滑) V m/s Max line speed V (Greases lubrication)		2.5	2.5	2.5	2.5	—
合金层硬度 HB Alloy layer hardness		60~130	70~130	70~130	60~90	30~40
导热系数 W/mk Thermal conductivity		47	47	47	60	47
线膨胀系数 (轴向) Coefficient of linear expansion		18×10 ⁻⁶ /K	18×10 ⁻⁶ /K	18×10 ⁻⁶ /K	18×10 ⁻⁶ /K	19×10 ⁻⁶ /K
最高PV值 N/mm ² ·m/s Max PV value	油脂润滑 Greases lubrication	2.8	2.8	2.8	2.8	—
	油润滑 Oil lubrication	10	10	10	10	15
摩擦系数u Friction coef u	油脂润滑 Greases lubrication	0.05~0.12	0.05~0.15	0.05~0.12	0.05~0.15	—
	油润滑 Oil lubrication	0.04~0.12	0.04~0.12	0.04~0.12	0.04~0.12	0.04~0.12
最高温度 °C Max Working temperature	油脂润滑 Greases lubrication	150	150	150	150	150
	油润滑 Oil lubrication	250	250	250	250	250
相配轴径 Matching Shaft	硬度 HRC Hardness	≥53	≥53	—	≥45	≥270
	粗糙度 Ra Roughness	0.32~0.63	0.32~0.63	—	0.32~0.63	0.16~0.63
针对性运用领域 Pertinence application		适用于中等负载，以及有大的冲击载荷的轴承，如发动机连杆轴套、转向销轴套等。 Lead free, For use in medium load conditions, such as the engine connecting rod bushings, steering pin covers.	产品适用于汽车发动机连杆，工程机械、农业机械等。 Application: con-rod of automobile engines, engineering and agriculture machinery, heavy duty construction machinery etc.	适用于中等负载，以及有大的冲击载荷的轴承，如发动机连杆轴套、转向销轴套等。 Lead free, For use in medium load conditions, such as the engine connecting rod bushings, steering pin covers.	产品适用于高速、重载的内燃机主轴和变速齿轮。 Application: High speed, heavy load engine main shaft and ransmission gearbox, etc.	产品适用于内燃机主轴和连杆轴承、空压机、制冷机用轴承。 Application: High speed, heavy load engine main shaft and air compressor, cooling machine.etc.

JF 双金属轴承标准公制尺寸
JF Bimetal Bearing Standard Metric Size



内外倒角 ID and OD chamfers

Table with 4 columns: S3, C0, C1, beta. It contains two rows of data for different S3 values (0.75, 1.00, 1.50 and 2.00, 2.50).

单位unit:mm

Main table with columns: ID (内径 Di), OD (外径 Do), 轴径(h8) Shaft Ds, 座孔(H7) Housing Dh, 压装后内孔公差 After assembled Di, 配合间隙 Clearance Co, 壁厚 Wall thickness S3, 油孔 Oil hole dL, and a grid for length L (10 to 50 mm).

JF 双金属轴承标准公制尺寸

JF Bimetal Bearing Standard Metric Size

单位unit:mm

ID 内径 D _i	OD 外径 D _o	轴径(h8) Shaft D _s	座孔(H7) Housing D _H	压装后 内孔公差 After assembled D _i	配合间隙 Clearance C _o	壁厚 Wall thickness S _j	油孔 Oil hole d _t	长度 L ⁰ _{-0.40}								
								25	30	40	50	60	80	90	100	
45	50	45 _{-0.039}	50 ^{+0.025}	+0.225 +0.080	0.264 0.080	2.460 2.400	8	4525	4530	4540	4550					
50	55	50 _{-0.039}	55 ^{+0.030}	+0.230 +0.080	0.269 0.080				5030	5040	5050	5060				
55	60	55 _{-0.046}	60 ^{+0.030}					5530	5540	5550	5560					
60	65	60 _{-0.046}	65 ^{+0.030}					6030	6040	6050	6060					
65	70	65 _{-0.046}	70 ^{+0.030}					6530	6540	6550	6560					
70	75	70 _{-0.046}	75 ^{+0.030}					7030	7040	7050	7060	7080				
75	80	75 _{-0.046}	80 ^{+0.030}		+0.235 +0.080		0.281 0.080	9.5		7530	7540	7550	7560	7580		
80	85	80 _{-0.046}	85 ^{+0.035}						8030	8040	8050	8060	8080	8090		
85	90	85 _{-0.054}	90 ^{+0.035}						8530	8540	8550	8560	8580	8590	85100	
90	95	90 _{-0.054}	95 ^{+0.035}							9040	9050	9060	9080	9090	90100	
95	100	95 _{-0.054}	100 ^{+0.035}								9550	9560	9580	9590	95100	
100	105	100 _{-0.054}	105 ^{+0.035}									10050	10060	10080	10090	100100
105	110	105 _{-0.054}	110 ^{+0.035}									10550	10560	10580	10590	105100
110	115	110 _{-0.054}	115 ^{+0.035}									11050	11060	11080	11090	110100
115	120	115 _{-0.054}	120 ^{+0.035}								11550	11560	11580	11590	115100	
120	125	120 _{-0.054}	125 ^{+0.040}	+0.240 +0.080		0.303 0.080						12050	12060	12080	12090	120100
125	130	125 _{-0.063}	130 ^{+0.040}						12560	12580	12590	125100				
130	135	130 _{-0.063}	135 ^{+0.040}						13060	13080	13090	130100				
135	140	135 _{-0.063}	140 ^{+0.040}						13560	13580	13590	135100				
140	145	140 _{-0.063}	145 ^{+0.040}						14060	14080	14090	140100				
150	155	150 _{-0.063}	155 ^{+0.040}							15060	15080	15090	150100			

FB08G 双金属石墨润滑卷制轴承

FB08G Graphite Lubricant Embedded Wrapped Bronze Bearing



材料结构 Material Structure

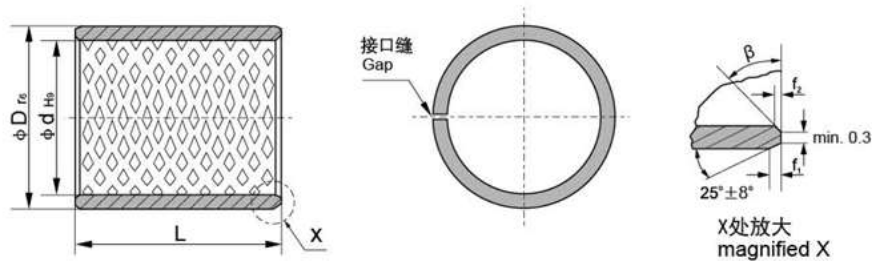
FB08G 固体润滑轴承是以 JF-800 双金属材料为基体，再埋入特殊固体润滑剂制作成的新型滑动轴承。由于高强度承载的合金材料作基体，并经过严格选择的高分子填充材料为耐磨剂，合理的螺旋角度菱形块状均布的润滑面，润滑面积达 25%，因此，能发挥超群的低摩擦，良好的润滑性和抗磨损性免除加油。该产品已广泛应用于起重起、微型电机、升降机、吊车及冶金机械等行业。

FB08G is a kind of steel-lead bronze alloys based bearing, which is embedded with particular formulation of solid lubricants(graphite). Due to the high strength, high load capacity and the spirally distributed diamond type of the embedded solid lubricant, the high temperature resistant action as extraordinary exploited. The lubrication area of the bearing surface is being about 25%. This type of bearing is particularly applied in starting motor for automobiles, generators cranes and those machines in metallurgical industry.

技术参数 Tech.Data

最大承载压力	Load capacity	150N/mm ²
适应温度范围	Temperature limit	-100°C ~+200°C
最高滑动速度	Speed limit	1.5M/s
摩擦系数	Friction coef	0.06~0.25
允许最高 PV 值 (干)	PV limit (dry)	2.5N/mm ² ·m/s
允许最高 PV 值 (油)	PV limit (oil)	15N/mm ² ·m/s

FB08G 石墨润滑卷制轴承标准公制尺寸
FB08G Graphite-Lubricant-Embedded Wrapped Bearing Standard Metric Size



单位 Unit: mm

d	D	f ₁	f ₂	L ⁰ _{-0.40}												
				10	15	20	25	30	35	40	50	60	70	80	90	100
10	12	0.3	0.5	1010	1015	1020										
12	14			1210	1215	1220										
14	16			1410	1415	1420	1425									
15	17			1510	1515	1520	1525									
16	18			1610	1615	1620	1625									
18	20			1810	1815	1820	1825									
20	23	0.8	0.4	2010	2015	2020	2025									
22	25			2210	2215	2220	2225	2230								
24	27				2415	2420	2425	2430								
25	28				2515	2520	2525	2530								
28	32	1.0	0.6		2815	2820	2825	2830								
30	34				3015	3020	3025	3030	3035	3040						
32	36				3215	3220	3225	3230	3235	3240						
35	39				3515	3520	3525	3530	3535	3540						
40	44	1.2	0.8			4020	4025	4030	4035	4040	4050					
45	50					4520	4525	4530	4535	4540	4550					
50	55					5020	5025	5030	5035	5040	5050	5060				
55	60					5520	5525	5530	5535	5540	5550	5560				
60	65						6025	6030	6035	6040	6050	6060	6070			
65	70							6530	6535	6540	6550	6560	6570			
70	75							7030	7035	7040	7050	7060	7070	7080		
75	80							7530	7535	7540	7550	7560	7570	7580		
80	85							8030	8035	8040	8050	8060	8070	8080		
85	90										8540	8550	8560	8570	8580	8590
90	95	1.4	0.8						9040	9050	9060	9070	9080	9090		
95	100										9550	9560	9570	9580	9590	95100
100	105										10050	10060	10070	10080	10090	100100
105	110										10550	10560	10570	10580	10590	105100
110	115										11050	11060	11070	11080	11090	110100
115	120										11550	11560	11570	11580	11590	115100
120	125											12060	12070	12080	12090	120100
125	130											12560	12570	12580	12590	125100
130	135											13060	13070	13080	13090	130100
135	140											13560	13570	13580	13590	135100
140	145									14060	14070	14080	14090	140100		
145	150									14560	14570	14580	14590	145100		
150	155									15060	15070	15080	15090	150100		
155	160									15560	15570	15580	15590	155100		
160	165									16060	16070	16080	16090	160100		

FB090 系列青铜卷制轴承 FB090 Bronze-Wrapped Bearing



结构特性及用途 Structure Characteristics and Applications

FB090青铜卷制轴承，以锡青铜合金CuSn8为材料，表面轧制菱形油穴，起储存油脂作用，它具有良好的疲劳强度和承载能力、耐腐蚀、抗磨损。广泛运用于农业机械、建筑机械、工程机械等高载低速场合。

FB090 wrapped bronze bushing is made of tin-bronze CuSn8 with its surface punched with diamond oil sockets which are preserved for oil saving. It has good anti-fatigue, anti-erosion anti-abrasion and load capacity. The products are widely applied in conditions of heavy load but low running velocity, such as on agricultural, construction and engineering machines.

FB092 系列青铜卷制轴承 FB092 Bronze-Wrapped Bearing



结构特性及用途 Structure Characteristics and Applications

FB092青铜卷制轴承，以锡青铜合金CuSn8为材料，工作表面按一定角度、密度均匀排布着润滑通孔，在启动时容易形成油膜，从而降低启动摩擦系数。它具有良好的疲劳强度的承载能力、耐腐蚀、抗磨损。该系列产品广泛运用于农业机械、建筑机械、工程机械等高载低速场合。

FB092 wrapped bronze bushing is made of tin-bronze CuSn8 that is of high density, its surface is punched with oil apertures by certain angle and density therefore its easier to form an oil film when the bushing works. It has good anti-fatigue and load, anti-erosion anti-abrasion and load capacity. The products are widely applied in conditions of heavy load but low running velocity, such as on agricultural, buiding and engineering machines.

产品的优点 Product Benefits

1. 节约大量铜材、节省车制铜套工时；
 2. 与车制轴套、滚动轴承相比其重量轻、成本低；
 3. 可在摩擦面加工出各种有穴、有坑、储存一定油脂，延长加油的时间是铜套的5倍；
 4. 极高的承载能力，特别是适用于粗糙的摩擦面；
- 可供产品：直套、止推垫片、翻边衬套、轴瓦、滑板、钢套组合件。

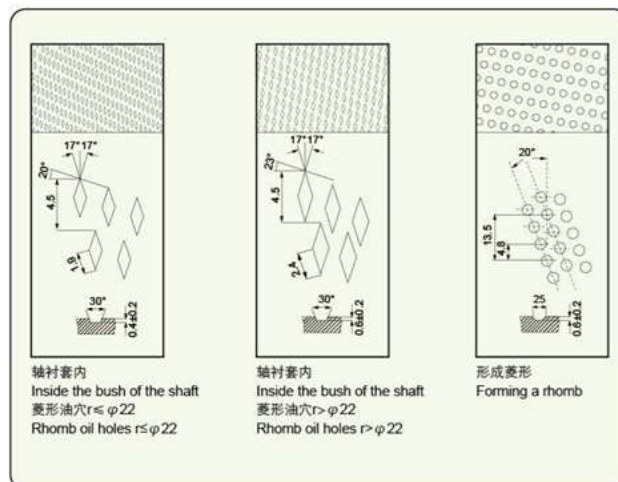
1. Saving large amount of bronze material and save the working hours normally spent for lathing the bronze bushing.
 2. Compared with lathed bushings and roller bearings, it is lights and more cost-effective.
 3. Various holes and dents can be made on the frication surface for grease storage, prolonging the lubrication interval to 5 times as long as required by the bronze bushing.
 4. Extremely high load sustainability, especially suitable for coarse abrasion surfaces.
- Standard products available: straight bushings, thrust plates and pressure bearings.
Non-standard products available: sleeve bushings, thrust plates, flanged bushing, bearing bushings, slide plates and steel bushing combination.

FB090/FB092 系列青铜卷制轴承 FB090/FB092 Bronze-Wrapped Bearing

FB090 材料结构 Material Structure

采用高密度青铜卷制形成球形油袋、油穴特殊合成内部表面以减少磨损延长使用时间并且很好的做到防腐功能。

High-density bronze is rolled into shape or oil bags and oil holes are specially integrated into the inner surface to reduce the wearing and prolong the service hours. Besides, it has excellent anti-corrosion functions.



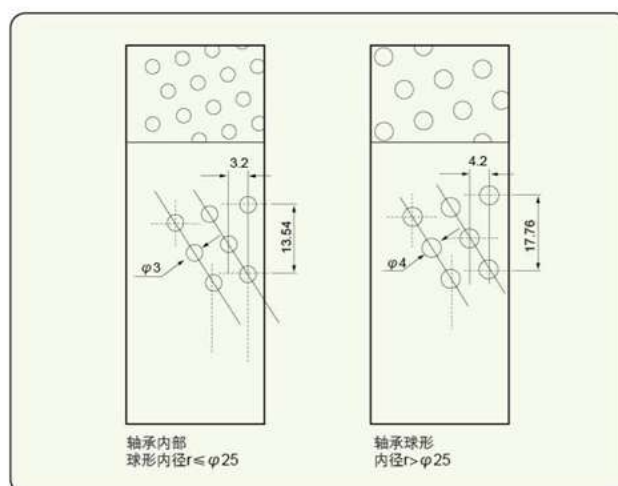
FB092 材料结构 Material Structure

表面排布规则的油孔，可在装配前或装配后涂抹油脂，以便在工作中易形成转移油膜，降低摩擦系数。

具有油脂储存量大、免维护周期长等优点。产品被广泛应用于农业机械、森林机械、工程机械等。

FB092 is deriving from FB090, the difference between FB090 & FB092 is indentations on working surface, which substituted by through-holes. Theses holes will allow greater capacity to collect lubricant, which build up a lubrication film at the start of movement and reduce the friction.

It is suitable for high load, lower speed application like construction, transport, and agriculture machinery.



标准衬套公差 (依据 DIN ISO/3547) Standard tolerance for bushes (As per to DIN ISO/3547)

标准直径 Standard Dia.	衬套外径尺寸 O.D.Size	相配座孔 Housing Bore	衬套内径尺寸 I.D.Size	相配轴径 Matching Shaft Diameter
10~18	+0.065 +0.030	+0.018 0	+0.046 0	-0.016 -0.043
18~30	+0.075 +0.035	+0.021 0	+0.052 0	-0.020 -0.020
30~50	+0.085 +0.045	+0.025 0	+0.062 0	-0.025 -0.064
50~80	+0.100 +0.055	+0.030 0	+0.074 0	-0.030 -0.076
80~120	+0.120 +0.070	+0.035 0	+0.087 0	-0.036 -0.090
120~180	+0.170 +0.100	+0.400 0	+0.100 0	-0.043 -0.106
180~250	+0.210 +0.130	+0.046 0	+0.115 0	-0.050 -0.122
250~315	+0.260 +0.170	+0.052 0	+0.130 0	-0.056 -0.137

FB09G 系列青铜固体卷制轴承
FB09G Graphite Lubricated Bronze-Wrapped Bearing



可供形式 Availability

直套、止推垫片、滑板及其它非标品部件等。
Cylindrical bushes, thrust washers, strip and non-standard parts as the clients supplied drawing etc.

公差 Tolerance

一般推荐座孔公差为H7，轴径公差为f7。

材料结构 Material Structure

与FB090具有相同的生产工艺及使用场合，其基体为青铜基板，在其菱形油穴内填充了以石墨为主的固体润滑剂，使产品在起始运用阶段及过程中能有更低的摩擦系数，在短时间断油的情况下仍能保持良好的工作状态。因此被广泛使用在工程机械、齿轮箱传动部件、汽机车离合器等高载中速部位、户外高空设备的转动部位。

The same produce process and application except overlay the solid lubricants into the diamond shaped lubrication indents on the bearing surface, which will offer good friction at the start and process works and keep good condition even no oil giving at short time. So can be used in construction machines, gears, automotive clutch pads etc.

技术参数 Tech.Data

最大承载压力	Load capacity	140N/mm ²
适应温度范围	Temperature limit	-100°C~+250°C
最高滑动速度	Speed limit	1.5M/s
摩擦系数	Friction coef	0.06~0.25
允许最高PV值(干)	PV limit (dry)	2.6N/mm ² ·m/s
允许最高PV值(油)	PV limit (oil)	15N/mm ² ·m/s

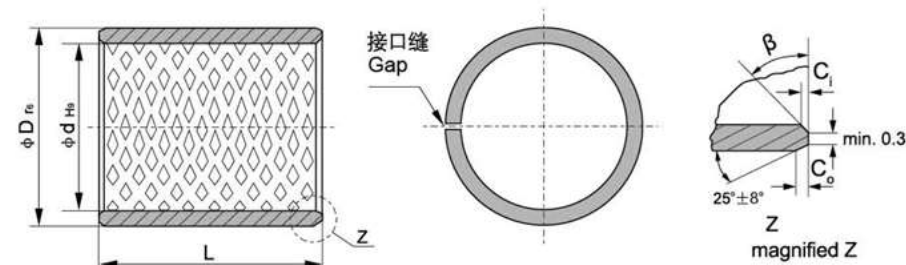
FB090/FB092/FB09G 系列青铜卷制轴承 FB090/FB092/FB09G Bronze-Wrapped Bearing

实际运用中根据使用工况的不同，基体可以采用不同牌号的合金，表面可以加工成其他形式的油孔和油槽。产品范围包括：FB090、FB092、FB09G。

According to the different working conditions and environmental protection, different type of alloy can be chosen, product range includes

有关数据 Data	代号Grade	FB090	FB092	FB09G
	材料名称 Material	CuSn8	CuSn8	CuSn8+石墨/graphite
密度 g/cm ³ Density		8.8	8.8	8.3
最大动载 N/mm ² Max Dynamic Load		40	40	40
最高线速度(脂润滑) m/s Max Linear Velocity (Grease)		2.5	2.5	2.5
最高PV值(脂润滑) N/mm ² ·m/s Max PV value (Grease)		2.8	2.8	2.8
抗拉强度 N/mm ² Pressure strength		460	460	460
屈服强度 N/mm ² Yield Strength		260	260	230
硬度 HB hardness		90~150	90~150	90~150
相配轴 Mating Axis	硬度 HRC Hardness	≥50	≥50	≥50
	粗糙度 Roughness	0.4~1.0	0.4~1.0	0.4~1.0
适用温度 °C Working Temperature		-40~150	-40~150	-40~150
摩擦系数 Friction Coefficient		0.06~0.15	0.06~0.15	0.03~0.1
导热系数 W/m·K coefficient of heat conduction		58	58	58
线膨胀系数 (轴向) Linear expansion coefficient		18.5×10 ⁻⁶ /K	18.5×10 ⁻⁶ /K	18.5×10 ⁻⁶ /K
针对性运用领域 Pertinence application		产品适用于起重机械、建筑机械、采矿机械，农业机械，森林机械等。 Application: Construction machinery, hoisting machinery, mining machinery, Forest machinery, agricultural machinery etc.	产品广泛运用于农业机械、建筑机械、工程机械等。 Application: Agricultural Machinery, Foresty machinery, Heavy duty construction machinery etc.	它具有很低的摩擦系数，较好的耐磨性等优点，能在无油或少油的条件下工作。产品广泛应用于启动马达起升机，工程机械，汽车，卡车，拖拉机等。 Application: starting motor hoisting machines and other construction machines, automobiles, tractors, trucks, machines tools and some mineral engines etc.

FB090/FB092/FB09G 青铜卷制轴承标准公制尺寸
FB090/FB092/FB09G Bronze-Wrapped Bearing Standard Metric Size



内外倒角 ID and OD chamfers

S_3	C_o	C_i	β
0.75	0.5 ± 0.3	0.25 ± 0.2	$35^\circ \pm 5^\circ$
1.00	0.6 ± 0.3	0.30 ± 0.2	$35^\circ \pm 5^\circ$
1.50	0.7 ± 0.3	0.50 ± 0.3	$35^\circ \pm 5^\circ$

S_3	C_o	C_i	β
2.00	1.2 ± 0.4	0.50 ± 0.3	$35^\circ \pm 5^\circ$
2.50	1.8 ± 0.6	0.60 ± 0.3	$45^\circ \pm 5^\circ$

单位Unit: mm

内径 d	外径 D	长度 $L \begin{smallmatrix} 0 \\ -0.40 \end{smallmatrix}$												
		10	15	20	25	30	35	40	50	60	70	80	90	100
10	12	1010	1015	1020										
12	14	1210	1215	1220										
14	16	1410	1415	1420	1425									
15	17	1510	1515	1520	1525									
16	18	1610	1615	1620	1625									
18	20	1810	1815	1820	1825									
20	23	2010	2015	2020	2025									
22	25	2210	2215	2220	2225	2230								
24	27		2415	2420	2425	2430								
25	28		2515	2520	2525	2530								
28	31		2815	2820	2825	2830								
30	34		3015	3020	3025	3030	3035	3040						
32	36		3215	3220	3225	3230	3235	3240						
35	39		3515	3520	3525	3530	3535	3540						
40	44			4020	4025	4030	4035	4040	4050					
45	50			4520	4525	4530	4535	4540	4550					
50	55			5020	5025	5030	5035	5040	5050	5060				
55	60			5520	5525	5530	5535	5540	5550	5560				
60	65				6025	6030	6035	6040	6050	6060	6070			
65	70					6530	6535	6540	6550	6560	6570			
70	75					7030	7035	7040	7050	7060	7070	7080		
75	80					7530	7535	7540	7550	7560	7570	7580		
80	85					8030	8035	8040	8050	8060	8070	8080		
85	90					8530	8535	8540	8550	8560	8570	8580	8590	
90	95					9030	9035	9040	9050	9060	9070	9080	9090	
95	100							9540	9550	9560	9570	9580	9590	95100

FB090/FB092/FB09G 青铜卷制轴承标准公制尺寸

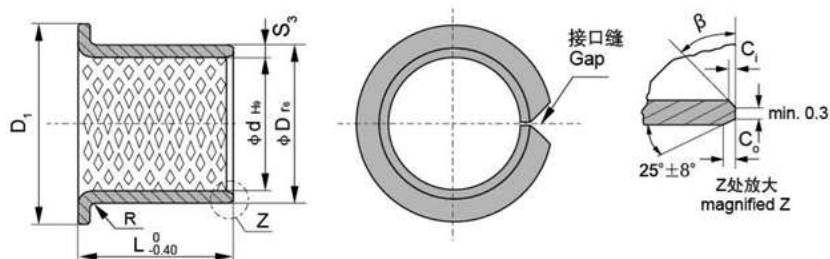
FB090/FB092/FB09G Bronze-Wrapped Bearing Standard Metric Size

单位Unit: mm

内径 d	外径 D	长度 L $\begin{smallmatrix} 0 \\ -0.40 \end{smallmatrix}$									
		25	30	35	40	50	60	70	80	90	100
100	105					10050	10060	10070	10080	10090	100100
105	110					10550	10560	10570	10580	10590	105100
110	115					11050	11060	11070	11080	11090	110100
115	120					11550	11560	11570	11580	11590	115100
120	125						12060	12070	12080	12090	120100
125	130						12560	12570	12580	12590	125100
130	135						13060	13070	13080	13090	130100
135	140						13560	13570	13580	13590	135100
140	145						14060	14070	14080	14090	140100
145	150						14560	14570	14580	14590	145100
150	155						15060	15070	15080	15090	150100
155	160						15560	15570	15580	15590	155100
160	165						16060	16070	16080	16090	160100
165	170						16560	16570	16580	16590	165100
170	175						17060	17070	17080	17090	170100
175	180						17560	17570	17580	17590	175100
180	185						18060	18070	18080	18090	180100
185	190						18560	18570	18580	18590	185100
190	195						19060	19070	19080	19090	190100
195	200						19560	19570	19580	19590	195100
200	205						20060	20070	20080	20090	200100
205	210						20560	20570	20580	20590	205100
215	220						21560	21570	21580	21590	215100
225	230						22560	22570	22580	22590	225100
230	235						23060	23070	23080	23090	230100
240	245						24060	24070	24080	24090	240100
250	255						25060	25070	25080	25090	250100
260	265						26060	26070	26080	26090	260100
270	275						27060	27070	27080	27090	270100
280	285						28060	28070	28080	28090	280100
290	295						29060	29070	29080	29090	290100
300	305						30060	30070	30080	30090	300100

FB090/FB092 青铜卷制翻边轴承标准公制尺寸

FB090/FB092 Bronze-Wrapped Flange Bearing Standard Metric Size



S_3	1.0	1.5	2.0	2.5
R	$1^{-0.5}$	1 ± 0.5	1.5 ± 0.5	2 ± 0.5

单位Unit: mm

内径 d	外径 D	法兰外径 D ₁	长度 L $^{0}_{-0.40}$										
			15	20	25	30	35	40	50	60	70	80	90
25	28	35	25150	25200	25250								
30	34	45		30200	30250	30300							
35	39	50		35200	35250	35300	35350						
40	44	55			40250	40300	40350	40400					
45	50	60				45300	45350	45400	45500				
50	55	65				50300	50350	50400	50500				
55	60	70				55300	55350	55400	55500				
60	65	75				60300	60350	60400	60500	60600			
65	70	80				65300	65350	65400	65500	65600			
70	75	85					70350	70400	70500	70600	70700		
75	80	90					75350	75400	75500	75600	75700		
80	85	100					80350	80400	80500	80600	80700	80800	
90	95	110							90500	90600	90700	90800	90900
100	105	120							100500	100600	100700	100800	100900
110	115	130							110500	110600	110700	110800	110900
120	125	140							120500	120600	120700	120800	120900
130	135	155								130600	130700	130800	130900
140	145	165								140600	140700	140800	140900
150	155	180								150600	150700	150800	150900
160	165	190								160600	160700	160800	160900
170	175	200								170600	170700	170800	170900
180	185	215								180600	180700	180800	180900
190	195	225								190600	190700	190800	190900
200	205	235								200600	200700	200800	200900
225	230	260								225600	225700	225800	225900
250	255	290								250600	250700	250800	250900
265	270	305								265600	265700	265800	265900
285	290	325								285600	285700	285800	285900
300	305	340								300600	300700	300800	300900

500# 固体镶嵌轴承

500# Solid-lubricant-Inlaid Bearing



产品应用 Application

注塑机模架、汽车模具、工程机械、液压油缸、大型齿轮箱、冶金连铸机、列车支架、轧钢设备、矿山机械、船舶、气轮机、吊车支撑、食品机械、水轮机轴承等

Injection molding machine, automotive moulds, hydrocylinder, gear case, gas turbine, water turbine, Crane support etc.

结构特性 Structure Characteristics

铜合金镶嵌式固体润滑剂自润滑轴承，结合了铜合金的耐磨性及固体润滑剂的自润滑性能，使其在使用过程中无需加油维护。产品被广泛应用于高载、间歇性或摇摆运动，如汽机车生产流水线、水轮机、水库工作/事故门、塑胶机械、冲床周边设备等。根据使用的工况，可以提供各种类型的铜合金。

This material provides a maintenance-free bearing solution, particularly for high load, intermittent of oscillating motion. Solid lubricants within a bronze combines the strength of the bronze with the wear resistance and low friction. The application including automotive products line, water engineering, dam gate, plastic industries etc. Different bronze alloy type can be available according to the work condition.

材料特点

- 可以长期使用而无需维护；
- 设计用于很高的静承载和动承载；
- 具有很低的且平稳的摩擦系数，无“粘着”现象；
- 具有耐粉尘、耐腐蚀、耐冲击和耐边缘负载能力；
- 金属基材具有很好的吸震能力；
- 能够在很宽的温度范围内使用；
- 适合于往复、旋转和摆动等启动频繁又难以形成油膜的场合；
- 具有极低的磨损率，使用寿命长。

Material Properties

- Allows maintenance-free and long-life operation;
- Suitable for high static and dynamic loads;
- With low and smoothly coefficient of friction and without stick-slip effects;
- Suitable for dirty, corrosion, impact load and edge loading;
- The base material provided a good shock-absorbing capacity;
- Can be used over a large temperature range;
- Suitable for reciprocating, rotating and oscillating movement with start frequency and difficulty to form oil film occasions;
- With low wear rate and long life service.

500# 固体镶嵌轴承

500# Solid-lubricant-Inlaid Bearing

实际运用中根据使用工况的不同，基体可以采用不同牌号的合金，产品范围包括：500#-1、500#-2、500#-3、500#-4、500#-5各系列产品。

According to the different working conditions, different type of alloy can be chosen, product range includes 500#-1、500#-2、500#-3、500#-4、500#-5.

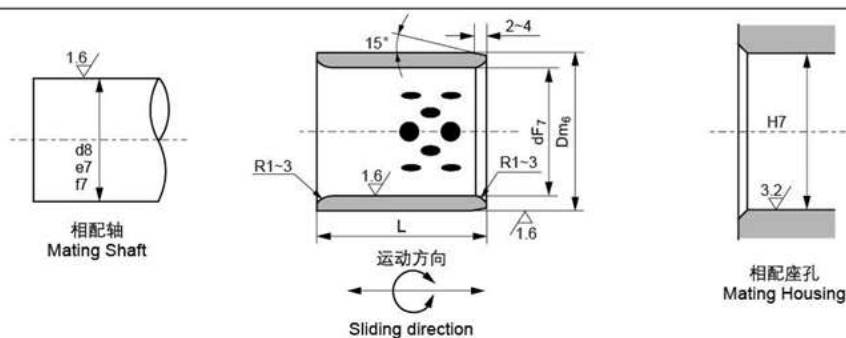
代号 Grade	500#-1	500#-2	500#-3	500#-4	500#-5
材料 Material	CuZn25Al6Mn4Fe3	CuSn5Pb5Zn5	CuZn25Al5Mn4Fe3	ZCuAl9Fe4Ni4Mn2	铸铁/HT250 250 Cast iron
密度 g/cm ³ Density	8.0	8.7	-	8.0	6.8
硬度 HB Hardness	>210	>70	>80~100	>210	>160
抗拉强度N/mm ² Tensile strength	>750	>200	-	>750	>150
屈服强度N/mm ² Yield strength	>450	>90	-	>450	-
延伸率% Elongation	>8	>15	-	>12	-
线胀系数 10 ⁻⁵ /°C Coefficient of linear expansion	1.9	1.8	1.2	-	-
导热系数W/(m.k) Heat-conducting Coefficient	38~55	46~63	-	-	-
弹性系数KN/mm ² Flexibility Coefficient	100~140	85~115	-	-	-
使用温度 °C Temp. Limits	-40~+300	-40~+250	-	-	-
最大动载N/mm ² Max. Dynamic Load	120	60	-	-	-
最大线速度 m/s Max.speed	干摩擦 Dry Lubrication	0.4	0.3	-	-
	油润滑 Oil Lubrication	1.0	0.85	1.0	1
最大PV值 Max.PV N/mm ² ·m/s	干摩擦 Dry Lubrication	1.5	1.0	1.5	1.2
	油润滑 Oil Lubrication	3.25	1.65	3.25	1.55
摩擦系数 Friction	干摩擦 Dry Lubrication	0.12~0.16	0.12~0.16	0.12~0.16	-
	油润滑 Oil Lubrication	0.03~0.08	0.03~0.08	0.03~0.08	0.13~0.2

固体润滑剂 Solid Lubricants

固体润滑剂 Lubricant	特性 Features	典型用途 Typical application
高纯石墨+添加剂 Graphite+add 	很好的耐磨性和化学稳定性，使用温度 < 400°C Good wear performance and chemical stability, temperature limit 400°C	应用于一般机械，在大气中使用 Suit for general machines and under atmosphere
PTFE+添加剂 PTFE+add 	极低的摩擦系数和很好的水润滑性，使用温度 < 300°C Lowest friction coefficient and good water lubrication, temperature limit 300°C	应用于水、海水润滑，如船舶 Suit for water and seawater lubricant, such as ship

500# 直套固体镶嵌轴承标准公制尺寸

500# Solid-lubricant-Inlaid Bearing Standard Metric Size



单位Unit: mm

d	D	d F ₇		D m ₆		L ^{-0.10} _{-0.30}														
						8	10	12	15	16	20	25	30	35	40	50	60	70	80	
8	12	8	+0.028 +0.013	12	+0.018 +0.007	081208	081210	081212	081215											
10	14	10		14		101408	101410	101412	101415	101416	101420									
12	18	12	+0.034 +0.016	18	+0.021 +0.008		121810	121812	121815	121816	121820	121825	121830							
13	19	13		19			131910	131912	131915	131916	131920	131925	131930							
14	20	14		20			142010	142012	142015	142016	142020	142025	142030							
15	21	15		21			152110	152112	152115	152116	152120	152125	152130	152135						
16	22	16		22			162210	162212	162215	162216	162220	162225	162230	162235	162240					
18	24	18		24			182410	182412	182415	182416	182420	182425	182430	182435	182440					
20	28	20		28				202810	202812	202815	202816	202820	202825	202830	202835	202840	202850			
22	32	22	+0.041 +0.020	32	+0.025 +0.009			223212	223215	223216	223220	223225	223230	223235	223240	223250				
25	33	25		33				253312	253315	253316	253320	253325	253330	253335	253340	253350	253360			
30	38	30		38				303812	303815	303816	303820	303825	303830	303835	303840	303850	303860			
35	45	35	+0.050 +0.025	45							354520	354525	354530	354535	354540	354550	354560	354570		
40	50	40		50							405020	405025	405030	405035	405040	405050	405060	405070	405080	
45	55	45		55									455530	455535	455540	455550	455560	455570	455580	
50	60	50		60										506030	506035	506040	506050	506060	506070	506080

500# 直套固体镶嵌轴承标准公制尺寸

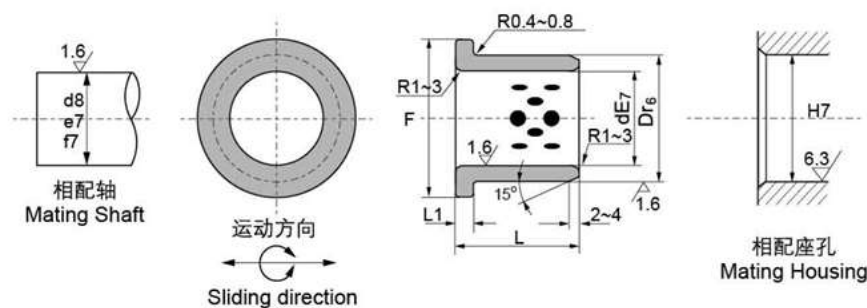
500# Solid-lubricant-Inlaid Bearing Standard Metric Size

单位Unit: mm

d	D	d F ₇		D m ₆		L ^{-0.10 -0.30}												
						30	35	40	50	60	70	80	100	120	130	140	150	
50	62	50	+0.050 +0.025	62		506230	506235	506240	506250	506260	506270							
50	65	50		65		506530	506535	506540	506550	506560	506570	506580	5065100					
55	70	55		70	+0.030 +0.011	557030	557035	557040	557050	557060	557070	557080	5570100					
60	74	60		75		607430	607435	607440	607450	607460	607470	607480	6074100					
60	75	60		75		607530	607535	607540	607550	607560	607570	607580	6075100					
63	75	63		75			637535	637540	637550	637560	637570	637580	6375100					
65	80	65		80			658035	658040	658050	658060	658070	658080	6580100					
70	85	70		+0.060 +0.030		85	+0.035 +0.013		708535	708540	708550	708560	708570	708580	7085100			
70	90	70	90			709035		709040	709050	709060	709070	709080	7090100					
75	90	75	90					759040	759050	759060	759070	759080	7590100					
75	95	75	95					759540	759550	759560	759570	759580	7595100	7595120				
80	96	80	96						809640	809650	809660	809670	809680	8096100	8096120	8096130		
80	100	80	100							8010040	8010050	8010060	8010070	8010080	80100100	80100120	80100130	80100140
90	110	90	+0.071 +0.036	110	+0.040 +0.015				9011050	9011060	9011070	9011080	90110100	90110120	90110130	90110140		
100	120	100		120						10012060	10012070	10012080	100120100	100120120	100120130	100120140		
110	130	110		130								11013080	110130100	110130120	110130130	110130140		
120	140	120		140								12014080	120140100	120140120	120140130	120140140		
125	145	125	+0.083 +0.043	145								125145100	125145120	125145130	125145140			
130	150	130		150									130150100	130150120	130150130	130150140	130150150	
140	160	140		160									140160100	140160120	140160130	140160140	140160150	
150	170	150		170									150170100	150170120	150170130	150170140	150170150	
160	180	160		180										160180100	160180120	160180130	160180140	160180150

500# 自润滑翻边轴承标准公制尺寸

500# Self-lubricating Flange Bearing Standard Metric Size

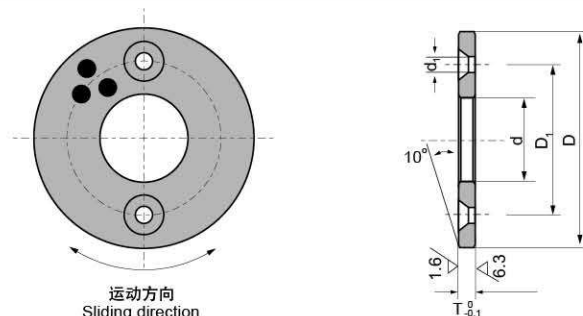


单位Unit: mm

d	D	d E ₇		D r ₆		F	L ₁	L ^{-0.10} L _{-0.30}									
								15	20	25	30	35	40	50	60	80	100
10	14	10	+0.040 +0.025	14	+0.034 +0.023	22	2	1015	1020								
12	18	12	+0.050 +0.032	18	+0.041 +0.028	25	3	1215	1220								
13	19	13		19		26		1315	1320								
14	20	14		20		27		1415	1420	1425							
15	21	15		21		28		1515	1520	1525	1530						
16	22	16	+0.061 +0.040	22	+0.050 +0.034	29		1615	1620	1625	1630						
20	30	20		30		40	5		2020	2025	2030	2035					
25	35	25		35		45			2520	2525	2530	2535	2540				
30	40	30		40		50			3020	3025	3030	3035	3040	3050			
35	45	35		45		60				3525	3530	3535	3540	3550			
40	50	40		50		65					4030	4035	4040	4050			
45	55	45		55		70					4530	4535	4540	4550	4560		
50	60	50	+0.075 +0.050	60	+0.060 +0.041	75						5035	5040	5050	5060		
55	65	55		65		80							5540	5550	5560		
60	75	60		75		90	7.5						6040	6050	6060	6080	
70	85	70		85		105								7050	7060	7080	
75	90	75		90		110								7550	7560	7580	75100
80	100	80		100		120	10								8060	8080	80100
90	110	90	+0.090 +0.060	110	+0.076 +0.054	130									9060	9080	90100
100	120	100		120		150									10060	10080	100100
120	140	120		140		170									12060	12080	120100

500# 自润滑止推垫片标准公制尺寸

500# Self-lubricating Thrust Washer Standard Metric Size

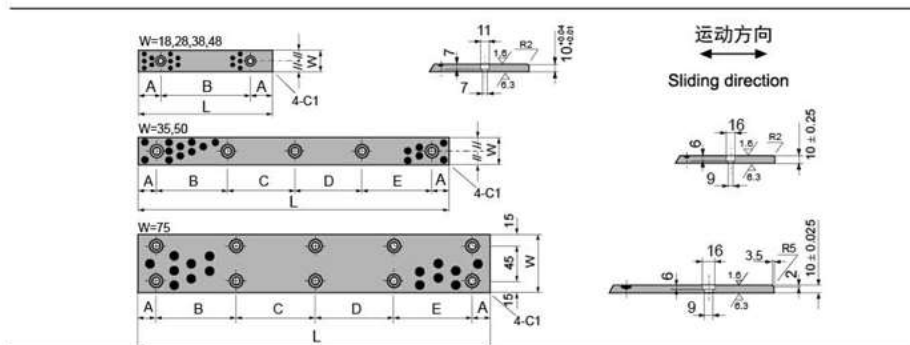


单位Unit: mm

型号规格 Standard No.	d	D	T ⁰ _{-0.10}	螺孔 Bolt Hole			
				D ₁	平头螺钉 Crop Bolt	d ₁	孔数 Bore Number
500#-10	10.2	30	3	20	M3	3.5	2
500#-12	12.2	40		28			
500#-13	13.2						
500#-14	14.2						
500#-15	15.2	50	35	M5	6		
500#-16	16.2						
500#-18	18.2						
500#-20	20.2						
500#-25	25.2	55	5	40	M6	7	
500#-30	30.2	60		45			
500#-35	35.2	70		50			
500#-40	40.2	80	7	60	M8	9	
500#-45	45.3	90		70			
500#-50	50.3	100	8	75			4
500#-55	55.3	110		85			
500#-60	60.3	120		90			
500#-65	65.3	125		95			
500#-70	70.3	130	10	100	M10	11	
500#-75	75.3	140		110			
500#-80	80.3	150		120			
500#-90	90.5	170		140			
500#-100	100.5	190		160			
500#-120	120.5	200		175			

500# 滑板标准公制尺寸

500# Wear Plates Standard Metric Size



单位Unit: mm

型号规格 Standard No.	W	L	A	B	C	D	E	平头螺钉尺寸 Flat Head Screw Size	孔数 Q'ty of holes
500#-1875	18	75	15	45				M6	2
500#-18100		100	25	50					
500#-18125		125		75					
500#-18150		150		100					
500#-2875	28	75	15	45				M6	2
500#-28100		100	25	50					
500#-28125		125		75					
500#-28150		150		100					
500#-35100	35	100	20	60				M8	3
500#-35150		150		55	55				
500#-35200		200		55	50	55			
500#-35250		250		70	70	70			
500#-35300		300		65	65	65	65		
500#-35350		350		80	75	75	80		
500#-3875	38	75	15	45				M6	2
500#-38100		100	25	50					
500#-38125		125		75					
500#-38150		150		100					
500#-4875	48	75	15	45				M6	2
500#-48100		100	25	50					
500#-48125		125		75					
500#-48150		150		100					
500#-50100	50	100	20	60				M8	3
500#-50150		150		55	55				
500#-50200		200		55	50	55			
500#-50250		250		70	70	70			
500#-50300		300		65	65	65	65		
500#-50400		400		90	90	90	90		
500#-75150	75	150	20	110				M8	4
500#-75200		200		80	80				
500#-75250		250		105	105				
500#-75300		300		85	90	85			
500#-75400		400		120	120	120			
500#-75500		500		115	115	115	115		

FZ 直线轴承

FZ Ball Retainer Bearing



产品简介 Intruduction

FZH (铜基)、FZL (铝基)、FZP (树脂基) 钢球保持圈, 分别以铜合金、硬铝合金、POM树脂为基体, 并在其外圆表面上, 加工出排列有序、大小适当, 形状特殊的孔穴, 在其孔穴中镶入滚动轴承钢球。口采用最新的沟槽圆周锁球工艺, 有效地解决了传统式锁球和压痕式锁球不能完全防止钢球脱落的难题。孔底加工出90°止口使钢球在孔内自由转动而不脱落。由于钢球的直径大于保持圈的壁厚, 所以在使用时钢球高出保持圈内、外圆表面, 直接与相配的孔与轴接触, 使基体(保持圈)浮于中间, 并且相配的孔与轴半径之差小于钢球直径, 即钢球与之配合为过盈配合, 配合精度高, 轴与孔相对运动灵活。是保持圈的更新换代产品。

FZH. FZL. FZP. ball retainer are as copper, aluminium, POM base. they are machined some regular holes and embedded the steel-ball into. The new work-craft will prevent the ball getting out of as old. as the ball diameter is larger than the retainer's thickness, so it will face to face directly with 90° guide bushing, that will bring high precision match now the ball retainer series items are designed to rotate on the post, as well as maintains vertical motion. we believe this will give you the benefit of increasing accijracy.

优点与用途 Advantages and Application

传统的具有相对运动的孔与轴是有一定间隙的, 并孔与轴之间运动摩擦系数较大, 使用钢球保持圈后, 使轴与孔不直接接触, 而是通过中间微量过盈的钢球, 因而运动精度高, 滚动摩擦代替摩擦, 滚动灵活, 摩擦系数小, 使用寿命长, 在既有转动、又有移动的场合, 用无油或加油的轴套与轴相配合, 虽然能满足, 但运动精度较低, 用滚动轴承, 只能满足轴相对转动的场合, 而钢球保持圈, 则上述二个条件均得到满足, 目前已广泛应用于冷冲模滚动模架、高精度机床、机床附件以及要求高精度轴向或轴径向同时运动场合。

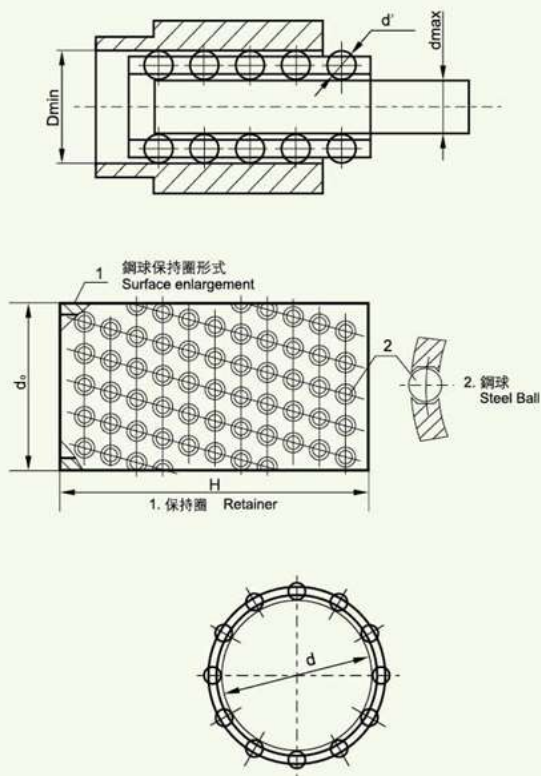
As the traditional work-craft has some grudge between bushing with posts, and the coefficient of friction is larger. now we have changed the work-ways to steel-ball directly face to face guide bushing, so the precision is improved. it composes of both active roll and lower friction coefficient, now they have been widely used in punching machine, die machine, high precision machine which need rotation and vertical motion.

相配零件的要求

Requirements for Installed Components

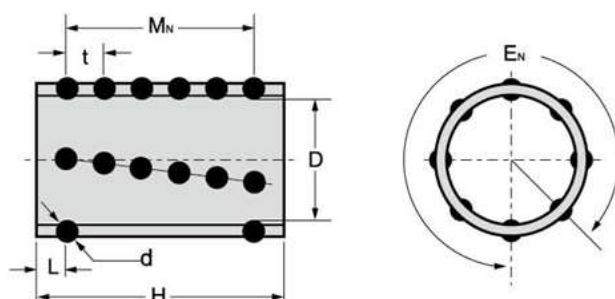
1. 导套: 材料GCr15、YB9, 热处理, 硬度HRC62~66, 技术条件按GB/T12446与轴配合应具有0.01-0.02径向过盈量, 表面粗糙度为 $\sqrt{0.05}$
2. 轴: 材料GCr15、YB9, 热处理, 硬度HRC62~66, 技术条件按GB/T12446, 轴的公差采用h5, 表面粗糙度为 $\sqrt{0.05}$
3. 测量: 用通用的测量手段 (气动量仪、外径千分尺、内径千分表等) 测量轴导套和钢球的尺寸偏差值, 即可求出配合后的过盈量, 即 $y_{max} = d_{max} + 2d' - D_{min}$, 要求过盈量为0.01-0.02mm

1. Guide bushing: material GCr15, YB9, heat treatment HRC62-66, technique condition according to GB/T12446. Request 0.01-0.02Mm the surface roughness is $\sqrt{0.05}$
2. Guidie posts: matrial GCr15, TB9, heat treatment HRC62-66, the tolerance of shaft is h5, the surface roughness is $\sqrt{0.05}$
3. Size test: it is tested by outside micrometer & dial gauge as usual. The y_{max} ($y_{max} + 2d' - d_{min}$) request 0.01-0.02Mm



FZ 直线轴承

FZ Ball Retainer Bearing



单位Unit: mm

Model	D	H	d	E _N	M _N	Balls	t	L
FZ(X)-1950	19	50	3	12	8	96	5.5	5.75
FZ(X)-1960	19	60	3	12	10	120	5.5	5.25
FZ(X)-2050	20	50	3	12	8	96	5.5	5.75
FZ(X)-2060	20	60	3	12	10	120	5.5	5.25
FZ(X)-2250	22	50	3	14	8	112	5.5	5.75
FZ(X)-2260	22	60	3	14	10	140	5.5	5.25
FZ(X)-2360	23	60	3	14	10	140	5.5	5.25
FZ(X)-2475	24	75	3	16	13	208	5.45	4.8
FZ(X)-2550	25	50	3	16	8	128	5.5	5.75
FZ(X)-2560	25	60	3	16	10	160	5.5	5.25
FZ(X)-2575	25	75	3	16	13	208	5.45	4.8
FZ(X)-2775	27	75	3	16	13	208	5.45	4.8
FZ(X)-2860	28	60	4	14	8	112	6.5	7.25
FZ(X)-2875	28	75	4	14	11	154	6.5	5.0
FZ(X)-3060	30	60	4	14	8	112	6.5	7.25
FZ(X)-3075	30	75	4	14	11	154	6.5	5.0
FZ(X)-3260	32	60	4	16	8	128	6.5	7.25
FZ(X)-3275	32	75	4	16	11	176	6.5	5.0
FZ(X)-3290	32	90	4	16	13	208	6.5	6.0
FZ(X)-3685	36	85	4	16	12	192	6.5	6.75
FZ(X)-3690	36	90	4	16	13	208	6.5	6.0
FZ(X)-3870	38	70	5	16	8	128	8.0	7.0
FZ(X)-3890	38	90	5	16	11	176	7.9	5.5
FZ(X)-4090	40	90	5	16	11	176	7.9	5.5
FZ(X)-4590	45	90	5	18	11	198	7.9	5.5
FZ(X)-45110	45	110	5	18	13	234	8.0	7.0
FZ(X)-5090	50	90	5	20	11	220	7.9	5.5
FZ(X)-50110	50	110	5	20	13	260	8.0	7.0
FZ(X)-6090	60	90	5	22	11	242	7.9	5.5
FZ(X)-60110	60	110	5	22	13	286	8.0	7.0
FZ(X)-80130	80	130	5	28	15	420	8.0	9.0

TEX 无给油轴承 TEX Oilless Bearing



该材料以各种优质金属为基体，表面覆着以PTFE和其它添加剂为主的低摩擦耐磨编织物材料。这种材料结构相比一般三层复合材料具有更高的承载能力、抗高温性和更长的使用寿命。基材为低碳钢（TEX-1T）、不锈钢（TEX-1H）、钢（TEX-1S）等。主要运用于高温生产线、建筑机械、汽机车底盘零部件、球阀、蝶阀各种阀门，水泵及化工工业和高速火车等重载低速而无法加油的场合。

The material is in various high-quality metal for the substrate, the surface covered with PTFE and other additives to the low friction abrasion-based woven fabric material. This material is compared to the general three-layer composite structure has a higher carrying capacity, high-temperature and longer life. Substrate for low-carbon steel (TEX-1T), stainless steel (TEX-1H), steel (TEX-1S) and so on. Mainly used in high temperature production lines, construction machinery, automobile chassis parts, ball valves, butterfly valves, pumps and chemical industries and high-speed trains and other heavy low and can not refuel occasion

最大承载 Max. Load	静承载 Static	450 N/mm ²	使用温度 Temp.	-150°C ~ 380°C
	动承载 Dynamic	250 N/mm ²	摩擦系数 Friction coefficient	0.03 ~ 0.20
最高速度 Max. Speed	干摩擦 Dry	1.5m/s	导热系数 Thermal conductivity	42W (m·K) ⁻¹
	油润滑 Lubrication	> 2.5m/s	热膨胀系数 coefficient of thermal expansion	11·10 ⁻⁶ ·K ⁻¹
最大PV(干) Max. PV(Dry)	短时间 Short-term	3.6 N/mm ² ·m/s		
	连续 Continuous	1.8 N/mm ² ·m/s		

FR 系列铜网四氟软带轴承 FR Bronze Mesh with PTFE Self-lubricating Bearing



软带材料是以青铜丝网为基础，通过表面轧制PTFE等相关的增强减摩材料烧结后制成。这种材料结构使产品的重量更轻，安装更方便。该产品具有较低的摩擦系数和较好的耐磨特性。由于它的柔软性能特别好，可以加工成钢与钢金属之间的隔离膜，实现无间隙，无噪音，无油润滑，无需保养，无污染的理想状态。

FR is a composite material, it is made of bronze wire mesh as frame and cover the mixture of PTFE and other anti-wear material by special sintering. It is of low friction coefficient and good performance in anti-wear. Due to its flexibility, it can act as segregation film between two steel friction surfaces, in this application, the superior performance of no clearance, no noise, no oil lubrication, no maintenance and no pollution will be appeared.

适用范围 Application

汽车门窗铰链，纺织机械，关节轴承，化工行业，食品工业，阀门控制机构，办公机械，仪器仪表等，轻载低速但需要自润滑的不同场合。

Automobile door hinge, textile machinery, spherical bearings, chemical industries, food industries, medical industries, valve controllers etc. used in those light load and lower speed applications.

金属承载力 Bearing capacity	厚度 Thickness	自润 Lubricating
锡青铜 Bronze	0.48 ^{+0.02}	PTFE这主体和相关的减摩擦材料 PTFE and other anti-wear material
黄铜 Brass	0.48 ^{+0.02}	
不锈钢 Stainless steel	0.48 ^{+0.02}	

厚度公差可按要求定制

技术参数 Tech. Data

最大承载力 Max. Load		30N/mm ²
适用温度 Temp. Limit		- 20℃~ + 250℃
最高滑动速度 Max. Speed	干摩擦 Dry	0.5m/s
	油润滑 Lubrication	2m/s
允许最高PV值 Max. PV		1.65/mm ² ·m/s
摩擦系数μ Friction coefficient		0.05~0.20

FD 含铜四氟软带 FD PTFE Soft Strip



结构特性 Structure Characteristics

FD以PTFE为主材，以铜粉及其它高分子添加剂为辅的耐磨性材料。产品广泛运用化工行业、油压、油缸、汽摩减振器、机床导轨、印刷机械、纺织机械等轻载但需要自润滑的场合。产品如经过特殊处理，可粘帖于钢质或者橡胶面上，产品在使用过程中无爬行现象。

FD consist of PTFE with bronze powder and additive material, This material structure enables the final goods have more light and easy for install. It is widely been used in chemical industries, medical industries, fluid hydraulic industries, textile machines, OA machines, Door/window hinges etc.

技术参数 Tech. Data

最大承载 Max. Load	静承载 Static Load	30N/mm ²
	动承载 Dynamic Load	20N/mm ²
使用温度 Temp. Limit		-40°C ~+250°C
最高滑动速度	干摩擦 Dry Friction	0.5m/s
Tiptop Sliding Velocity	油摩擦 Oil Friction	2m/s
摩擦系数 Friction Coeff.		0.10-0.20
允许最高 PV 值 PV limit	干摩擦 Dry Friction	1.65N/mm ² *m/s

FD 产品活塞环尺寸 Size of Piston Ring

20×18×2	25×23.2×8	30×28.2×8
20×18×3	25×23×8	30×28×8
25×22.2×2.5	27×25×8	30×28.2×11.4
25×22×2.5	30×28×9	32×30.2×8

FD 产品带材尺寸 Strip Measurement

100×1.5	100×1	200×0.5
8×2.5	12×2.5	25×2.5
6.1×2.5	7.9×2.5	14.8×2.5
19.5×2.5	24.5×2.5	29.5×2.5

卷制类轴承尺寸公差检测方法

Wrapped Bushing Dimensional Inspection

内径检验方法 Internal diameter test methods

检验方法 C (ISO3547-2: Test C)

将轴套压入基准环规后检查轴套的内径，内径的检测可以采用三点测量装置或通、止塞规检验。从实际使用考虑一般建议采用通、止塞规检验，此时在用手最大推力不超过 250N 时通端塞规可以通过轴套内孔，在相同情况下止端塞规应当无法通过轴套内孔。当轴套压入基准环规后，轴套外径可能会引起永久变形而无法正常使用。

Test C (ISO3547-2: Test C)

To check the inside diameter, the bush is to be pressed into a ring gauge, whose nominal diameter corresponds to the dimension specified in ISO3547-1:1999. The inside diameter shall be measured with a 3-point measuring instrument or checked with a GO and NO GO plug gauge. The GO plug gauge shall be inserted by a minimum effort; the NO GO plug gauge shall not be inserted by manual pressure (maximum force 250N). In order to enable the manufacturer and the customer to compare results of this test it should be agreed whether results should be obtained by measuring or by gauging.

止推片检验方法 Thrust washer test method

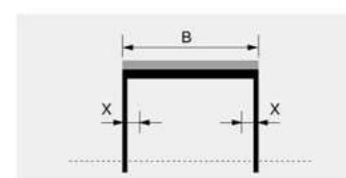
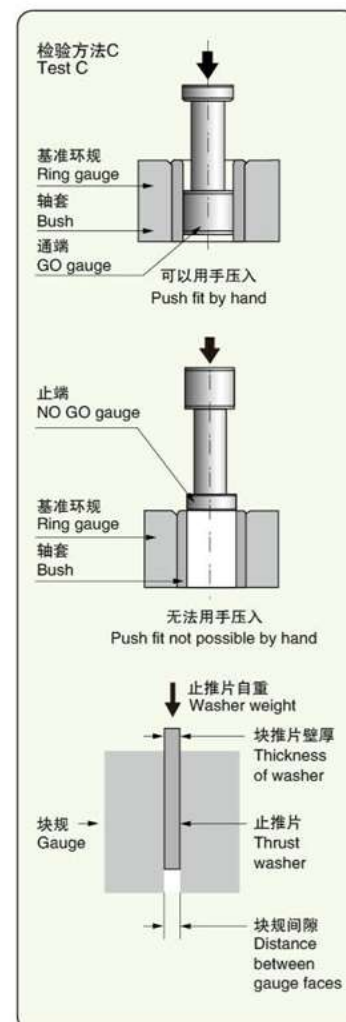
除了厚度公差以外，垫片的平行度对于垫片和对磨件的使用寿命同样重要。我们使用比较有效的检验方法来检测垫片的平行度，让垫片依靠自重来通过两个平行块；当然平行块必须大于垫片本身的规格。

Beside the thickness, the flatness of washer is also important for washer and grinding parts' usage age. We use very helpful test in which the washer falls through the gap between two plain parallel plates of a gauge under its dead weight. The plates must be big enough to cover the whole washer.

壁厚检测方法 Wall Thickness test method

作为检验方法 C 的替代方案两则不能同时使用，壁厚根据轴套尺寸在轴向进行测量。

The wall thickness is measured at once, two or three positions axially according to the bearing dimensions. The wall thickness and the inside diameter shall not be specified together on the same drawing.



测量点
Measurement position

B[mm]	X[mm]	测量点 measurement position
$B \leq 15$	$B/2$	1
$15 < B \leq 50$	4	2
$50 < B \leq 90$	6 and $B/2$	3
$B > 90$	8 and $B/2$	3

卷制类轴承尺寸公差检测方法 Wrapped Bushing Dimensional Inspection

卷制类产品的制造工艺决定了开口缝的存在，使得产品在自由状态下没有很好的圆整度，同时轴套外径和座孔之间为过盈配合，轴套要最大限度地适应座孔的形状，因此不能在自由状态下直接测量产品的内外径而必须使用特殊的测量仪和设备才能检测；ISO3547 标准第 2 部分中对卷制类产品的公差检验作了明确的规定，包括：

检验方法 A：哈夫规检验外径；

检验方法 B：止通规检验外径；

检验方法 C：止通规检验内径；

检验方法 D：测量尺检验大规格产品外径

以及替代检验方法 C 的壁厚检验方法，壁厚检验方法和检验方法 C 不能同时使用。

Rolled products in the manufacturing process determine the existence of open joints, making products in the free state not have a good whole circle shape, while sleeve diameter and the seat for the interference fit between the holes, sleeve adapted to maximize Block hole shape can not be directly measured in the free state the inner/outside diameter of the product only can be by a special measuring instrument; In ISO3547 standards measured Part 2 of the rolled products made clear tolerance test requirements, including :

Test Method A: Huff regulatory test outside diameter;

Test method B: use stop-pass gauge to test the outside diameter;

Test method C: use stop-pass gauge to test the inside diameter;

Test method D: Measure the outer diameter of large scale product and use wall-thickness test to replace test method C. (Wall-thickness test and test method C can not be used at the same time.)

外径检验方法 External diameter test methods

检验方法 A (ISO3547-2: Test A)

采用如右视图的上下两哈夫规对外径进行检验，检验时产品的开口缝朝上哈夫规相向施加检验载荷 F_{ch} ，该载荷使卷制轴套能够按符合要求的方式就位于检验模。检验中，由于弹性变形卷制轴套外径会变小但不会产生永久变形。产品的外径可以通过检验模之间的距离 Z 的变化量 ΔZ 来计算。

Test A of ISO 3547 Part 2

Check the outside diameter of a wrapped bush using measuring equipment as shown to the right, with a checking block consisting of upper and lower halves and setting plugs, at a determined checking load of F_{ch} , during the test the outside diameter of the bush is made smaller by the elastic reduction, however it is not a permanent deformation. The bushes outside diameter can be calculated from the difference in the value of z (Z)

检验方法 B (ISO3547-2: Test B)

检验采用两个环规即通规和止规，用手以最大力 250N 可将轴套推入并通过通规；在相同情况下无法进入和通过止规。在某些情况下检验精度可能受到影响，比如轴套不圆或闭合开口缝的力本身已超过 250N，此时建议采用检验方法 A 或测压入力或壁厚相结合的检验方法。

Test B of ISO 3547 Part 2

The test is carried out with two ring gaugs, a Go gauge and a No Go gauge whose diameter Shall be chosen empirically from with Table 6 of ISO3547-1:1999 and agreed upon. It shall be possible to press the bushes into the GO gauge and then push them through with hand pressure (maximum force 250N). On the other hand with the same force, it shall not be possible for them to go into and through the NO GO gauge (See ISO 12307-1)

检验方法 D (ISO3547-2: Test D)

采用精确的测量尺来测量外径，一般针对大规格的轴套外径检测。

Test D (ISO 3547-2)

The test is carried out by means of a precision measuring tape.

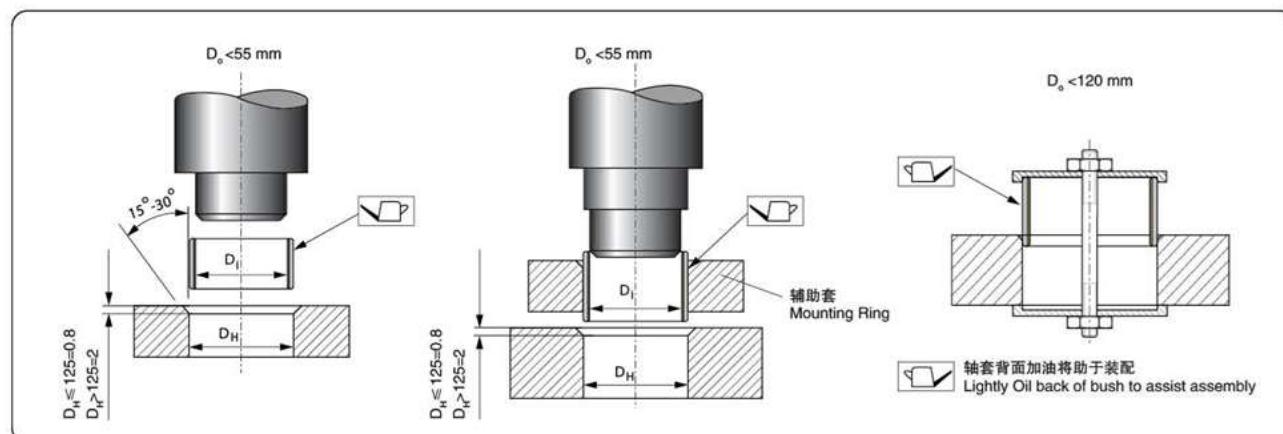
检验方法 A Test A of ISO



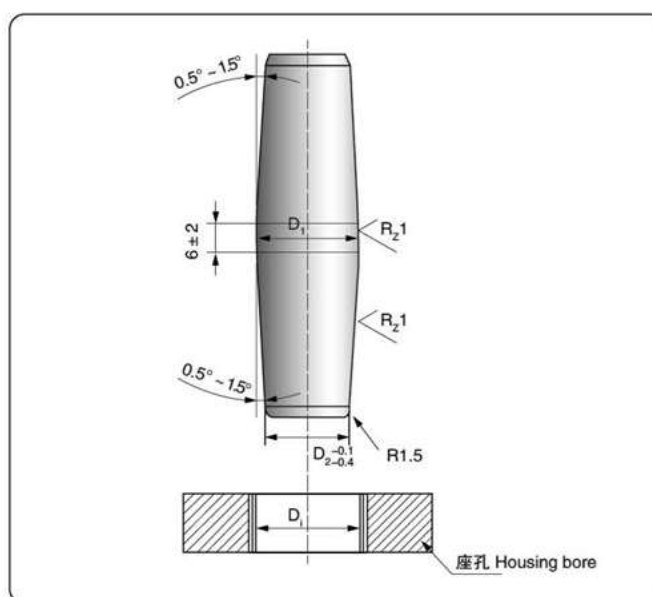
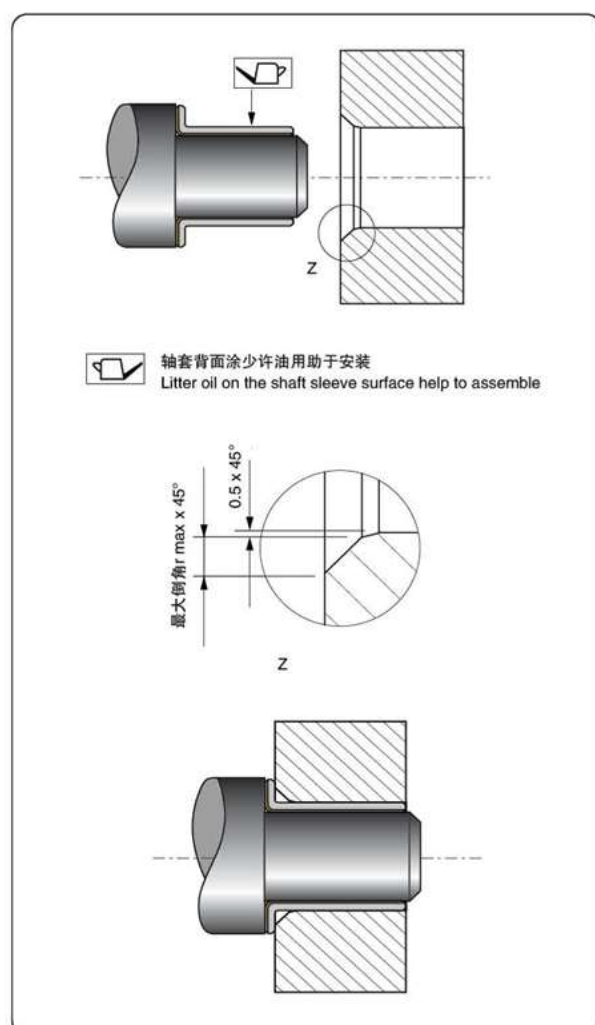
卷制类的安装

Wrapped Bushing Installation

直套安装 Straight set of installation



翻边套安装 Flange set of installation



衬套内孔 D_i Inner Dimension D_i	挤压芯棒 D_1 Extrusion Mandrel D_1	使用寿命 Life
D_i	—	100%
$D_i + 0.02$	$D_1 + 0.06$	90%
$D_i + 0.03$	$D_1 + 0.08$	80%
$D_i + 0.04$	$D_1 + 0.10$	70%