NOVIN Ball Bearing
www.novinballbearing.com

SF 无油轴承

SF BEARING

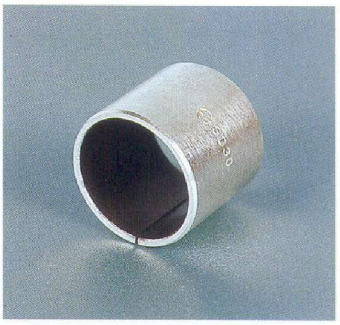
SF-1系列无油润滑轴承

SF-1 BEARING

SF-1X 无油润滑轴承
SF-1X BEARING

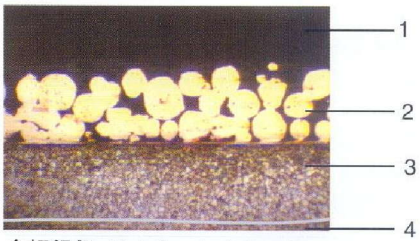
■ 材料组织结构
STRUCTURE

1、 聚四氟乙烯与铅混合物0.01-0.03mm
PTFE with lead 0.01-0.03mm
2、 球形青铜粉0.2-0.3mm
Porous bronze 0.2-0.3mm
3、 钢背0.7-2.3mm
Steel backing 0.7-2.3mm
4、 电镀层：镀锡层厚约0.005mm，或镀铜层厚约0.008mm
Tin-plating about 0.005mm or copper plating about 0.008mm



■ 应用特点

1、 无油润滑或少油润滑，适用于无法加油或很难加油的场所，可在使用时不保养或少保养。
2、 耐磨性能好，摩擦系数小，使用寿命长。
3、 有适量的弹塑性，能将应力分布在较宽的接触面上，提高轴承的承载能力。
4、 静动摩擦系数相近，能消除低速下的爬行，从而保证机械的工作精度。
5、 能使机械减少振动、降低燥音，防止污染，改善劳动条件。
6、 在运转过程中能形成转移膜，起到保护对磨轴的作用，无咬轴现象。
7、 对轴的硬度要求低，未经调质处理的轴都可使用，从而降低了相关零件的加工难度。
8、 薄壁结构、质量轻，可减小机械体积。
9、 钢背面可电镀多种金属，可在腐蚀介质中使用；目前已广泛应用于各种机械的滑动部位，
例如：印刷机、纺织机、烟草机械、微电机、汽车、摩托车与农林机械等。



金相组织 Metallurgied structure


应用举例 Application case

■ APPLICATION CHARACTERISTICS

1、 Dry or only a trace of grease or oil required maintenance free.
2、 Low friction and with long life.
3、 Load will spread over a wider area due to the bearing material's elastic nature.
4、 Low stick slip properties ensuring accuracy of machine operation under low sliding speeds.
5、 Low vibration, low noise and non-pollution in operation.
6、 PTFE and Lead film is transferred to the mating shaft to improve running properties.
7、 It can be used in low hardness of mating shaft, so the shafts processing is easy.
8、 The machine will be compact because of the thin thickness and low weight of the bush.
9、 Electro plating is possible to prevent corrosion. It is widely used in various sliding motions of different kind of machines such as textile machine, tobacco machines, hydraulic vehicles Automobiles, agriculture machines and so on.

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SF-1T 齿轮泵专用轴承

材料组织结构与SF-1X相同，不同与SF-1X的方面是：表面PTFE的填充成份，增加了适应高速滑动的亲和纤维。

SF-1T For Geer Pump Bearing

Its material composition is similar with SF-1X bearing , the only difference is that its PTFE was added fabric which is suitable to high speed sliding.

SF-1P 往复运动轴承

材料组织结构与SF-1X相同，不同与SF-1X的方面是：PTFE中用铜粉取代了铅、提高了在油润滑条件下的结合力和耐磨性能。

SF-1P Reciprocating Bearing

Its material composition is similar with SF-1X bearing, the only difference is that the Pb is replaced by bronze powder in its PTFE, and its binding force and abrasion resistance improved with oil.

SF-1W 无铅轴承

材料组织结构与SF-1X相同，不同与SF-1X的方面是：用亲和纤维和其它金属取代了铅，并达到了铅量<0.1%的欧盟 RoHs 标准，性能等同于SF-1X。

SF-1W Lead Free Bearing

Its material composition is similar with SF-1X bearing, the only difference is that we use fabric and other metal instead of Pd, and lead composition is less than 0.2% , its function is the same as SF-1X but lead free.

SF-1B 青铜基轴承

材料组织结构与SF-1X相同，不同与SF-1X的方面是：基体材料由CuSn6.5-0.1青铜板取代了钢板，从而提高了安全性和使用寿命的延长。

SF-1B Bronze Bearing

Its material composition is similar with SF-1X bearing, the only difference is that the basic material steel is replaced by CuSn6.5-0.1, and its security improved and its life extended.

SF-1D 液压专用轴承

材料组织结构与SF-1X相同，不同与SF-1X的方面是：表面PTFE的填充成份以纤维组织取代了铅，成为不含铅产品，并提高了在油润滑条件下的抗冲击能力。

SF-1D Hydraulic Bearing (lead free)

Its material composition is similar with SF-1X bearing, the only difference is that its Pb is completely replaced by fabric, it is lead free , and its resistance to impact with oil lubrication improved.

SF-1S 不锈钢耐蚀轴承

材料组织结构与SF-1D相同，不同于SF-1D的方面是：用不锈钢取代了钢板，使之达到了抗酸碱的效果。

SF-1S Stainless Steel Bearing

Its material composition is similar with SF-1D bearing, the only difference is that we use stainless steel instead of steel, and it can be used in the condition of strong acid and alkali.

SF-PK 无油轴承

材料组织结构与SF-1X相同，不同与SF-1X的方面是：表面用PFEK+PTFE取代了PTFE填充材料，并把表面层的厚度由0.01-0.03mm变成了0.1-0.2mm，耐磨性能大大提高，并可实现内表面车削加工。

SF-PK Bearing

Its material composition is similar with SF-1X bearing, the only difference is that we use PFEK+PTFE instead of PTFE , the thickness of surface layer changed from 0.01~0.03mm to 0.1-0.2mm,which improves its performance of anti-wear, in addition, its inner surface is machinable.

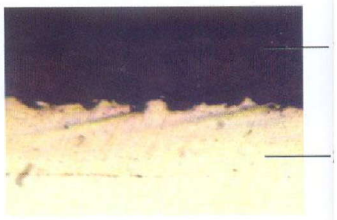
SF-1SS 不锈钢喷塑轴承
SF-1SS Stainless Bearing

■ 材料组织结构
STRUCTURE

1、 聚四氟乙烯与亲油性纤维混合0.01-0.03mm
PTFE with fibre 0.01-0.03mm
2、 不锈钢背0.7-2.3mm
Stainless steel backing 0.7-2.3mm

■ 应用特点

1、 PTFE、亲油性纤维的混合物在运动时可形成很好的转移膜保护对磨轴。
2、 耐磨性能好，磨擦系数低。
3、 走合性能好，无咬轴现象。
4、 适用于轻载低速的旋转、摇摆、往复运动场合。
5、 由于不含铜粉层，所以具有更好的耐腐蚀性能。
6、 典型用途：主要运用于强酸、强碱场合，例如：化工中酸碱流量计、泵、阀、印染机械，海洋工业等需要耐腐蚀的滑动部位。



金相组织 Metallurgical structure

应用举例 Application case

■ APPLICATION CHARACTERISTICS

1、 PTFE with oil fibre can protect the shaft, while machine operated.
2、 Low friction coefficient, good anti-wear performance.
3、 Good running in property, no shaft seizing.
4、 It fits well in motion of circumrotation, sway and to-and-fro.
5、 Good anti-corrosion performance without copper layer.
6、 It can be used in food machine, pharmaceutical machine etc. due to lead-free. It is mainly used in the condition of strong acid and alkali, such as chemical industry, pumps, valves etc.

SF-1 系列产品 SF-1 SERIES

可供产品	PRODUCT AVAILABLE
直套	Standard bushes
翻边轴套（SF-1S、SF-1SS除外）	Flanged bushes (except SF-1S, SF-1SS bushes)
WC止推垫片	Thrust washers
板材	Standard strip
(及其它按客户要求定制的产品)	(Special product according to your request)

标准公制产品的外径公差(mm)

THE TOLERANCE AND O.D. OF STANDARD METRIC BUSH mm

轴承外径 Outside diameter	外径公差 Tolerance for outside diameter
≤10	+0.055 +0.025
10<d≤18	+0.065 +0.030
18<d≤30	+0.075 +0.035
30<d≤50	+0.085 +0.045
50<d≤80	+0.100 +0.055
80<d≤105	+0.120 +0.070
105<d≤180	+0.170 +0.100
180<d≤250	+0.210 +0.130
250<d≤305	+0.260 +0.170

注：检验方法详见25页
Note:inspection method P25

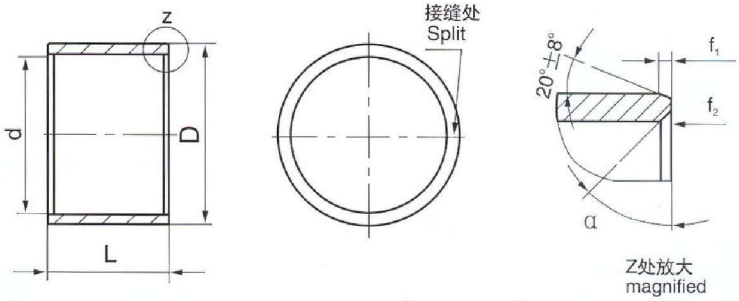
标准公制产品的壁厚公差(mm)

THE TOLERANCE AND THIKNESS OF STANDARD METRIC BUSH mm

轴承内径尺寸 Inside diameter	壁厚公称尺寸 Thickness	公差 Tolerance for wall thickness
5≤d<20	1.0	+0.005 -0.020
20≤d<28	1.5	+0.005 -0.025
28≤d<45	2.0	+0.005 -0.030
45≤d<80	2.5	+0.005 -0.040
80≤d<120	2.5	-0.010 -0.060
120≤d	2.5	-0.035 -0.085

SF-1 系列轴承标准尺寸

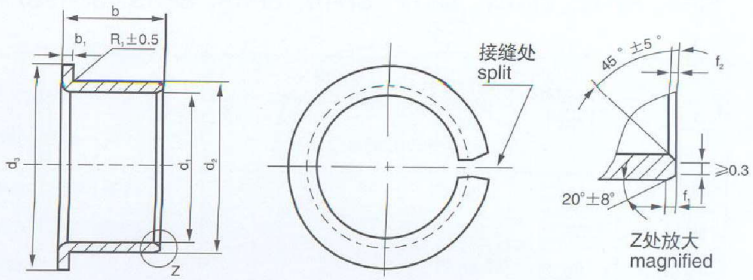
(SF-1、SF-1T、SF-1W、SF-1P、SF-1D、SF-1B、SF-1S、SF-1SS)



mm

d	D	相配轴径 (Shaft Dia.)	相配座孔 (Housing Bore) H7	壁厚 Wall Thickness		f_1	f_2	$L_{-0.40}^{0}$									
				Min.	Max.			6	8	10	12	15	20	25	30	40	50
6	8	$6_{-0.028}^{-0.013}$	$8^{+0.015}$	0.980	1.005	0.6	0.3	0606	0608	0610							
8	10	$8_{-0.028}^{-0.013}$	$10^{+0.015}$					0806	0808	0810	0812	0815					
10	12	$10_{-0.034}^{-0.016}$	$12^{+0.018}$					1006	1008	1010	1012	1015	1020				
12	14	$12_{-0.034}^{-0.016}$	$14^{+0.018}$					1206	1208	1210	1212	1215	1220	1225			
13	15	$13_{-0.034}^{-0.016}$	$15^{+0.018}$							1310			1320				
14	16	$14_{-0.034}^{-0.016}$	$16^{+0.018}$							1410	1412	1415	1420	1425			
15	17	$15_{-0.034}^{-0.016}$	$17^{+0.018}$							1510	1512	1515	1520	1525			
16	18	$16_{-0.034}^{-0.016}$	$18^{+0.018}$							1610	1612	1615	1620	1625			
17	19	$17_{-0.034}^{-0.016}$	$19^{+0.021}$							1710	1712		1720				
18	20	$18_{-0.034}^{-0.016}$	$20^{+0.021}$							1810	1812	1815	1820	1825			
20	23	$20_{-0.041}^{-0.020}$	$23^{+0.021}$	1.475	1.505	0.6	0.4			2010	2012	2015	2020	2025	2030		
22	25	$22_{-0.041}^{-0.020}$	$25^{+0.021}$							2210	2212	2215	2220	2225	2230		
24	27	$24_{-0.041}^{-0.020}$	$27^{+0.021}$									2415	2420	2425	2430		
25	28	$25_{-0.041}^{-0.020}$	$28^{+0.021}$							2510	2512	2515	2520	2525	2530	2540	2550
28	32	$28_{-0.041}^{-0.020}$	$32^{+0.025}$	1.970	2.005	1.2	0.4					2815	2820	2825	2830	2840	
30	34	$30_{-0.041}^{-0.020}$	$34^{+0.025}$								3012	3015	3020	3025	3030	3040	
32	36	$32_{-0.050}^{-0.025}$	$36^{+0.025}$										3220		3230	3240	
35	39	$35_{-0.050}^{-0.025}$	$39^{+0.025}$								3512	3515	3520	3525	3530	3540	3550
38	42	$38_{-0.050}^{-0.025}$	$42^{+0.025}$									3815			3830	3840	
40	44	$40_{-0.050}^{-0.025}$	$44^{+0.025}$								4012		4020	4025	4030	4040	4050

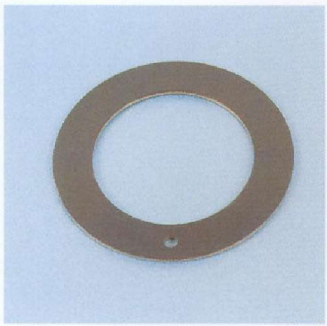
SF-1F 系列标准尺寸

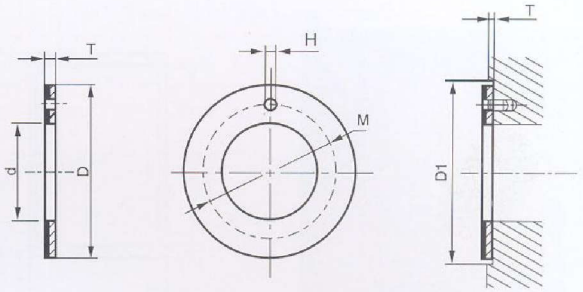


mm

相配轴径 (Shaft Dia.)	相配座孔 (Housing Bore) H7	规格标志 (Part number)	尺寸(Size)					f_1	f_2
			d_1	d_2	d_3±0.5	b±0.25	b_1-0.2		
6 $^{-0.013}_{-0.028}$	8$^{+0.015}$	F06040	6	8	12	4	1	0.6	0.3
		F06070				7			
8 $^{-0.013}_{-0.028}$	10$^{+0.015}$	F08055	8	10	15	5.5			
		F08075				7.5			
10 $^{-0.016}_{-0.034}$	12$^{+0.018}$	F10070	10	12	18	7			
		F10090				9			
		F10120				12			
12 $^{-0.016}_{-0.034}$	14$^{+0.018}$	F12070	12	14	20	7			
		F12090				9			
		F12120				12			
14 $^{-0.016}_{-0.034}$	16$^{+0.018}$	F14120	14	16	22	12			
		F14170				17			
15 $^{-0.016}_{-0.034}$	17$^{+0.018}$	F15090	15	17	23	9			
		F15120				12			
		F15170				17			
16 $^{-0.016}_{-0.034}$	18$^{+0.018}$	F16120	16	18	24	12			
		F16170				17			
18 $^{-0.016}_{-0.034}$	20$^{+0.021}$	F18120	18	20	26	12			
		F18170				17			
		F18200				20			
20 $^{-0.020}_{-0.041}$	23$^{+0.021}$	F20115	20	23	30	11.5	1.5	0.6	0.4
		F20165				16.5			
		F20215				21.5			
22 $^{-0.020}_{-0.041}$	25$^{+0.021}$	F22150	22	25	32	15			
		F22200				20			
25 $^{-0.020}_{-0.041}$	28$^{+0.021}$	F25115	25	28	35	11.5			
		F25165				16.5			
		F25215				21.5			
30 $^{-0.025}_{-0.050}$	34$^{+0.025}$	F30160	30	34	42	16	2	1.2	0.4
		F30260				26			
35 $^{-0.025}_{-0.050}$	39$^{+0.025}$	F35160	35	39	47	16			
		F35260				26			
40 $^{-0.025}_{-0.050}$	44$^{+0.025}$	F40260	40	44	53	26			
		F40400				40			

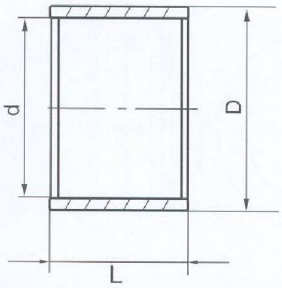
WCSF-1 系列标准尺寸

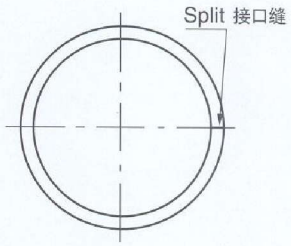




规格标志 (Part Number)	相配轴径 (Shaft Dia.)	垫片尺寸 (Size Of Washer)				安装尺寸 (Size For Installation)		
		$d^{+0.25}$	$D_{-0.25}$	$T_{-0.05}$	$M^{+0.12}_{-0.12}$	$H^{+0.4}_{+0.1}$	$T^{+0.2}_{-0.2}$	$D1^{+0.12}$
WC10SF-1	8	10	20	1.5	15	1.5	1	20
WC12SF-1	10	12	24	1.5	18	1.5	1	24
WC14SF-1	12	14	26	1.5	20	2	1	26
WC16SF-1	14	16	30	1.5	23	2	1	30
WC18SF-1	16	18	32	1.5	25	2	1	32
WC20SF-1	18	20	36	1.5	28	3	1	36
WC22SF-1	20	22	38	1.5	30	3	1	38
WC24SF-1	22	24	42	1.5	33	3	1	42
WC26SF-1	24	26	44	1.5	35	3	1	44
WC28SF-1	25	28	48	1.5	38	4	1	48
WC32SF-1	30	32	54	1.5	43	4	1	54
WC38SF-1	35	38	62	1.5	50	4	1	62
WC42SF-1	40	42	66	1.5	54	4	1	66
WC48SF-1	45	48	74	1.5	61	4	1.5	74
WC52SF-1	50	52	78	2	65	4	1.5	78
WC62SF-1	60	62	90	2	76	4	1.5	90

SF-1 系列轴承英制尺寸
(SF-1、SF-1T、SF-1P、SF-1W、SF-1B、SF-1D、SF-1S、SF-1SS)



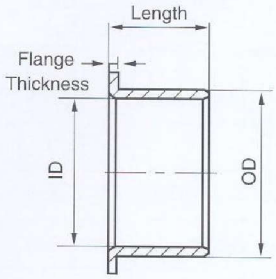


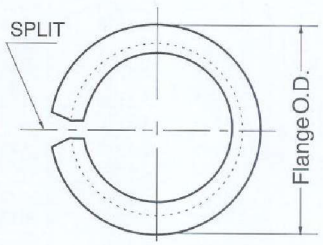
Inch

尺寸 Nominal Bearing Bore	轴 Shaft Dia	座孔 Housing Bore	内径 Installed Bearing I.D.	壁厚 Wall Thickness		轴承长度及轴承规格 Bearing Length and Part Number												
				Min.	Max.	1/8	5/32	3/16	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2
1/8	.1243 .1236	.1878 .1873	.1268 .1243	0.0305	0.0315	02/02		02/03										
5/32	.1554 .1547	.2191 .2186	.1581 .1556				025/025		025/04									
3/16	.1865 .1858	.2503 .2497	.1893 .1867					03/03	03/04	03/06								
1/4	.2490 .2481	.3128 .3122	.2518 .2492						04/04	04/06								
5/16	.3115 .3106	.3753 .3747	.3143 .3117							05/06	05/08							
3/8	.3740 .3731	.4691 .4684	.3769 .3742	0.0461	0.0471			06/03	06/04	06/06	06/08	06/10	06/12					
7/16	.4365 .4355	.5316 .5309	.4394 .4367								07/08		07/12					
1/2	.4990 .4980	.5941 .5934	.5019 .4992						08/04	08/06	08/08	08/10	08/12	08/14				
9/16	.5615 .5605	.6566 .6559	.5644 .5617							09/06	09/08	09/10	09/12					
5/8	.6240 .6230	.7192 .7184	.6270 .6242						10/04		10/08	10/10	10/12	10/14	10/16			
11/16	.6865 .6855	.7817 .7809	.6895 .6867											11/14				
3/4	.7491 .7479	.8755 .8747	.7525 .7493	0.0615	0.0627				12/04	12/06	12/08	12/10	12/12		12/16			
13/16	.8116 .8104	.9372 .9380	.8118 .8150										13/12			13/18		
7/8	.8741 .8729	1.0005 .9997	.8775 .8743						14/04	14/06			14/12		14/16		14/20	
1	.9991 .9979	1.1256 1.1246	1.0026 0.9992							16/06	16/08		16/12		16/16		16/20	16/24
1 1/8	1.1238 1.1226	1.2818 1.2808	1.1278 1.1240	0.0770	0.0784					18/06		18/10	18/12		18/16			
1 1/4	1.2488 1.2472	1.4068 1.4058	1.2528 1.2490							20/06			20/12	20/14	20/16		20/20	
1 3/8	1.3738 1.3722	1.5318 1.5308	1.3778 1.3740												22/16			22/24
1 1/2	1.4988 1.4972	1.6568 1.6558	1.5028 1.4990								24/08				24/16	24/18	24/20	24/24
1 5/8	1.6238 1.6222	1.7818 1.7808	1.6278 1.6240															26/24

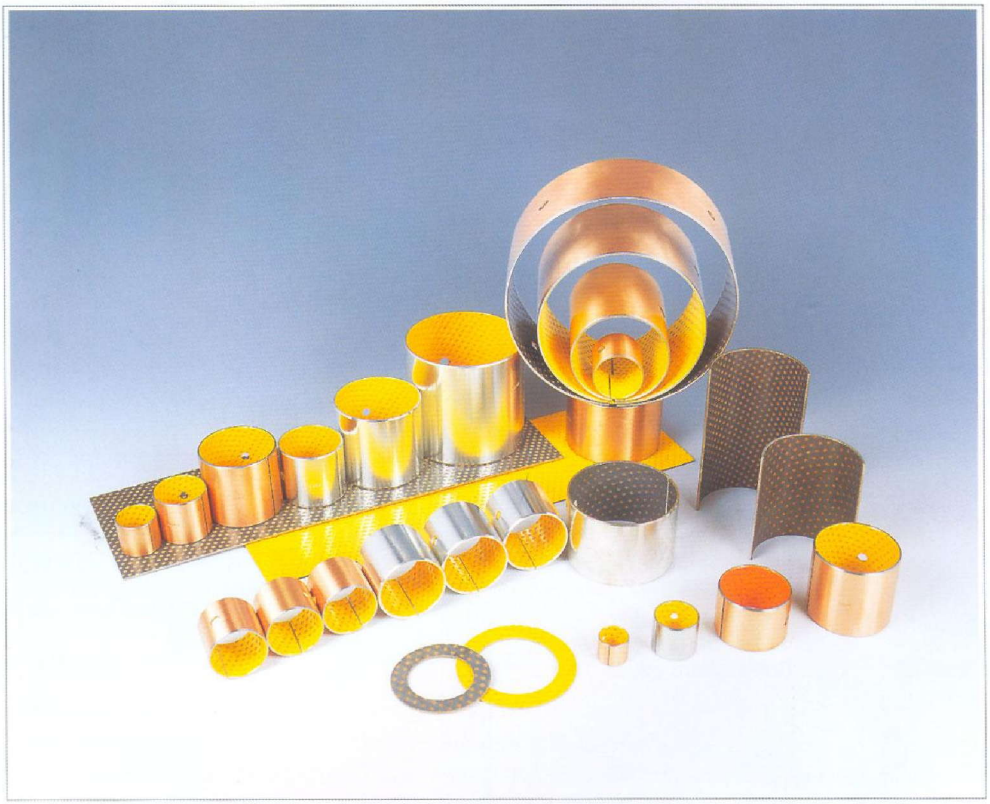
尺寸 Nominal Bearing Bore	轴 Shaft Dia	座孔 Housing Bore	内径 Installed Bearing I.D.	壁厚 Wall Thickness		轴承长度及轴承规格 Bearing Length and Part Number											
				Min.	Max.	1	1 1/2	1 5/8	2	2 1/4	2 3/8	2 1/2	3	3 1/2	3 3/4	4	4 1/2
1 3/4	1.7488 1.7472	1.9279 1.9269	1.7555 1.7493	0.0921	0.0939	28/16	28/24		28/32								
1 7/8	1.8738 1.8722	2.0531 2.0519	1.8807 1.8743				30/24		30/32	30/36							
2	1.9988 1.9970	2.1781 2.1769	2.0057 1.9993			32/16	32/24		32/32			32/40					
2 1/8	2.1257 2.1239	2.3130 2.3118	2.1326 2.1262	0.0906	0.0925								34/48				
2 1/4	2.2507 2.2489	2.4377 2.4365	2.2573 2.2509						36/32			36/40	36/48	36/56	36/60	36/64	36/72
2 1/2	2.5011 2.4993	2.6881 2.6869	2.5077 2.5013			40/16		40/26	40/32			40/40	40/48	40/56	40/60	40/64	40/72
2 3/4	2.7500 2.7482	2.9370 2.9358	2.7566 2.7502						44/32	44/36		44/40	44/48	44/56	44/60	44/64	44/72
2 7/8	2.8752 2.8734	3.0623 3.0610	2.8819 2.8754						46/32	46/36		46/40	46/48	46/56	46/60	46/64	46/72
3	3.0000 2.9982	3.1872 3.1858	3.0038 3.0002						48/32	48/36		48/40	48/48	48/56	48/60	48/64	48/72
3 1/4	3.2500 3.2480	3.4372 3.4358	3.2538 3.2502						52/32		52/38	52/40	52/48	52/56	52/60	52/64	52/72
3 1/2	3.5000 3.4978	3.6872 3.6858	3.5068 3.5002						56/32		56/38	56/40	56/48	56/56	56/60	56/64	56/72
3 5/8	3.6250 3.6228	3.8122 3.8018	3.6318 3.6252						58/32	58/36		58/40	58/48	58/56	58/60	58/64	58/72
3 3/4	3.7500 3.7478	3.9372 3.9358	3.7568 3.7502						60/32	60/36		60/40	60/48	60/56	60/60	60/64	60/72
4	4.0000 3.9978	4.1872 4.1858	4.0068 4.0002						64/32	64/36		64/40	64/48	64/56	64/60	64/64	64/72
4 1/4	4.2500 4.2478	4.4372 4.4358	4.2568 4.2502						68/32	68/36		68/40	68/48	68/56	68/60	68/64	68/72
4 3/8	4.3750 4.3728	4.5622 4.5608	4.3818 4.3752						70/32	70/36		70/40	70/48	70/56	70/60	70/64	70/72
4 1/2	4.5000 4.4978	4.6872 4.6858	4.5038 4.5002						72/32	72/36		72/40	72/48	72/56	72/60	72/64	72/72
4 3/4	4.7500 4.7475	4.9374 4.9358	4.7572 4.7502						76/32	76/36		76/40	76/48	76/56	76/60	76/64	76/72
5	4.9986 4.9961	5.1860 5.1844	5.0056 4.9988	0.0896	0.0915				80/32	80/36		80/40	80/48	80/56	80/60	80/64	80/72
5 1/4	5.2500 5.2475	5.4374 5.4358	5.2570 5.2502						84/32	84/36		84/40	84/48	84/56	84/60	84/64	84/72
5 1/2	5.5000 5.4975	5.6874 5.6858	5.5070 5.5002						88/32	88/36		88/40	88/48	88/56	88/60	88/64	88/72
5 3/4	5.7500 5.7475	5.9374 5.9358	5.7570 5.7502						92/32	92/36		92/40	92/48	92/56	92/60	92/64	92/72
6	6.0000 5.9975	6.1874 6.1858	6.0070 6.0002						96/32	96/36		96/40	96/48	96/56	96/60	96/64	96/72
6 1/4	6.2500 6.2475	6.4374 6.4358	6.2570 6.2502						100/32	100/36		100/40	100/48	100/56	100/60	100/64	100/72
6 1/2	6.5000 6.4975	6.6874 6.6858	6.5070 6.5002						104/32	104/36		104/40	104/48	104/56	104/60	104/64	104/72
6 3/4	6.7500 6.7475	6.9374 6.9358	6.7570 6.7502						108/32	108/36		108/40	108/48	108/56	108/60	108/64	108/72
7	6.9954 6.9929	7.1830 7.1812	7.0026 6.9956						112/32	112/36		112/40	112/48	112/56	112/60	112/64	112/72

SF-1F 系列轴承英制尺寸





尺寸 Nominal Bearing Bore	轴 Shaft Dia	座孔 Housing Bore	内径 Installed Bearing I.D.	法兰尺寸 Nominal Flange O.D.	法兰厚度 Flange Thick-ness	轴承长度及轴承规格 Bearing Length and Part Number								
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	2
3/8	.3750 .3740	.4684 .4691	.3752 .3779	11/16	.052 .044	06/04F	06/06F	06/08F		06/12F				
1/2	.5000 .4990	.5934 .5941	.5002 .5029	13/16	.052 .044	08/04F	08/06F	08/08F		08/12F				
5/8	.6250 .6240	.7184 .7192	.6252 .6280	15/16	.052 .044		10/06F	10/08F	10/10F	10/12F				
3/4	.7500 .7488	.8747 .8755	.7502 .7534	1 1/8	.068 .060		12/06F	12/08F		12/12F	12/16F			
7/8	.8750 .8738	0.9997 1.0005	.8752 .8784	1 1/4	.068 .060			14/08F		14/12F	14/16F	14/20F		
1	1.0000 0.9988	1.1247 1.1255	1.0002 1.0034	1 3/8	.068 .060			16/08F		16/12F	16/16F	16/20F		
1 1/4	1.2500 1.2484	1.4058 1.4068	1.2502 1.2540	1 3/4	.083 .075						20/16F	20/20F	20/24F	
1 1/2	1.5000 1.4984	1.6558 1.6568	1.5002 1.5040	2	.083 .075						24/16F		24/24F	24/32F
1 3/4	1.7500 1.7484	1.9371 1.9381	1.7502 1.7548	2 3/8	.098 .090						28/16F		28/24F	28/32F

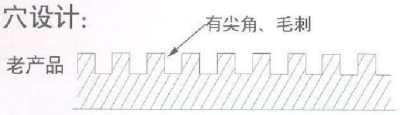


SF-2系列边界润滑轴承

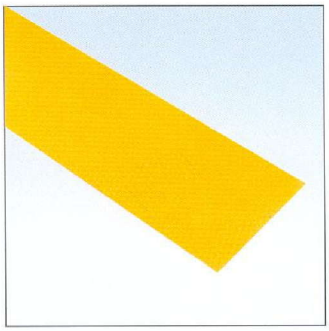
SF-2 BEARING

SF-2材料

油穴设计:

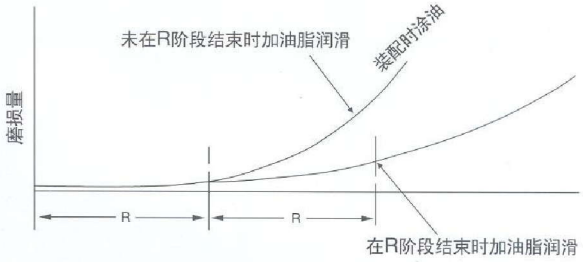


有利于油润滑和接触磨损面
大、使用寿命长



磨损规律

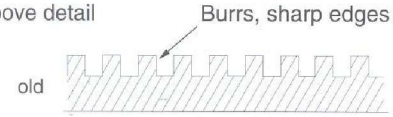
SF-2材料有特殊的磨损特性，如右图所示。在安装时涂油脂的条件下，材料在初始阶段(R阶段)磨损量极小。但在R阶段后(如图示)其磨损量会显著增大。如果在"R阶段"结束前间歇加油脂润滑一次，则"R阶段"会再次延长，所以SF-2材料必须间隔一段时间加油脂润滑，其间隔时间较一般金属材料长，约五倍左右。



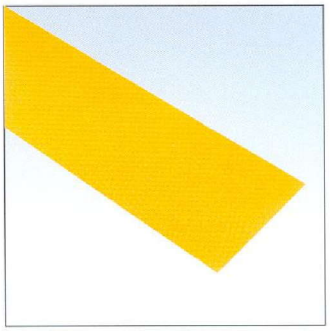
SF-2的典型磨损曲线

SF- material

groove detail

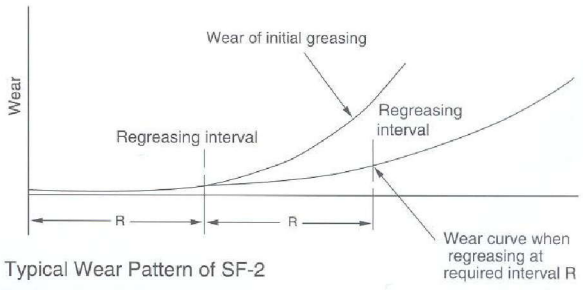


Better lubrication
and longer life



WEAR PATTERN

The wear pattern of SF-2 is shown in Figure. While assembly, the wear is very small during the bedding period. However at the end of "R" stage as shown in figure the wear rate increase rapidly if regreasing is not applied. If regreasing takes place before the end of wear acceleration, the "R" stage is normally 5 times that of conventional bearing materials.



Typical Wear Pattern of SF-2

寿 命

SF-2轴承的使用寿命取决于工作时的PV值。例如在装配时涂油脂的前提下，当工作时的PV值为2.5N/mm².m/s，其使用寿命约为200小时；当工作时的PV值小于0.1N/mm².m/s，其使用寿命可达到10000小时以上(详见下表)。

一般情况下，SF-2轴承的加油脂保养周期为其使用寿命的50%，如当工作时的PV值为2.5N/mm².m/s，则要求每隔100小时加油脂保养一次。

LIFE

The life of the bush is depend on the PV value. For a bush, when greased on assembly and where the PV is 2.5N/mm².M/s the life is approximately 200 hours. Where the PV is less than 0.10N/mm².m/s the life can be 1000 hours as per table above.

The regreasing interval is normally at 50% of the life. In the aforementioned examples regreasing would take place at 100 hours and 5000 hours respectively.

PV N/mm². m/s	使用寿命(小时)L life(hrs)	加油保养周期(小时)R Regreasing Interval(hrs)
2.5	200	100
2.0	610	310
1.5	1100	560
1.0	2400	1200
0.5	6200	3000
0.1	>10000	8000

注：除上述因素外，SF-2材料的使用寿命还受工作环境温度、轴表面硬度和粗糙度的影响。

NOTE: The life of SF-2 material is also influenced by the operating temperature, the surface roughness and hardness of the mating material.

SF-2 边界润滑轴承

■ 材料组织结构 STRUCTURE

1、聚甲醛与铅混合物 0.3-0.5mm　POM with lead 0.3-0.5mm
2、球形青铜粉0.2-0.3mm　Porous bronze 0.2-0.3mm
3、钢背0.4-2.2mm　Steel backing 0.4-2.2mm
4、电镀层：镀铜层厚约0.008mm　Copper plating about 0.008m

■ 应用特点

1、承载高，耐磨性能好。
2、适用于低速重载的旋转运动，摇摆运动以及频繁起动而不易形成油膜润滑的场合。
3、在边界润滑条件下可以工作很长时间，如在使用过程中定期加油保养，其使用寿命可以延长。
4、表面塑料层有可加工性。轴承装配入座孔后，可进行加工从而达到更好的配合精度。
5、标准产品油穴表面圆滑过度，润滑效果更显著。
6、产品主要运用于汽车底盘、冶金机械、矿山机械、水利机械、建筑机械、农用机械、轧钢设备等。

■ APPLICATION CHARACTERISTICS

1、Good load capacity and anti-wear.
2、It is used in high load capacities and low speed with rotational, oscillating or frequent stop-start motion.
3、It can work long time without oil in the condition of boundary lubrication, under oil or grease lubrication interval, the work is longer.
4、POM Thickness is machinable .
5、The groove is smooth , so the lubrication is better.
6、The bushes can be applied in auto chassis, forging machine, metallurgical, construction machines, power station, steel rolling industries, etc.

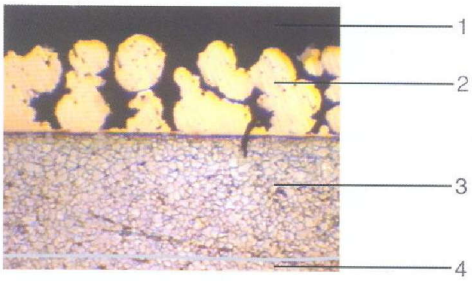
SF-2Y 边界润滑无铅轴承
SF-2Y Bearing (lead free)

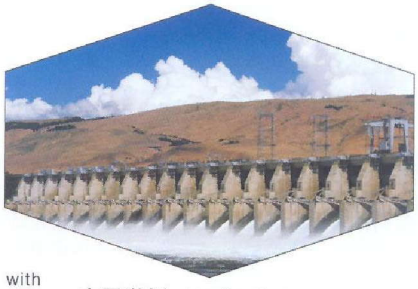
■ 材料组织结构
STRUCTURE

1、 聚甲醛与纤维混合物0.3-0.5mm
POM with fibre 0.3-0.5mm
2、 球形青铜粉0.2-0.3mm
Porous bronze 0.2-0.3mm
3、 钢背0.4-2.2mm
Steel backing 0.4-2.2mm
4、 电镀层：镀锡层厚约0.005mm
或镀铜层厚约0.008mm
Tin-plating about 0.005mm or
copper plating about 0.008mm

■ 应用特点

1、承载好，耐磨性能好。
2、适用于低速重载的旋转运动，摇摆运动以及频繁起动而不易形成油膜润滑的场合。
3、在边界润滑条件下可以工作很长时间，如在使用过程中定期加油保养，其使用寿命可以延长。
4、表面塑料层有可加工性。轴承装配入座孔后，可进行加工从而达到更好的配合精度。
5、产品主要运用于汽车底盘、冶金机械、矿山机械、水利机械、建筑机械、农用机械、轧钢设备等。
6、标准产品油穴表面圆滑过度，润滑效果更显著。
7、因其不含铅，故可广泛运用于要求无铅的领域。





应用举例 Application case

■ APPLICATION CHARACTERISTICS

1、 Good load capacity and anti-wear performance.
2、 It is used under high load capacities performance & low speed with rotational, oscillating or frequent stop-start motion.
3、 It can work long time without oil in the condition of boundary lubrication, if it is with oil or grease lubrication intervally, the life will be longer.
4、 POM thickness is machinable.
5、 The bushes can be applied in auto chassis, forging machine, metallurgica industry, construction machine , mining machine , power station, and steel rolling equipment, etc.
6、 The groove is smooth, so the lubrication is better.
7、 It is widely used in the machine that lead is unacceptable.

SF-2 系列产品　　SF-2 SERIES

可供产品	PRODUCT AVAILABLE
直套	Bushes
止推垫片	Thrust Washers
板材	Strip
(及其它按客户要求定制产品)	(Special Product According to Your Requirements)

标准公制产品的外径公差(mm)

O. D. TOLERANCE FOR BUSHING WITH STANDARD METRIC SIZE　　mm

轴承外径 Outside diameter	外径公差 Tolerance for outside diameter
≤10	+0.055 +0.025
10<d≤18	+0.065 +0.030
18<d≤30	+0.075 +0.035
30<d≤50	+0.085 +0.045
50<d≤80	+0.100 +0.055
80<d≤105	+0.120 +0.070
105<d≤180	+0.170 +0.100
180<d≤250	+0.210 +0.130
250<d≤305	+0.260 +0.170

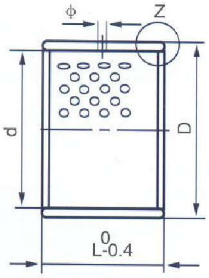
注：检验方法详见25页
Note:inspection method P25

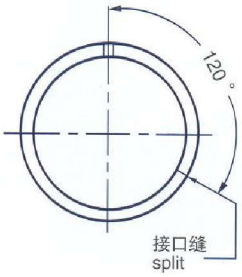
标准公制产品的壁厚公差

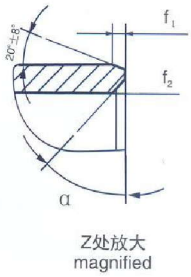
TOLERANCE AND THIKNESS OF STANDARD METRIC SIZE BUSH　　mm

轴承内径尺寸 Inside diameter	壁厚公称尺寸 Thickness	公差 Tolerance for wall thickness
8≤d<20	1.0	-0.020 -0.045
20≤d<28	1.5	-0.025 -0.055
28≤d<45	2.0	-0.030 -0.065
45≤d<80	2.5	-0.040 -0.085
80≤d	2.5	-0.050 -0.115

SF-2 系列轴承标准尺寸
(SF-2、SF-2Y)







mm

d	D	相配轴径 (Shaft Dia.)	相配座孔 (Housing Bore) H7	壁厚 Wall Thickness Min.	Max.	油孔 (Hole Dia.)	f_1	f_2	$L^{0}_{-0.40}$ 10	12	15	20	25	30	35	40	45	50
10	12	$10_{-0.022}$	$12^{+0.018}$	0.955	0.980	4	0.5	0.3	1010		1015	1020						
12	14	$12_{-0.027}$	$14^{+0.018}$			4			1210	1212	1215	1220						
14	16	$14_{-0.027}$	$16^{+0.018}$			4				1412	1415	1420						
15	17	$15_{-0.027}$	$17^{+0.018}$			4				1512	1515	1520	1525					
16	18	$16_{-0.027}$	$18^{+0.018}$			4					1615	1620	1625					
18	20	$18_{-0.027}$	$20^{+0.021}$			4					1815	1820	1825					
20	23	$20_{-0.033}$	$23^{+0.021}$	1.445	1.475	4	0.8	0.4			2015	2020	2025	2030				
22	25	$22_{-0.033}$	$25^{+0.021}$			6					2215		2225					
25	28	$25_{-0.033}$	$28^{+0.021}$			6						2520	2525	2530				
28	32	$28_{-0.033}$	$32^{+0.025}$	1.935	1.970	6	1.0	0.5				2820		2830				
30	34	$30_{-0.033}$	$34^{+0.025}$			6						3020	3025	3030		3040		
35	39	$35_{-0.039}$	$39^{+0.025}$			6						3520		3530	3535	3540		
40	44	$40_{-0.039}$	$44^{+0.025}$			8						4020		4030		4040		4050
45	50	$45_{-0.039}$	$50^{+0.025}$	2.415	2.460	8	1.2	0.6				4520		4530		4540	4545	4550
50	55	$50_{-0.039}$	$55^{+0.030}$			8								5030		5040		5050
55	60	$55_{-0.046}$	$60^{+0.030}$			8								5530		5540		5550
60	65	$60_{-0.046}$	$65^{+0.030}$			8								6030		6040		6050

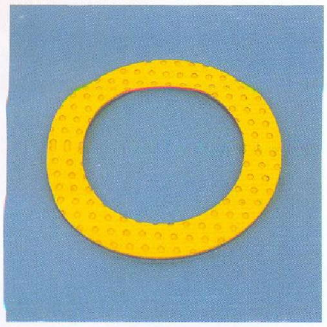
SF-2系列轴承标准尺寸
(SF-2、SF-2Y)

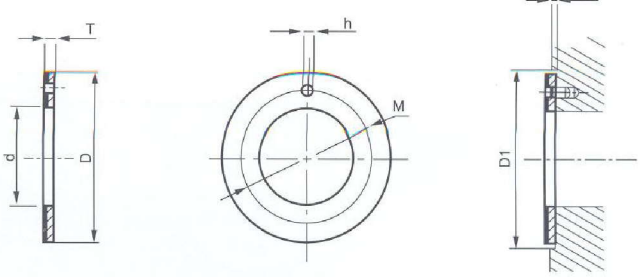
mm

d	D	相配轴径 (Shaft Dia.)	相配座孔 (Housing Bore) H7	壁厚 Wall Thickness		油孔 (Hole Dia)	f_1	f_2	$L^{0}_{-0.40}$								
				Min.	Max.				40	45	50	60	65	80	90	95	100
65	70	$65_{-0.046}$	$70^{+0.030}$	2.415	2.460	8	1.2	0.6	6540			6560					
70	75	$70_{-0.046}$	$75^{+0.030}$			8			7040		7050		7065	7080			
75	80	$75_{-0.046}$	$80^{+0.030}$			9.5			7540			7560		7580			
80	85	$80_{-0.046}$	$85^{+0.035}$	2.385	2.450	9.5	1.4	0.7	8040			8060		8080			
85	90	$85_{-0.054}$	$90^{+0.035}$			9.5			8540	8545		8560		8580			
90	95	$90_{-0.054}$	$95^{+0.035}$			9.5			9040	9045		9060		9080	9090		
100	105	$100_{-0.054}$	$105^{+0.035}$			9.5				10045	10050			10080		10095	
105	110	$105_{-0.054}$	$110^{+0.035}$			9.5	1.6	0.8				10560		10580		10595	105100
110	115	$110_{-0.054}$	$115^{+0.035}$			9.5						11060		11080		11095	110100
120	125	$120_{-0.054}$	$125^{+0.040}$			9.5						12060		12080			120100
125	130	$125_{-0.063}$	$130^{+0.040}$			9.5						12560		12580			125100
130	135	$130_{-0.063}$	$135^{+0.040}$			9.5					13050	13060		13080			130100
140	145	$140_{-0.063}$	$145^{+0.040}$			9.5					14050	14060		14080			140100
150	155	$150_{-0.063}$	$155^{+0.040}$			9.5					15050	15060		15080			150100
160	165	$160_{-0.063}$	$165^{+0.040}$			11					16050	16060		16080			160100
170	175	$170_{-0.063}$	$175^{+0.040}$			11					17050	17060		17080			170100
180	185	$180_{-0.063}$	$185^{+0.046}$			11					18050	18060		18080			180100
190	195	$190_{-0.072}$	$195^{+0.046}$			11					19050	19060		19080			190100
200	205	$200_{-0.072}$	$205^{+0.046}$			12					20050	20060		20080			200100
220	225	$220_{-0.072}$	$225^{+0.046}$			12					22050	22060		22080			220100
240	245	$240_{-0.072}$	$245^{+0.046}$			12					24050	24060		24080			240100
250	255	$250_{-0.072}$	$255^{+0.052}$			12					25050	25060		25080			250100
260	265	$260_{-0.081}$	$265^{+0.052}$			12					26050	26060		26080			260100
280	285	$280_{-0.081}$	$285^{+0.052}$			12					28050	28060		28080			280100
300	305	$300_{-0.081}$	$305^{+0.052}$			12					30050	30060		30080			300100

WCSF-2 系列标准尺寸

(SF-2、SF-2Y)





规格标志 (Part Number)	相配轴径 (Shaft Dia.)	垫片尺寸 (Size Of Washer)				安装尺寸 (Size For Installation)		
		$d^{+0.25}$	$D_{-0.25}$	$T_{-0.05}$	$M^{+0.12}_{-0.12}$	$h^{+0.4}_{+0.1}$	$t^{+0.2}_{-0.2}$	$D_1^{+0.12}$
WC10SF-2	8	10	20	1.5	15	1.5	1	20
WC12SF-2	10	12	24	1.5	18	1.5	1	24
WC14SF-2	12	14	26	1.5	20	2	1	26
WC16SF-2	14	16	30	1.5	23	2	1	30
WC18SF-2	16	18	32	1.5	25	2	1	32
WC20SF-2	18	20	36	1.5	28	3	1	36
WC22SF-2	20	22	38	1.5	30	3	1	38
WC24SF-2	22	24	42	1.5	33	3	1	42
WC26SF-2	24	26	44	1.5	35	3	1	44
WC28SF-2	25	28	48	1.5	38	4	1	48
WC32SF-2	30	32	54	1.5	43	4	1	54
WC38SF-2	35	38	62	1.5	50	4	1	62
WC42SF-2	40	42	66	1.5	54	4	1	66
WC48SF-2	45	48	74	2	61	4	1.5	74
WC52SF-2	50	52	78	2	65	4	1.5	78
WC62SF-2	60	62	90	2	76	4	1.5	90

SF轴承的装配

SF轴承在装配前宜先用煤油或柴油清洗干净，然后在机油内浸油、沥干。轴承与座孔装配时，既要保证轴承在座孔中不发生转动和轴向移动，又要使轴承外表面与座孔充分接触，一般应保证接触面大于70%以上，以利于承受载荷和传导摩擦热，SF轴承内表面是自润滑塑料，外表面是钢背，钢对钢的摩擦系数比钢对塑料的摩擦系数大，因此采用适当的过盈配合，既保证使用时衬套不会在座孔内发生相对移动，又不会使衬套外径过大致使衬套内孔变 形过大。

于工作压力较高的场合为避免轴套走外圆，推荐用以下二种方法：

1、加大轴套外径尺寸，内孔变形用校正芯棒校正。

2、安装时，座孔可涂ZY801厌氧胶，增强轴套与座孔的结合强度。

对于外径<55mm的轴承可按图A所示，利用一个带有手柄的压头轴芯，小心操作，轻轻压入座孔中。

当轴承外径>55mm时可按图B所示，利用带台肩的手柄以及一个“0”形圈和一个辅助圈小心操作，将轴承压入座孔中。

The Installation of SF Bush

SF bushes should be cleaned in kerosene or diesel oil first, immersed in engine oil and then dried up. When the bush is installed into the housing, make sure the bush not rotating in the housing or moving in the axial direction and at the same time make the outer surface fully contact to the base hole, generally guarantee the contact area over 70%, thus to improve load capacity and transmission of friction heat. The inner surface of SF bush is made of self-lubricating plastic, the outer surface steel backing. The friction coefficient of steel to steel is bigger than that of steel to plastic. So we should choose the light-graded tight fit, preventing the axle sleeve from moving in the base when working, and also preventing the inner holes from getting deformed and too big because of the large tight fit of the outer diameter.

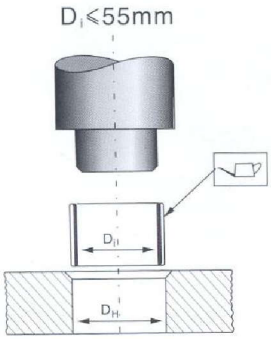
Out circle of the axle sleeve should be avoided in the high-pressure working conditions. Two methods are recommended here:

1、Increase the outer diameter of the axle sleeve, and the deformation of inner holes can be calibrated with calibrating core stick.

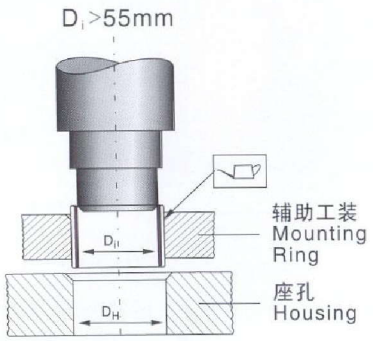
2、When installing, apply ZY 801 Oxygen-hatred glue in the housing to streng then the combination strength between the axle sleeve and the base hole.

For bush (outer diameter < 55mm), press the bush into the housing gently and carefully using an core axle with a handle FigA.

For bush (outer diameter > 55mm), press the bush into the housing gently and carefully using a handle with a shoulder, an "O" ring and an assisting circle FigB.



图A



图B

一、SF轴套外径检测方法

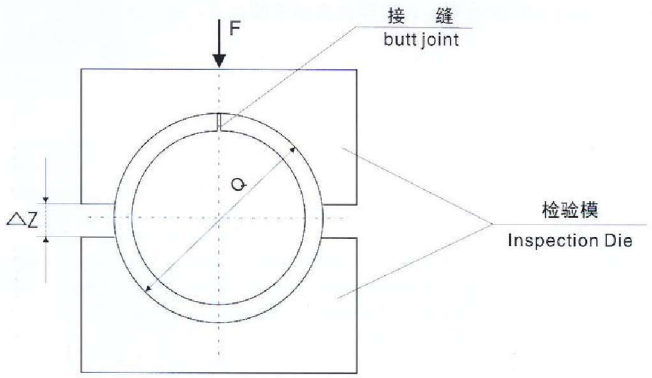
1.O. D. inspecting method of SF bearing's

(一)外径采用ISO3547-2中第一种方法检测，其步骤如下：

In accordance to ISO3547-2-A;the method is described as follows:

1.设定测量外径装置（如图所示）。先把一个直径与检验模内径一样的调节芯轴Q放在检验模之间，然后施加一定的试验力F，在检验模之间出现间隙Z，作为最初调整值。

1.Set the measuring device (see figure). First a core bar Q with the same diameter as the inside diameter of inspecting mould is put into the mould, then load F is given until clearance Z appears on the mould, which is logged as the reference parameter.



2.取出调节芯轴，将被测轴套开口向上，放入检孔中，并施加同样试验力F，记录Z的变化值△Z。

2.Get the mandril out of the mould,then put the bush with the split upward into the inspecting bore,and the load F is given.Meanwhile a changed value △Z is logged.

3.芯轴Q和试验力F 的取值和计算方法

3.Inspection and Caculation for the dimension of Q & F

D(mm)	≤6	>6~12	>12~80	>80~180
Q(mm)	Dmax-0.003	Dmax-0.006	Dmax-0.013	Dmax-0.025
F(N)	1500 · A/Q 取100倍数值 (100 fold's value)	3000 · A/Q 取250倍数值 (250 fold)	6000 · A/Q 取500倍数值 (500 fold)	12000 · A/Q 取500倍数值 (500 fold)

A=L ·S,适用SF轴套 For SF bearing.

L为轴套宽度 S_1为钢板厚度 S_2为球形青铜粉层厚度.

L: Bush Width S_1: Steel Layer Thickness S_2: Alloy Layer Thickness

△Z的极限值：上极限值0，下极限值-π /2△D △Z extremum: upper 0,lower-π/2△D

△D为轴套外径公差值 △D: Bearing Outside Diameter Tolerance

4.测定数据的例举 Example ForInspecting Date
轴套 (Bush Desc) ISO3547SF-1 ϕ30×ϕ34×30，轴套宽 (Width) L=30±0.25
外径 (O.D.) $D=34^{+0.085}_{+0.045}$　总壁厚(Total Thickness) $S_3=2^{+0.005}_{-0.030}$
球形青铜粉层厚度 (Porous bronze thickness) $S_2=0.25\pm0.05$
钢背层厚度 (Steel thickness) $S_1=S_3-S_2-0.02=1.73$
(1)调节芯轴外径 (Adjusting Mandril ' s O.D) Q=Dmax-0.013=34.085-0.013=34.072
(2)试验力 (Load) F=6000 · A/Q=6000×51.9/34.072=9139，取整后(After modulatd) F=9500(N)
其中 (Here) A=L · S_1=30×1.73=51.9
(3)△Z极限值 (△Z Extremum)　上极限值 (Upper) △Z=0
下极限值 (Lower) $\triangle Z=-\pi/2 \cdot \triangle D=-\pi/2\times0.04=-0.0628$
取整数后 (After modulated) △Z=-0.063
(即被测轴套外径在检验模中的允许变化值为0～-0.063)
(That ' stosay,the permitted vatiable of O.D. is 0～-0.063 when bush in the inspecting gauge).
(4)实际被测轴套外径计算举列:
Example for the calculation of the actual O.D. of the bushbeing inspected.
若上述例举中实际测得△Z=-0.035,则被测轴套实际外径D
If the actual△Z=-0.035,then the actual O.D.
$D=Dmax+\triangle Z \cdot 2/\pi=34.085+(-0.035\times2/3.14)=34.063$

(二)外径采用ISO3547-2标准第二种方法检测
Inspecting O.D. In accordance to ISO3547-2-B

在手的压力作用下(最大值为250N)，轴套应能推入“通”环规，而不能进入“止”环规。“通”环规的内径应等于轴套的最大理论外径，“止”环规的内径应等于轴套的最小理论外径。此方法较简便，通常较适应批量检测和提高工作效率，并易使供货双方简便地达成验收协议，也能满足装配的过盈配合要求。

Under the pressure of the hand(the maximum value is 250N),bush should bepushed in to thegoend of the ring gauge while can ' t come through the stop end.

The I.D of the go end should be equal to the maximum theoreticalO.D. of the bush,while the I.D.of the stop end equals to the minimum theoreticalO.D. of the bush.

Due to its relative easiness,the method generally is more suitable for batch inspection and canimprove the working effciency as well. It will also more conveniently lead to inspection agreementsbetween the customer and the manufacturer. Moreover,the demand of shrink fit in installation can be realized.

二、SF轴套内径检测方法

SF轴套的内径测量方法可参照ISO3547-2中第三种方法检测，对于产品内径小于120mm的产品，测量方法是将轴承压入一个检验座孔中（座孔内径按H7中值制造，公差为±0.003mm），然后用三点内径千分尺或塞规来测量轴套的内径。在手的压力作用下（最大值为250N），“通”塞规应能通过轴套内孔，“止”塞规不能通过轴套内孔。“通”塞规的外径应等于轴套的最小理论内径，“止”塞规的外径应等于轴套的最大理论内径。但因本方法为破坏性测量，产品经测量后外径尺寸会发生变化，产品经测量后不得再次使用，所以本测量方法只适用于批量产品的抽检。

内径大于120mm的产品，测试方法由供需双方协商确定。

2. The inspecting method of SF bush inside diameter

To check the inside diameter, the bush is to be pressed into a ring gage, the size of the ring gauge inside diameter is made up of the outside diameter and the rounded average value of the tolerance class H7.The inside diameter shall be measured with 3 point measuring instrument or checked with a GO and NO GO plug gauge. The plug gauge diameters are determined empirically based on the maximum and minimum values of bush ' s outside diameter. The GO plug gauge shall enter the bush with minimum effort; the NO GO plug gauge shall not enter the bush manually(maximum force 250N).The test is appropriate for inside diameters up to 120mm.When the bush is pressed into the ring gauge it is possible that there will be permanent reduction in the outside diameter.

For inside diameters over 120mm, the test shall be agreed between supplier and user.