NOVIN Ball Bearing
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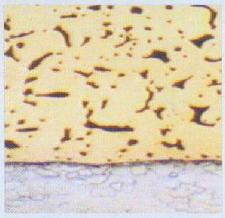
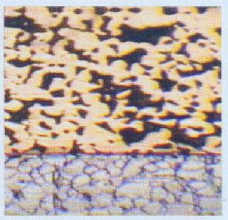
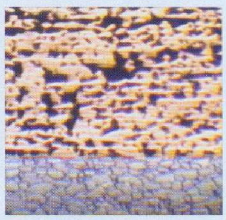
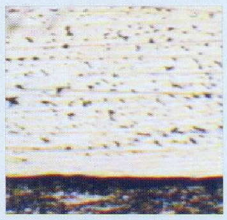
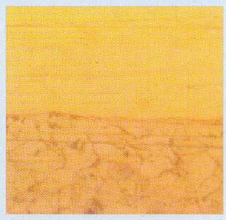
JF 双金属轴承
JF BIMETAL BEARINGS

JF型双金属合金的技术标准
Specieications for JF Steel–Lead Bronze alloys

双金属合金的化学成份、特性与用途
Chemical Compositions and Application Characteristics of Steel–Lead Bronze alloys

材料型号 Material Type	铜合金牌号 Specification of Bronze	相当代号 Equivalent Code	金相组织图 ×100 Metallographies	合金层硬度 Hardness of Bronze alloy HB
JF800	CuPb10Sn10	美国SAE–797 德国GLYCO66 日本JIS–LBC3 USA SAE–797 GERMANY GL–YCO66 JAPAN JIS–LBC3		70–100
JF720	CuPb24Sn4	美国SAE–799 德国GLYCO68 日本JIS–LBC6 USA SAE–799 GERMANY GL–YCO68 JAPAN JIS–LBC3		45–70
JF700	CuPb30	美国SAE–48 USA SAE–48 日本 JIS–KJ3 JAPAN JIS–KJ3		30–45
JF20	AlSn20Cu	美国SAE–783 德国GLYCO74 日本JIS–AJL USA SAE–783 GERMANY GL–YCO 74 JAPAN JIS–AJL		30–40
JF930	CuSn6.5P0.1			60–90

允许最大动荷载 Allowable Max Dynamic Load N/mm^2	对磨轴硬度 Hardness of mating surface	最高使用温度 Max.Temperature ℃	特性与用途 Application Characteristics
65	53HRC	260	属铜铅合金中最强的一种，应用场合十分广泛，适用于承受高冲击震动载荷的轴套、止推垫片等。 The strongest stype,wide application field, most suitable for high impact vibrating load bushes and washers.
38	50HRC	200	有较高的疲劳强度和承载能力,较好的滑动性能,易受润滑油的腐蚀。适用于中载、中速。表面镀软合金时,可用于高速内燃机主轴套连、杆轴套。 Relative high fatige strengh & load capaity, good sliding performance, poor oil corrosion resistance. Fit for middle load, middle speed. Normally applied in mainbushes of inner-combushtion engine, connecting rod when plated.
25	270HB	170	有良好的抗咬性、异物埋没性，工作表面需镀软合金。常用于高速中低何载的内燃机主轴套、连杆轴套。 Good seizuring resistance, good capacity to submerge foreign, overlayer plated. Normally applied in main bearings of high speed. Low to morderate load inner-combustion engine & connecting rod bearing.
30	250HB	150	有中等的疲劳强度和承载能力，良好的抗腐蚀性能，较好的轴承滑动性能。常用于高速低载的内燃机轴瓦、气压机、制冷机轴承。 Moderate fatige strenth & load capacity good corrosion resistance, relative in half bushs of high speed, low load inner combustion engine, aircompressor, refigerator bearings.
65	50HRC	200	是一种无铅产品，有较高的疲劳强度和承载能力，较好的滑动性能，应用领域正逐步拓展。 The JF930 bearing is a kind of product without lead, Relative high fatige strengh & load capaity, good sliding performance,whose application industry is gradually being expanded.

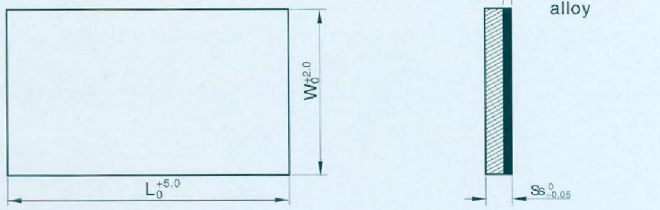
JF双金属轴承合金化学成份
Composition analysis of JF alloy

化学元素 chemical elements	JF800	JF720	JF700	JF20 (Pb-free)	JF930 (Pb-free)
Cu	余量remainder	余量remainder	余量remainder	0.7~1.3	余量remainder
Pb	9.0~11.0	21.0~27.0	26.0~33.0	–	–
Sn	9.0~11.0	3~4.5	≤0.5	17.5~22.5	6~7
Zn	≤0.5	≤0.5	≤0.5	–	–
P	≤0.1	≤0.1	≤0.1	–	0.1~0.25
Fe	≤0.7	≤0.7	≤0.7	≤0.7	–
Ni	≤0.5	≤0.5	≤0.5	≤0.1	–
Sb	≤0.2	≤0.2	≤0.2	–	–
Al	–	–	–	余量remainder	–
Si	–	–	–	≤0.7	–
Mn	–	–	–	≤0.7	–
Ti	–	–	–	≤0.2	–
其它Other	≤0.5	≤0.5	≤0.5	≤0.5	≤0.5

JF双金属轴承的物理性能
Phisical characteristics of JF material

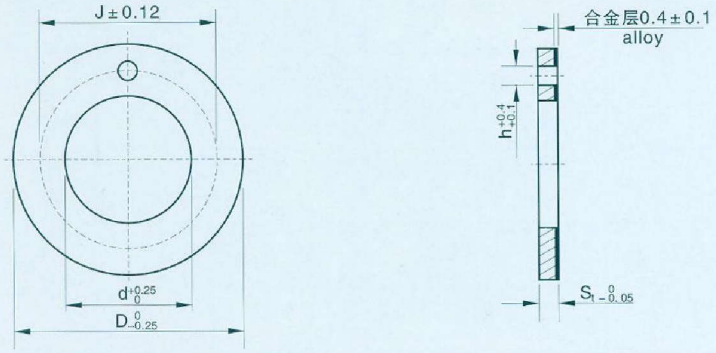
物理性能 PHSICAL PROPERITES		JF800	JF720	JF700	JF20	JF930
最高静承载压力N/mm² Load Limit		150	130	120	100	150
抗拉强度N/mm² Tensile Strenghth		185	150	200	200	185
最高速度(油)m/s Speed Limit Vmax (Oil)		5	10	15	25	5
摩擦因数(油)m/s Friction confficient (Oil)		0.06~0.14	0.06~0.16	0.08~0.16	0.08~0.17	0.06~0.16
允许PV值 PV Limit N/mm² m/s	(脂) Greases	2.8	2.8	2.5	–	2.8
	(油) Oil	10	10	8	6	10
"蓝宝石" 疲劳级Mpa "Sapphire" fatigue class		125	115	105	85	–

滑板标准产品
JF standard slide plate



L 0 +0.5	W 0 +2.0	Ss 0 -0.05
0	125	1. 0
		1. 5
		2. 0
		2. 5

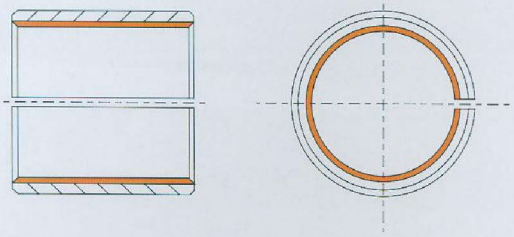
垫片标准产品
JF standard washer



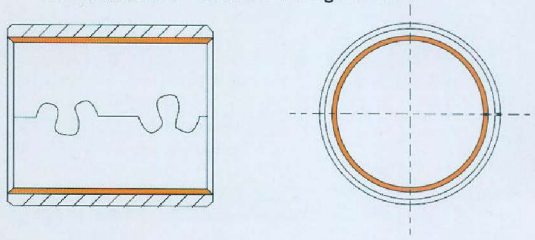
ΦD 0 +0.25	ΦD -0.25 0	S1 -0.05 0	ΦJ±0.12	Φh +0.1 +0.4
12	24	1. 5	18	1. 5
14	26		20	2
16	30		22	
18	32		25	
20	36		28	3
22	38		30	
24	42		33	
26	44		35	
28	48		38	4
32	54		43	
38	62		50	
42	6. 6		54	
48	74	2	61	
52	78		65	

接口形式
Lock Types of JF Bushes

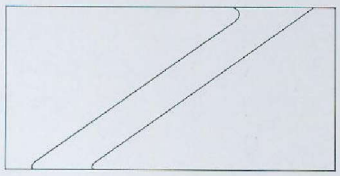
a.开口型 Straight Joint



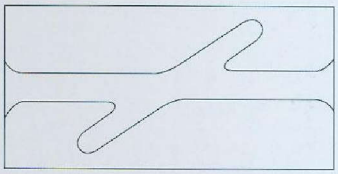
b.互锁搭扣型 Inter Locking Joint



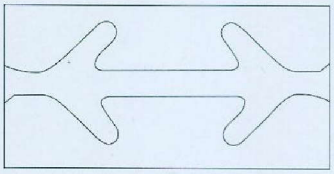
润滑油穴、油槽
Types for JF bush's grooves & indentations



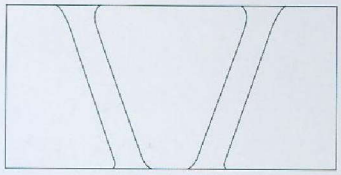
(A)



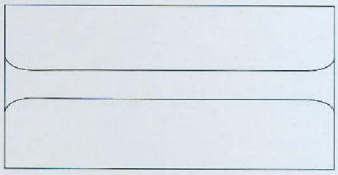
(B)



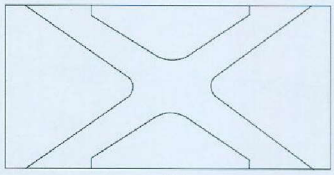
(C)



(D)



(E)



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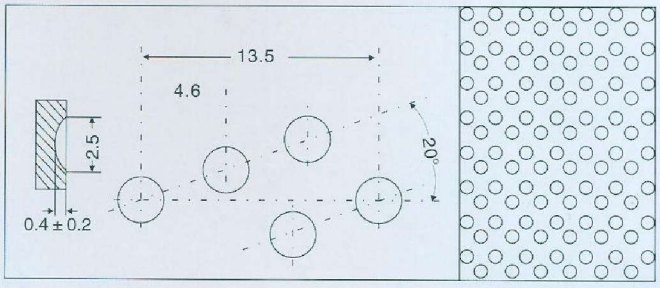


(G)

润滑油孔

The Designing of Oil Indentation

为使轴承得到充分的润滑，一般在设计轴承时需要考虑润滑油孔，油孔尺寸推荐按下表。

In order to fully lubricate the bush when in the performance,the size of lubrication hole as follows are recommended.

油孔的位置应避开接缝处和承载区域，并应有利于进油。

The lubrication hole should be away from butt joint and loading aera and designed to be easy oil feeding as well.

轴承外径 O.D.	14~22	22~40	40~50	50~100	100~180
油孔直径(mm) Lubrication hole	3	4	5	6	7

壁厚尺寸
Thickness of JF Bearing

单位：mm
Unit : mm

公称厚度 Nomimal Thickness of	1	1.5	2	2.5	3	3.5	4	5
钢背厚度 Thickness of Steel Baking	0.6	1	1.4	1.9	2.3	2.8	3.2	4
铜合金层厚度 Thickness of Bronze layer	0.4	0.5	0.6	0.6	0.7	0.7	0.8	1.0
留加工余量轴承推荐壁厚 Manufacturable wall Thickness	$1^{+0.25}_{+0.15}$	$1.5^{+0.25}_{+0.15}$	$2^{+0.25}_{+0.15}$	$2.5^{+0.25}_{+0.15}$	$3^{+0.25}_{+0.15}$	$3.5^{+0.25}_{+0.15}$	$4^{+0.25}_{+0.15}$	$5^{+0.25}_{+0.15}$
直接装配轴承推荐壁厚 Manufactured wall Thickness	$1_{-0.025}$	$1.5_{-0.03}$	$2_{-0.0035}$	$2.5_{-0.04}$	$3_{-0.045}$	$3.5_{-0.05}$	$4_{-0.055}$	$5_{-0.06}$

壁厚测量方法

Inspecting the tolerance of wall thickness

对宽度L≤15mm的轴套，测量点应选在轴套宽度中间截面的圆周上。

对宽度L>15mm的轴套，测量点应选在距离轴承一端5mm处的圆周上。

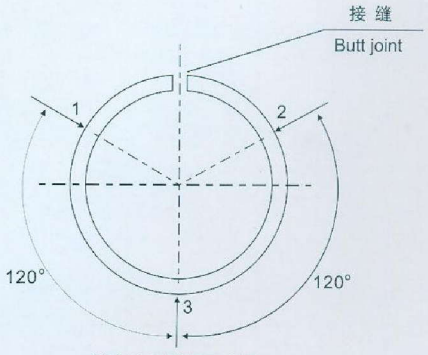
测量点应避开油槽、油穴、油孔和钢印标记位置，角度分布按右图。

Bush for width L≤15mm,measurement should be carried out on the circle of the middle section of the width.

Bush for width L >15mm, measurement should be carried out on the two circles (5mm from each end) .

The measuring point should be selected according to Fig.

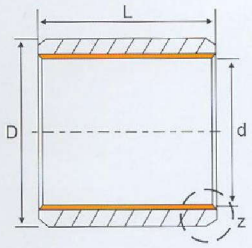
(avoiding oil grooves, pockets, indentations and print mark).

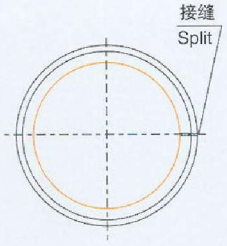


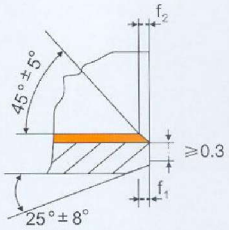
轴套壁厚测量示意图

(Figure to inspect bush wall thickness)

轴承标准产品
Stand Size Series of JF Bushing





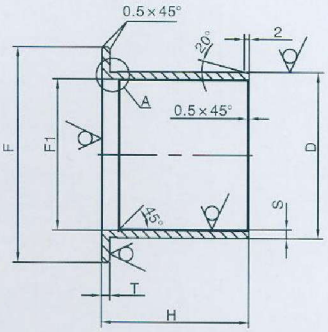


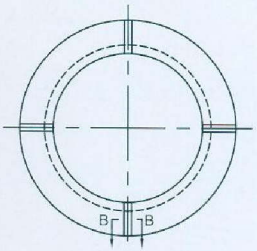
Z处放大
Z detail

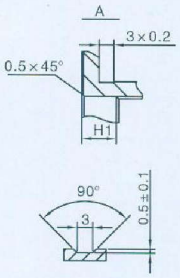
d	D	壁厚 Wall Thickness	外径 O.D.	内径 I.D.	座孔 Housing Bore	轴径 Journal Diameter	f_1	f_2	L -0.40										
									10	15	20	25	30	40	50	60	80	90	100
10	12	1 -0.025	12 +0.065 +0.030	10 +0.022 +0.000	12 +0.018	10 -0.013 -0.028	0.5	0.3	Δ	Δ	Δ								
12	14		14 +0.065 +0.030	12 +0.027 +0.000	14 +0.018	12 -0.016 -0.034	0.5	0.3	Δ	Δ	Δ								
14	16		16 +0.065 +0.030	14 +0.027 +0.000	16 +0.018	14 -0.016 -0.034	0.5	0.3	Δ	Δ	Δ								
15	17		17 +0.065 +0.030	15 +0.027 +0.000	17 +0.018	15 -0.016 -0.034	0.5	0.3	Δ	Δ	Δ								
16	18		18 +0.075 +0.035	16 +0.027 +0.000	18 +0.018	16 -0.016 -0.034	0.8	0.4	Δ	Δ	Δ								
18	20		20 +0.075 +0.035	18 +0.033 +0.000	20 +0.021	18 -0.016 -0.034	0.8	0.4	Δ	Δ	Δ	Δ							
20	23	1.5 -0.03	23 +0.075 +0.035	20 +0.033 +0.000	23 +0.021	20 -0.020 -0.041	0.8	0.4	Δ	Δ	Δ	Δ							
22	25		25 +0.075 +0.035	22 +0.033 +0.000	25 +0.021	22 -0.020 -0.041	0.8	0.4	Δ	Δ	Δ	Δ							
24	27		27 +0.075 +0.035	24 +0.033 +0.000	27 +0.021	24 -0.020 -0.041	1.0	0.5	Δ	Δ	Δ	Δ	Δ						
25	28		28 +0.075 +0.035	25 +0.033 +0.000	28 +0.021	25 -0.020 -0.041	1.0	0.5		Δ	Δ	Δ	Δ						
26	30	2 -0.035	30 +0.075 +0.035	26 +0.033 +0.000	30 +0.021	26 -0.020 -0.041	1.0	0.5		Δ	Δ	Δ	Δ						
28	32		32 +0.085 +0.045	28 +0.033 +0.000	32 +0.025	28 -0.020 -0.041	1.0	0.5		Δ	Δ	Δ	Δ	Δ					
30	34		34 +0.085 +0.045	30 +0.039 +0.000	34 +0.025	30 -0.020 -0.041	1.2	0.6		Δ	Δ	Δ	Δ	Δ					
32	36		36 +0.085 +0.045	32 +0.039 +0.000	36 +0.025	32 -0.025 -0.050	1.2	0.6		Δ	Δ	Δ	Δ	Δ					
35	39		39 +0.085 +0.045	35 +0.039 +0.000	39 +0.025	35 -0.025 -0.050	1.2	0.6			Δ	Δ	Δ	Δ	Δ				
38	42		42 +0.085 +0.045	38 +0.039 +0.000	42 +0.025	38 -0.025 -0.050	1.2	0.6			Δ	Δ	Δ	Δ	Δ				
40	44		44 +0.085 +0.045	44 +0.039 +0.000	44 +0.025	40 -0.025 -0.050	1.2	0.6			Δ	Δ	Δ	Δ	Δ				

d	D	壁厚 Wall Thickness	外径 O.D.	内径 I.D.	座孔 Housing Bore	轴径 Journal Diameter	f_1	f_2	L-0.40										
									10	15	20	25	30	40	50	60	80	90	100
45	50	$2.5_{-0.040}$	$50^{+0.085}_{+0.045}$	$45^{+0.039}_{+0.000}$	$50^{+0.025}$	$45^{-0.025}_{-0.05}$	1.5	1.0			△	△	△	△	△				
50	55		$55^{+0.100}_{+0.055}$	$50^{+0.039}_{+0.000}$	$55^{+0.030}$	$50^{-0.030}_{-0.060}$	1.5	1.0					△	△	△	△			
55	60		$60^{+0.100}_{+0.055}$	$55^{+0.046}_{+0.000}$	$60^{+0.030}$	$55^{-0.030}_{-0.060}$	1.5	1.0					△	△	△	△			
60	65		$65^{+0.100}_{+0.055}$	$60^{+0.046}_{+0.000}$	$65^{+0.030}$	$60^{-0.030}_{-0.060}$	1.5	1.0					△	△	△	△			
65	70		$70^{+0.100}_{+0.055}$	$65^{+0.046}_{+0.000}$	$70^{+0.030}$	$65^{-0.030}_{-0.060}$	1.5	1.0					△	△	△	△			
70	75		$75^{+0.100}_{+0.055}$	$70^{+0.046}_{+0.000}$	$75^{+0.030}$	$70^{-0.030}_{-0.060}$	1.5	1.0					△	△	△	△	△		
75	80		$80^{+0.100}_{+0.055}$	$75^{+0.046}_{+0.000}$	$80^{+0.035}$	$75^{-0.030}_{-0.060}$	1.5	1.0					△	△	△	△			
80	85		$85^{+0.120}_{+0.070}$	$80^{+0.054}_{+0.000}$	$85^{+0.035}$	$80^{-0.030}_{-0.060}$	1.5	1.0						△	△	△	△		
84	90	$3_{-0.045}$	$90^{+0.120}_{+0.070}$	$84^{+0.054}_{+0.000}$	$90^{+0.035}$	$84^{-0.036}_{-0.071}$	1.8	1.2						△	△	△	△		
89	95		$95^{+0.120}_{+0.070}$	$89^{+0.054}_{+0.000}$	$95^{+0.035}$	$89^{-0.036}_{-0.071}$	1.8	1.2						△	△	△	△		
94	100		$100^{+0.120}_{+0.070}$	$94^{+0.054}_{+0.000}$	$100^{+0.035}$	$94^{-0.036}_{-0.071}$	1.8	1.2							△	△	△	△	
99	105		$105^{+0.120}_{+0.070}$	$99^{+0.054}_{+0.000}$	$105^{+0.035}$	$99^{-0.036}_{-0.071}$	1.8	1.2							△	△	△	△	
104	110		$110^{+0.120}_{+0.070}$	$104^{+0.054}_{+0.000}$	$110^{+0.035}$	$104^{-0.036}_{-0.071}$	1.8	1.2							△	△	△		
109	115		$115^{+0.120}_{+0.070}$	$109^{+0.054}_{+0.000}$	$115^{+0.035}$	$109^{-0.036}_{-0.071}$	1.8	1.2							△	△	△		
114	120		$120^{+0.120}_{+0.070}$	$114^{+0.054}_{+0.000}$	$120^{+0.040}$	$114^{-0.036}_{-0.071}$	1.8	1.2							△	△	△		
119	125		$125^{+0.170}_{+0.100}$	$119^{+0.054}_{+0.000}$	$125^{+0.040}$	$119^{-0.036}_{-0.071}$	1.8	1.2							△	△	△		
123	130	$3.5_{-0.050}$	$130^{+0.170}_{+0.100}$	$123^{+0.063}_{+0.000}$	$130^{+0.040}$	$123^{-0.043}_{-0.083}$	2	1.5							△	△	△		△
128	135		$135^{+0.170}_{+0.100}$	$128^{+0.063}_{+0.000}$	$135^{+0.040}$	$128^{-0.043}_{-0.083}$	2	1.5							△	△	△		△
133	140		$140^{+0.170}_{+0.100}$	$133^{+0.063}_{+0.000}$	$140^{+0.040}$	$133^{-0.043}_{-0.083}$	2	1.5							△	△	△		△
138	145		$145^{+0.170}_{+0.100}$	$138^{+0.063}_{+0.000}$	$145^{+0.040}$	$138^{-0.043}_{-0.083}$	2	1.5								△	△		△
143	150		$150^{+0.170}_{+0.100}$	$143^{+0.063}_{+0.000}$	$150^{+0.040}$	$143^{-0.043}_{-0.083}$	2	1.5								△	△		△
148	155		$155^{+0.170}_{+0.100}$	$148^{+0.063}_{+0.000}$	$155^{+0.040}$	$148^{-0.043}_{-0.083}$	2	1.5								△	△	△	
153	160		$160^{+0.170}_{+0.100}$	$153^{+0.063}_{+0.000}$	$160^{+0.040}$	$153^{-0.043}_{-0.083}$	2	1.5								△	△	△	
158	165		$165^{+0.170}_{+0.100}$	$158^{+0.063}_{+0.000}$	$165^{+0.040}$	$158^{-0.043}_{-0.083}$	2	1.5								△	△		△
163	170		$170^{+0.170}_{+0.100}$	$163^{+0.063}_{+0.000}$	$170^{+0.040}$	$163^{-0.043}_{-0.083}$	2	1.5								△	△		△
168	175		$175^{+0.170}_{+0.100}$	$168^{+0.063}_{+0.000}$	$175^{+0.046}$	$168^{-0.043}_{-0.083}$	2	1.5								△	△		△
173	180		$180^{+0.170}_{+0.100}$	$173^{+0.063}_{+0.000}$	$180^{+0.046}$	$173^{-0.043}_{-0.083}$	2	1.5								△	△		△

JF-MZ模具成型摩擦焊接轴承标准产品
Stand Size Series of JF-MZ Bearing



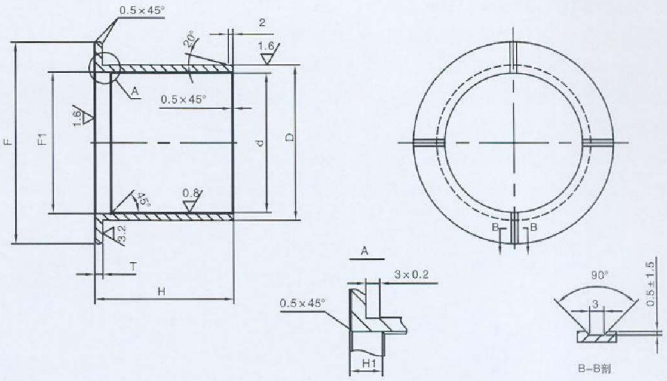




B-B剖

代 号	$F^{0}_{-0.5}$	$D^{+0.18}_{+0.12}$(平均值)	$S^{0}_{-0.05}$(平均值)	$H^{0}_{-0.7}$	$T^{0}_{-0.1}$	$F1^{+1.0}_{0}$	H1±0.5
MZ4040	60	46	3.0	39.5	3..5	41	6.5
MZ4035	62	47	3.5	35	3.5	41	6.5
MZ4555	62	55	5.0	55	3.5	46	6.5
MZ5040A	72	57	3.5	40	3.5	51	6.5
MZ5040B	70	57	3.5	40	3.5	51	6.5
MZ5050	70	57	3.3	50	3.5	51	6.5
MZ5460	92	60.6	3.5	60	3.5	55	6.5
MZ6053	83	67	3.5	53	3.5	61	6.5
MZ6060	87	67	3.5	60	3.5	61	6.5
MZ6065	77	67	3.5	65	3.5	61	6.5
MZ6060A	88	68	4.0	60	4.0	61	7.0
MZ6060B	87	68	4.0	60	4.0	61	7.0
MZ6465	102.6	70.4	3.5	65	3.5	64.5	6.5
MZ6473	103	70.8	3.5	73	3.5	64.8	6.5
MZ6553	85	72	3.5	53	3.5	66	6.5
MZ6564	87	72	3.5	64	3.5	66	6.5
MZ6575	108	72	3.5	75	3.5	66	6.5
MZ7060	93	77	3.5	60	3.5	71	6.5
MZ7090	108	80	5.0	90	5.0	71	8.0
MZ7560	100	82	3.5	60	3.5	76	6.5
MZ8068	105	87	3.5	68	3.5	81	6.5
Mz8580	127	92	3.5	80	3.5	86	6.5
MZ85103	128	92	3.8	103.5	3.5	86	6.5
MZ89123	138	97.5	4.2	126.5	4.2	90.2	7.2
MZ95127	144	105	5.0	127	5.0	96	8.0

JF–MP精加工型摩擦焊接轴承标准产品
Stand Size Series of JF–MP Bearing



代 号	$F^{0}_{-0.5}$	$D^{+0.25}_{+0.20}$	$d^{+0.20}_{+0.15}$	$H^{0}_{-0.5}$	$T^{0}_{-0.1}$	$F1^{+1.0}_{0}$	H1±0.5
MP4040	60	46	40	39.5	3.5	41	6.5
MP4035	62	47	40	35	3.5	41	6.5
MP4555	68	55	45	55	3.5	46	6.5
MP5040A	72	57	50	40	3.5	51	6.5
MP5040B	70	57	50	40	3.5	51	6.5
MP5050	70	57	50	50	3.5	51	6.5
MP5460	92	60.6	54	60	3.5	55	6.5
MP6053	83	67	60	53	3.5	61	6.5
MP6060	87	67	60	60	3.5	61	6.5
MP6065	77	67	60	65	3.5	61	6.5
MP6060A	88	68	60	60	4.0	61	7.0
MP6060B	87	68	60	60	4.0	61	7.0
MP6465	102.6	70.4	63.5	65	3.5	64.5	6.5
MP6473	103	70.8	63.8	73	3.5	64.8	6.5
MP6553	85	72	65	53	3.5	66	6.5
MP6564	87	72	65	64	3.5	66	6.5
MP6575	108	72	70	75	3.5	66	6.5
MP7060	93	77	70	60	3.5	71	6.5
MP7090	108	80	70	90	5.0	71	8.0
MP7560	100	82	75	60	3.5	76	6.5
MP8068	105	87	80	68	3.5	81	6.5
MP8580	127	92	85	80	3.5	86	6.5
MP85103	128	92.6	85	103.5	3.5	86	6.5
MP89123	138	97.5	89.2	126.5	4.2	90.2	7.2
Mp95127	144	105	95	127	5.0	96	8.0

一、JF轴套外径检测方法

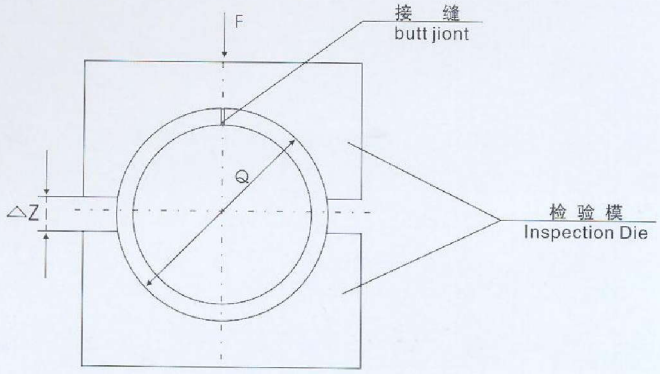
Ⅰ.O.D. Inspecting method of JF beating's

(一) 外径采用ISO3547-2 第一种方式检验，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)。先把一个直径与检测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,做为最初调整值。

1.Set the measuring device(see figure).Fist 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,将被测轴套开口上,放入检孔中,并施加同样试验力F,记录Z的变化值ΔZ。

2.Get the mandril out of the mould, then put the bush with the spilt upward into the inspecting bore, and the load F is given. Mean while a changed value ΔZ is logged.

3.芯轴Q和实验力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)	$D_{max-0.003}$	$D_{max-0.006}$	$D_{max-0.013}$	$D_{max-0.025}$
F(N)	1500 · A/Q 取100倍数值 (100fold's value)	3000 · A/Q 取250倍数值 (250fold)	6000 · A/Q 取500倍数值 (500fold)	12000 · A/Q 取500倍数值 (500fold)

$A=L\cdot(S_1+S_2/2)$适用钢铜合金轴套For JF steel-copper alloy bushes.

$A=L\cdot(S_1+S_2/3)$ 适用JF-20钢铝合金轴套 For JF-20 steel-aluminum alloy bushes.

L为轴套宽度,S1为钢板厚度,S2为合金层厚度

L:Bush Width S1:Steel Layer Thickness ,S2:Alloy Layer Thickness

ΔZ上极限值0,下极限值$-\pi/2\times\Delta D$ ΔZ extremum:upper 0,lower:$-\pi/2\times\Delta D$

ΔD为轴套外径公差值ΔD:Bush Outside Diameter Tolerance