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ISO9001:2000 质量体系认证

品质卓越 以诚致远

公司简介 Company Introduces

嘉善三星轴承有限公司是专业制造和销售自润滑无油轴承系列的企业。公司坚持依靠技术进步，采用先进工艺，引进先进设备；致力于自润滑无油轴承及新型材料的开发研制。根据不同领域的产品要求，生产不同工况条件下的自润滑无油轴承。目前生产、经营的产品达数千种规格。产品畅销全国各地，并出口欧美及东南亚等国家和地区。

公司生产的自润滑无油轴承系列广泛应用于：汽车、摩托车、机床、模具；纺织、印刷、烟草、制药、食品机械；仪器、仪表；油泵、油缸、液压件、阀门、气动元件；发动机、内燃机主轴和连杆轴承；微电机、电动工具；升降机、吊车、建筑、冶金、矿山、工程机械；起重设备、锻压机床、海洋、石油、船舶工业机械；桥梁工程；水利、水电、钢铁行业等。

公司以追求高新技术、打造优质品牌为主要经营理念，以最好品质的产品与合理的价位相结合的经营目标，竭诚欢迎国内外客商前来考察、订购、洽谈业务。

Jiashan Three Star Bearings Co.,Ltd is the professional manufacture and sale of oilless lubrication bearings.the company to rely on technological progress, the use of advanced process, introduced advanced equipment;committed to the purpose of lubrication bearings is oilless and the development of new materials developed different areas. According to the product requirement, different conditions conditions of lubrication bearings. at present there is no oil production and operation of thousands of different specifications of products. the productsof export, and the occident and southeast asia etc countries and regions.

The oilless lubricated bearing series of wide application in: cars, motorcycles; the textile, print, tobacco, pharmaceutical, mechanical; instruments, food and fuel or oil tank; hydraulic, valves, and pneumatic components; engine, the spindle of the engine and rod bearing: electric tool; lifts, the crane, architecture, metallurgy, mine and bridge project; Water conservancy projects and hydroelectric power, the steel industry, etc.

Company to pursue high technology and build a good brand is the main business, to the best quality products and reasonable price combined business goals, we warmly welcome the domestic and international merchants came to hold business talks.

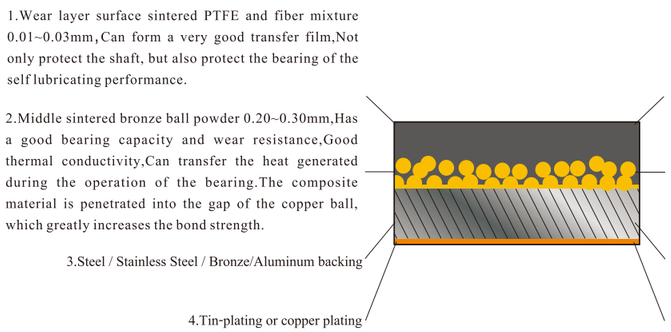
SF-1 系 列

标准产品尺寸 Standard size P. 7

SF 型复合材料系机械工业部上海材料研究所研制，在国内机械行业应用并推广。

Research Institute of Shanghai Material Research Institute of SF type composite material, which is applied in the domestic machinery industry.

材料结构图 Structure



1、耐磨层表面烧结PTFE和纤维的混合物0.01~0.03 mm，可形成很好的转移膜，不仅保护轴，还保障了轴承的自润滑性能。

2、中间烧结青铜球粉0.20~0.30mm，具有很好的承载能力和耐磨性，良好的导热性，可及时转移轴承运作过程中产生的热量。复合材料渗透到铜球的间隙中，大大增强了结合强度。

3、钢基/不锈钢基/铜基/铝基

4、电镀层：镀锡层或镀铜层

THREE STAR BRARING

SF-1系列无油自润滑轴承的应用基本特点
Basic characteristics of application of SF-1 series oilless self lubricated bearings

1.可以在无油情况下工作，耐磨性能好，摩擦系数小，使用寿命长。
Can work without oil, good wear resistance, low friction coefficient, long service life.
2.动静摩擦系数接近，能防止“爬行”现象，运动平稳。
Dynamic and static friction coefficient is close, can prevent the "crawling" phenomenon, the movement is stable.
3.使用温度范围宽，可在-195℃~+280℃温度范围内工作。
The temperature range is wide, and can be used in the temperature range of -195 for ~+280.
4.耐腐蚀性能好，可以在各种腐蚀介质（包括液体和气体）中工作。
Good corrosion resistance, can be in a variety of corrosive media (including liquid and gas) in the work.
5.机械强度高，可以承载较大的稳定载荷和动载荷。
High mechanical strength, it can carry a large load and stability.
6.不产生和不聚集静电。
No static electricity
7.结构紧凑，占有体积小，重量轻。
Compact structure, small volume, light weight.

SF-1系列无油自润滑轴承影响寿命的主要因素
The main factors affecting the life of the SF-1 series of oilless lubricated bearings

1）PV值的影响
Effect of PV value

PV值是确定SF-1磨损寿命的有效指标。如果要求寿命延长，负载必须降低；SF-1虽然是一种良好的无油润滑材料，但用油润滑时其PV值可显著的提高。

PV value is an effective index to determine the wear life of SF-1. If the required service life is prolonged, the load must be reduced. SF-1 is a good oilless lubricating material, but the PV value can be significantly improved by using oil lubrication.

2）环境温度的影响
Effect of environmental temperature

环境温度越高，SF-1使用寿命越短。
The higher the ambient temperature, the shorter the service life of SF-1.

3）对偶件的影响
Effect of dual component

对偶件采用合金钢或镀硬铬的轴，表面粗糙度Ra=0.4~0.63范围内时，SF-1轴承使用寿命可以显著提高。

The dual parts are made of alloy steel or plated hard chromium. The life of the SF-1 bearing can be improved significantly when the surface roughness is Ra=0.4~0.63.

SF-1系列无油轴承特性
SF-1 series of oilless bearing characteristics

SF-1系列轴承以优质钢板为基体，中间烧结青铜球粉，表面以PTFE为主，添加多种填充材料，如纤维、石墨MoS2等，使轴承材料从根本上改进了PTFE在力学强度、导热率与蠕变性、导热系数及耐磨性方面的不足，是一种较为理想的干摩擦材料。

SF-1 series bearings are made of high quality steel plate as the substrate, and the intermediate sintered bronze ball powder, which is based on PTFE, adding a variety of filler materials, such as fiber, graphite and MoS2, etc., to improve the mechanical strength, thermal conductivity and thermal conductivity and wear resistance of PTFE.

无油轴承在起始磨合过程中，PTFE耐磨材料会迅速转移到轴，并与之产生物理结合，形成一层固体薄膜，它和轴承材料上的表面层一样，在轴承的整个使用寿命期间，都是始终存在的。这层固体保护膜隔断了对轴与轴承之间的直接接触，降低了磨损率，延长了轴承的使用寿命。

Oilless bearing in the beginning of the running process, PTFE wear-resistant material will quickly transfer to the shaft, and with the combination of physical, forming a solid film, and bearing material on the surface of the same, in the entire service life of the bearing is always there. This layer of solid protective film cut off the direct contact between the shaft and the bearing, reduces the wear rate, and prolongs the service life of the bearing.

1、物理机械性能
physical and mechanical properties

SF-1系列轴承，它比单一塑料轴承，可提高承载能力20倍；导热系数50倍；降低线胀系数75%，从而改善了尺寸的稳定性，提高PV值20倍左右。聚四氟乙烯是目前为止，固体物质中摩擦系数较小的一种材质，可以不需要外界润滑，而摩擦系数却很低且有较好的化学稳定性。

SF-1 series of bearings, it is more than a single plastic bearing, can improve the carrying capacity of 20 times; 50 times the heat conduction coefficient; reduce the linear expansion coefficient of 75%, so as to improve the stability of the size, increase the PV value of 20 times. So far, PTFE is a material that has a small coefficient of friction in the solid material, it can not need the external lubrication, while the friction coefficient is very low and has good chemical stability.

2、化学性能
Chemical properties

SF-1系列轴承表面PTFE和纤维的混合耐化学腐蚀，仅能被熔融的碱金属或高温下的含氟化合物侵蚀，因此它的耐腐蚀性主要在于钢背及外表面电镀层。钢背表面镀铜或镀锡，可以有效防止大气的腐蚀。若于腐蚀介质中工作，钢背必须镀铅、锌、镍、镍铬合金等。

SF-1 series bearing surface PTFE and fiber mixed with chemical corrosion, can only be molten alkali metal or high temperature under the fluorine containing compound corrosion, so it is mainly in the corrosion resistance of steel back and external surface coating. Copper or tin plating on the back surface of the steel can effectively prevent the corrosion of the atmosphere. If the work of corrosion, steel, zinc, nickel plating must lead, nickel chromium alloy etc..

3、摩擦性能
Friction performance

轴承的摩擦系数与承载、滑动速度、对轴的表面粗糙度以及工作温度等有关。承载越大，相对摩擦系数越小；当负荷大于>Mpa时，摩擦系数可减小到0.05或更小；线速度越低，摩擦系数也越小；温度升高，摩擦系数减小。

The friction coefficient and load bearing, sliding speed, surface roughness of the shaft and working temperature, etc.. The friction coefficient can be reduced to 0.05 or less when the load is greater than >Mpa, and the friction coefficient is smaller, the temperature increases and the friction coefficient decreases.

4、磨损性能
Wear performance

在正常使用条件下，SF-1系列轴承的磨损大致可分为三个阶段，即磨合阶段、稳定磨损阶段和剧烈磨损阶段。
Under normal operating conditions, the wear of SF-1 series bearings can be divided into three stages, that is, the running in stage, the stable wear stage and the severe wear stage.

A.磨合阶段：SF-1材料轴承初期磨合的磨损比例比较大，为0.015。在产生表面层聚四氟乙烯磨屑的同时，有少量的PTFE微粒转移到对磨表面，填平了对磨表面微观的凹凸不平之处，形成了比较稳定的固体润滑膜，此时磨合阶段结束。

A. Running in stage:SF-1 material bearing initial run in the wear ratio is relatively large, is 0.015. In the generation of wear debris on the surface layer of PTFE at the same time, there is a small amount of PTFE particles transferred to the surface of grinding, filled the microscopic surface irregularities of grinding, forming a relatively stable solid lubricating film, when running in period is over.

B.稳定磨损阶段：经磨合后的摩擦变成了PTFE之间的摩擦，其摩擦系数低而稳定。材料的磨损率低而平稳。长时间磨损速度稳定到一个最小值。

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B. Stable wear stage: After running in the friction into the friction between the PTFE, the friction coefficient is low and stable. The wear rate of the material is low and stable. Long time wear rate stable to a minimum value.

C.剧烈磨损阶段：随着工作时间的延长，铜层露出的比例逐渐增大，多孔层孔隙中的PTFE润滑剂消耗，无法使摩擦面间获得足够量的润滑剂，摩擦面间润滑不良，摩擦系数迅速上升，材料的磨损率亦急剧加快。当70%–80%的青铜裸露时，表明轴承的寿命接近终止。

C.Severe wear stage: With the extension of working time, the ratio of copper layer is gradually increasing, and the consumption of PTFE lubricant in the pores of the porous layer is not enough to obtain sufficient amount of lubricant, and the friction coefficient is rapidly increased, and the wear rate of the materials increases rapidly. When 70%-80%'s Bronze bare, the bearing's life close to the end of the.

SF-1系列轴承的耐磨性能在无油条件下，当PV值为 5.7 Kgf/cm².m/sec时，与其他常用轴承比较（见表）。
The wear resistance of SF-1 series bearing is in no oil condition, when the PV value is 5.7 Kgf/cm² .m/sec, compared with other commonly used bearings（See table）

材　料	试验小时（小时）	磨损量（mm）
SF-1材料	1000	<0.025
含油石墨的青铜	158	0.25
含油多孔性青铜	105	0.25
含有MoS2的酚醛塑料	73	0.125
减磨石墨	24	0.125
石棉织物浸渍含有MoS2的树脂	0.8	0.125
尼龙	0.3	0.25

Materials	Test hours(h)	Wear quantity
SF-1Materials	1000	<0.025
Copper graphite	158	0.25
Oily porous bronze	105	0.25
Phenolic plastics containing MOS2	73	0.125
Graphite reduction	24	0.125
Asbestos fabric impregnated with MoS2 resin	0.8	0.125
Nylon	0.3	0.25

SF-1

SF-1无油润滑轴承，是以钢板为基体，中间烧结球形青铜粉，表面轧制聚四氟乙烯（PTFE）和铅的混合物，是卷制而成的滑动轴承。它具有摩擦系数小，耐磨、抗腐蚀性好和无油润滑的特点。使用该项产品能降低成本、缩小机械体积、避免咬轴现象和降低机械噪音等优点。产品已广泛应用于各种机械的滑动部位，如印刷机、升降机、纺织机、烟草机、健身器、液压搬运车、微电机、电磁阀、汽车、摩托车与家林机械等。

SF-1 is wall wrapped bearings made of triple layer composites materlal which consists of a steel backing, a sintered porous bronze partivles interlayer and calendared with PTFE and Pb mixture as surface layer. It is of low friction coefficient, anti-wear,anti-corrosion and low noise, compact and light. SF-1 is widely applied in various sliding articles of different kind of machines such as textile zmachines,tobaccomachines,hydraulic vehicles, automobiles agriculmture and forests forests machines and soon.

最大承载压力 Max load capacity	140N/mm²	摩擦系数 Friction coef	0.04~0.18
适用温度范围 Working temperature	-195℃~+280℃	允许最高PV值（干） Max imum PV value(Dry)	3.6N/mm²·m/s
最高滑动速度 Max line speed	10m/s	允许最高PV值（油） Max imum PV value(Oil)	50N/mm²·m/s

SF-1T

SF-1T齿轮油泵专用轴承是在SF-1材料的结构基础上，根据齿轮油泵的高PV值工况条件而设计推出的特殊配方产品。产品具有特殊的抗疲劳冲击优点。适应的油泵压力：16-25MPa，线速度3.5-5M/S。产品具有特殊的抗疲劳、抗冲击的优点载流体润滑境界下PV值达120N/mm².m/s。是各种齿轮油泵、柱塞泵、叶片泵的最佳选择。本公司产品长期为榆次液压有限公司齿轮油泵配套，质量水平处于国内领先地位。

SF-1T is composed of a specially designed surface layer of PTFE formulations and is specifically applied for the high PV bushes of gearoilpumps. It is to be used in hydrodynamic or boundarylubricating condition of medium or high pressure gear oil pumps such as P=16-25Mpa, V=3.5-5m/s. It shows the benefit of low friction coefficient ,wear resistant and anti-impact properties . At hydrodynamic lubrication, the Pvlimit reaches to 120N/mm².m/s. It isabest choice for the bushes of various kinds of gear pumps as well as plunger pumps,vane pumps and so on .It is successfuiiy tested ov er one million times by Changjiang hydraulic equipments company.

最大承载压力 Max load capacity	140N/mm²	摩擦系数 Friction coef	0.04~0.18
适用温度范围 Working temperature	-195℃~+280℃	允许最高PV值（干） Max imum PV value(Dry)	3.6N/mm²·m/s
最高滑动速度 Max line speed	10m/s	允许最高PV值（油） Max imum PV value(Oil)	60N/mm²·m/s

SF-1P

SP-1P 往复运动轴承是在SF-1材料的结构基础上，根据往复运动的特殊工况条件下而设计的新颖的配方产品，其性能与国外DD2相似。具有断油条件下润滑能力强、耐磨性能好、保持油膜清晰等优点，该产品能较好地保持对磨轴表面不受磨损。目前该产品已广泛地运用于汽车减震器、摩托车减震器、各种液压油缸、液压马达、气动元件等领域。

SF-1P is particularly suitable for bushes in reciprocating motion, and the properties are similar to DD2 type product in foreign country.It is wear resistant,and so can keep the lubricating oil clear after long period of working.Meanwhile it can protect the mating surface from wearing. It is widely used as oil damping vibrating absorber of automobiles,motorcycles and various hydraulic cylinders,hydraulic motors and pneumatic elements.

最大承载压力 Max load capacity	140N/mm²	摩擦系数 Friction coef	0.04~0.20
适用温度范围 Working temperature	-195℃~+280℃	允许最高PV值（干） Max imum PV value(Dry)	3.6N/mm²·m/s
最高滑动速度 Max line speed	2.5m/s	允许最高PV值（油） Max imum PV value(Oil)	50N/mm²·m/s

SF-1W

无铅
Lead Free

SF-1W无铅轴承，是SF-1材料基础上根据国际环保要求而开发的一种新产品。该产品除广泛适用于一般通用机械机外，对食品机械，制药机械、烟草机械尤其适用，无铅效果符合欧洲卫生标准，是无油润滑轴承发展的新方向。

SF-1W isa new type bushing without lead composition which is developed aiming at increasing demandson environmental protection. Besides its wideapplication ongeneral machines,SF-1 is particularly suitable for food machine, pharmaceutical machine, tobacco, machine etc.

最大承载压力 Max load capacity	140N/mm²	摩擦系数 Friction coef	0.04~0.20
适用温度范围 Working temperature	-195℃~+280℃	允许最高PV值（干） Max imum PV value(Dry)	3.6N/mm²·m/s
最高滑动速度 Max line speed	5m/s	允许最高PV值（油） Max imum PV value(Oil)	50N/mm²·m/s

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SF-1D

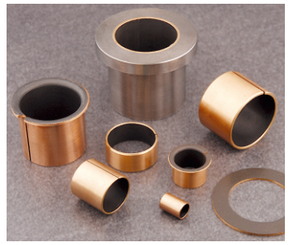
无铅
Lead Free

SF-1D液压专用轴承，是在SF-1P的基础上结合油缸及减震器工作原理而设计的一种新型材料，在无油的条件下显得更耐磨，该产品除具有SF-1P的优点外，特别适用于往复频繁的大侧向力场合。其性能与国外DP4相似，目前该产品逐步替代SF-1P产品，适用于汽车、摩托车减震器以及各种液压缸等领域。

SF-1D hydraulic bushing is developed on the basis of SF-1P and meanwhile considering the working principle of oil pump and damper.It shows better performance under working condition of without oil lubrication.It is the substitution of and parallels in performance with DP4 type product abroad.In addition to covering the same usage of SF-1P, SF-1D in particular fits frequently reciprocating motion with a high side force.It is a tendency to gradually replace SF-1P with SF-1D, the latter will Cover a wide application in automobile,motor damper and oil pumps,etc.

最大承载压力 Max load capacity	140N/mm²	摩擦系数 Friction coef	0.04~0.20
适用温度范围 Working temperature	-195℃~+280℃	允许最高PV值（干） Max imum PV value(Dry)	3.8N/mm²·m/s
最高滑动速度 Max line speed	3m/s	允许最高PV值（油） Max imum PV value(Oil)	50N/mm²·m/s

SF-1B

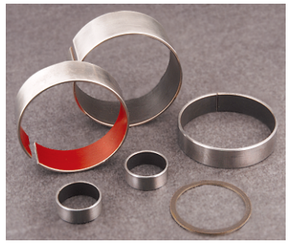


SF-1B青铜基轴承，是以锡青铜为基体，中间烧结青铜球形粉，表面扎制PTEE和耐高温填充材料而成。它具有很高的安全系数，在连续工作不能停机修理的场所和高温不能加油的场所特别适用。目前已广泛应用在冶金钢铁工业，连铸机方坯滚道、高温炉炉前设备，水泥灌浆泵和螺旋式输送机上。它可以在外部组合钢套，也可以制成翻边，达到端面、内孔同时摩擦使用的效果。桥梁支座滑动部位。就是采用SF-1B耐磨层加厚的产品以取代纯PTFE板，达到130N/mm²承载使用的要求。

SF-1B bronze bushing is made of bronze base, sinter with bronze powder and PTFE layer with filling material of anti-high temperature.It has high safety factor,and is particularly appropriate for high temperature environment where no oil is effcient and where the machine must be under successive long period working condition. This is widely used in steel metallurgy industry such as bushes for roller grooves of successive casting machines.cement grouting pumps and screw type converyers for cement.It can also be composed in steel housing or fabricated into flanged bushes which both outer surface and inside bore can be used as working surface. Wear plate made of SF-1B material can be applied in sliding part of bridge surporter instead of PTFE plate, and it can reach the requirement of load capacity of 130N/mm².

最大承载压力 Max load capacity	140N/mm²	摩擦系数 Friction coef	0.03~0.18
适用温度范围 Working temperature	-195℃~+300℃	允许最高PV值（干） Max imum PV value(Dry)	3.6N/mm²·m/s
最高滑动速度 Max line speed	5m/s	允许最高PV值（油） Max imum PV value(Oil)	50N/mm²·m/s

SF-1S

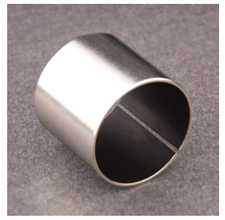


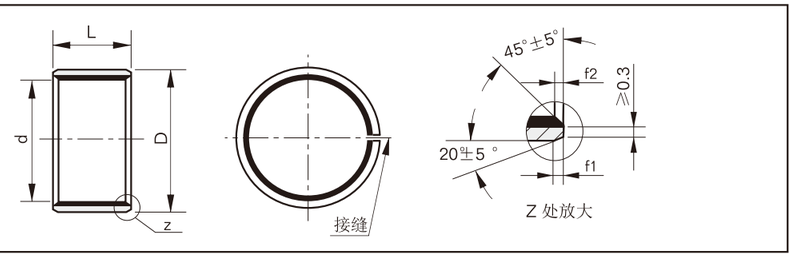
SF-1S不锈钢耐腐蚀轴承，是以不锈钢材料为基体，中间烧结耐腐蚀合金粉末,表面轧制以聚四氟乙烯为主的耐腐蚀材料。它具有耐油、耐酸、耐碱、耐海水和耐磨损的特点，表面PTEE材料不含铅成份。在食品饮料机械、化工中度酸碱流量的泵阀、制药机械、印刷机械、化工机械、海洋工业耐腐蚀滑动部位最适合使用。

SF-1S is of oil resistant, acid resistant,alkali-resistant and seawater resistant.moreover,there is no lead in the PTEE surface layer, and so is particularly fit for bushings in foodstuff machines,alkali flowmeters,pumpsmotion elements in pharmaceutical machines, printing machines chesical engineering machines and oter ocean industry. This is a triple layers composites bush, rhe base material being a bronze plate and a film of heat resistant power filled PTEE being calendered onto the sintered spherical bronze interlayer.

最大承载压力 Max load capacity	140N/mm²	摩擦系数 Friction coef	0.03~0.20
适用温度范围 Working temperature	-195℃~+280℃	允许最高PV值（干） Max imum PV value(Dry)	3.6N/mm²·m/s
最高滑动速度 Max line speed	2.5m/s	允许最高PV值（油） Max imum PV value(Oil)	50N/mm²·m/s

SF-1 DIN1494 标准公制轴套
DIN1494 STANDARD METRIC BUSHINGS



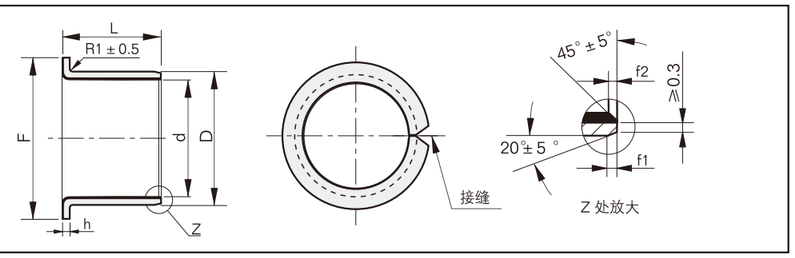


Unit(单位):mm

压入座孔后的内径 I.D.after fixed	外径 D		轴径 Shaft Dia. f7		座孔H7 Housing Bore(H7)		壁厚 Wall Thickness	f_1	f_2	L $^{0}_{-0.40}$ (d≤Φ30 L −0.3; d>Φ30 L −0.4)														
										6	8	10	12	15	20	25	30	40	50	60	70	80	90	100	115
5.990 6.055	8	+0.055 +0.025	6	−0.013 −0.028	8	+0.015				●	●	●													
7.990 8.055	10		8		10					●	●	●	●	●											
9.990 10.058	12		10		12						●	●	●	●											
11.990 12.058	14		12		14						●	●	●	●	●	●									
13.990 14.058	16	+0.065 +0.030	14		16	+0.018	0.980 1.005	0.6	0.3			●	●	●	●	●									
14.990 15.058	17		15	−0.016 −0.034	17							●	●	●	●	●									
15.990 16.058	18		16		18							●	●	●	●	●									
16.990 17.061	19		17		19							●	●		●	●									
17.990 18.061	20		18		20							●	●	●	●	●									
19.990 20.071	23	+0.075 +0.035	20		23	+0.021						●	●	●	●	●	●								
21.990 22.071	25		22		25		1.475 1.505	0.6	0.4				●	●	●	●	●								
23.990 24.071	27		24	−0.020 −0.041	27									●	●	●	●								
24.990 25.071	28		25		28									●	●	●	●	●							
27.990 28.085	32		28		32									●	●	●	●	●							
29.990 30.085	34		30		34								●	●	●	●	●	●							
31.990 32.085	36		32		36		1.970 2.005	1.2	0.4						●		●	●							
34.990 35.085	39	+0.085 +0.045	35		39	+0.025									●	●	●	●	●						
37.990 38.085	42		38	−0.025 −0.050	42												●	●							
39.990 40.085	44		40		44										●	●	●	●	●						
44.990 45.105	50		45		50										●	●	●	●	●						
49.990 50.110	55		50		55										●		●	●	●	●					
54.990 55.110	60		55		60												●	●	●	●					
59.990 60.110	65	+0.100 +0.055	60	−0.030 −0.060	65	+0.030	2.460 2.505	1.8	0.6								●	●	●	●	●				
64.990 65.110	70		65		70												●	●	●	●	●				
69.990 70.110	75		70		75													●	●	●	●	●			
74.990 75.110	80		75		80													●	●	●	●	●			
80.020 80.155	85		80		85													●	●	●	●	●	●	●	
85.020 85.155	90		85		90														●		●		●		
90.020 90.155	95		90		95														●	●		●		●	
95.020 95.155	100	+0.120 +0.070	95	−0.035	100	+0.035	2.440 2.490	1.8	0.6										●	●		●	●	●	
100.020 100.155	105		100		105														●	●		●			●
105.020 105.155	110		105		110															●		●	●		●
110.020 110.155	115		110		115															●		●	●		●
120.070 120.210	125		120		125															●		●	●	●	
125.070 125.210	130		125		130																	●		●	●
130.070 130.210	135	+0.170 +0.100	130	−0.04	135	+0.04	2.415 2.465	1.8	0.6											●		●	●	●	
140.070 140.210	145		140		145															●		●	●	●	
150.070 150.210	155		150		155															●		●	●	●	

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

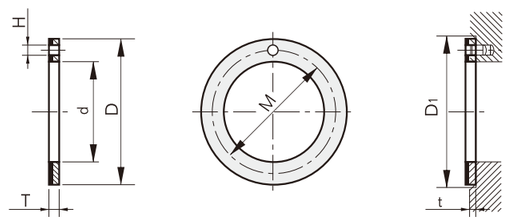
SF-1 DIN1494 标准公制翻边轴套
DIN1494 STANDARD METRIC FLANGE BUSHINGS



Unit(单位):mm

压入座孔后的内径 I.D.after fixed	外径 D		轴径 Shaft Dia. f7		座孔H7 Housing Bore(H7)		法兰 F±0.5	壁厚 Wall Thickness	f_1	f_2	L ±0.03															
											4	5.5	7	7.5	8	9	10	12	15	16	17	22	26	30	40	50	60	70
5.990 6.055	8	+0.055 +0.025	6	−0.013 −0.028	8	+0.015	12				●		●		●													
7.990 8.055	10		8		10		15					●		●	●		●											
9.990 10.058	12		10		12		18						●			●		●	●									
11.990 12.058	14		12		14		20	+0.005 −0.020	0.6	0.3			●			●		●	●		●							
13.990 14.058	16	+0.065 +0.030	14	−0.016 −0.034	16	+0.018	22											●			●							
14.990 15.058	17		15		17		23									●		●			●							
15.990 16.058	18		16		18		24											●			●							
17.990 18.061	20		18		20		26											●	●		●							
19.990 20.071	23	+0.075 +0.035	20	−0.020 −0.041	23	+0.021	30											●	●		●	●						
21.990 22.071	25		22		25		32	+0.005 −0.025	0.6	0.4									●		●	●						
24.990 25.071	28		25	−0.020 −0.041	28		35											●			●	●						
29.990 30.085	34		30		34		42													●		●	●				
34.990 35.085	39		35		39		47	+0.005 −0.030												●		●	●				
37.990 38.085	42	+0.085 +0.045	38	−0.025 −0.050	42	+0.025	51		1.2	0.4													●	●			
39.990 40.085	44		40		44		53															●	●	●	●	●	
44.990 45.105	50		45		50		59															●	●	●	●	●	
49.990 50.110	55		50		55		64															●		●	●	●	●
54.990 55.110	60		55		60		70	+0.005 −0.040																●	●	●	●
59.990 60.110	65	+0.100 +0.055	60	−0.030 −0.060	65	+0.030	75																	●	●	●	●
64.990 65.110	70		65		70		80																	●	●	●	●
69.990 70.110	75		70		75		85																		●	●	●

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工



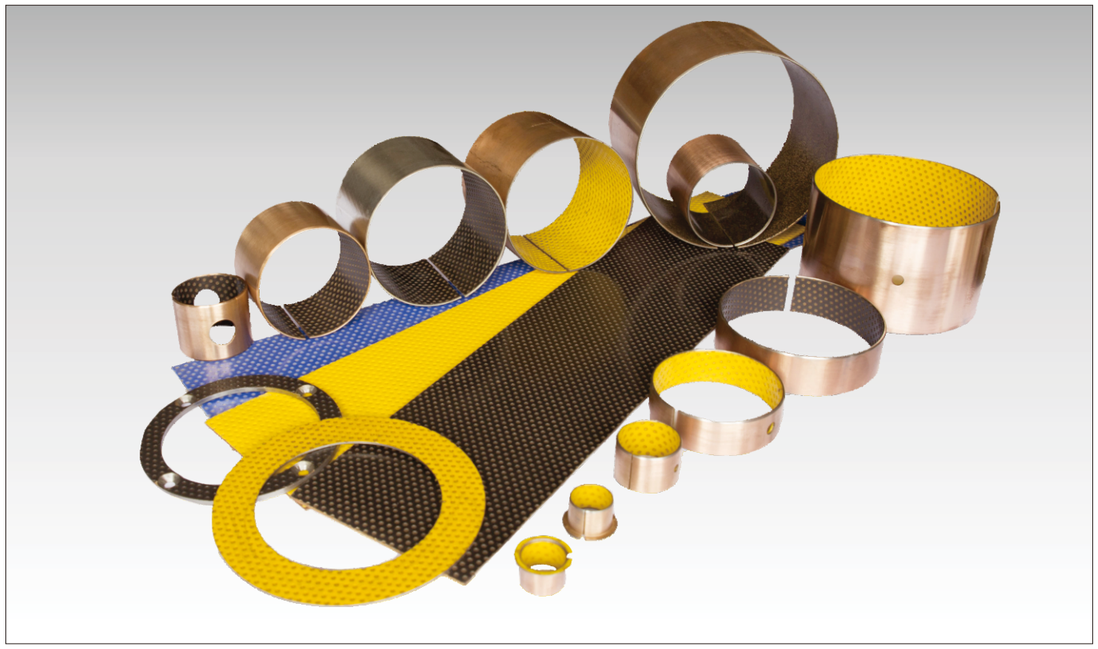
Unit(单位):mm

规格型号 Type	轴径 Shaft Dia. f7	垫片尺寸 Size Of Washer				安装尺寸 Size For Installation		
		Φd $^{+0.25}_{0}$	D $^{0}_{-0.25}$	T $^{0}_{-0.05}$	M $^{+0.12}_{-0.12}$	H $^{+0.4}_{-0.1}$	t	D_1
WC 06 SF-1	6	8	16		11			16
WC 07 SF-1	7	9	17		12			17
WC 08 SF-1	8	10	18	1	13	1.5		18
WC 09 SF-1	9	11	19		14			19
WC 10 SF-1	10	12	22		16			22
WC 12 SF-1	12	14	24		18			24
WC 14 SF-1	14	16	26		20			26
WC 16 SF-1	16	18	30		23	2		30
WC 18 SF-1	18	20	32		25			32
WC 20 SF-1	20	22	36		28			36
WC 22 SF-1	22	24	38		30			38
WC 24 SF-1	24	26	42		33	3	1	42
WC 25 SF-1	25	27	43		34			43
WC 26 SF-1	26	28	44	1.5	35			44
WC 28 SF-1	28	30	48		39			48
WC 30 SF-1	30	32	50		41			50
WC 32 SF-1	32	34	54		43			54
WC 35 SF-1	35	37	59		47			59
WC 36 SF-1	36	38	60		48			60
WC 38 SF-1	38	40	62		50	4		62
WC 40 SF-1	40	42	64		52			64
WC 42 SF-1	42	44	66		54			66
WC 45 SF-1	45	47	70		27.5			70
WC 48 SF-1	48	50	74		61			74
WC 50 SF-1	50	52	76		63			76
WC 52 SF-1	52	54	78		65			78
WC 55 SF-1	55	57	80		67.5			80
WC 60 SF-1	60	62	90		75			90
WC 62 SF-1	62	64	92		76		1.5	92
WC 65 SF-1	65	67	100	2	83.5	5		100
WC 70 SF-1	70	72	105		88			105
WC 75 SF-1	75	77	110		92.5			110
WC 80 SF-1	80	82	120		100			120
WC 85 SF-1	85	87	125		105			125

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

SF-2 系 列

标准产品尺寸 Standard size P. 14



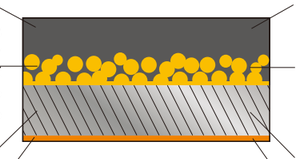
材料结构图 Structure

1.POM 0.30-0.50mm modified formaldehyde, has a good wear resistance, even in the case of an instant lack of oil also has a low friction coefficient. Oil storage pit, bearing surface with a spiral angle arrangement of the assembly, should be filled with grease.

2. Copper powder layer 0.20~0.35mm has good carrying capacity and wear resistance, good thermal conductivity can be timely transfer the heat generated in the process of the operation of the bearing. Composite materials can be infiltrated into the gap in the copper ball, improves the bond strength.

3. Low carbon steel, bearing capacity and heat transfer function of bearing.

4. Copper / tin plating 0.002mm, so that the bearing has a good corrosion resistance.



1. POM 0.30–0.50mm改性聚甲醛，具有很好的耐磨性能，甚至在瞬间缺油的情况下也具有较低的磨擦系数。轴承表面有排布规律的带有螺旋角度的储油坑，装配时，必须涂满润滑油脂。

2. 铜粉层0.20-0.35mm，具有很好的承载能力和耐磨性，良好的导热性能可及时转移轴承运作过程中产生的热量。复合材料可渗入到铜粉球的间隙中，提高了结合强度。

3. 低碳钢，提供轴承的承载能力和热转移作用。

4. 铜/锡电镀层0.002mm，使轴承有很好的耐腐蚀功能。

应用基本特点
Basic characteristics

- 适用于边界润滑下长期使用而无需维护；
  Suitable for long term use without maintenance of boundary lubrication;
- 建议初始油脂润滑，轴承表面的储油穴可以保证最佳的油脂分布，而过程加油可以大大提高产品的使用寿命；
  It is suggested that the initial grease lubrication and oil bearing surface of the bearing surface can ensure the best oil distribution, and the process can greatly improve the service life of the product;
- 适用于重载低速下的旋转运动和摇摆运动；
  Suitable for heavy load and low speed of the rotating movement and swing movement;
- 优秀的承载能力，较低的摩擦系数和很低的耐磨率；
  Excellent bearing capacity, low friction coefficient and low wear rate;
- 无吸水性和吸油性，尺寸稳定；
  No water absorption and oil absorption, dimensional stability;
- 轴承在压装后可以进行再次加工以得到更好的公差。
  Bearings can be processed again in the press fit to get better tolerances.

典型运用
Typical application

汽车工业：踏板总成、平衡轴套、制动钳、转向主销轴套和卡车尾板轴套等；
Automobile industry：Pedal assembly, brake caliper, balance shaft, steering knuckle sleeve and truck tail plate sleeve etc.;
物流机械：搬运车、起重机、车载吊车、森林机械、包装机械等；
Logistics machinery：Truck, crane, truck crane, forest machinery, packaging machinery, etc.
以及液压马达、液压油缸、气动元件、农用机械等。
as well as hydraulic motor, hydraulic cylinder, pneumatic components, agricultural machinery, etc..

SF-2

SF-2边界润滑轴承，是以钢板为基体、中间烧结球型青铜粉，表面轧制改性聚甲醛（POM），并含有储油坑。它适用于常温条件下低速重载场所，取代于传统铜套，既降低成本又延长使用寿命。特殊情况下，在轧钢机上使用，又能节省加油频次，简化更换程序。该产品已广泛应用于汽车底盘、锻压机床、冶金矿山机械、工程机械、水电、轧钢行业等领域。

SF-2 boundary lubrication bushing is based on a composite material with 3 firmly bonded layers steel as backing, sintered bronze spherical powder as interlayer and modified POM as lining layer. It fits well for low speed, heavy duty and normal temperature and saves cost and prolongs working life when replacing normal all copper sleeves. If is widely applied in auto chassis, forging machine, metallurgical and mining machine, civil engineering, power station, strip rolling industries, etc.

最大承载压力 Max load capacity	140N/mm²	摩擦系数 Friction coef	0.05~0.25
适用温度范围 Working temperature	-40℃~+130℃	允许最高PV值（干） Max imum PV value(Dry)	3.8N/mm²·m/s
最高滑动速度 Max line speed	2.5m/s	允许最高PV值（油） Max imum PV value(Oil)	22N/mm²·m/s

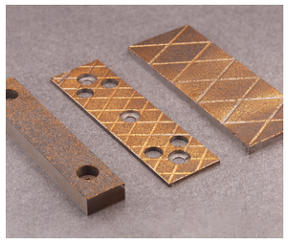
SF-2Y

SF-2Y边界润滑无铅轴承,是在SF-2的基体上改进而成。其性能与SF-2相同，但表面不含铅，使用领域可以扩展至有环保要求的领域。目前该产品已应用于进口纺织设备、柱塞泵摆动部位、汽车操纵杆部位等中载、中速、油脂润滑的场合。

SF-2Y non-lead boundary lubrication bearing is improved on the basis of SF-2. It can be applied to the field where non-lead is required. Now its wldely used in textile machines, auto operating parts and other middle speed, middle load and grease lubrication occasions.

最大承载压力 Max load capacity	140N/mm²	摩擦系数 Friction coef	0.05~0.25
适用温度范围 Working temperature	-40℃~+130℃	允许最高PV值（干） Max imum PV value(Dry)	2.8N/mm²·m/s
最高滑动速度 Max line speed	2.5m/s	允许最高PV值（油） Max imum PV value(Oil)	22N/mm²·m/s

TSG-2



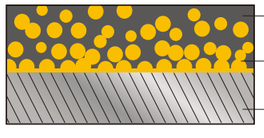
TSG-2是在钢基上烧结铜球塑料复合材料。它是一种高强度低磨擦新材料。该材料以填充有塑料的铜塑复合层为减摩抗磨工作层，钢板主要承担机械荷载作用，塑料层起磨合和润滑的作用。

TSG-2特点是塑料表面层要求尽量薄，铜层则加大厚度，表面允许露铜层。该材料承受能力比钢还大数倍，当荷载从1~90KN/cm²，磨擦系数仅为0.127~0.045，且与钢轨半径无关。它是重载、轻载、检修闸门都适用的优越滑道材料。

TSG-2 is a bronze-plastic steel composite material, which is sintered porous bronze layer on steel base. The pores of this layer are filled with plastic(POM).It is a high-strength, low-friction material researched by jointing adventure of Wuhan Hydraulic-Electric institute and us.It's bronze-plastic layer could reduce friction and resist wear. Its steel base is for carrying load and the plastic layer is for running in and lubricating.

TSG-2 plastic layer is as thin as possible and not voer 0.1mm. Its bronze layer is thicker than 1.5mm and to be emerged . Its load capacity is several time s larger than of steels. If Its load is 1~90KN/cm², its friction coefficient is only 0.127~0.045, and has nothing to do with its turnround radius, It is excellent slide materials for gates heavy or light load and repair.

最大承载压力 Max load capacity	280N/mm²
摩擦系数 Friction coef	(P=80-100Mpa)0.14 (P≥Mpa)0.12
摩合深度 Mount Hop depth	0.3mm
适用温度 Working temperature	-40℃~+120℃

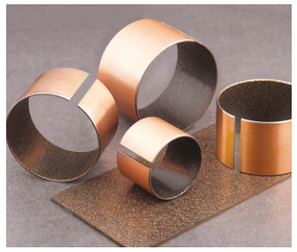


1、聚甲醛（POM）+混合物
POM + mixture
2、铜粉（均匀分布）
Copper (uniform distribution)
3、低碳钢，提供轴承的承载能力和热转移作用。
Low carbon steel, bearing capacity and heat transfer function of bearing.

材料结构图
Structure

SF-2 DIN1494 标准公制轴套 DIN1494 STANDARD METRIC BUSHINGS

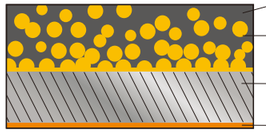
TSG-150



TSG–150轴承它是要根据接触力学和固体润滑原理设计加工而成的钢基铜塑复合材料。铜球粒直径大，铜塑复合层露铜面积占总面积约10%。这样构成的材料，钢板主要承担机械荷载，铜层抗磨，嵌入铜球间隙的塑料则起润滑作用。所以该材料具有接近于钢材的机械强度，铜的抗磨能力和塑料的抵摩性能。

TSG-150 Bearing is based on Touch Dynamics and Solid Lubrication principle. The bronze balls diameter Dmax=0.8mm, particle class d=(1~0.707)d,emerging area of bronze-plastic composite is about 10% of the totai area. Its steel plate is the major load carrier, bronze layer is wear-resistant, plastic filled among bronze balls is lubricant. So the TSG-150 strength is close to steels wear-resistance, to bronze and plastics friction is to plastics.

最大承载压力 Max load capacity	150N/mm^2
摩擦系数 Friction coef	(油滑润)0.06 (P≥= 100Mpa)0.12
摩合深度 Mount Hop depth	0.3mm
适用温度 Working temperature	-40℃ + 120℃



材料结构图
Structure

1、聚甲醛（POM）+混合物
POM + mixture

2、铜粉（均匀分布）
Copper (uniform distribution)

3、低碳钢，提供轴承的承载能力和热转移作用。
Low carbon steel, bearing capacity and heat transfer function of bearing.

4、铜/锡电镀层0.002mm，使轴承有很好的耐腐蚀功能。
Copper / tin plating 0.002mm, so that the bearing has a good corrosion resistance.

SF-1/SF-2/TSG-150 复合材料组合件

SF–1组合件

SF–2组合件

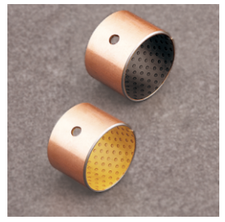
TSG–150 组合件

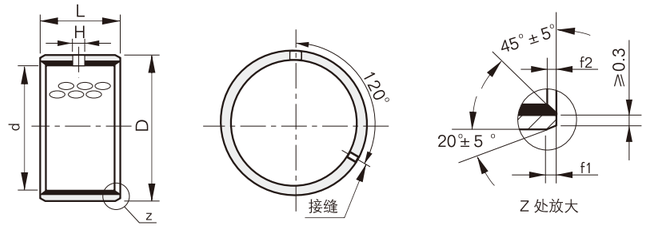
SF–1 SF–2 TSG–150 复合材料组合件，是根据特定的工况要求，外层以铸件和钢管件为基体，内层选用SF–1、SF–2、TSG–150复合材料组合而成。

该产品常用于：水利工程，冶金，炼钢等机械行业。具体规格按客户设计图纸要求定制加工。

SF-1 SF-2 TSG-150 composite assembly is required under specific operating conditions, the outer layer to casting and steel parts for the base, the inner layer selected SF-1, SF-2, TSG-150 combination of composite materials into.

The product used in: engineering, metallurgy, steel making and other machinery industry. Drawings according to customer design specifications customized processing.





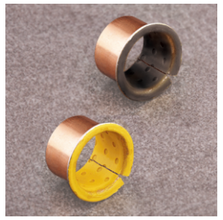
Unit(单位):mm

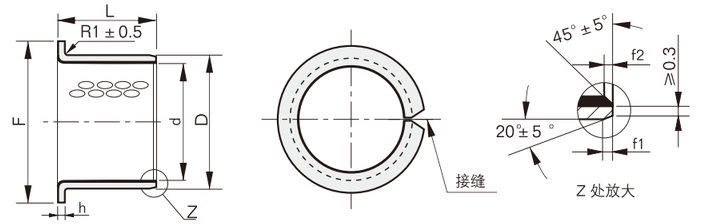
压入座孔后的内径 I.D.after fixed	外径 D		轴径 Shaft Dia. f7		座孔H7 Housing Bore(H7)		壁厚 Wall Thickness	油孔 Oil Hole	f_1	f_2	L $^{0}_{-0.40}$ 10	12	15	20	25	30	35	40	45	50	60	80	90	95	100
10.040 10.108	12		10	−0.022	12						●	●	●											
12.040 12.108	14		12		14						●	●	●											
14.040 14.108	16	+0.065 +0.030	14		16	+0.018	0.955 0.980		0.6	0.3		●	●											
15.040 15.108	17		15	−0.027	17			4				●	●	●										
16.040 16.108	18		16		18							●	●	●										
18.040 18.111	20		18		20							●	●	●										
20.050 20.131	23	+0.075 +0.035	20		23	+0.021	1.445 1.475					●	●	●	●									
22.050 22.131	25		22		25				0.6	0.4		●		●										
25.050 25.131	28		25	−0.033	28								●	●	●									
28.060 28.155	32		28		32			6					●		●									
30.060 30.155	34		30		34		1.935 1.970		1.2	0.4			●	●	●		●							
35.060 35.155	39	+0.085 +0.045	35		39	+0.025							●		●	●	●							
40.060 40.155	44		40	−0.039	44								●		●		●		●					
45.080 45.195	50		45		50								●		●		●	●	●					
50.080 50.200	55		50		55										●		●		●					
55.080 55.200	60		55		60		2.415 2.460	8							●		●		●					
60.080 60.200	65	+0.100 +0.055	60		65	+0.030									●		●		●					
65.080 65.200	70		65	−0.046	70													●			●			
70.080 70.200	75		70		75													●		●		●		
75.080 75.200	80		75		80													●			●	●		
80.100 80.265	85		80		85													●			●	●		
85.100 85.265	90		85		90													●			●	●		
90.100 90.265	95	+0.120 +0.070	90		95													●			●	●	●	
100.100 100.265	105		100	−0.054	105	+0.035													●		●	●		●
105.110 105.265	110		105		110														●		●	●		●
110.110 110.265	115		110		115														●		●	●		●
120.110 120.270	125		120		125		2.385 2.450		1.8	0.6									●		●	●		●
125.110 125.270	130		125		130			9.5											●		●	●		●
130.110 130.270	135		130		135														●		●	●		●
140.110 140.270	145	+0.170 +0.100	140		145														●		●	●		●
150.110 150.270	155		150	−0.063	155	+0.040													●		●	●		●
160.110 160.270	165		160		165														●		●	●		●
170.110 170.270	175		170		175														●		●	●		●
180.110 180.276	185		180		185														●		●	●		●
190.110 190.276	195		190		195														●		●	●		●
200.110 200.276	205	+0.210 +0.130	200	−0.072	205	+0.046													●		●	●		●
220.110 220.276	225		220		225														●		●	●		●
240.110 240.276	245		240		245														●		●	●		●

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

SF-2

DIN1494 标准公制翻边轴套
DIN1494 STANDARD METRIC FLANGE BUSHINGS





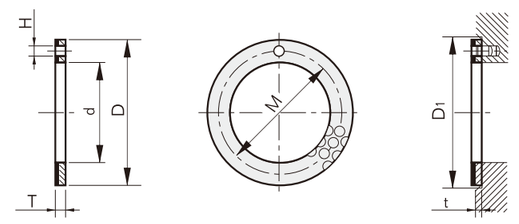
Unit(单位):mm

压入座孔后的内径 I.D.after fixed	外径 D		轴径 Shaft Dia. f7		座孔H7 Housing Bore(H7)		法兰 F±0.5	壁厚 Wall Thickness	f_1	f_2	L ±0.03											
											10	12	15	20	25	30	35	40	45	50	60	80
10.040 10.108	12		10	−0.022	12		18				●	●	●									
12.040 12.108	14		12		14		20				●	●	●									
14.040 14.108	16	+0.065 +0.030	14		16	+0.018	22					●	●									
15.040 15.108	17		15	−0.027	17		23					●	●	●								
16.040 16.108	18		16		18		24	0.955 0.980	0.6	0.3		●	●	●								
18.040 18.111	20		18		20		26					●	●	●								
20.050 20.131	23	+0.075 +0.035	20		23	+0.021	30					●	●	●	●							
22.050 22.131	25		22		25		32					●		●								
25.050 25.131	28		25	−0.033	28		35						●	●	●							
28.060 28.155	34		30		34		42	1.445 1.475	0.6	0.4			●		●							
30.060 30.155	39		35		39		47						●	●	●		●					
35.060 35.155	42	+0.085 +0.045	38		42	+0.025	51						●		●	●	●					
40.060 40.155	44		40	−0.039	44		53	1.935 1.970					●		●		●		●			
45.080 45.195	50		45		50		59						●		●		●	●	●			
50.080 50.200	55		50		55		64		1.2	0.4					●		●		●			
55.080 55.200	60		55		60		70								●		●		●			
60.080 60.200	65	+0.100 +0.055	60	−0.046	65	+0.030	75	2.415 2.460							●		●		●			
65.080 65.200	70		65		70		80											●			●	
70.080 70.200	75		70		75		85											●		●		●

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

SF-2
SF-2Y

DIN1494 标准公制垫片尺寸及公差表
DIN1494 STANDARD METRIC WHSHER



Unit(单位):mm

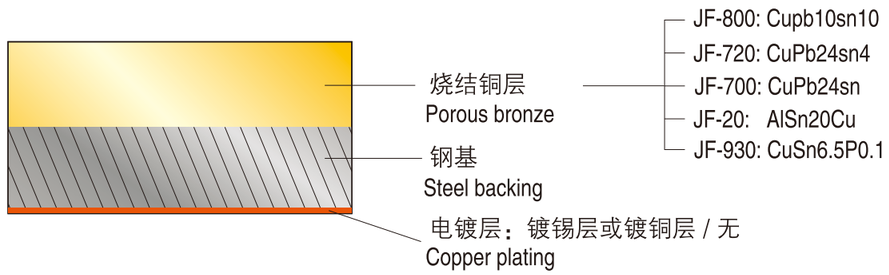
规格型号 Type	轴径 Shaft Dia. f7	垫片尺寸 Size Of Washer				安装尺寸 Size For Installation		
		Φd $^{+0.25}_{0}$	D $^{0}_{-0.25}$	T $^{0}_{-0.05}$	M $^{+0.12}_{-0.12}$	H $^{+0.4}_{-0.1}$	t	D_1
WC 06 SF-2	6	6	16		11			16
WC 07 SF-2	7	7	17		12			17
WC 08 SF-2	8	8	18	1	13	1.5		18
WC 09 SF-2	9	9	19		14			19
WC 10 SF-2	10	10	22		16			22
WC 12 SF-2	12	12	24		18			24
WC 14 SF-2	14	14	26		20			26
WC 16 SF-2	16	16	30		23	2		30
WC 18 SF-2	18	18	32		25			32
WC 20 SF-2	20	20	36		28			36
WC 22 SF-2	22	22	38		30			38
WC 24 SF-2	24	24	42		33	3	1	42
WC 25 SF-2	25	25	43		34			43
WC 26 SF-2	26	26	44	1.5	35			44
WC 28 SF-2	28	28	48		39			48
WC 30 SF-2	30	30	50		41			50
WC 32 SF-2	32	32	54		43			54
WC 35 SF-2	35	35	59		47			59
WC 36 SF-2	36	36	60		48			60
WC 38 SF-2	38	38	62		50	4		62
WC 40 SF-2	40	40	64		52			64
WC 42 SF-2	42	42	66		54			66
WC 45 SF-2	45	45	70		27.5			70
WC 48 SF-2	48	48	74		61			74
WC 50 SF-2	50	50	76		63			76
WC 52 SF-2	52	52	78		65			78
WC 55 SF-2	55	55	80		67.5			80
WC 60 SF-2	60	60	90		75			90
WC 62 SF-2	62	62	92		76		1.5	92
WC 65 SF-2	65	65	100	2	83.5	5		100
WC 70 SF-2	70	70	105		88			105
WC 75 SF-2	75	75	110		92.5			110
WC 80 SF-2	80	80	120		100			120
WC 85 SF-2	85	85	125		105			125

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

JF 系列

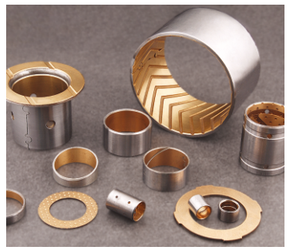
标准产品尺寸 Standard size P. 22

材料结构图 Structure



THREE STAR BRARING

JF-800

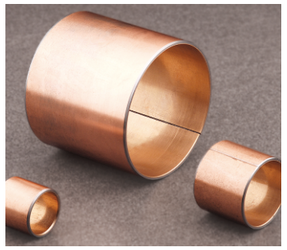


JF–800双金属轴承，是以低碳钢板为基体材料，表面烧结CuPb10Sn10或CuSn6Zn6Pb3材料的钢铜合金产品。该产品是双合金轴承中承载能力最强的一种，重型车的平衡桥衬套、垫片；推土机的从动轮；汽车钢板衬套，均使用该产品。它是一种用途很广的高载低速滑动轴承。

JF-800 bi-metal bushing is backing on low carbon steel, sintered with CuPb10Sn10 or CuSn6Zn6Pb3 bronze powder, which has the highest load capacity among the bi-metal bushings.the application including balance suspensions of heavy-duty trucks, track roller of bulldozers, auto chassis etc. It is a kindly of high load and low speed bushing, with wide application.

最大承载压力 P Max load capacity P	150N/mm²	最高PV值（脂润滑） Max imum PV value(Grease lubrication)	2.8 N/mm²·m/s
合金层硬度 Alloy hardness	60~90 HB	最高PV值（油润滑） Max imum PV value(OIl lubrication)	10 N/mm²·m/s
合金层材料 Alloy material	CuPb10Sn10	最大线速度 V Max line speed V	5 m/s

JF-720



JF–720双金属轴承以优质低碳钢板为基体，表面烧结铅锡青铜合金，经多次烧结轧制而成。它有很高的抗疲劳强度、承载能力、抗冲击能力、耐腐蚀、有较好的轴承表面性能，产品适用于高速、重载的内燃机主轴和连杆轴承。

JF-720 bi-metal bushing is backing on low carbon steel, sintered with CuPb24Sn4 bronze powder, which has fairly good performance in anti-fatigue and load capacity, fit for middle speed and middle load working situation. When soft alloy is plated on the bushing surface and with oil lubrication, it can be applied in high speed internal-combustion engine and connect-rod.

最大承载压力 P Max load capacity P	130N/mm²	最高PV值（脂润滑） Max imum PV value(Grease lubrication)	2.8 N/mm²·m/s
合金层硬度 Alloy hardness	45~70 HB	最高PV值（油润滑） Max imum PV value(Oil lubrication)	10 N/mm²·m/s
合金层材料 Alloy material	CuPb24Sn4	最大线速度 V(油润滑) Max line speed V(Oil lubrication)	10 m/s

JF-700

JF–700双金属轴承该产品以优质低碳钢板为基体，表面烧结铅锡青铜合金，经多次烧结轧制而成。它有很高的抗疲劳强度、承载能力、抗冲击能力、耐腐蚀、有较好的轴承表面性能，产品适用于高速、重载的内燃机主轴和连杆轴承。

JF700 bi-metal bushing is backing on low carbon steel, sintered with CuPb30 bronze powder. It has good performance in shaft seizing resistance and cover up alien substance due to the high lead content. When soft alloy is plated on the bushing surface, it can be applied under high speed and middle load working situation, just like engine main bearing, connect-rod bushing, rocket arm bushing and oil pump side plate.

最大承载压力 P Max load capacity P	130N/mm²	最高PV值（脂润滑） Max imum PV value(Grease lubrication)	2.8 N/mm²·m/s
合金层硬度 Alloy hardness	40~60 HB	最高PV值（油润滑） Max imum PV value(Oil lubrication)	10 N/mm²·m/s
合金层材料 Alloy material	CuPb24Sn	最大线速度 V（油润滑） Max line speed V(Oil lubrication)	10 m/s

JF-20

JF-20高锡铝轴承该产品以优质低碳钢板为基体，表面采用特殊工艺轧制铝锡合金。它有中等抗疲劳强度和承载能力，良好的耐腐蚀性，较好的轴承表面性能，产品适用于内燃机主轴和连杆轴承、压气机、制冷机用轴承。

JF20 high percentage of tin with aluminum alloy bushing is backing on low carbon steel,pressed with AlSn20Cu as liner. It has fairly good performance in anti-fatigue and good load capacity, anti-corrosion and smooth sliding movement. It usually used as engine bearing with middle or low power, air compressor bushing. It is a good substitution for Babbit material.

最大承载压力 P Max load capacity P	65N/mm²	最高PV值（油润滑） Max imum PV value(OIl lubrication)	25N/mm²·m/s
合金层硬度 Alloy hardness	70~100 HB	最大线速度 (油润滑) Max line speed (Oil lubrication)	25m/s
合金层材料 Alloy material	AlSn20PCu		

JF-930

JF-930无铅双金属轴承是一种环保型的双金属轴承，它是以低碳钢板为基体，表面烧结CuSn6.5P0.1材料的钢铜合金产品。产品具有较高的疲劳强度和承载能力，较好的滑动性能，在许多场合能够替代含铅的双金属轴承或铜套。

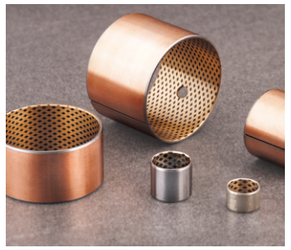
Metal bushing is an environmental protection type, it is backing on low carbon steel, sintered with CuSn6.5P0.1 bronze powder.It has high performance of anti-fatigue and load capacity, and good slide performance. It can act as a substitute as bi-metal bushing with lead or bronze bushing under many working conditions.

最大承载压力 P Max load capacity P	65N/mm²	最高PV值（脂润滑） Max imum PV value(Grease lubrication)	2.8 N/mm²·m/s
合金层硬度 Alloy hardness	70~100 HB	最高PV值（油润滑） Max imum PV value(OIl lubrication)	10 N/mm²·m/s
合金层材料 Alloy material	CuSn6.5P0.1		

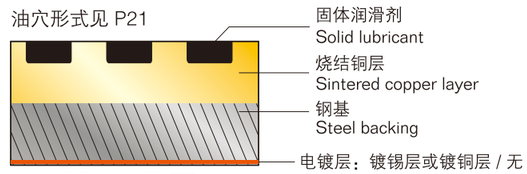
载重卡车
Truck

发动机
Engine

FB08G



油穴形式见 P21



材料结构图
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颖滑动轴承。由于高强度承载的合金材料作基体，理想的并经过严格选别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耗性。产品已适用于汽车起动电机、发电机、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. Owing to the high strength, high load capacity and the spirally distributed diamond type of the embedded solid lubricant, the high temperature lubricating action and wear 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,hoisting machines,various cranes and those machines in metallurgical industry.

最大承载压力 Max load capacity	150 N/mm²	允许最高PV值（干磨擦） Max imum PV value(Dry finction)	1.8N/mm²·m/s
摩擦系数（干磨擦） Max load capacity	< 0.22	最大线速度 V（干磨擦） Max line speed V(Dry finction)	0.4 m/s
摩擦系数（脂润滑） Friction coef (Grease lubrication)	< 0.08	最大线速度 V（脂润滑） Max line speed V (Grease lubrication)	2 m/s
合金层材料 Alloy material	CuPb10Sn10	合金层硬度 Alloy hardness	60~90 HB

JF双金属轴套的加油设计
Technics design

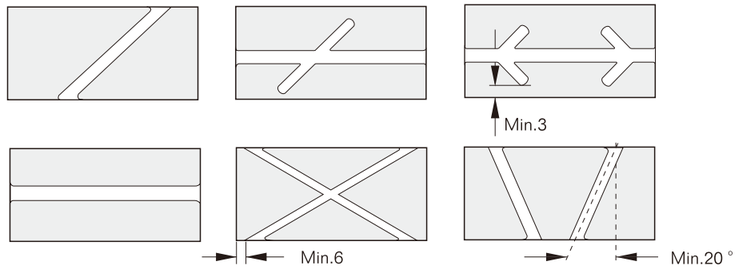
JF双金属轴承的应用，必须设计有油润滑的条件。一般的低速场合加油条件是装配时加油脂全封闭，使用时按周期用油栓加油，例：汽车平衡桥中，弹簧钢板座孔中,制动蹄中；转向节中；运动连杆中 ；冲床滑动部位；推土机支动轮、重动轮中等。运动中速场合应配置油杯稀油润滑，例：连杆部位、冲剪机转轴部位、输送轮部位等。高速的场合是浸泡在油 中的加油条件，例：齿轮箱体中、油泵中、油缸中、发动机中、离合器中等。

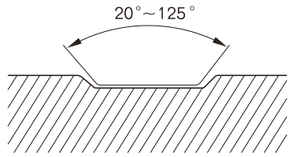
Bimetal bearings are widely used in oil lubricating situations. Normally under low speed and oil lubricating situations assemble with grease and work with adding oil periodically, such as suspension, steeping ball joints, brake pedal points, redirector,connecting rod,slide part of punch,construction and earth-moving equipment, etc. Under middle speed work: with oil, such as connecting rod, shaft and transportation parts of cut machine. Under high speed work within oil, such as gear box, fuel pump, engine, clutch, etc.

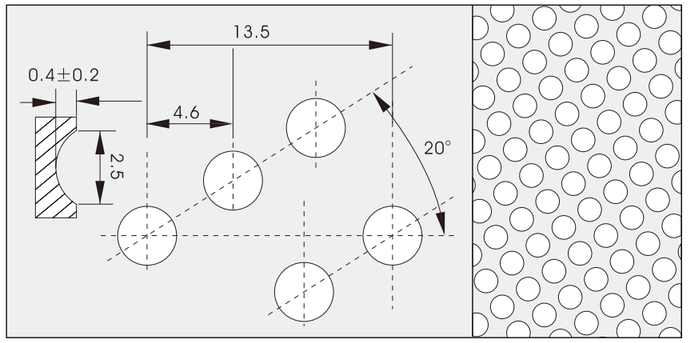
JF-800

DIN1494 标准双金属公制轴套
DIN1494 STANDARD BIMETAL METRIC BUSHINGS

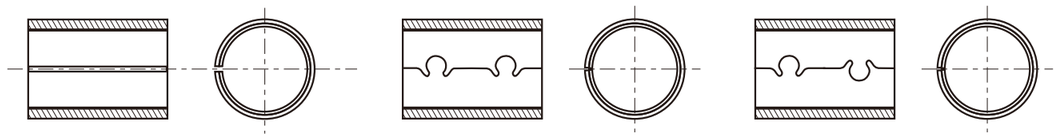
JF 双金属轴套的油槽油穴形式
Types for JF bush's grooves&indentations







JF 双金属轴套的接口形式
Clinch lock of JF wrapped bushes



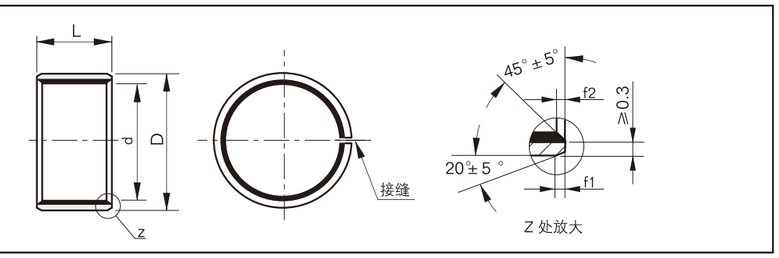
JF双金属轴套的油孔设计
The designing of oil indentations

为了使JF双金属轴套在使用中，能得到充分的油润滑，因此推荐如下尺寸油孔，客户需油孔而无特殊要求的，都按此油孔标准制作。

In order to fully lubricate the bush when in the performance, the indentations with size as follow are recommended. They should be manufactured according to the standard below if without special requirements.

轴承外径 Bush O.D	14~22	22~40	40~50	50~100	100~180
油孔直径 Lubricating hole	3	4	5	6	7

油孔的位置应避开接缝处和承载区域，这有利于进油。
The lubricating hole should be away from butt joint and loading area and designed to be easy-oil-feding as well.



Unit(单位):mm

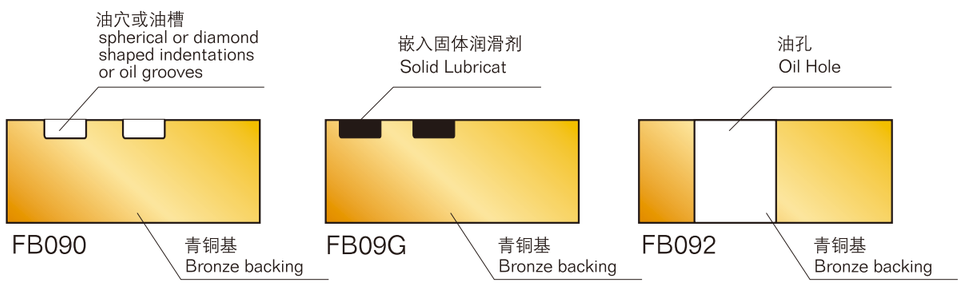
外径 D		压入座孔后的内径 I.D.after fixed		壁厚 Wall Thickness	座孔H7 Housing Bore(H7)		轴径 Shaft Dia. f7		f_1	f_2	L $^{0}_{-0.40}$										
											10	15	20	25	30	40	50	60	80	90	100
12		10	+0.022		12		10	−0.013 −0.028			●	●	●								
14	+0.065 +0.030	12			14		12		0.5	0.3	●	●	●								
16		14	+0.027	1 −0.025	16	+0.018	14				●	●	●								
17		15			17		15	−0.016 −0.034			●	●	●								
18		16			18		16				●	●	●								
20		18			20		18		0.8	0.4	●	●	●	●							
23		20			23		20				●	●	●	●							
25	+0.075 +0.035	22		1.5 −0.030	25	+0.021	22				●	●	●	●							
27		24	+0.033		27		24				●	●	●	●	●						
28		25			28		25	−0.020 −0.041	1.0	0.5		●	●	●	●						
30		26			30		26					●	●	●	●						
32		28			32		28					●	●	●	●	●					
34		30			34		30					●	●	●	●	●					
36		32		2 −0.035	36		32		1.2	0.6		●	●	●	●	●					
39	+0.085 +0.045	35	+0.039		39	+0.025	35						●	●	●	●	●				
42		38			42		38	−0.025 −0.050					●	●	●	●	●				
44		40			44		40						●	●	●	●	●				
50		45			50		45						●	●	●	●	●				
55		50			55		50								●	●	●				
60		55			60		55		1.5	1.0					●	●	●	●			
65	+0.100 +0.055	60		2.5 −0.040	65	+0.030	60								●	●	●	●			
70		65	+0.046		70		65	−0.030 −0.060							●	●	●	●			
75		70			75		70								●	●	●	●	●		
80		75			80		75								●	●	●	●			
85		80			85		80									●	●	●	●		
90		84			90		84									●	●	●	●		
95		89			95	+0.035	89									●	●	●	●		
100	+0.120 +0.070	94			100		94										●	●	●	●	
105		99	+0.054	3 −0.045	105		99	−0.036 −0.071	1.8	1.2							●	●	●	●	
110		104			110		104										●	●	●		
115		109			115		109										●	●	●		
120		114			120		114										●	●	●		
125		119			125		119										●	●	●		
130		123			130		123										●	●	●		●
135	+0.170 +0.100	128			135	+0.040	128		2	1.5							●	●	●		●
140		133	+0.063	3.5 −0.050	140		133	−0.043 −0.083									●	●	●		●
145		138			145		138												●		●
150		143			150		143												●		●

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

FB 系列

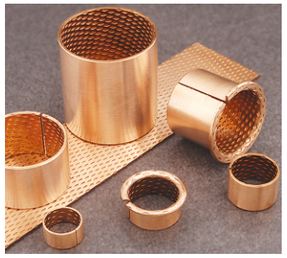
标准产品尺寸
Standard size P. 26

材料结构图 Structure



THREE STAR BRARING

FB090

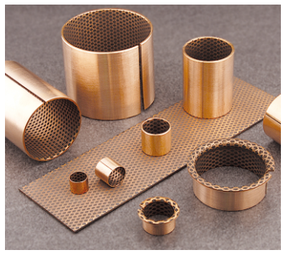


FB090青铜轴承采用特殊配方的高密度铜合金带材料为基体，表面可以按用户要求轧制菱形或半球形油穴、油槽。具有密度高、承载压力大、耐磨性能好、使用寿命长等优点，以取代传统的铸造铜套，可以缩小机械体积，降低成本。FB090已广泛应用于起重机械、建筑机械、汽车拖拉机底盘、机床工业及采矿机械中，还可以制成轴瓦、翻边套、止推垫片和球碗等形式。

Fb090 is a kind of bushes wrapped by bronze strip. The bronze is of particular formulation with high specific gravity and on its surface may be incorporated with spherical or diamond shaped indentations or oil grooves as required by customers. It is of high load capacity and long life. In place of traditional bronze bush,it is more cheap and more compact. It is widely applied in hoisting machines and other construction machines, automobiles, trucks, machine tools and me mineral engines.

基体材质 Alloy material	CuSn8P0.3或CuSn6.5P0.1		
硬度 Hardness	HB90~120	适用温度范围 Working temperature	-195℃~+280℃
最大承载压力 Max load capacity	150N/mm²	最高滑动速度 Max line speed	2.5m/s

FB09G



FB09G青铜固体润滑轴承是以青铜材料为基体，再埋入特殊固体润滑剂制作成的新颖滑动轴承。由于高强度承载的合金材料作基体，理想的并经过严格选别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耗性。产品以适用于汽车起动电机、发电机、升降机、吊车及冶金机械等行业。

FB09G is based bronze material and embedded with solidlubricants in tis diamond or round shape pockets which are evenly distributed on its inside layers. Owing to the high strength, high load capacity and the spirally distributed diamond type of the embedded solid lubricant,the high temperature lubricating action and wear resistantaction as estraordinary exploited. The lubrication area of the bearing surface is being about 25%. This type of bearing is particularly applied in staring motor for automobiles, generators, hoisting machines, various cranes and those machines in metallurgical industry.

最大承载压力 Max load capacity	150N/mm² 2	摩擦系数 Friction coef	0.06~0.25
适用温度范围 Working temperature	-100℃~+250℃	允许最高PV值（干） Max imum PV value(Dry)	2.6N/mm²·m/s
最高滑动速度 Max line speed	1.5m/s	允许最高PV值（油） Max imum PV value(Oil)	15N/mm²·m/s

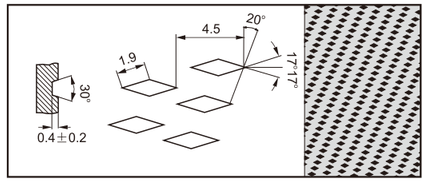
FB092

FB092青铜轴承,是以青铜材料为基体,加工均匀有序的注油孔,经卷制而成的薄壁轴承,在装配后注入润滑油脂,再配置端面密封使用。该轴承具有存油量大、安装方便、设计机子小的优点，而且可以取代铜套便用，能大大地降低成本。目前该产品已应用于输送机、升降机、卷扬机、校平机等中载、低速地场合。

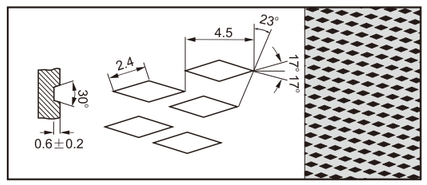
Fb092bronze bushing is based on bronze CUSN8.3p6.3 and evenly distributed drilling oil hole on its body. When in assembly, oil or grease should be stored in the holes before bushing is sealed form both ends. Fb092 has the advantage of abundant oil storage, easy-to-assembly,machine the compactness etc. It can replace the conventional whole copper middle load, low speed such as in convey machine, hoisting machine, windlass, aligning machine etc.

基体材质 Alloy material	CuSn8P0.3或CuSn6.5P0.1		
硬度 Hardness	HB90~120	适用温度范围 Working temperature	-195C~+280C
最大承载压力 Max load capacity	150N/mm 2	最高滑动速度 Max line speed	2.5m/s

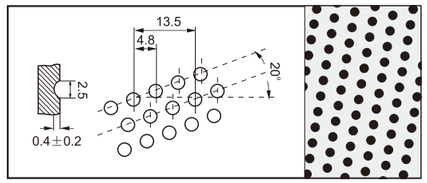
油穴形式
Types of Oil Pockets



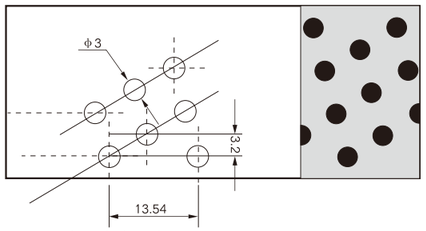
FB090/FB09G/JF80G
菱形油穴
适用内径≤ϕ22的轴承



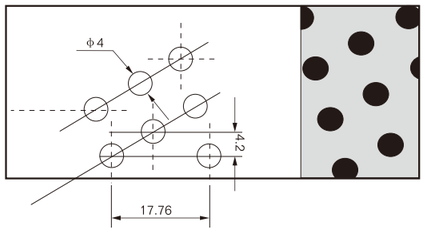
FB090/JF090G/JF80G
菱形油穴
适用内径> ϕ22的轴承



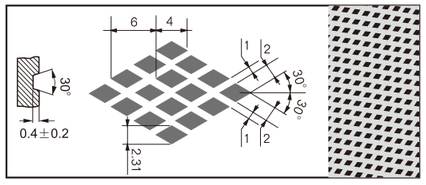
FB090
球形油穴



FB092球形油孔形式
适用内径≤ϕ25的轴承



FB092球形油孔形式主义
适用内径> ϕ25的轴承

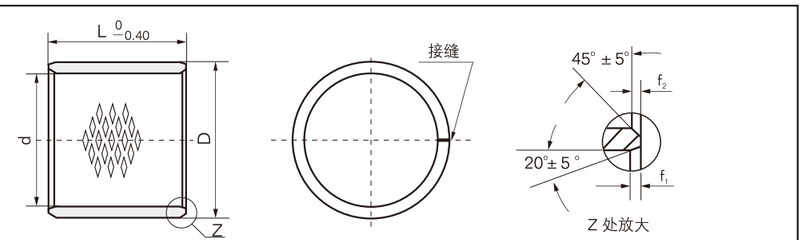


FB090G/FB08G
油穴排布

化学成分
Chemical Composition

材料 MATERIAL	Cu	Sn	P	Pb	Zn
CuSn8P0.3	余量	2~9%	0.03~0.45%		
CuSn6.5P0.1	余量	6~7%	0.1~0.25%		

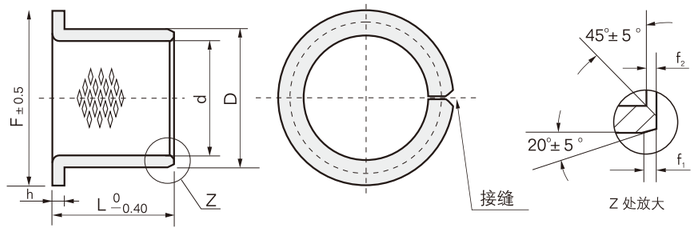
应用举例
Application



Unit(单位):mm

压入座孔后的内径 I.D.after fixed		外径 O.D.		f1	f2	L											
						10	15	20	25	30	35	40	50	60	70	80	90	100
10		12				●	●	●										
12		14				●	●	●										
14	+0.043 0	16	+0.065 +0.030	0.5	0.3	●	●	●	●									
15		17				●	●	●	●									
16		18				●	●	●	●									
18		20				●	●	●	●									
20		23				●	●	●	●									
22		25		0.8	0.4	●	●	●	●									
24	+0.052 0	27	+0.075 +0.035				●	●	●	●								
25		28					●	●	●	●								
28		32					●	●	●	●								
30		34					●	●	●	●	●	●						
32		36		1.0	0.6		●	●	●	●	●	●						
35		39					●	●	●	●	●	●						
40	+0.062 0	44	+0.085 +0.045					●	●	●	●	●	●					
45		50						●	●	●	●	●	●					
50		55						●	●	●	●	●	●	●				
55		60						●	●	●	●	●	●	●				
60		65		1.2	0.8				●	●	●	●	●	●	●			
65	+0.074 0	70	+0.100 +0.055							●	●	●	●	●	●			
70		75								●	●	●	●	●	●	●		
75		80								●	●	●	●	●	●	●		
80		85								●	●	●	●	●	●	●		
85		90								●	●	●	●	●	●	●	●	●
90		95								●	●	●	●	●	●	●	●	●
95		100										●	●	●	●	●	●	●
100	+0.087 0	105	+0.120 +0.070										●	●	●	●	●	●
105		110											●	●	●	●	●	●
110		115											●	●	●	●	●	●
115		120		1.4	0.8								●	●	●	●	●	●
120		125												●	●	●	●	●
125		130												●	●	●	●	●
130		135												●	●	●	●	●
135	+0.100 0	140	+0.170 +0.100											●	●	●	●	●
140		145												●	●	●	●	●
145		150												●	●	●	●	●
150		155												●	●	●	●	●

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工



Unit(单位):mm

压入座孔后的内径 I.D.after fixed		外径 O.D.		法兰 F±0.5	f1	f2	L 0 -0.40										
							15	20	25	30	35	40	50	60	70	80	90
25	+0.052 0	28	+0.075 +0.035	35	0.8	0.4	●	●	●								
30		34		45				●	●	●							
35		39		50	1.0	0.6		●	●	●	●						
40	+0.062 0	44	+0.085 +0.045	55					●	●	●	●					
45		50		60						●	●	●	●				
50		55		65						●	●	●	●				
55		60		70						●	●	●	●				
60		65		75	1.2	0.8				●	●	●	●	●			
65	+0.074 0	70	+0.100 +0.055	80						●	●	●	●	●			
70		75		85							●	●	●	●	●		
75		80		90							●	●	●	●	●		
80		85		100							●	●	●	●	●	●	
90		95		110									●	●	●	●	●
100	+0.087 0	105	+0.120 +0.070	120									●	●	●	●	●
110		115		130									●	●	●	●	●
120		125		140									●	●	●	●	●
130		135		155										●	●	●	●
140		145		165										●	●	●	●
150	+0.100 0	155	+0.170 +0.100	180	1.4	0.8								●	●	●	●
160		165		190										●	●	●	●
170		175		200										●	●	●	●
180		185		215										●	●	●	●
190		195		225										●	●	●	●
200	+0.115 0	205	+0.210 +0.130	235										●	●	●	●
225		230		260										●	●	●	●
250		255		290										●	●	●	●
265		270		305										●	●	●	●
285	+0.130 0	290	+0.260 +0.170	325										●	●	●	●
300		305		340										●	●	●	●

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

JDB 系列

标准产品尺寸 Standard size P. 36

产品简述 INTRUDUCTION

JDB 固体润滑轴承是在轴承基体的金属摩擦面上开出大小适当、排列有序的孔穴，然后在孔穴中嵌入具有独特自润滑性能的成型固体润滑剂（固体润滑剂面积一般为摩擦面积的 25% –35% ）而制成的自润滑轴承。 该轴承综合了金属基体和特殊配方润滑材料的各自优点，突破了一般轴承依靠油膜润滑的局限性。JDB 固体润滑轴承特别适用于无油、高温、高负载、低速度、防污、防蚀、防辐射、以及在水中或真空溶液浸润而根本无法加润滑油膜的特殊工况条件下使用。 该产品广泛应用于冶金轧钢设备、灌装设备、水轮机、气轮机、仪器仪表以及矿山机械、船舶机械、纺织机械、船舶工业、航天航海等领域，同时也越来越广泛的使用在其它工农业机械中。

JDB solid lubrication bearing is open the proper size, arranged in an orderly manner of cavity in the bearing base metal friction surface, then in the cavity embedded with a unique self lubrication performance of forming solid lubricant (solid lubricant is generally an area of friction area of 25% - 35%) and made of self lubricating bearing. The bearing has the advantages of the metal matrix and the special lubricating material. It breaks through the limitation of the oil film lubrication. JDB solid lubricating bearings are especially suitable for non oil, high temperature, high load, low speed, anti fouling, anti radiation, anti radiation, and in the water or vacuum solution infiltration and can not add lubricant film under the special conditions of use. The products are widely used in the fields of metallurgy, steel rolling equipment, filling equipment, hydraulic turbine, gas turbine, instrument and instrument, mining machinery, marine machinery, textile machinery, marine industry, space navigation and other fields, but also more and more widely used in other industrial and agricultural machinery.

使用注意事项
APPLICATION NOTES

设计 > 装配前 > 装配时 > 使用后

1. 设计时，不同的部位应选用适当的材质，以便提高机械性能,延长轴承的使用寿命；
2. 在可能情况下，设计时尽量采用标准规格;
3. 装配前，若以润滑油涂于磨件上，可减短走合期，利于机械操作、运转；
4. 装配时请注意表面有无异物；
5. 装配时应徐徐压入，严禁敲打，以免伤及轴承及引起变形；
6. 使用后的滑动面，因固体润滑剂形成的油膜导致表面有黑色或灰黑色现象，请不要擦洗，照常使用；
7. 在高承载，往复运动中，建议使用螺钉固定;
8. 在淡水中、海水中及在海上作业时，对磨轴建议使用不锈钢或表面镀铬。

Design > Pre assembly>assembly > After use

1. Using proper material in different parts when designing in order to enhance the mechanical properties and prolong the service life of the bushing;
2. Use standard designation when designing if possible;
3. It is good for mechanical operation and running if lay the lubricant on the corresponding friction set before installing;
4. Note if there are any foreign matters on the surface when assembling;
5. Pressing should be carried out slowly when installing. Do not beat in the event of damaging the bushing or causing the distortion to the bushing;
6. Do not erase the black or grey phenomenon on the sliding surface caused by the oil film that is formed by the solid lubricant after using;
7. It would be better to fix with bolt in high load and reciprocating motion.
8. It is recommended to use stainless steel or plate chrome on the surface of the corresponding friction shaft when working in the water or in the sea.

固体润滑轴承的优点

1、设计灵活、简单、方便，使用范围广;供油系统在机械设计上是一件费工，费时的装置，使用固体润滑轴承在设计时不需要考虑加油装置，节约了加油装置设备，同时可以针对各种特殊场合，把固体润滑轴承设计成各种形状，以满足各种特殊场合的需要，使用固体润滑轴承，可以大幅减少机械检修，油料等费用。

2、无油可以使用 ;由于固体润滑剂的线膨胀系数大于金属基体，因此当固体润滑轴承开始运转时，油膜会转移到对磨件上而实现自润滑，所以固体润滑轴承可以使用在难以加油以及不能加油或油脂的地方，即使在低速高负载的情况下，也能起到良好的润滑作用。

3. 使用成本低;传统的机械设计，在一定的操作时间内，要经常加油保养，检查油表，供油装置是否畅通，因定期加油导致机体本身及周边环境污染，造成维护保养成本的增加 ，实现自润滑后，不但可以实现环境整洁，而且大大降低了使用润滑油的成本。

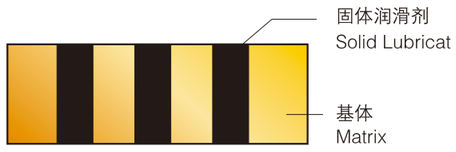
4、高承载、低转速情况下，可发挥优越的性能；固体润滑轴承是用离心铸造的高强度黄铜作基体，起到承载负荷的作用，用具有良好自润滑性能的特殊配方的石墨作润滑剂，起到自润滑作用，因此它综合了他们的各自优点，即使在高承载，低转速情况下，可发挥优越的性能。

5、往复运动、 摇摆运动、 起动停止频繁等油膜形成困难的场所，可发挥优越的耐磨性;

固体润滑轴承润滑剂的排列原则是保证对磨件在运转过程中各个部位都有润滑剂作用，因此排列润滑剂时必须根据对磨件的运动方向来确定润滑剂的排布位置。

6. 优越的耐药品性及耐蚀性;固体润滑轴承的润滑剂是用特殊配方的石墨、PTFE等耐磨材料制成的，它具有稳定的分子结构，金属基体可以根据不同金属具有不同的耐药品性和耐蚀性来选择，因此固体润滑轴承具有优越的耐药品性和耐蚀性。

7. 产品成本更具竞争力，与同类产品相比，工作寿命较长，所需维护保养甚少，替代更换周期长，性能好。



材料结构图 Structure

- JDB–1 CuZn25Al6Fe3Mn4
- JDB–2 CuSn6Zn6Pb3
- JDB–3 钢/CuSn6Zn6Pb3 或CuZn25Al6Fe3Mn4
- JDB–4 HT–250
- JDB–5 GCr15

THREE STAR BRARING

THE ADVANTAGES OF THE SOLID-LUBRICANT-INLAID BUSHING

1. Properly and simply designed, widely used;

Oil offering system is an energy waste and time waste set in mechanical design. There is no needs for considering the oil-putting set in design when using the solid lubricant bushing so it can save the oil-putting equipment and at the same time it also design the solid-lubricant-inlaid bushing into alt kinds of shapes in order to meet various needs in special places. Using solid-lubricant-inlaid bushing can reduce the costs of the machinery mending and the oil in wide range.

2. Being used without oil;

Because of the linear coefficient expansion of the solid lubricant is bigger than that of the metal basement, when the solid- lubricant-inlaid bushing starts to operate, the oil film can transfer to the corresponding friction set to make out self-lubricant. So the solid-lubricant-inlaid bushing can be used in places where the oil or grease cannot be added. It can make out the self-lubricant function even though under high load conditions.

3.Low cost for usage;

Traditional mechanical design asks for frequently aiding oil and checking if the oil watch and the offering set are through in certain period. Because adding oil at regular intervals causes the pollution to the machine itself and the nearby surroundings and increase the maintenance cost. And when the self-lubricant is made out, it can not only make the surroundings clean but also decrease the cost of using the lubricant.

4. The superior functions can be brought into play under high load and low rotating speed.

The solid-lubricant-inlaid bushing is based on the high intensity brass that is centrifuge cast. And then make out the loading function. Use special graphite that has good self-lubricant properties as lubricant to make out the self-lubricant so that the bushing has included all of their advantages. It can still bring the superior properties into play even under high load and low rotating speed.

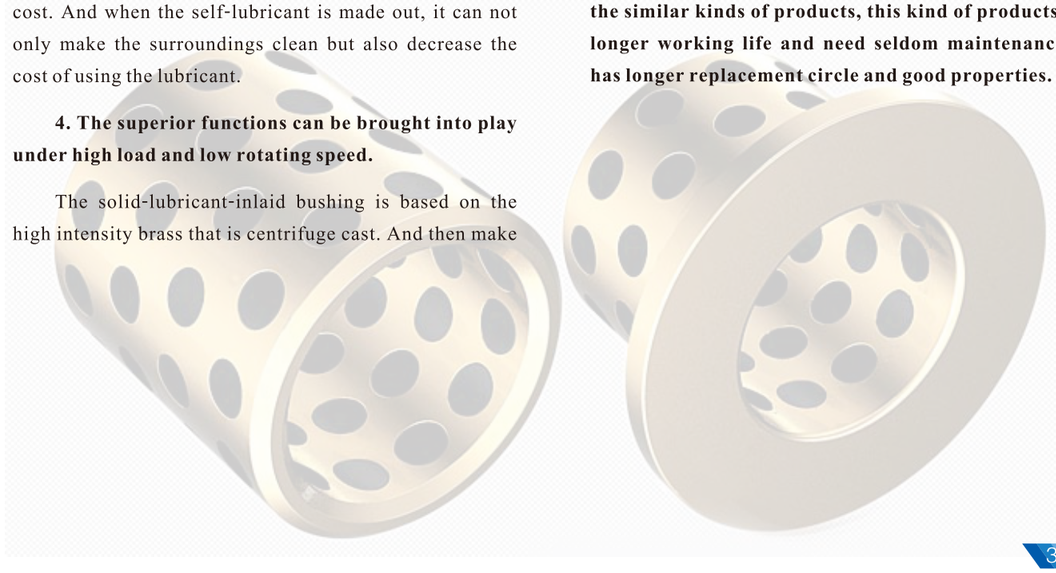
5. The wear resistance can be brought into play even in places where the oil film form into difficulties because of the reciprocating and rocking movement, starting and stopping;

The arrangement principle of the lubricant of the solid-lubricant-inlaid bushing is to ensure that all the parts of the corresponding friction sets have the lubricant function in the operating procession. So the arrangement place of the lubricant should be depended upon the operating direction of the corresponding friction sets.

6. Superior chemical resistance and corrosion resistance;

The lubricant of the solid-lubricant-inlaid bushing is made of special graphite and PTFE. It has steady molecule structures. The metal basement can be chosen according to the different chemical resistance and corrosion resistance of the metal appliance. So the solid-lubricant-inlaid bushing has the superior chemical resistance and corrosion resistance.

7. The products is more competitive, comparing to the similar kinds of products, this kind of products has longer working life and need seldom maintenance. It has longer replacement circle and good properties.



轴承的寿命:
THE LIFE OF THE BUSHING

固体润滑轴承的寿命，除急剧的烧焦外，通常由轴承内径的磨损量来决定，磨损量主要受摩擦条件的影响，而摩擦又受承载、速度、杂质、材质、表面粗糙度、工作温度、不同运行方式、所使用润滑剂等条件影响，因此，磨损量只能是一个理论估计值，轴承的寿命取决于各种复杂的条件。

The life of solid-lubricant-inlaid depends on the wear depth of the inside diameter of the bushing except such condition as acute singe, etc. The wear depth is influenced by the load speed, foreign matter, material, surface roughness, working temperature, different operating methods and the lubricant used. So the wear depth is only a theoretical estimate value and the life of the bushing depends on all kinds of the complex conditions.

若因供油不良，杂质渗入而使磨损急剧变化时，就很难预测磨损情形。下式为正常情况下由实验得出的磨损量计算式。

If the oil is not provided well, it is hard to estimate the abrasion state when the foreign matters intermingling. The following formula is the computing method.

$$W = K \times P \times V \times T$$

K:摩擦系数 Coefficient of Friction
[mm/(N/mm² · m/min · hr]
W:磨损量 Wear Depth (mm)
P:承载压力Load Pressure (N/mm²)
V:线速度 Linear Speed (m/min)
T:磨损时间 Wear Time (hr)

从上式中可以看出，若摩擦系数(K)已知，便可根据承载压力(P)、线速度(V)和磨损时间(T)计算出轴承实际磨损量。但是，在各种实际条件下准确计算出摩擦系数K是件非常困难的事情。在理想条件下，摩擦系数 K 由影响其值的因素因子 Ci 来决定。

From the above formula you can see that if the coefficient of the friction "K" is known the real wear depth can be computed according to the pressure "P" .linear speed "V" and wear time "T". But it is very difficult to calculate "K" under various actual conditions. Under ideal conditions. "K" depends on the factor "Ci" which influences it.

即 i.e. $K = Ci \times k$

Ci: 影响磨损量的因素因子 Ci= $C1 \times C2 \times C3 \times \cdots\cdots$

Ci: $Ci = C1 \times C2 \times C3 \times \cdots\cdots$ Factor genes that influence the wear depth.

K: 理想条件下的摩擦系数 And k is the coefficient of friction under ideal conditions.

$K = (1\text{-}5) \times 10^{-8}$ [mm/(N/mm²· m/min · hr)]

C_0:滑动条件系数 Coefficient of sliding conditions

C_0		线速度 Linear speed V(m/min)		
		≤1	1～10	10～30
承载压力 Loading pressure P(N/mm²)	≤5	8～10	10～12	12～18
	5～25	12～18	18～25	25～30
	25～50	18～25	25～30	30～40

C_1:温度条件系数 Coefficient of temperature conditions

工作温度 Working temperature(℃)	≤100	100～200	200～400
C_1	1～2	3～5	5～10

C_2:环境条件系数 Coefficient of the surrounding temperature

环境 Surrounding	一般场所 general place	室外 Outside	粉尘较多场合 Places w ith much powder
C_2	1～2	5～10	10～30

C_3:使用场所系数 Coefficient of places used

使用场所 Places used	大气中 Atmosphere	水中 Water	海水中 Sea
C_3	1.9	0.8	1.2

轴承高度、壁厚
THE WALL-THICKNESS AND THE HEIGHT OF THE BUSHING

1. 轴承高度
The height of the bushing

轴承内径是由对磨轴的轴径所决定，所以在受载荷条件下，轴承高度受轴承承载压力P(N/mm)所决定，轴承越高，其所承受的承载压强相对减小，但此时可能会造成偏位接触，或冷却效果降低，导致轴承寿命减短，相反，轴承高度太短时，润滑油会很快从轴承端面流出，因此很难形成油膜，轴承性能相应降低。

The inside diameter of the bushing depends on the shaft diameter of the corresponding friction shaft. So under the load conditions, the heigth of the bushing depends on the load pressure the bushing bears. Thicker the bushing is, lower the intensity of the pressure is. But it may cause the Lean cortact or the decrease of the cooling effect and reduce the bushing life. Contrarily, if the length of the bushing is too short, the lubricant may flow out quickly so that may be difficult to form the oil film and decrease the bushing property accordingly.

一般轴承以L/D(轴承高度/轴承内径)的比例在0.5－3的范围内为适当，但应特别注意在高载荷，易引起偏位接触，高转速时引起的发热情形，此时L/D取1以下较适当。

Generally, the proportion of the height of the bushing and the inside diameter of the bushing should be in the scale of 0.5 to 3. But special attention should be paid that heat condition may cause under high load lean contact and high running speed. Then L/d should be below 1.

2. 轴承壁厚 The wall-thickness of the bushing

滑动轴承跟滚动轴承相比，其壁厚限制较小，壁厚薄为其主要的优点之一。

Comparing to the sliding bushing, the wall-thickness of this kind of bushing has little limit Thin wall-thickness is one of the main advantage.

一般情况下，壁厚 In most cases, the wall-thickness

$t = (0.05\text{-}0.07)d + (2\text{-}5)mm$

对磨轴条件
THE CONDITION TO THE CORRESPONDING FRICTIONSHAFT

JDB固体润滑轴承的使用寿命，磨损量，最高PV值，最高使用温度等都受对磨轴材质等条件的影响。

The service life, wear depth, max value and max using temperature of the #500 solid-lubricant-inlaid bushing are all influenced by the corresponding friction shaft material.

1. 对磨轴的材质和硬度
The material and hardness of thecorresponding bushing

一般情况下，使用JDB轴承时，对磨轴的材质可以选用35#以上优质碳素结构钢，Cr12合金钢或9SiCr合金工具钢等，以上材质经淬火，调质，表面处理后硬度超过轴承硬度，就能收到比较理想的效果，但当有硬性杂质侵入时，应尽可能选用硬度较高的轴材料，可以收到更好的使用效果。

In most cases, the material of the corresponding friction shaft can be the upwards #35 superior carbon structure steel, Cr12 steel alloy or 9siCr tool steel alloy. All the above materials are quenched, mixed and surface dealt to reach an ideal effect. But when foreign matters come into, higher hardness bushing materials should be used in order to get better effects.

2. 表面粗糙度
The surface roughness

对磨轴表面粗糙度过大时，轴与轴承的凸起部分会切断油膜，造成两者直接接触，因此，提高对磨轴的表面粗糙度，尽可能缩小油膜间隙，使其接近流体润滑的状态，这样就能提高轴承的使用寿命，一般情况下，我们推荐轴承的表面粗糙度应在Ra0.4以上。

When the surface roughness of the corresponding friction shaft is too large, the bulge of the shaft and the bushing may cut down the oil film so it may cause the direct connection between the two parts .So enhancing the surface roughness of the corresponding friction shaft can reduce the space of the oil film and be close to the lubricant state so that it can prolong the service life of the bushing. Generally, the surface roughness we recommended is above Ra0.4.

3. 表面处理
The surface treatment

通常情况下，在对磨轴表面所做处理的目的，大致可分为以下三项: In most cases, the purpose of the treatment to the corresponding friction shaft can be divided into 3 items:

a. 提高耐蚀性；
Enhance the corrosion resistance;

b. 提高表面硬度;
Enhance the surface hardness of the surface

c. 使表面平滑，提高润滑性。
Make the surface flat and enhance the lubricant properties.

对磨轴进行电镀处理，可提高其耐蚀性，而且能够有效防止粗糙磨损，以及提高润滑性能等，同样当对磨轴生锈时，所生硬氧化物与异物侵入，同样会产生磨损加剧，因此，我们建议使用者在对磨轴上镀硬铬，另外，在高载荷，微小摇摆运动时，将对磨轴进行适当的热处理也会收到良好的效果，又如在海水中等类似的腐蚀条件下，对磨轴镀上二至三层硬铬，是很有必要的。

It can enhance the corrosion resistance and prevent the roughness wear by the treatment to the correspondingfriction shaft, it can also enhance the lubricant property. When the corresponding friction shaft is stain, the coming of the hard oxygen and the foreign matters may also cause an increase in the wear. So we recommend the users plate rigidity chrome on the corresponding friction shaft. Besides, it will get a good result by proper heat treatment on the corresponding friction shaft. It is also necessary to plate two or three rigidity chrome on the corresponding friction shaft.

工况条件
WORKING CONDITIONS

1. 承载压力 Loading pressure

通常所谓承载压力是指轴承承受载荷时，轴承支持的最大载荷除以受压面积。所谓受压面积，当轴承为圆柱形时，取与轴承接触部分的载荷方向的投影面积.

The so-called loading pressure generally means that when the bushing is loading , the max load it bears divides the pressed area. And the loading pressed area means the projection area of the connecting parts when the bushing is cylindrical.

2. 线速度 Linear speed

轴承的发热量，主要是由轴承的摩擦作用引起的，根据经验可知，对摩擦面温度的上升，滑动速度v的影响远大于承载压力P的影响。轴承若使用同一PV值，速度V愈大，轴承面温度上升愈快，因此在高温使用时，最好能供给润滑油，增大冷却效果和流体润滑；以求降低摩擦系数，以防高磨损和烧焦现象的发生。

The heat radiated by the bushing is mainly caused by the friction of the bushing. According to the experience we know that the sliding speed "V" affects more than load pressure "P" to the surface temperature. If the bushing uses the same PV value, the higher speed the more quickly temperature ascends. So it would be better to provide lubricant to enlarge the cooling effect and liquid lubricant by using high temperature in order to reduce the coefficient of the friction and to prevent the high abrasion and burning.

3. PV值 PV value

PV值是衡量轴承磨损极限和使用寿命的重要指标。以承载压力P(N/mm)和线速度V(m/s)的乘积PV值(N/mm・m/s)来表示。

PV value is an important guideline to weigh the abrasion limit and the service life of the bushing. It is shown by the load pressure P multiplying the line speed V.

轴承在单位时间，单位面积所产生的摩擦热量Q，以下式表示:
In the unit time the friction heat Q caused by the unit area of the bushing can be shown by the following formula.

$$Q=\frac{\mu \cdot P \cdot V}{J}\ \text{kcal/min}$$

J: 热功当量Heat equivalent of work≈ 4270 (N・ mm/Kcal)

P: 承载压力 Load pressure (N/mm²)

V: 线速度 Linear speed (m/s)

μ:摩擦系数 Coefficient of the friction

如果摩擦系数 μ略大一些，轴承所产生的摩擦热量跟PV值成正比，这时所产生的热量Q，在经验上就可被认为固体润滑轴承设计时的重要依据.

当轴承运转时，轴承温度受摩擦发生的热量及热量散发情况影响，通常会在一定的温度上稳定下来. 若运转持续进行中有杂质渗入，润滑油的性能就会降低，同时由于摩擦粉末的影响，材料的疲劳，此时摩擦面的形态即发生变化，摩擦系数提高，轴承的温度上升，致使摩擦面损伤，而导致烧焦，基于此种情况，轴承的运转温度越低，亦即使用低PV值时，轴承的负荷性较好，寿命延长. 所以在设计时，尽可能使用较低的PV值较安全，反之，在详细分析冷却方法，轴的材质，表面粗糙度，配合间隙等因素情况下，欲超越最大PV值使用，也是可能的.

If the coefficient of the friction "μ " is a little bigger, the friction heat and the PV value are in the direct ratio. Then the caused heat Q is commonly considered as the important principle in the solid lubricant bushing design.

When the bushing is running the heat and the heat radiation can be fixed at a certain temperature. If there are foreign matters in the running process, the lubricant property may be reduced and the friction shape may be changed because of the effect of the friction powder and the fatigue of the material. The enhancement of the coefficient of the friction and the ascending of the bushing temperature cause the damage of the friction surface and it will burn at last. Considering such cases, the load property of the bushing will be better and the service life will be longer if the operating temperature of the bushing is lower i.e.using lower PV value. So when designing, use lower PV value to ensure it is safe. Otherwise, it is also possible to use max PV value by carefully analyzing cooling methods, material of the shaft and the roughness of the surface,etc.

PV 值计算方法 The calculating method of the PV value：

	承载压力 Load pressure $P(N/mm^2)$	线速度 linear speed V(m/s)
轴承 bushing	F/dl	$\pi dn/10^3$
		$\pi d\theta c/1.8\times10^3$
垫片 washer	$4F/\pi(D^2-d^2)$	$\pi n\sqrt{2(D^2+d^2)}/2\times10^3$
		$\pi\theta\sqrt{2(D+d^2)}/3.6\times10^3$
滑块 sliding plate	F/BL	$60S/T\times10^3$

F: 垂直承载 uprightness load(N)

d: 轴承内径 inside diameter of the bushing(mm)

D: 轴承外径 outside diameter of the bushing(mm)

B: 滑块宽度 the width of the sliding plate(mm)

L: 滑块长度 the length of the sliding plate(mm)

N: 回转数 the rotation times (rpm)

C: 往复次数 reciprocating times (cpm)

θ: 摇摆角 the rocking angle(℃)

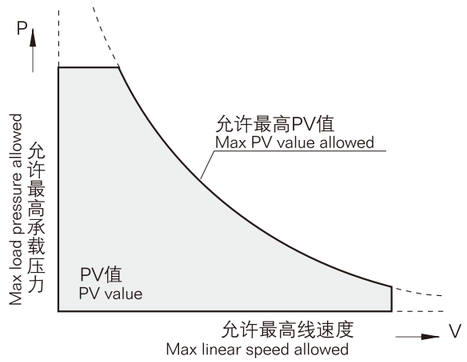
S: 往复长度 the length of the reciprocation (mm)

T: 往复一次所需时间(sec)
time spending in each reciprocation

4. 最大PV值 Max PV value

所谓最大PV值是在轴承设计时，在轴承的单位投影面积内所承受的载荷及线速度乘积之最大值，使用时请勿超越此值，在设计时应在图1实线范围内.

The so-called max PV value means the max value of the load in the unit projection of the bushing multiplying the linear speed. Do not exceed the value when using it. When designing please be in the range of Fig 1.



图Fig 1：轴承PV值图

产品应用领域 Product application domain

高温 High temperature

≥ 钢铁厂
Iron and steel works
≥ 溶矿炉
Dissolved ore furnace
≥ 干燥设备
Drying equipment
≥ 烘烤炉
Baking oven
≥ 热控制器
Heat controller

汽车制造 Automobile manufacturing

≥ 冲床模具
Punch die
≥ 焊接组织
Welding organization
≥ 烤漆与干燥线
Baking and drying line
≥ 金属输送带
Metal conveyor belt
≥ 工具机
Tool machine

防水 Waterproof

≥ 水坝闸门
Dam gate
≥ 沈水泵浦
Shen water pump
≥ 流体电门结构
Fluid switch structure
≥ 近海结构
Offshore structure
≥ 船坞及淤泥机设备
Dock and silt machine equipment

船舶 Ship

≥ 甲板起重机
Deck crane
≥ 起锚机
Windlass
≥ 舱口盖
Hatch cover
≥ 方向舵臂
Rudder arm
≥ 起重机机与吊环设备
Crane and lifting equipment

抗化学 Anti chemistry

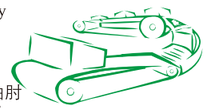
≥ 化学工厂
Chemical plant
≥ 电镀设备
Plating equipment
≥ 废水处理设备
Waste water treatment equipment
≥ 染色机械
Dyeing machine
≥ 油与化学药品提炼设备
Oil and chemical refining equipment

桥梁和升降轨 The bridge and the lifting rail

≥ 桥梁轴承
Bridge bearing
≥ 梁、桥架、吊桥
Beam, bridge, suspension bridge
≥ 核能相关反应器
Nuclear related reactor
≥ 蒸汽产生器
Steam generator

重工业 Heavy industry

≥ 钢管工厂机械
Steel tube factory machinery
≥ 轮胎与纸厂
Tire and paper mill
≥ 发电厂
Power plant
≥ 模具射出机械之连接曲肘
The connecting curve of the mould injection machine



建筑、采矿、装载 Construction, mining, loading

≥ 搅拌机、研磨机、粉碎机
Mixer, grinder, grinder
≥ 建筑机械
Construction machinery
≥ 采矿设备
Mining equipment
≥ 连杆轴承
Connecting rod bearing
≥ 动力轴
Power shaft

风力 The wind

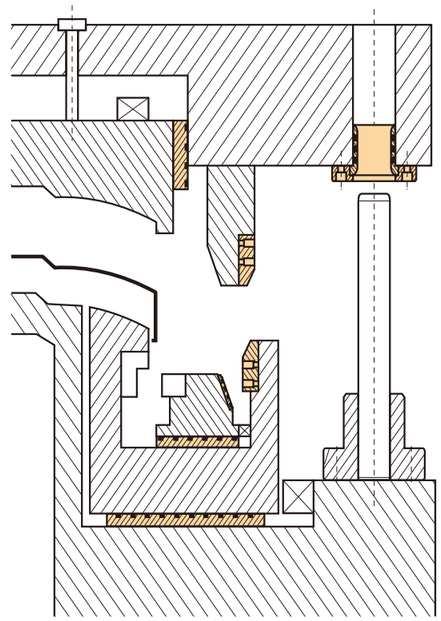
≥ 风力发电
Wind power generation
≥ 新能源
New energy

特点

》免维护、自润滑、无需加油。
》高承载、滑动面摩擦系数极低、抗磨损性能优越。
》使用温度-40℃-+300℃。
》良好的抗化学抗腐蚀性能。
》产品尺寸及形状可按图纸要求生产。
》硬度210-240HB, 使用寿命比普通大至少一倍。

Advantages of JDB Slide Elements:

》 Maintenance free
》Wear resistant
》 Low frictional resistance
》 Resistant against temperatur es up to
》Approx. 300℃ (approx.572℉)
No impurity through discharge of lubrication
》Environmentally friendly
》Corrosion resistant
》 Insensitive to impact str ess
》Specially suited for oscillating slide motions
》 Stick,slip free sliding
》Long life



JDB 标准轴套尺寸 STANDARD SERIES JDB BUSHES

机械物理性能 Physical and Mechanical Performance

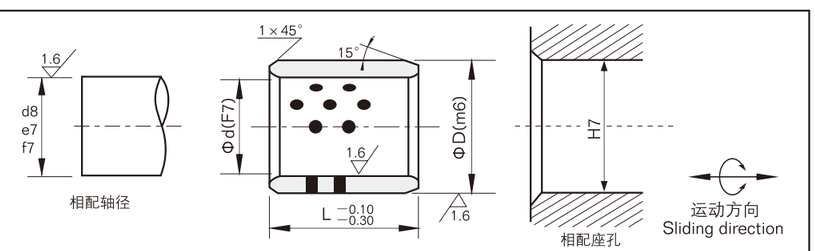
型号 Type	JDB-1	JDB-2	JDB-3	JDB-4	JDB-5	JDB-6
产品图片 Sketch map						
材料牌号 Code	CuZn25Al6 Fe3Mn4	CuSn6Pb6Zn3	钢+ CuSn6Pb6Zn3	HT250	GCr15	CuZn25Al6 Fe3Mn4
硬度 Hardness HB	>210	>70	>70	>210	HRC>58	>250
摩擦系数 Friction coef (μ)	<0.16	<0.15	<0.14	<0.17	<0.17	<0.16
抗拉强度N/mm² Tensile strength	>750	>200	>450	>150	>150	>700
屈服强度N/mm² Yield strength	>450	>90	>90			>400
伸长率 Elongation%	>12	>13	>12			>4
热胀系数 Coefficien of linear expansion	1.9×10^{-5}/℃	1.8×10^{-5}/℃	1.8×10^{-5}/℃	1.0×10^{-5}/℃	1.1×10^{-5}/℃	1.9×10^{-5}/℃
温度 Limit Temp	-40~300℃	-40~400℃	-40~400℃	-40~400℃	-40~300℃	-40~400℃
最大动承载 Max. Load N/mm²	100	60	70	60	200	150
最大线速度 Max.Speed m/min	15	10	10	8	5	15
Max.PV最大PV N/mm²/min	200	200	200	40	150	200
压缩永久变形量 300 N/mm²	<0.01mm	<0.05mm	<0.05mm	<0.015mm	<0.002mm	<0.005mm
适用范围 Applicable conditions	适用于高载荷、高强度、低速、耐腐蚀、耐磨损的部位 It breaks through the limit of general bearing whose lubrication depends on oil film.	适用于较高载荷、低速、在大气、淡水、海水中均有优良的耐腐蚀性 High temperature, Mid-load, low s peed.	适用于较高载荷、中等滑动速度下工作的耐磨、耐腐蚀零件 Most suitable for dry position in construction, metallurgical machines, conveyor machines e tc.	低载荷，低速 Low load, low speed	挖土机支承，卷扬机支承具有极高的抗压性能 Can be used low, middle a nd . D ue to its s uper high hardnedd, when Under high load, it over performs than other JDB type.	适用于高载荷、高强度、低速、耐腐蚀、耐磨损的部位 It breaks through the limit of general bearing whose lubrication depends on oil film.

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	很好的耐磨性和化学稳定性，使用温度<400 C Excellent resistance against chemical attacks and low friction, Temp limit 400°C	应用于一般机械，在大气中使用 Suite for general machines and under atmospher e Ship
PTFE+MoS_2+添加剂	极低的磨擦系数和很好的水润性，使用温度 <300 C ° Lowest in friction and good of water lubrication, Temp limit 300°C	应用于水、海水润滑，如船舶、 Suite for water and seawater lubricant, such as ship, hydraulic turbine, pharmaceutic and beverage machiner y etc.

磨损性能（与CuSn6Zn6Pb3青铜套的比较耐磨性能如下表）

型号 Type	试验压强 Load Applied	铜套 CuSn6Zn6Sn3	JDB-1	JDB-2	JDB-3	JDB-4	JDB-5
润滑条件 Lubrication		油润滑 Oil	干磨擦 Dry	干磨擦 Dry	干磨擦 Dry	干磨擦 Dry	干磨擦 Dry
磨损量 Wear depth	62N/mm²	0.098	0.011	0.025	0.03	0.03	0.0022
时间 Time	62N/mm²	10	100	30	30	10	100
磨损量 Wear depth	24.5N/mm²	0.125	0.015	0.11	0.12	0.25	0.013
时间 Time	24.5N/mm²	100	100	100	100	20	100
磨损量 Wear depth	14.7N/mm²	0.10	0.012	0.025	0.015	0.011	0.01
时间 Time	14.7N/mm²	100	100	100	100	100	100

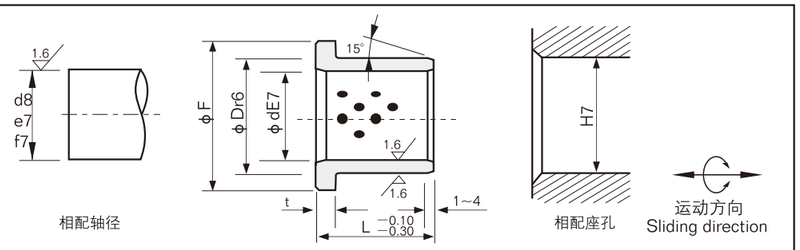


Unit(单位):mm

Φd	公差 (F7)	ΦD	公差 (m6)	L																			
				8	10	12	15	20	25	30	35	40	50	60	70	80	90	100	120	140	160	180	200
8	+0.028 +0.013	12		●	●	●	●																
10		14	+0.018 +0.007	●	●	●	●	●															
12		18		●	●	●	●	●	●														
14	+0.034 +0.016	20			●	●	●	●	●	●													
16		22	+0.021 +0.008		●	●	●	●	●	●	●	●											
20		28				●	●	●	●	●	●	●											
20		30				●	●	●	●	●	●	●											
25	+0.041 +0.020	33					●	●	●	●	●	●	●										
25		35					●	●	●	●	●	●	●										
30		38	+0.025 +0.009					●	●	●	●	●	●										
30		40						●	●	●	●	●	●										
35		45							●	●	●	●	●	●									
40		50								●	●	●	●	●	●								
40		55								●	●	●	●	●	●	●							
45	+0.050 +0.025	55								●	●	●	●	●	●	●							
45		56								●	●	●	●	●	●	●							
45		60								●	●	●	●	●	●	●							
50		60	+0.030 +0.011							●	●	●	●	●	●	●							
50		65								●	●	●	●	●	●	●							
55		70									●	●	●	●	●	●	●						
60		75									●	●	●	●	●	●	●						
65		80										●	●	●	●	●	●	●					
70	+0.060 +0.030	85										●	●	●	●	●	●	●					
70		90										●	●	●	●	●	●	●					
75		90										●	●	●	●	●	●	●	●				
75		95	+0.035 +0.013									●	●	●	●	●	●	●	●				
80		100											●	●	●	●	●	●	●	●			
85		100											●	●	●	●	●	●	●	●			
90		110											●	●	●	●	●	●	●	●			
100	+0.071 +0.036	120											●	●	●	●	●	●	●	●	●		
110		130											●	●	●	●	●	●	●	●	●		
120		140													●	●	●	●	●	●	●		
130		150	+0.040 +0.015												●	●	●	●	●	●	●		
140		160													●	●	●	●	●	●	●		
150	+0.083 +0.043	170													●	●	●	●	●	●	●		
160		180													●	●	●	●	●	●	●	●	
170		190														●	●	●	●	●	●	●	
180		200	+0.046 +0.017															●	●	●	●	●	●
190	+0.096 +0.050	210																●	●	●	●	●	●

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

JFB 翻边轴套尺寸 STANDARD SERIES JFB FLANGED BUSHES

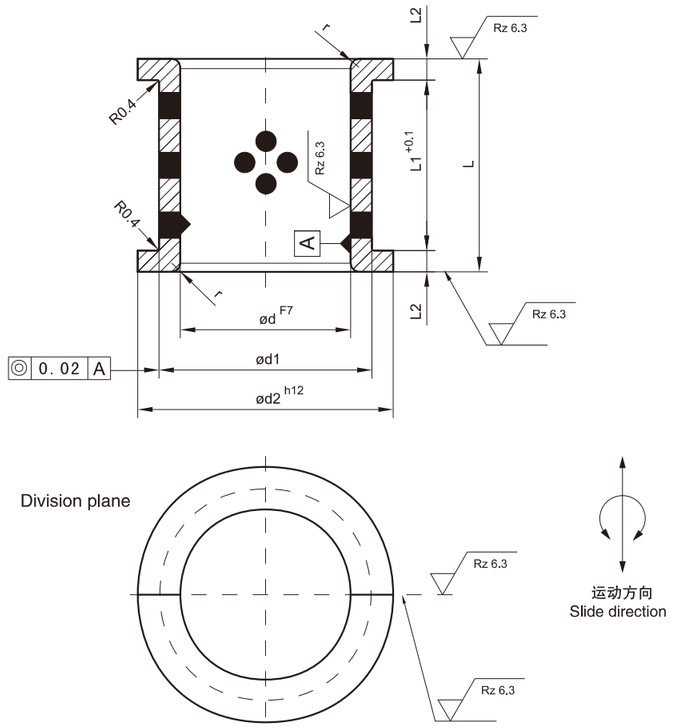


Unit(单位):mm

Φd	公差 Tolerance	ΦD	公差 Tolerance	法兰 ΦF	t	L																	
						10	12	15	20	25	30	35	40	45	50	55	60	65	70	75	80	90	100	120
8	+0.04 +0.025	12		20	2	●	●	●																
10		14	+0.034 +0.023	22		●	●	●	●															
12		18		25		●	●	●	●	●														
14	+0.05 +0.032	20		27		●	●	●	●	●	●													
16		22		29	3	●	●	●	●	●	●													
18		24	+0.041 +0.028	32			●	●	●	●	●	●												
20		28		35			●	●	●	●	●	●	●											
20	+0.061 +0.04	30		40			●	●	●	●	●	●	●											
25		35		45				●	●	●	●	●	●	●										
30		40		50					●	●	●	●	●	●	●									
31.5		40	+0.05 +0.034	50					●	●	●	●	●	●	●									
35		45		60	5					●	●	●	●	●	●									
40	+0.075 +0.05	50		65						●	●	●	●	●	●	●								
45		55		70								●	●	●	●	●	●							
50		60	+0.06 +0.041	75								●	●	●	●	●	●	●						
55		65		80								●	●	●	●	●	●	●	●					
60		75	+0.062 +0.043	90									●	●	●	●	●	●	●	●	●			
65	+0.09 +0.06	80		95	7.5								●		●	●	●	●	●	●	●			
70		85		105											●	●	●	●	●	●	●			
75		90	+0.073 +0.051	110												●	●	●	●	●	●	●		
80		100		120													●	●	●	●	●	●	●	
90		110	+0.076 +0.054	130													●	●	●	●	●	●	●	
100	+0.107 +0.072	120		150														●	●	●	●	●	●	●
120		140	+0.088 +0.063	170	10														●	●	●	●	●	●
130		150		180																	●	●	●	●
140	+0.125 +0.085	160	+0.090 +0.065	190																		●	●	●
150		170		200																			●	●
160		180		210																			●	●

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

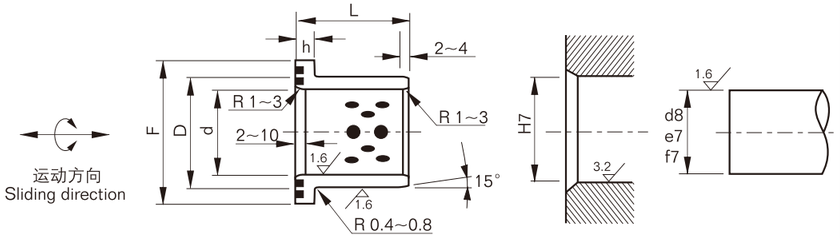
JFFB 自润滑轴承 HALF-BEARING



规格型号 Type	I.D. ϕd 内径 H7	O.D. ϕd1 外径		ϕd2 d11	L h12	L1 +0.1 0	L2	C
JFFB-030	30	38		48	34	22	6	
JFFB-035	35	45		55	45	32	6.5	
JFFB-040	40	50		60	50	35		1
JFFB-045	45	55		65	55	40	7.5	
JFFB-050	50	60	s6	70	60	45		
JFFB-060	60	70		80	70	50	10	
JFFB-070	70	85		95	80	60		
JFFB-080	80	95		110	95	70		
JFFB-090	90	105		120	105	80	12.5	
JFFB-100	100	115		130	115	90		2
JFFB-110	110	125		140	125	100		
JFFB-120	120	135	r6	150	140	110	15	
JFFB-140	140	160		175	160	120	20	
JFFB-160	160	180		200	180	140		

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

JDBB 自润滑翻边轴套 METRIC FLANGE BUSHES



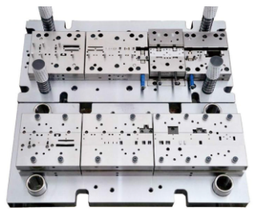
Unit(单位):mm

L.D. ϕd 内径 E7		O.D. ϕD 外径 r6		Flange 翻边 ϕF	t		F $^{0}_{-0.03}$ 10	11	12	13	15	18	20	23	25	27	35	37	38	47	48	50	58	60	68	80	90	压装后内孔 I.D.After Press-Fitting
6	+0.032 +0.040	10	+0.028 +0.019	20			●	●	●																			+0.016 +0.004
8	+0.040 +0.025	12		25					●	●	●																	+0.021 +0.006
10		14	+0.034 +0.023		3					●		●																
12		18		30				●				●		●														+0.031 +0.013
13		19								●		●		●														
15	+0.050 +0.032	21		35						●		●		●														+0.026 +0.008
16		22	+0.041 +0.028			0 −0.03				●		●		●	●													
18		24		40								●		●														
20		28		45									●		●													+0.037 +0.016
25	+0.061 +0.040	33		50	5								●		●													+0.032 +0.011
30		38	+0.050 +0.034	55									●		●		●											
35		44		65									●		●		●											+0.046 +0.021
40	+0.075 +0.050	50		70	7											●		●		●								
50		62	+0.060 +0.041	90	8														●		●		●					+0.040 +0.015
60		74	+0.060 +0.041	110		0 −0.04													●		●		●		●			+0.053 +0.023
70	+0.090 +0.060	85	+0.060 +0.041	120	10																	●				●		+0.046 +0.016
80		96		140																				●			●	

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

应用举例 Application

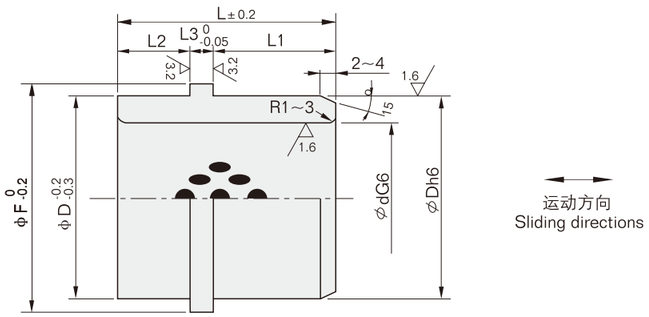
液压机
Hydraulic Presses Machine



冲压模具
Mould Die

注塑机 Plastic injection machine

JEGB/JEGB-K 射出座导套 OILLESS EJECTOR GUIDE BUSHES

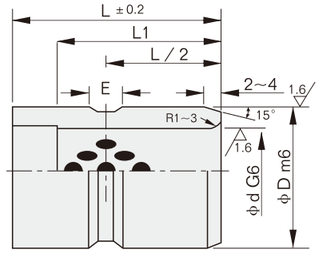


Unit(单位):mm

规格代码 Standard No	ϕd	G6	ϕD	h6	ϕF	L	L1	L2	L3
JEGB-16X 26	16	+0.017 +0.006	25	0 −0.013	30	26	12	10	
JEGB-16X 28						28	14		
JEGB-16X 33						33	19		
JEGB-16X 38						38	24		
JEGB-20X 26	20		30		35	26	12		
JEGB-20X 28						28	14		
JEGB-20X 33						33	19		
JEGB-20X 38						38	24		
JEGB-25X 26	25	+0.020 +0.007	35	0 −0.016	40	26	12	15	4
JEGB-25X 28						28	14		
JEGB-25X 33						33	19		
JEGB-25X 38						38	24		
JEGB-30X 33	30		40		45	33	14		
JEGB-30X 38						38	19		
JEGB-30X 43						43	24		
JEGB-32X 38	32		42		47	38	19		
JEGB-32X 43						43	24		
JEGB-32X 48						48	29		
JEGB-35X 38	35	+0.025 +0.009	46		50	38	19		
JEGB-35X 43						43	24		
JEGB-35X 48						48	29		
JEGB-40X 48	40		52	0 −0.019	57	48	24	20	
JEGB-40X 53						53	29		
JEGB-50X 48	50		62		67	48	24		
JEGB-50X 53						53	29		
JEGB-K-30X 37	30	+0.020 +0.007	42	0 −0.016	47	37	14	15	
JEGB -K-30X 42						42	19		
JEGB -K-30X 47						47	24		
JEGB -K-30X 52						52	29		
JEGB -K-40X 53	40	+0.025 +0.009	55	0 −0.019	60	53	20	25	
JEGB -K-40X 57						57	24		
JEGB -K-40X 60			50	0 −0.016	55	60	32	20	8
JEGB -K-40X 67			55	0 −0.019	60	67	29	30	
JEGB -K-40X 70			50	0 −0.016	55	70	42	20	
JEGB -K-50X 67	50		62	0 −0.019	67	67	29	30	
JEGB -K-50X 87						87	39	40	
JEGB -K-60X 67	60	+0.029 +0.010	74		82	67	29	30	
JEGB -K-60X 87						87	39	40	

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

JGB 自润滑导向套 OILLESS GUIDE BUSHES



运动方向
Sliding directions

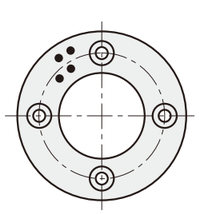
Unit(单位):mm

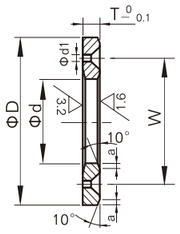
规格型号 Standard No	ϕd	G6	ϕD	m6	L	L1	E
JGB-12 X 9					9	9	—
JGB-12 X 1 4	12		18		14	14	
JGB-12 X 1 9				+0.018 +0.007	19	19	
JGB-12 X 2 4					24	24	4
JGB-13 X 1 4					14	14	
JGB-13 X 1 9					19	19	
JGB-13 X 2 4	13		20		24	24	
JGB-13 X 2 9		+0.017 +0.006			29	29	6
JGB-13 X 3 4					34	30	
JGB-16 X 1 4					14	14	4
JGB-16 X 1 9					19	19	
JGB-16 X 2 4	16		25	+0.021 +0.008	24	24	
JGB-16 X 2 9					29	29	
JGB-16 X 2 4					34	34	6
JGB-16 X 3 9					39	35	
JGB-20 X 1 4					14	14	4
JGB-20 X 2 9					19	19	
JGB-20 X 2 4					24	24	
JGB-20 X 2 9	20		30		29	29	
JGB-20 X 3 4					34	34	6
JGB-20 X 3 9					39	39	
JGB-20 X 4 0					49	40	
JGB-25 X 2 4					24	24	
JGB-25 X 2 9		+0.020 +0.007			29	29	
JGB-25X 34	25		35		34	34	8
JGB-25 X 3 9					39	39	
JGB-25 X 4 9				+0.025 +0.009	49	49	
JGB-25 X 5 9					59	50	
JGB-30 X 2 9					29	29	
JGB-30 X 3 4	30		42		34	34	8
JGB-30X 49					39	39	
JGB-30X 59					49	49	

规格型号 Type	ϕd	G6	ϕD	m6	L	L1	E
JGB-30X 59					59	59	
JGB-30X 69	30	+0.020 +0.007	42		69	60	8
JGB-30X 79					79		
JGB-35X 29					29	29	
JGB-35X 34				+0.025 +0.009	34	34	
JGB-35X 39					39	39	
JGB-35X 49					49	49	
JGB-35X 59	35		48		59	59	8
JGB-35X 69					69	69	
JGB-35X 79					79	70	
JGB-40X 39					39	39	
JGB-40X 49					49	49	
JGB-40X 59					59	59	
JGB-40X 69	40	+0.025 +0.009	55		69	69	10
JGB-40X 79					79	79	
JGB-40X 89					89	80	
JGB-50X 49					49	49	
JGB-50X 59					59	59	
JGB-50X 69				+0.030 +0.011	69	69	
JGB-50X 79	50		70		79	79	10
JGB-50X 89					89	80	
JGB-50X 99					99	90	
JGB-60X 59					59	59	
JGB-60X 69					69	69	
JGB-60X 79	60		80		79	79	10
JGB-60X 89					89	89	
JGB-60X 99					99	90	
JGB-60X 109					109		
JGB-70X 69					69	69	
JGB-70X 79					79	79	
JGB-70X 89	70		90		89	89	10
JGB-70X 99					99	99	
JGB-70X 109				+0.035 +0.013	109	100	
JGB-70X 119					119		
JGB-80X 69					69	69	
JGB-80X 79		+0.029 +0.010			79	79	
JGB-80X 89	80		100		89	89	10
JGB-80X 99					99	99	
JGB-80X 119					109	100	
JGB-80X 229					119		

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

JTW 标准止推垫片尺寸 STANDARA SERIES OF JTW THRUST WASHERS





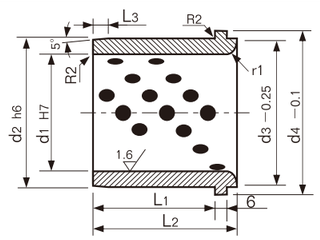
运动方向
Sliding direction

Unit(单位):mm

规格代码 Standard No .	ϕd	公差 Tolerance	ϕD	T	孔距 Pitch W	孔数 Hole	平顶螺钉 Flat head Screw	d1	倒角 Chamfering
JTW-1003	10.2		30		20				1.5
JTW-1203	12.2								
JTW-1303	13.2		40		28				
JTW-1403	14.2			3			M3	3.5	2
JTW-1503	15.2								
JTW-1603	16.2		50		35				
JTW-1803	18.2					2			
JTW-2005	20.2	+0.2 +0.1							
JTW-2505	25.2		55	5	40		M5	6	2.5
JTW-3005	30.2		60		45				
JTW-3505	35.2		70		50				
JTW-4007	40.2		80		60				
JTW-4507	45.2		90	7	70		M6	7	3
JTW-5008	50.3		100		75				
JTW-5508	55.3		110		85				
JTW-6008	60.3		120	8	90				
JTW-6508	65.3		125		95				
JTW-7010	70.3		130		100		M8	9	
JTW-7510	75.3		140		110	4			5
JTW-8010	80.3	+0.3 +0.1	150		120				
JTW-9010	90.5		170	10	140				
JTW-10010	100.5		190		160		M10	11	
JTW-12010	120.5		200		175				

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

JNA 汽车模具标准导套 STANDARD GUIDE BUSHING



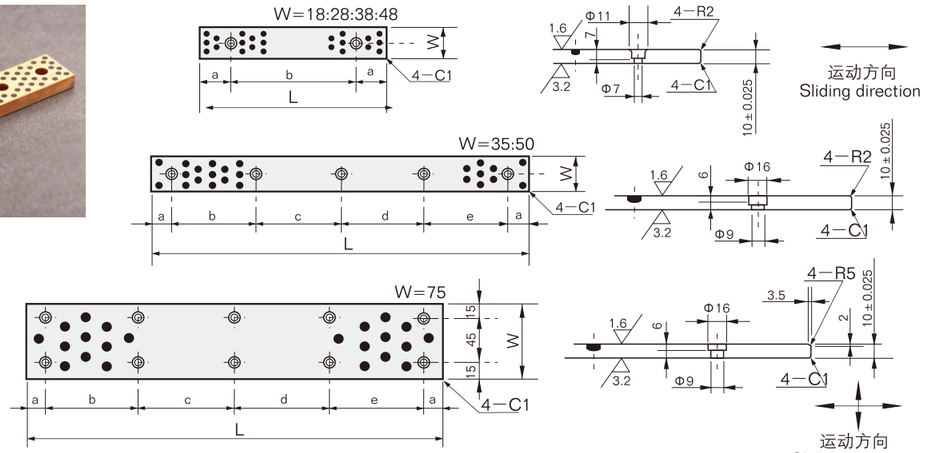
运动方向
Sliding direction

Unit(单位):mm

规格代码 Standard No .	d1	H7	d2	h6	d3	d4	L1	L2	L3	r1
JNA-32 x 50	32		40	+0.009 +0.025	40	50	40	50	4	3
JNA-40 x 63	40	+0.016	50		50	63	50	63	5	3
JNA-50 x 71	50		63	+0.010 -0.029	63	71	56	71	6	5
JNA-63 x 80	63	+0.019	80		80	90	63	80	8	6

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

JSP 标准滑板尺寸 STANDARA SERIES OF JSP OILLESS WEAR PLATE



Unit(单位):mm

规格代码 Standard No .	W $^{0}_{-0.2}$	L	螺孔 Screw Holes					螺钉 Bolt	
			a	b	c	d	e	规格 Standard	数量 Quantity
JSP-1875	18	75	15	45				M6	2
JSP-18100		100	25	50				M6	2
JSP-18125		125	25	75				M6	2
JSP-18150		150	25	100				M6	2
JSP-2875	28	75	15	45				M6	2
JSP-28100		100	25	50				M6	2
JSP-28125		125	25	75				M6	2
JSP-28150		150	25	100				M6	2
JSP-35100	35	100	20	60				M8	2
JSP-35150		150	20	55	55			M8	3
JSP-35200		200	20	55	50	55		M8	4
JSP-35250		250	20	70	70	70		M8	4
JSP-35300		300	20	65	65	65	65	M8	5
JSP-35350		350	20	80	75	75	80	M8	5
JSP-3875	38	75	15	45				M6	2
JSP-38100		100	25	50				M6	2
JSP-38125		125	25	75				M6	2
JSP-38150		150	25	100				M6	2
JSP-4875	48	75	15	45				M6	2
JSP-48100		100	25	50				M6	2
JSP-48125		125	25	75				M6	2
JSP-48150		150	50	100				M6	2
JSP-50100	50	100	20	60				M8	2
JSP-50150		150	20	55	55			M8	3
JSP-50200		200	20	55	50	55		M8	4
JSP-50250		250	20	70	70	70		M8	4
JSP-50300		300	20	65	65	65	65	M8	5
JSP-50400		400	20	90	90	90	90	M8	5
JSP-75150	75	150	20	110				M8	4
JSP-75200		200	20	85	80			M8	6
JSP-75250		250	20	105	105			M8	6
JSP-75300		300	20	85	90	85		M8	8
JSP-75400		400	20	120	120	120		M8	8

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

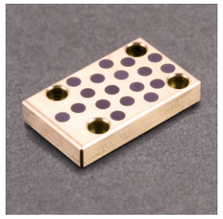
JSL L型标准滑板尺寸 L SHAPE OILLESS WEAR PALTE

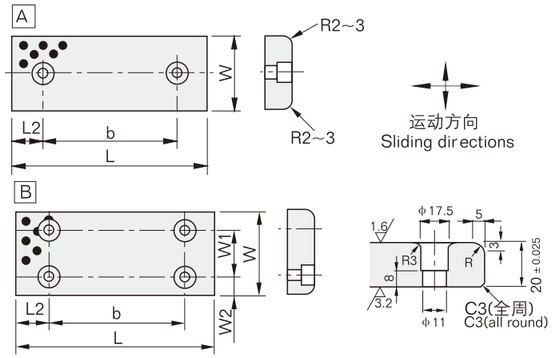
Unit(单位):mm

规格代码 Standard No .	W	L	a	b	c	d	镙钉 Bolt	数量 Quantity	图示 Icon
JSL- 20100	20	100	60	—	—		M8	2	A
JSL- 20150		150	55	55				3	
JSL- 20200		200	55	50	55			4	
JSL- 30100	30	100	60	—	—	—	M10	2	B
JSL- 30150		150	55	55				3	
JSL- 30200		200	55	50	55			4	
JSL- 30250		250	70	70	70			4	
JSL- 45200	45	200	55	50	55			4	C
JSL- 45250		250	70	70	70			4	
JSL- 45300		300	65	65	65	65		5	
JSL- 45350		350	80	75	75	80		5	

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

JESW 自润滑板 OILLESS WEAR PLATE



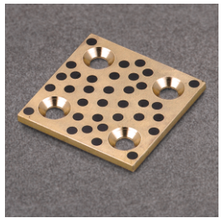


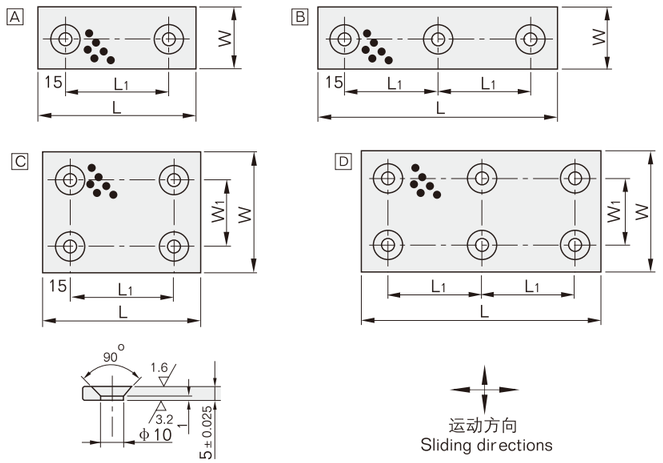
Unit(单位):mm

规格型号 Standard No .	W	L	W1	W2	L1	L2
JESW- 28×75	28	75	——	——	45	15
JESW- 28×100		100			50	25
JESW- 28×150		150			100	
JESW- 38×75	38	75			45	15
JESW- 38×100		100			50	25
JESW- 38×150		150			100	
JESW- 48×75	48	75			45	15
JESW- 48×100		100			50	25
JESW- 48×125		125	——	——	75	
JESW- 48×150		150			100	
JESW- 48×200		200			150	
JESW- 58×75	58	75			45	15
JESW- 58×100		100			50	25
JESW- 58×150		150			100	
JESW- 75×75	75	75			25	
JESW- 75×100		100			50	
JESW- 75×125		125			75	
JESW- 75×150		150			100	
JESW- 75×200		200			150	
JESW- 100×100	100	100	50	25	50	25
JESW- 100×125		125			75	
JESW- 100×150		150			100	
JESW- 100×200		200			150	
JESW- 100×250		250			200	
JESW- 100×300		300				50
JESW- 125×125	125	125		37.5	75	25
JESW- 125×150		150			100	
JESW- 125×200		200			150	
JESW- 125×250		250				
JESW- 125×300		300			200	50
JESW- 125×350		350				75
JESW- 150×150	150	150	100	25	100	25
JESW- 150×200		200			150	
JESW- 150×250		250			200	

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

JUWP 自润滑板 OILLESS WEAR PLATE

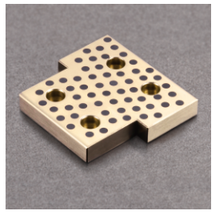


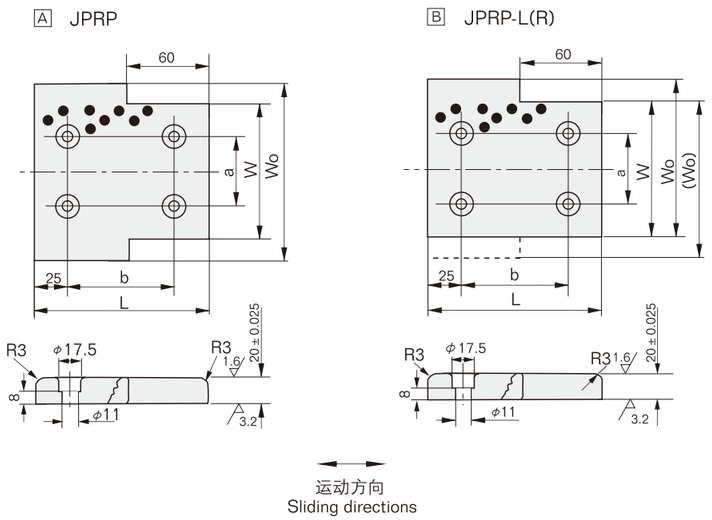


Unit(单位):mm

规格型号 Type	W	L	W1	L1	d	h	螺栓 Mounting Bolt
JUWP- 18×50	18	50	——	22	6.5	1.5	M6
JUWP- 18×75		75		45			
JUWP- 18×100		100		70			
JUWP- 18×150		150		60			
JUWP- 28×50	28	50	——	20			
JUWP- 28×75		75		45			
JUWP- 28×100		100		70			
JUWP- 28×150		150		60			
JUWP- 38×50	38	50	——	20			
JUWP- 38×75		75		45			
JUWP- 38×100		100		70			
JUWP- 38×150		150		60			
JUWP- 48×75	48	75	——	45	10	0.8	M8
JUWP- 48×100		100		70			
JUWP- 48×125		125		95			
JUWP- 48×150		150		60			
JUWP- 75×75	75	75	45	45			
JUWP- 75×100		100		70			
JUWP- 75×125		125		95			
JUWP- 75×150		150		60			
JUWP- 100×100	100	100	70	70			
JUWP- 100×125		125		95			
JUWP- 100×150		150		60			

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工





Unit(单位):mm

规格型号 Type	W	L	WO	a	b	尺寸图 SKETCH
JPRP-100125	100	125	130	50	75	
JPRP-100150		150			100	
JPRP-125150		150			100	
JPRP-125200	125	200	155	75	150	A
JPRP-125250		250			200	
JPRP-150200	150	200	180	100	150	
JPRP-150250		250			200	
JPRP-L(R)-100125	100	125	115	50	75	
JPRP-L(R)-100150		150			100	
JPRP-L(R)-125150		150			100	
JPRP-L(R)-125200	125	200	140	75	150	B
JPRP-L(R)-125250		250			200	
JPRP-L(R)-150200	150	200	165	100	150	
JPRP-L(R)-150250		250			200	

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

HT-M 系列

产品介绍 Product introduction

HT–M弹簧钢卷制轴承是以弹簧钢板为基材进行卷制，然后经整体淬火内表研磨处理而成。该产品取代普通的轴承钢产品，具有硬度适中、承载能力强、耐磨性能好等优点，该产品富有本能的弹性特点，在受严重冲击时对轴有缓冲保护作用。我公司生产的产品，与国外同类产品相比，其接缝形式的设计更具有科学性，易装配、易定位、能充分发挥轴套的弹性。

产品在装配入座孔后，依靠自身的弹性固定在座孔中，产品内孔经研磨后尺寸精度高，当轴运转时，如受摩擦力较大时，轴承会自我调整位置，与轴相容抗咬合，从而达到使用寿命长，保护设备不受损伤的作用。

HT-M Spring steel wrapped bushing is based on the spring steel plate, treared by quenching and rubbing technique. It is designed to replace the common bearing steel bushings. it has advantages as: mezzo hardness, higher capability for press load, good wear resistance performance and so on. And also, for sake of its instinctive elasticity of the material, the bushing could protect the shaft by the buffering power when eduruing bery serious impacts. Compared with the similar products abroad, our designing of the interface on the bushing is more scientific, easy to be assenbled and fixed and also easy for the bushing to perform its advantage of elasiticity adequately.

When pressed into the housing, the bushing will be fixed in the housing by its elasticity. Since the bore of the bushing is grinded, the tolerance range for it is very precise. When the shaft is working, the bushing can adjust its position if the friction force is big. The equipment can be protected from been damaged by the bushing's good anti-occlude performance with the shaft.

THREE STAR BRARING

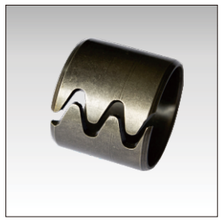
产品技术指标
Product technical index

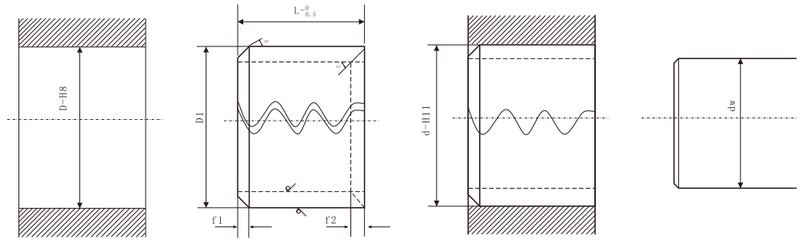
材质（Material）：65Mn

元素 element	材质成分（%） composition
C	0.62~0.70
Si	0.17~0.37
Mn	0.70~1.00
Cr	≤0.25
Fe	余量（Remainder）

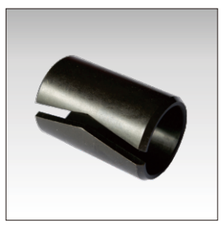
性能
Characteristics

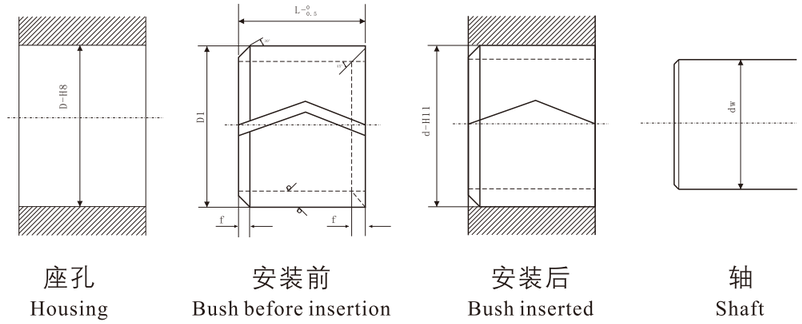
硬度 Hardness	HRC42~48
最高静承载 Max.Static Load	650N/mm²
最高动承载 Max.Dynamic Load	100N/mm²
最大线速度 Max.Speed	0.1m/s
最高使用温度 Max.Temperature	200℃
油润滑摩擦因数 Friction Coefficient（oil）	≤0.18



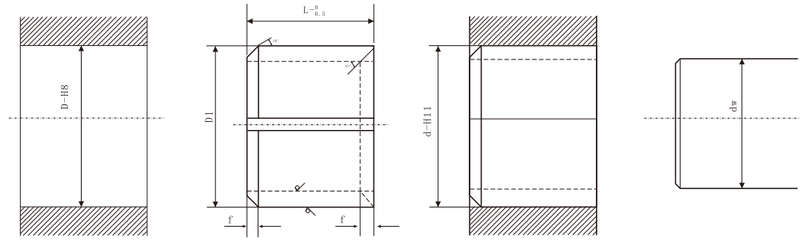


座孔 Housing　安装前 Bush before insertion　安装后 Bush inserted　轴 Shaft





座孔 Housing　安装前 Bush before insertion　安装后 Bush inserted　轴 Shaft



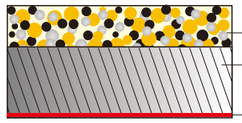
座孔 Housing　安装前 Bush before insertion　安装后 Bush inserted　轴 Shaft

d	D	D1	外径 O.D.	内径 I.D.	座孔H7 Housing Bore(H7)	轴（f8） Shaft	f1	f2	L 0 −0.40										
									10	15	20	25	30	40	50	60	80	90	100
14	20	20 +1.5 +0.5	20 +0.052	14 +0.11	20 +0.033	14 -0.016 -0.043	2.2	1	●	●	●	●	●						
15	20	20 +1.5 +0.5	20 +0.052	15 +0.11	20 +0.033	15 -0.016 -0.043	2.2	1	●	●	●	●	●						
16	22	22 +1.5 +0.5	22 +0.052	16 +0.11	22 +0.033	16 -0.016 -0.043	2.2	1	●	●	●	●	●	●					
18	24	24 +1.5 +0.5	24 +0.052	18 +0.11	24 +0.033	18 -0.016 -0.043	2.2	1	●	●	●	●	●	●					
20	25	25 +1.5 +0.5	25 +0.052	20 +0.13	25 +0.033	20 -0.02 -0.053	2.2	1	●	●	●	●	●	●					
22	28	28 +1.5 +0.5	28 +0.052	22 +0.13	28 +0.033	22 -0.02 -0.053	2.2	1	●	●	●	●	●	●					
24	30	30 +1.5 +0.5	30 +0.052	24 +0.13	30 +0.033	24 -0.02 -0.053	2.2	1		●	●	●	●	●	●	●			
25	32	32 +1.5 +0.5	32 +0.062	25 +0.13	32 +0.039	25 -0.02 -0.053	2.2	1		●	●	●	●	●	●	●			
28	35	35 +1.5 +0.5	35 +0.062	28 +0.13	35 +0.039	28 -0.02 -0.053	2.2	1		●	●	●	●	●	●	●			
30	38	38 +1.5 +0.5	38 +0.062	30 +0.13	38 +0.039	30 -0.02 -0.053	2.2	1			●	●	●	●	●	●			
32	40	40 +1.5 +0.5	40 +0.062	32 +0.16	40 +0.039	32 -0.025 -0.064	2.2	1			●	●	●	●	●	●			
35	44	44 +2.3 +0.8	44 +0.062	35 +0.16	44 +0.039	35 -0.025 -0.064	2.2	1			●	●	●	●	●	●			
36	45	45 +2.3 +0.8	45 +0.062	36 +0.16	45 +0.039	36 -0.025 -0.064	2.2	1				●	●	●	●	●	●		
38	48	48 +2.3 +0.8	48 +0.062	38 +0.16	48 +0.039	38 -0.025 -0.064	2.2	1				●	●	●	●	●	●		
40	50	50 +2.3 +0.8	50 +0.062	40 +0.16	50 +0.039	40 -0.025 -0.064	2.6	1				●	●	●	●	●	●		
42	52	52 +2.3 +0.8	52 +0.074	42 +0.16	52 +0.046	42 -0.025 -0.064	2.6	1					●	●	●	●	●	●	
45	55	55 +2.3 +0.8	55 +0.074	45 +0.16	55 +0.046	45 -0.025 -0.064	2.6	1					●	●	●	●	●	●	
48	58	58 +2.3 +0.8	58 +0.074	48 +0.16	58 +0.046	48 -0.025 -0.064	2.6	1					●	●	●	●	●	●	
50	60	60 +2.3 +0.8	60 +0.074	50 +0.16	60 +0.046	50 -0.025 -0.064	2.6	1					●	●	●	●	●	●	
52	60	60 +2.3 +0.8	60 +0.074	52 +0.19	60 +0.046	52 -0.03 -0.076	2.6	1						●	●	●	●	●	●
55	65	65 +2.3 +0.8	65 +0.074	55 +0.19	65 +0.046	55 -0.03 -0.076	2.6	1						●	●	●	●	●	●
60	70	70 +2.3 +0.8	70 +0.074	60 +0.19	70 +0.046	60 -0.03 -0.076	2.6	1						●	●	●	●	●	●
65	75	75 +3.0 +1.0	75 +0.074	65 +0.19	75 +0.046	65 -0.03 -0.076	2.6	1						●	●	●	●	●	●
70	80	80 +3.0 +1.0	80 +0.074	70 +0.19	80 +0.046	70 -0.03 -0.076	3.2	1						●	●	●	●	●	●
75	85	85 +3.0 +1.0	85 +0.87	75 +0.19	85 +0.054	75 -0.03 -0.076	3.2	1							●	●	●	●	●
80	90	90 +3.0 +1.0	90 +0.87	80 +0.19	90 +0.054	80 -0.03 -0.076	3.2	1							●	●	●	●	●
85	95	95 +3.0 +1.0	95 +0.87	85 +0.22	95 +0.054	85 -0.036 -0.09	3.2	1							●	●	●	●	●
90	100	100 +3.0 +1.0	100 +0.87	90 +0.22	100 +0.054	90 -0.036 -0.09	3.2	1							●	●	●	●	●
95	105	105 +3.0 +1.0	105 +0.87	95 +0.22	105 +0.054	95 -0.036 -0.09	3.2	1							●	●	●	●	●
100	115	115 +3.0 +1.0	115 +0.87	100 +0.22	115 +0.054	100 -0.036 -0.09	3.2	1							●	●	●	●	●
105	115	115 +3.0 +1.0	115 +0.87	105 +0.22	115 +0.054	105 -0.036 -0.09	3.2	1									●	●	●

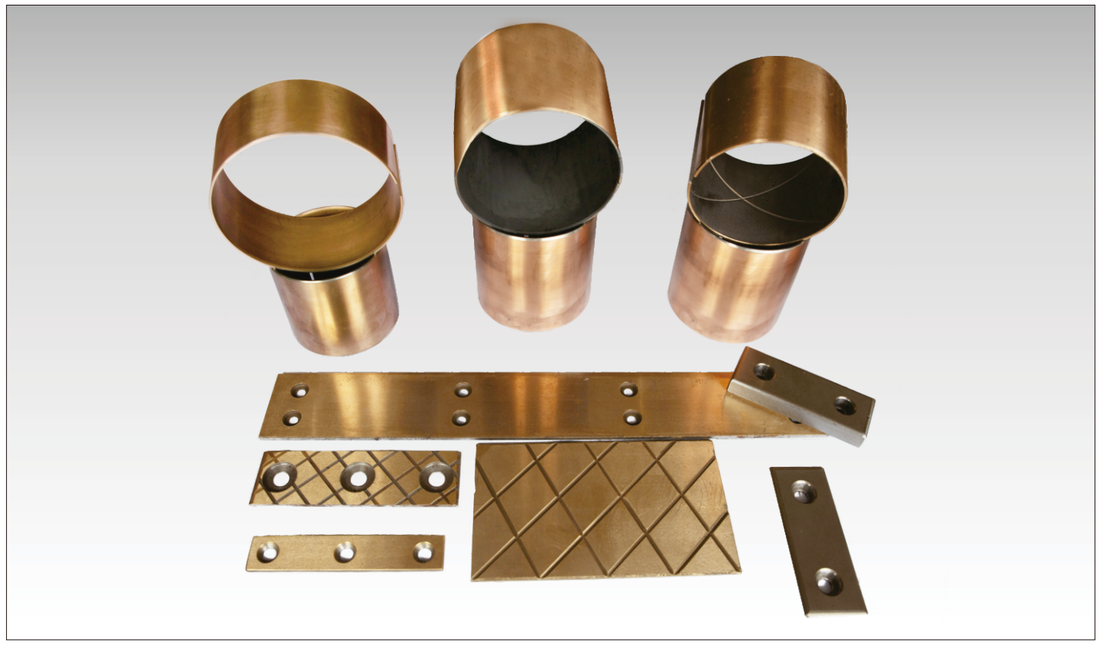
TF 系列

标准产品尺寸 Standard size P. 53

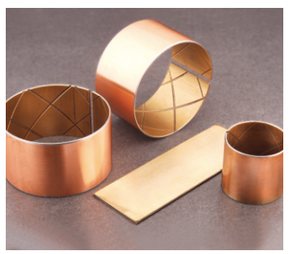
材料结构图
Structure



钢铜合金+石墨的混合层
Steel copper alloy+Mixed layer of graphite
钢基
Steel backing
电镀层：镀锡层或镀铜层 / 无
Copper plating



TF-1



TF－1双金属轴承，是以低碳钢板为基体材料，用特殊工艺表面烧结CuPb10Sn10+C材料的钢铜合金新一代改良产品。做成衬套后，具有JF－800双金属轴承的耐压、耐磨性能，经过石墨散嵌后达到了无给油润滑的作用。在少油条件下磨擦系数较少，完全防御咬轴的现象，该产品适用于橡胶轮胎模具的导向部位，升降设备的滑动部位，水轮机的高速滑动部们等高温、高速、不能长期加油的场合。

TF-1 self-lubrication bearings are improved according to JF-800 bimetal bushings.It has obvious advantages of anti-friction,even it works under condition of without oil,the graphite in the bushing can protect shaft from being seizing when the bushing works without oil lubrication or under high temperate.The bushing can be used in guiding part of mould for rubber tyre,sliding part of lift and sliding part of water turbine sliding with high speed.

合金层 Alloy layer	CuPb10Sn10+C	最高承载压力（静） Max load capacity(Static)	320N/mm²
合金层厚度 Alloy layer thickness	0.5~1.5mm	最高承载压力（动） Max load capacity(Dynamic)	150N/mm²
金相组织结构 Metallographic structure	三级以上	摩擦系数 Friction coef	0.05~0.18
合金层硬度 Alloy hardness	>45	最大线速度（干） Max line speed (dry)	0.5m/s
最高使用温度 Temp limit	300℃	极限PV值（干） Max imum PV value(dry)	1N/mm²·m/s
结合强度 Bonding strength	一级		

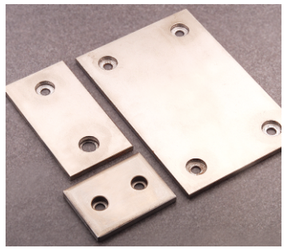
TF-1B

TF－1B青铜合金轴承，是以铜基板为基体材料，用特殊工艺表面烧结CuPb10Sn10+C材料的钢铜合金新一代改良产品。做成衬套后，具有JF－800双金属轴承的耐压、耐磨性能，经过石墨散嵌后达到了无给油润滑的作用。在少油条件下磨擦系数较少，完全防御咬轴的现象，该产品适用于橡胶轮胎模具的导向部位，升降设备的滑动部位，水轮机的高速滑动部们等高温、高速、不能长期加油的场合。

TF-1 self-lubrication bearings are improved according to JF-800 bimetal bushings.It has obvious advantages of anti-friction,even it works under condition of without oil,the graphite in the bushing can protect shaft from being seizing when the bushing works without oil lubrication or under high temperate.The bushing can be used in guiding part of mould for rubber tyre,sliding part of lift and sliding part of water turbine sliding with high speed.

合金层 Alloy layer	CuPb10Sn10+C	最高承载压力（静） Max load capacity(Static)	320N/mm²
合金层厚度 Alloy layer thickness	0.5~1.5mm	最高承载压力（动） Max load capacity(Dynamic)	150N/mm²
金相组织结构 Metallographic structure	三级以上	摩擦系数 Friction coef	0.05~0.18
合金层硬度 Alloy hardness	>45	最大线速度（干） Max line speed (dry)	0.5m/s
最高使用温度 Temp limit	300℃	极限PV值（干） Max imum PV value(dry)	1N/mm²·m/s
结合强度 Bonding strength	一级		

TF-2H



TF－2H双金属滑板滑块，是以低碳钢板为基体材料，采用特殊工艺表面烧结CuSn5Ni20Fe38+C材料的钢铜合金新无铅改良滑板、滑块产品。做成滑块、滑板后应于露天使用的铁路扳道滑块，既耐磨又可不保养，也适应用于汽车模具滑块和高温的冶金设备上使用。

TF-2 is a new self-lubrication bearing for high temperature.It has better performance than TF-1 series in anti-rust,anti-higher temperature.It is widely used in rail switch in the open air for anti-friction performance and it is free of maintenance,it also used as wear plate in auto mould,guide plate for high speed punching machines and metallurgy machines.

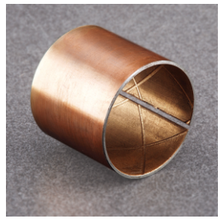
合金层 Alloy layer	CuSn5Ni20Fe38+C	最高承载压力（静） Max load capacity(Static)	73.5N/mm²
合金层厚度 Alloy layer thickness	0.5~1.5mm	最高承载压力（动） Max load capacity(Dynamic)	24.5N/mm²
金相组织结构 Metallographic structure	三级以上	摩擦系数 Friction coef	0.03~0.18
合金层硬度 Alloy hardness	>45	最大线速度（干） Max line speed (dry)	0.5m/s
最高使用温度 Temp limit	600℃	极限PV值（干） Max imum PV value(dry)	1.63N/mm²·m/s
结合强度 Bonding strength	一级		

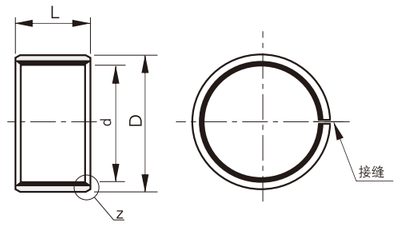
FU

Fu铜基含油轴承是以锡青铜粉末为料经过模具压制，在高温中烧结后整形而成。它的基体有细微、均匀的孔隙，经润滑油真空浸渍后形成含油状态。该产品具有短期不加油润滑，使用成本低，内外径尺寸可变化等特点，适应于中速低载负的场所使用。产品已广泛应用于家用电器、电动工具、纺织机械、化工机械、汽车工业和办公设备中及一些普通机械场合使用。

FU the bonze powder is mold pressed underhigh temperature,and oil is soaked into the homogeneously spreaded tiny pores of the metal under vacuum. Fubearing can withstand dry condition in medium speed and low oad for sometime. Moreover it ischeap and stable in dimension. This is widely used in domestic electric and electronic machines,electro tools, textile machines, chemicaengineering machines, automobiles and official business machines.

最大承载压力 Max load capacity	120 N/mm²
适用的温度范围 Working Temperature	-100℃~+200℃
最高滑动速度 Max line speed	2.5 m/s
合金材质 Alloy material	CuSn6-6-3
最高PV值 Max imum PV value	2.45 N/mm².m/s



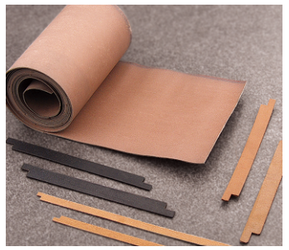


Unit(单位):mm

D		压入座孔后的内径 I.D.after fixed		壁厚 Wall Thickness	座孔H7 Housing Bore(H7)		轴径 Shaft Dia. f7		f_1	f_2	L $^{0}_{-0.40}$										
											10	15	20	25	30	40	50	60	80	90	100
23		20	+0.043	1.5 −0.030	23		20		1.0	0.6	●	●	●								
25		22			25		22				●	●	●	●							
27	+0.054 +0.041	24			27	+0.021	24	−0.065 −0.086			●	●	●	●	●						
28		25			28		25					●	●	●	●						
30		26	+0.052		30		26					●	●	●	●						
32		28		2 −0.035	32		28		1.5	0.8		●	●	●	●	●					
34	+0.064 +0.048	30			34		30					●	●	●	●	●					
36		32			36		32					●	●	●	●	●					
39		35			39	+0.025	35	−0.080 −0.105					●	●	●	●	●				
42		38	+0.062		42		38						●	●	●	●	●				
44	+0.070 +0.054	40			44		40						●	●	●	●	●				
50		45			50		45						●	●	●	●	●				
55		50		2.5 −0.040	55		50		1.8	1.0					●	●	●				
60	+0.085 +0.066	55			60		55								●	●	●	●			
65		60			65	+0.030	60								●	●	●	●			
70		65	+0.074		70		65	−0.100 −0.130							●	●	●	●			
75	+0.094 +0.075	70			75		70								●	●	●	●	●		
80		75			80		75								●	●	●	●			
85		80			85		80									●	●	●	●		
90	+0.113 +0.091	84			90		84									●	●	●	●		
95		89			95	+0.035	89									●	●	●	●		
100		94			100		94	−0.120 −0.155									●	●	●	●	
105		99	+0.087	3 −0.045	105		99		2.5	1.5							●	●	●	●	
110	+0.126 +0.104	104			110		104										●	●	●		
115		109			115		109										●	●	●		
120		114			120		114										●	●	●		
125		119			125		119										●	●	●		
130	+0.147 +0.122	123			130		123										●	●	●		●
135		128			135	+0.040	128	−0.145 −0.185									●	●	●		●
140		133	+0.100		140		133										●	●	●		●
145	+0.159 +0.134	138			145		138											●	●		●
150		143			150		143											●	●		●

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

FD

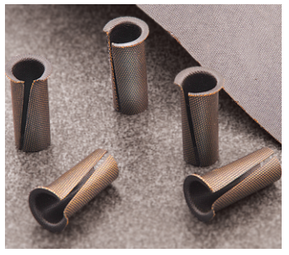


FD含铜四氟带是聚四氟乙烯（PTFE）为主要原料，填充铜粉等耐磨材料，经模具压制烧结而成，具有良好的耐磨性。其抗拉强度可以满足单体活塞环使用条件。摩擦系数低，在有油润滑和无油润滑条件下都能正常使用，是汽车减震器、活塞环的最佳选择。目前，一汽奥迪和大众桑塔纳、富康轿车都采用此产品，它能长期保持较低的摩擦系数。

FD soft strip is based on PTFE andmold pressed and sintered into is of low friction, low wear. Its tensile strength can meet the motion of mono piston ring. Due to its low friction, FD1 can be applied under oil or without oil and so it's the best choice of auto damper, piston ring. At present, it is adopted in a lot of China autos such as Aud,Volkswogen, Cetiron ect and it maintains loW friction long-termly.

抗拉强度 Tensile s trength	22N/mm
摩擦系数 Friction coef	0.09
最高滑动速度 Max line s peed	1.5m/s
使用温度 Working temperature	-100℃+250℃

FR

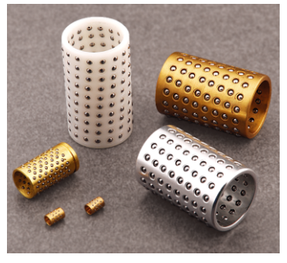


FR四氟软带轴承以青铜丝网为基体，通过特殊工艺。表面轧制聚四氟乙烯（PTFE）和其它填充减磨材料的混合物。它具有较低的摩擦系数，较好的耐磨特性。由于它的柔软性能好，可以做钢与钢对磨的隔膜，实现无间隙、无噪音、无油润滑无保养、无污染的理想目的。目前，产品已广泛应用在纺织机械关节轴承、汽车门铰链及仪器仪表、汽车操纵杆等场合。

FR is a composites material with bronze wire mesh as frame and calendered with a film of filled poly tetrafluoroethyene. This is of low friction and low wear, and is rather soft and is to be applied readily by inserting between the two rubbing metal surfaces,and can fulfill The ideal aim of no noise, no lubricating, no maintenance and no pollution. At present, this is applied in those mechanical elements under relatively low load and low speed. Such sa in textile machines, spherical bearings. Automobile door hinge and the operating rod forcare.

最大承载压力 Max load capacity	30N/mm²
适用温度范围 Working temperature	-40℃~+260℃
最高滑动速度 Max line speed	2.5m/s
摩擦系数 Friction coef	0.05~0.20
允许最高PV值 Max imum PV value	1.65N/mm²·m/s

FZ

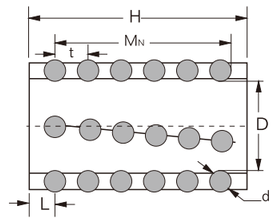


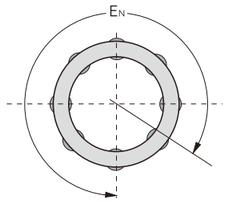
标准产品尺寸 Standard size P. 55

该产品用钢球滚动原理，配上铜基、铝基或树脂为保持架，按一定的角度和密度有序地排列。采用最新沟槽圆周锁珠工艺，防止钢珠脱落。产品具有摩擦系数低，轴向、径向都能运动的特点，依靠滚动摩擦，实现无间隙装配，保证了使用精度。该产品是传统导柱套的更新换代产品，能高速运动，主要用于冷冲模滚动模架及高精度机床机床附件等领域。

This is copper or aluminum or plastic based material, on which therollers are arranged oderly in certain angle and intervals. Moreover, the retaining technique is improved that dropping of the rollers can be thoroughly prevented The friction is low abdcan move freely both in axial directions, and the bearings in high precision. This is a oung generation of the roller berinf which can roll in high speed, and is used in rolling frane of cold impact moulds, high precision machine tools and their accessories.

最大承载压力 Max load capacity	30N/mm²
装配过盈 Shrink fit	0.01mm~0.02mm
最高滑动速度(脂润滑) Max line speed(Grease Lubrication)	6m/s
摩擦系数 Friction coef	0.01~0.08
滚珠直径差 Tolerance for ball dia.	<0.002mm





Unit(单位):mm

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

注：产品规格不在样本范围内，可根据客户图纸要求，定制加工

通用外径检验方法（ISO3547-2:PIN 1444-2 检验方法B）
Common test method of outside diameter (ISO3547-2:PIN 1444-2 检验方法B)

轴套用手压入环规通端（最大用力250N），通过

Press the bushes into the GO ring gauge and then push them through with hand pressure(maximum force 250N)

轴套用同样方法与同样力，压入环规止端，通不过

On the other hand with the same force, It shall not be possible for them to go into the NOGO ring gauge

通用的内径检验方法（ISO3547-2:PIN 1444-2 检验方法C）
Common test method of inner diameter test (ISO3547-2:PIN 1444-2 检验方法B)

检验内径，轴承压入环规，塞规通过用较小力，塞规止端通不过用力最大不超过250N

To check the inner diameter, the bush is to be press into a ring gauge. The GO plug gauge shall be inserted by a minimum effort, The NOGO Plug gauge shall not be insert by mutual pressure (maximum force 250N)

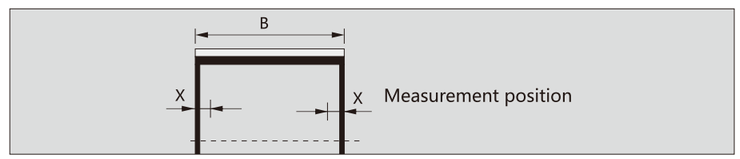
(注意：当轴承压入环规，轴承外径可能会被永久减少)

(Note: When the bush is pressed into the ring gague, It is possible that There will be a permanent reduction in the outside diameter)

通用的壁厚测量方法：
Common methed of wall thickness measurement:

用壁厚千分尺检测轴承壁厚，来间接计算轴承内径。注意：根据DIN 1494-1， 切记在图纸上不能同时标注检测轴承壁厚和内径。

Check the wall thickness of the bush with a wall thickness micrometer and then calculate out the inside diameter. According to ISO3547-2 make sure not to both mark the wall thickness and inside diameter on the drawing.



B[mm]	X[mm]	Measurement position
B≥15	B/2	1
15< B≤50	4	2
50< B≤90	6 and B/2	3
B> 90	8 and B/2	3

轴承选择 Bearing Selection

三星轴承公司根据不同的工况条件设计了不同的轴承材料。一般来说，用户在使用和设计时应当根据轴承的使用温度、承载面压、线速度、耐磨性能要求、运动类型、安装情况、轴承成本等各方面因素综合考虑。

THREE STAR BEARING have developed kinds of bearing material According to difference work condition .The user can select the material the material base on bearing work environment, load, speed, wear resistance resistance request, moving method, etc.

面压计算 Bearing Load:

直套、翻边产品 Cylidrncal bushes, flange bushes

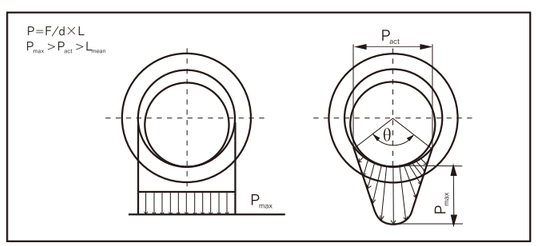
$$P=\frac{F}{d\times L}\ (N/mm^2)$$

F=轴承承载值 Load（N）
d=轴径 Shaft（mm）
L=轴承长度 Bearing Length（mm）

止推垫片 Thrust washer

$$P=\frac{4F}{\pi (D^2-d^2)}\ (N/mm^2)$$

F=垫片承载值 Load（N）
d=垫片 外径 Shaft(mm)
L=垫片 内径 Bearing Length（mm）



由于受配合间隙、材料强度、轴承倒角、内部油槽等原因的影响，轴承的真正承载面压（P）会大于理论计算值（P）
As the factor of clearance, bushes chamfer, oil groove etc., The actually load(P)is higher than theory of calculation(P)

线速度计算 Bearing Load:

旋转运动 Rotating motion

$$V=\frac{\pi\times d\times n}{1000\times 60}\ (m/s)$$

d=轴径 Shaft（mm）
n=转数/分 Rpm

往复运动 Rotating motion

$$V=\frac{2s\times c}{60}\ (m/s)$$

s=行程长度 Stoke distance（m）
c=往复频率 frequency（次数/分）

摇摆运动 Oscillating motion

$$V=\frac{\pi\times d\times C\times \theta}{1000\times 360\times 60}\ (m/s)$$

d=轴径 Shaft（mm）
C=摇摆频率 frequency（次数/分）
θ=摇摆角度 Oscillating angle

PV值计算PV=P×V（N/mm²×m/s）

PV值是指轴承在一定的承载和线速度条件下的乘积之和，PV值与轴承的使用寿命成反比例关系。因此建议设计时尽量使用比较低的安全的PV值，以确保轴承会有更长的寿命。同时在选择材料时也要注意不能超过承载、线速度、使用温度等极限值，并尽可能地小。

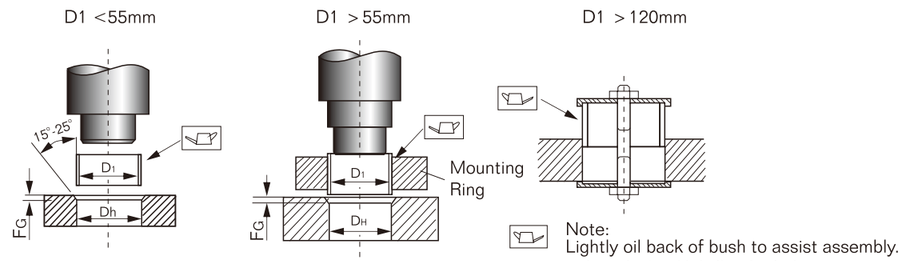
PV is the product of the specific bearing load P and the sliding speed V which is very important design date. We recommend design lower PV value will leads to longer service life. Also don′ t exceed the max. of material load, speed, temp. and lower if possible.

安装注意事项 Installation:

1）直轴承的装配方法
Fixing methods for straight bearings

芯轴引导棒的直径比安装后的轴承直径小0.1～0.3mm。芯轴最好进行热处理。为便于压装，可在轴承外径面上涂一点油，切勿以铁锤直接敲打衬套的端面等冲击方法压入；安装大直径d>55mm轴承时，必须采取措施，校准轴承接缝。

Diameter of the pressing-in arbor is 0.1～0.3mm smaller than the after-fixing diameter of the bearing. It's better to have the core axis heat-treated. For easier fixing, we can add a light coating of oil on the bush backing. Make sure not to fix the bearing into the housing by hammering its end surface. When the diameter of the bearing is more than 55mm, necessary measures must be taken to calibrate the seam position of bearing.

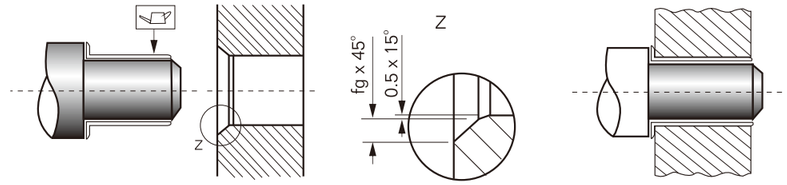


轴承安装
Fitting of bushes

2）翻边轴承的装配方法
Fixing methods for flanged bearings

对于翻边轴承，装配时翻边处的半径应该考虑，座孔要求提供足够大的倒角，以防止翻边轴承翻边半径处的变形。翻边轴承的压装方法和直轴承基本相同，但要求翻边轴承压装芯轴凸缘外径比直轴承压装芯轴凸缘外径大些。

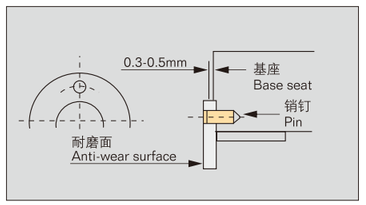
For flanged bearings, the radius at the transition from the radial to the axial component must the flanged folds must be taken into account. A sufficiently large chamfer must be provided on the housing to prevent flanged bush fouling in the area of the radius. Fixing methods for the flanged bearings are similar to that of straight bearings. However, the diameter of the convex part on the pressing-in arbor for flanged bearings needs to be a little bigger.



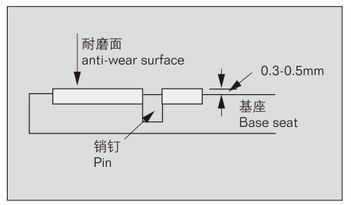
3）止推垫片、平板的装配方法
Fixing methods for thrust washers and gliding plate.

我们推荐采用固定销、沉头螺钉安装止推垫片，采用镶嵌式安装平板。安装止推垫片或平板时，要求润滑层比基座高0.3～0.5mm。

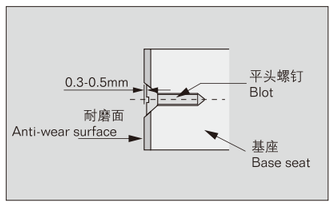
We recommend using a single dowel or countersunk head screw to fix the thrust washer. For the gliding plate we recommend adopting the methods of enchasing. When fix the thrust washer or the gliding plate, the sliding layer shall be 0.3～0.5mm thick.



固定销钉安装
Installing the fixed pin



镶嵌式安装（平板）
Embeded fixing (Plate)



沉头螺钉安装
Blot fixing

轴承与轴的配合要求
Bearing and shaft fit requirements

自润滑轴承的性能在很大程度上受相配轴承材料表面粗糙度、硬度的影响。高质量的轴表面能够延长轴承寿命。相反粗糙的，硬度低的表面影响、降低轴承的使用寿命。

The performance of the self lubricated bearings is largely influenced by the surface roughness and hardness of the material. High quality shaft surface can extend the bearing life. In contrast to rough, low hardness of the surface, reduce the bearing life.

A、轴表面粗糙度
Axis surface roughness

1、在流体润滑条件下使用，要求相配轴表面做镜面加工，尽可能缩小油膜的间隙，使其接近流体润滑状态，从而提高轴承的性能。

Under the condition of fluid lubrication, the surface of the shaft is required to make the mirror surface, so as to reduce the gap of the oil film, and make it close to the fluid lubrication state, so as to improve the performance of the bearing.

2、轴承在干摩擦条件下使用，只要控制其相配轴表面粗糙度Ra=0.4–063的范围内。

Bearing in dry friction conditions, as long as the control of the surface roughness of the Ra=0.4-063 range.

B、轴的硬度
Shaft hardness

轴的表面硬度不低于220HB。在高负荷、摇摆运动条件下，必须将轴进行热处理硬度HRC50以上或镀硬铬，再进行磨加工，经过表面处理后，能提高耐腐蚀性，提高表面硬度，提高润滑性。若在海水中等类似的腐蚀条件下，相配轴必须电镀二至三层硬铬。

轴的表面粗糙、尖角毛刺、沟槽都会损坏轴承的滑动层。

The surface hardness of the shaft is not less than 220HB. In high load and rolling motion condition, it is necessary to heat treatment of the shaft with the hardness of HRC50 or hard chromium plating, and then grinding, after surface treatment, can improve the corrosion resistance, improve the surface hardness, improve the lubrication. If in the middle of the sea water is similar to the corrosion conditions, the matching shaft must be two to three layers of hard chromium plating.

The surface of the shaft, sharp burrs, rough grooves will damage the bearing sliding layer.

轴承与轴承座的配合要求
Bearing and bearing seat of the matching requirements

A、座孔倒角
Hole chamfering

1、直套轴承的座孔要求：相配座孔对应倒角。
Straight sleeve bearing seat hole requirements: Match the seat hole corresponding to the chamfer.

座孔直径 Hole diameter	对应倒角 The corresponding chamfer
＜30	0.8±0.3×20 °±5°
80～80	1.2±0.4×20 °±5°
80～180	1.8±0.8×20 °±5°
＞180	2.5±1.0×20 °±5°

2、翻边轴承相配座孔，座孔要求提供足够大的倒角，以防止其翻边半径处变形
The bearing seat hole flanging match, seat hole requirements provide a large enough to prevent the chamfer, flanging radius of deformation.

座孔直径 Hole diameter	对应倒角 The corresponding chamfer
＜10	1.2±0.2×45 °±5°
＞10	1.7±0.2×45 °±5°

B、轴承座内径要求。bearing seat diameter requirements.

轴承座孔内径配合公差，取H7公差
Bearing bore diameter with tolerance, H7 tolerance

质量是企业的生命力
Quality is the vitality of the enterprise