CSB-EPB®

工程塑料轴承 Plastic Plain Bearings EPB4

标准产品规格表 Standard specifications: P132

产品特性 Product features

- 高温和良好的化学抗性材料。可在200度下连续使用，也适合用于潮湿环境甚至化学液体中。硬质轴材料与之配合使用较好
- 连续使用温度：-40℃/+200℃
- 适合多数中高载荷场合
- 适合干运行、免维护
- 良好的化学抗性
- 适合潮湿环境中使用

- High temperature material with good chemical resistance feature. It could be continously used under the temperature of 200 ℃, it is also suitable to be used in the humid environment and even inside the chemical liquids. It is best to be used against hard materials
- Continuous working temperature: -40℃/+200℃
- Suitable for medium and high load operation
- Maintenance-free dry operation
- Good chemical resistance
- Suitable for humid environment

材料数据表 Material properties data table

材料性能 Material properties	测试标准 Standard	单位 Unit	CSB-EPB4
颜色 Color	-	-	黑色 Black
密度 Density	ISO1183	g/cm^3	1.70
最大吸湿率 Max. moisture absorption, 50%RH	ISO62	%	0.1
最大吸水率 Max. water absorption	ISO62	%	0.3
对钢动摩擦系数 Coefficient of sliding friction(steel)	ITS025	μ	0.07-0.20
极限PV值 Max. PV value	ITS026	N/mm^2 × m/s	1.35
弯曲模量 Flexural modulus	ISO178	MPa	12000
弯曲强度 Flexural strength	ISO178	MPa	165
最大静载荷 Max. static load	ITS027	MPa	90
最大动载荷 Max. dynamic load	ITS028	MPa	50
邵氏硬度 Shore hardness	ISO868	D	82
连续运行温度 Long-term application temperature	ITS029	℃	+200
短时运行温度 Short-term application temperature	ITS029	℃	+240
最低运行温度 Lowest application temperature	ITS029	℃	-40
导热性 Thermal conductivity	ISO22007	W/m/K	0.60
线性热膨胀系数 Coefficient of thermal expansion	ISO11359	K^{-1} × 10^{-5}	4
阻燃等级 Flammability	UL94	Class	V0
体电阻率 Volume resistance	IEC60093	Ω·cm	>10^5
面电阻率 Surface resistance	IEC60093	Ω	>10^5

*ITS: CSB内部测试标准 CSB company's internal test standards.
**除非特殊说明测试温度为23℃ Test temperatures are 23℃ unless otherwise stated.

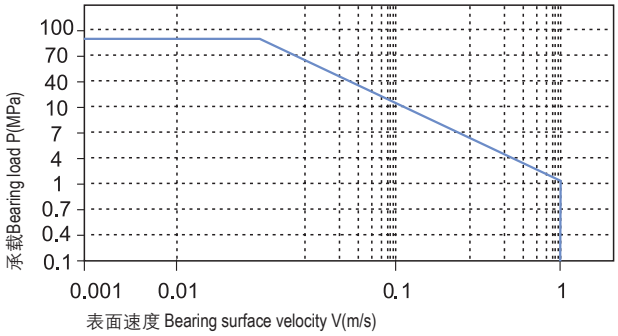
轴承PV值 PV value

CSB-EPB4塑料轴承最大运行PV值1.35N/mm^2 × m/s；由此决定轴承所承受的载荷与速度成反比，详细查阅图表EPB4-1。

The max PV value of the CSB-EPB4 plastic bearings is 1.35N/mm^2 × m/s which determines the load capacity of bearing is inversely proportional to the speed. Please refer to the chart for more detailed information (Graph EPB4-1).

■ PV图表 Permissible PV value for CSB-EPB4

图表 Graph EPB4-1



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轴承的载荷、速度、温度
Load, speed and temperature

CSB-EPB4塑料轴承可承受最大静载荷为90Mpa，在此载荷下轴承的最大压缩变形量参考图表EPB4-2，轴承实际工作载荷略小于90Mpa，载荷还受到运行速度以及温度的影响，速度越快 (Vmax: 1.0m/s) 会导致摩擦温度上升，而温度上升 (Tmax: 200℃) 会导致轴承的承载能力逐渐减弱，载荷随轴承工作温度变化情况参考图表EPB4-3。

CSB-EPB4 allows the Max static load of 90Mpa, The max compressive deformation rate under the max load is listed in Graph EPB4-2, The actual load capacity of bearing is slightly less than 90Mpa, The bearing load is variable against the speed and temperature, Fast speed (Vmax: 1.0m/s) results into higher temperature (Tmax: 200℃) which decreases the load capacity of the bearing. Please refer to the Graph EPB4-3 for such variation.

轴承的摩擦系数、磨损、轴材料
Friction factor, wear and shaft material

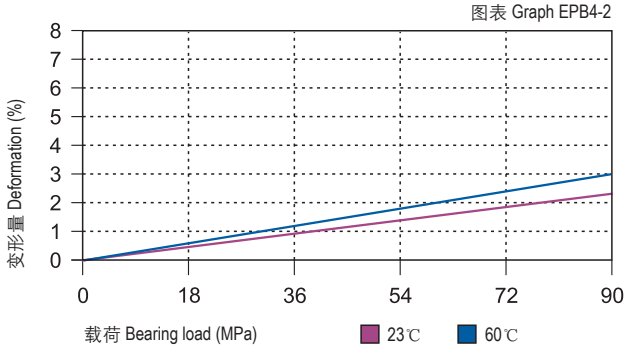
摩擦系数 Friction factor

图表EPB4-4表明CSB-EPB4塑料轴承在载荷保持不变时旋转下的摩擦系数会随着速度的增加而略有减低；图表EPB4-5表明CSB-EPB4塑料轴承在速度保持不变时旋转下的摩擦系数会随着载荷的增加而逐步降低，特别是在载荷小于30Mpa的情况下。图表EPB4-6表明CSB-EPB4塑料轴承的对磨轴粗糙度在Ra0.1 ~ 0.4um时摩擦系数几乎没有变化，但当轴表面粗糙度大于Ra0.4时摩擦系数会快速上升；我们推荐使用轴的粗糙度为Ra0.1 ~ 0.4um。

Friction factor will be slightly decreased along with the speed increasing under certain loading of the rotation operation (see Graph EPB4-4) and it will be slightly decreased along with the loading increasing under certain speed of the rotation operation especially when the loading is less than 30Mpa. Graph EPB4-5 tells that the friction of the CSB-EPB4 is not changed at all when the shaft roughness is between Ra0.1 to Ra0.4 and will be considerably increased when the shaft roughness is over Ra0.4. So the recommended shaft roughness is Ra0.1-Ra0.4.

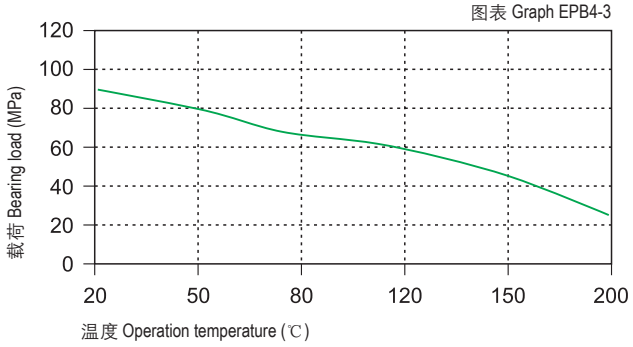
■ 载荷-温度-变形量图表 Load-Temperature deformation

图表 Graph EPB4-2



■ 载荷-温度图表 Load-Temperature diagrams

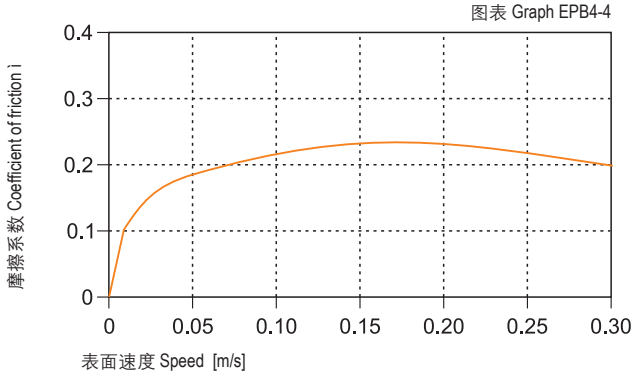
图表 Graph EPB4-3



■ 摩擦系数与速度变化关系图表 P=2MPa

Coefficient of friction & the speed of bearing, p = 2 MPa

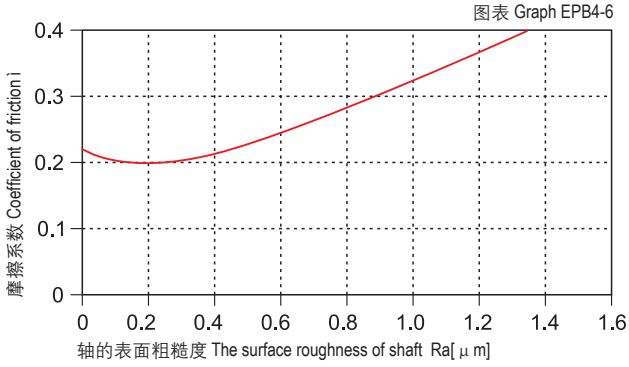
图表 Graph EPB4-4



■ 摩擦系数与轴表面粗糙度关系图表

Coefficient of friction & the surface roughness of shaft

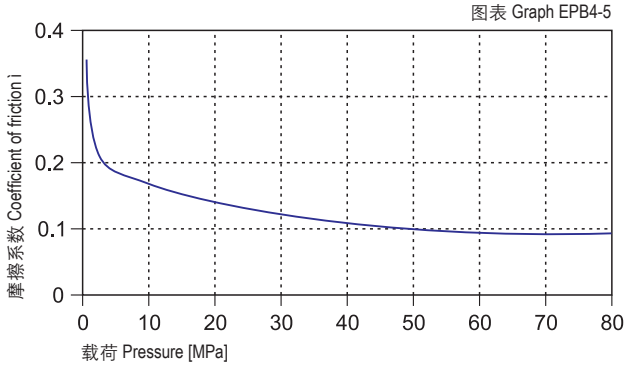
图表 Graph EPB4-6



■ 摩擦系数与载荷变化关系图表 v=0.2m/s

Coefficient of friction & the pressure of bearing, v = 0.2 m/s

图表 Graph EPB4-5



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CSB-EPB4	干运行 Dry	油脂 Grease	油 Oil	水 Water
摩擦系数 μ Friction coef.	0.07~0.20	0.09	0.04	0.04

磨损与轴材料 Wearing and shaft material

图表EPB4-7表明CSB-EPB4塑料轴承在低载荷旋转运动时适合大都数轴材料，而在高载旋转下硬化钢轴表现尤为特出（见图表EPB4-8）；CSB-EPB4塑料轴承在采用不锈钢轴摆动运动下较为合适，而在旋转运动中碳钢轴和硬化钢轴效果比较好。

Graph EPB4-7 shows that CSB-EPB4 is suitable for most of the shaft materials under low loading rotation operation and it is good for hardened carbon steel shaft under high loading rotation operation (see Graph EPB4-8). CSB-EPB4 is suitable for stainless steel shaft under oscillation operation and good for hot rolled carbon steel and hardened carbon steel shaft under rotation operation.

化学抗性 Chemical resistance

CSB-EPB4塑料轴承具有很好的化学抗性，能抵抗绝大多数酸碱。

The Chemical Resistance of CSB-EPB4 is fairly good against most of Acid and Alkalis.

吸水性 Water absorption

CSB-EPB4塑料轴承在标准大气中的吸湿率为0.1%。浸泡在水中的最高吸水率为0.3%。极低吸水率不会导致轴承发生性能和尺寸变化，非常适合用于潮湿环境。

The moisture absorption of CSB-EPB4 plastic plain bearings is 0.1% in standard atmosphere. The max. water absorption is 0.3% in water . These values are very low, CSB-EPB4 plastic palin bearings is very well suited for used in wet applications.

抗UV性能 UV resistance

CSB-EPB4塑料轴承长久暴露在紫外线下材料表面会发生蜕变，抗压强度会下降。

Disintegration could be possible for the material CSB-EPB4 after long period of exposing under the UV ray and therefore the compressive strength will be reduced.

安装公差 Installation tolerances

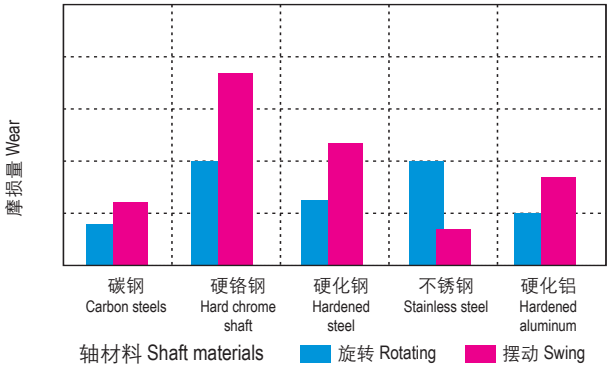
CSB-EPB4塑料轴承压装后公差 Tolerances after pressfit

直径 Di. [mm]	CSB-EPB4 F10 [mm]	座孔 Housing H7 [mm]	轴 Shaft h9 [mm]
>0 ~ 3	+0.006 ~ +0.046	0 ~ +0.010	0 ~ -0.025
>3 ~ 6	+0.010 ~ +0.058	0 ~ +0.012	0 ~ -0.030
>6 ~ 10	+0.013 ~ +0.071	0 ~ +0.015	0 ~ -0.036
>10 ~ 18	+0.016 ~ +0.086	0 ~ +0.018	0 ~ -0.043
>18 ~ 30	+0.020 ~ +0.104	0 ~ +0.021	0 ~ -0.052

在不同轴材料上旋转时的磨损量 p=2MPa, v=0.2m/s

Wear under rotating with different shaft materials, p = 2 MPa, v = 0.2 m/s

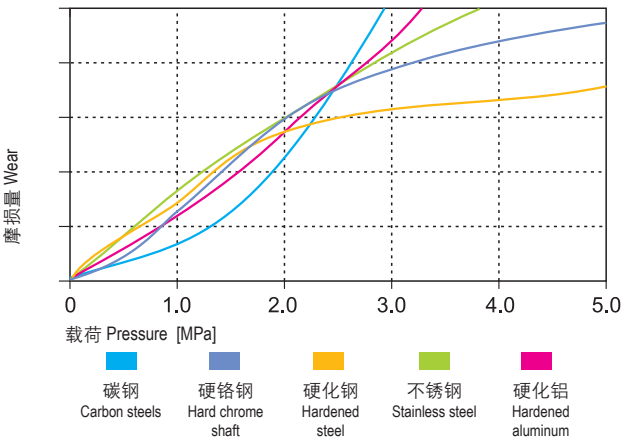
图表 Graph EPB4-7



旋转磨损随轴材料与压力变化关系 v=0.2m/s

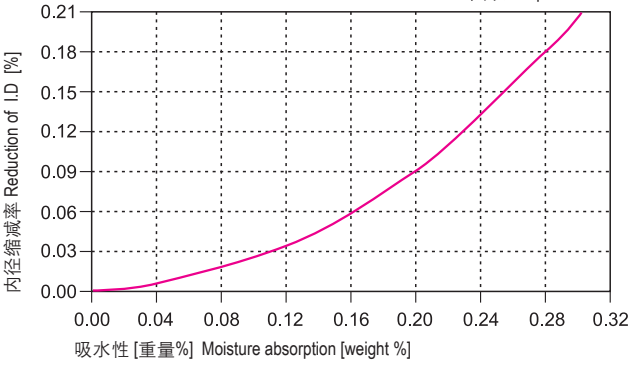
Wear & pressure under rotating with different shaft materials, v = 0.2 m/s

图表 Graph EPB4-8



吸水性的影响 Effect of moisture absorption on EPB4 bearings

图表 Graph EPB4-9



直径 Di. [mm]	CSB-EPB4 F10 [mm]	座孔 Housing H7 [mm]	轴 Shaft h9 [mm]
>30 ~ 50	+0.025 ~ +0.125	0 ~ +0.025	0 ~ -0.062
>50 ~ 80	+0.030 ~ +0.150	0 ~ +0.030	0 ~ -0.074
>80 ~ 120	+0.036 ~ +0.176	0 ~ +0.035	0 ~ -0.087
>120 ~ 180	+0.043 ~ +0.203	0 ~ +0.040	0 ~ -0.100

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