CSB-EPB®

工程塑料轴承 Plastic Plain Bearings EPB7

标准产品规格表 Standard specifications: P138

产品特性 Product features

- 低摩擦系数和高耐磨性的材料。出色的耐磨性能被应用于CSB其它塑料轴承不能胜任的场合。适合软轴和硬轴材料配合使用
- 连续使用温度：-40℃/+90℃
- 非常耐磨长寿命
- 适合在灰尘中运行
- 对轴表面粗糙度要求低
- 较低的摩擦系数
- 适用于软轴

- A material with low friction factor and good wear resistance. The outstanding wear resistance feature of it ensures the applications where the other plastic bearings are not suitable. It is good for both hard and soft shaft
- Continuous working temperature: -40℃/+90℃
- Good wear resistance with long service life
- Suitable for operation in dusty environment
- No special requirement on the surface roughness
- Low friction coefficient
- Applicable for flexible shaft

材料数据表 Material properties data table

材料性能 Material properties	测试标准 Standard	单位 Unit	CSB-EPB7
颜色 Color	-	-	米黄 Cream
密度 Density	ISO1183	g/cm^3	1.25
最大吸湿率 Max. moisture absorption, 50%RH	ISO62	%	1.3
最大吸水率 Max. water absorption	ISO62	%	6.5
对钢动摩擦系数 Coefficient of sliding friction(steel)	ITS025	μ	0.09-0.20
极限PV值 Max. PV value	ITS026	$N/mm^2 \times m/s$	0.50
弯曲模量 Flexural modulus	ISO178	MPa	3200
弯曲强度 Flexural strength	ISO178	MPa	75
最大静载荷 Max. static load	ITS027	MPa	60
最大动载荷 Max. dynamic load	ITS028	MPa	25
邵氏硬度 Shore hardness	ISO868	D	75
连续运行温度 Long-term application temperature	ITS029	℃	+90
短时运行温度 Short-term application temperature	ITS029	℃	+180
最低运行温度 Lowest application temperature	ITS029	℃	-40
导热性 Thermal conductivity	ISO22007	W/m/K	0.24
线性热膨胀系数 Coefficient of thermal expansion	ISO11359	$K^{-1} \times 10^{-5}$	9
阻燃等级 Flammability	UL94	Class	HB
体电阻率 Volume resistance	IEC60093	Ω·cm	$>10^{13}$
面电阻率 Surface resistance	IEC60093	Ω	$>10^{12}$

*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.

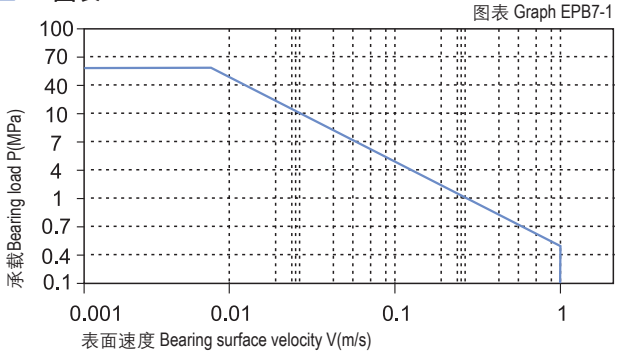
轴承PV值 PV value

CSB-EPB7塑料轴承最大运行PV值为$0.5N/mm^2 \times m/s$；由此决定轴承所承受的载荷与速度成反比，详细查阅图表EPB7-1。

The max PV value of the CSB-EPB7 plastic bearings is $0.5N/mm^2 \times m/s$ which determines the load capacity of bearing is inversely proportional to the speed. Please refer to the chart for more detailed information (Graph EPB7-1).

■ PV图表 Permissible PV value for CSB-EPB7

图表 Graph EPB7-1



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

CSB-EPB7塑料轴承可承受最大静载荷为60Mpa，在此载荷下轴承的最大压缩变形量参考图表EPB7-2，轴承实际工作载荷略小于60Mpa，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：90℃)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EPB7-3。

CSB-EPB7 allows the Max static load of 60Mpa, The max compressive deformation rate under the max load is listed in Graph EPB7-2, The actual load capacity of bearing is slightly less than 60Mpa, The bearing load is variable against the speed and temperature, Fast speed(Vmax: 1.0m/s) results into higher temperature (Tmax: 90℃) which decreases the load capacity of the bearing. Please refer to the Graph EPB7-3 for such variation.

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

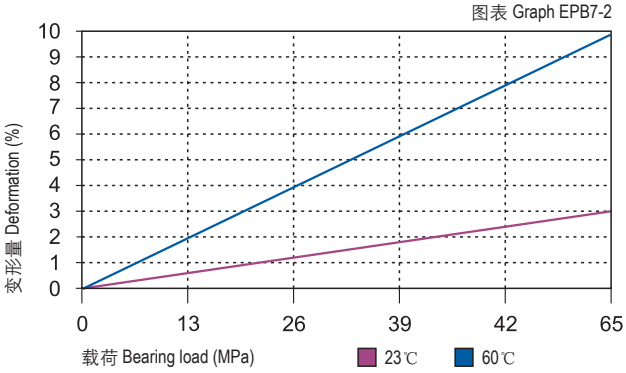
摩擦系数 Friction factor

图表EPB7-4表明CSB-EPB7塑料轴承的摩擦系数随着运动速度的变化影响较小，而图表EPB7-5表明CSB-EPB7塑料轴承的摩擦系数随着载荷的增加明显减小，在载荷超过20Mpa是逐渐趋于平稳；图表EPB7-6表明CSB-EPB7塑料轴承的摩擦系数受轴粗糙度的影响也相对比较小；虽然如此，我们还是建议轴的表面不能太光滑，也不能过于出差，推荐使用轴的粗糙度为Ra0.3 ~ 0.6um;

CSB-EPB7 Bearing Friction factor is not so sensitive to the operation speed (see Graph EPB7-4). The friction factor is considerably decreased along with the loading increasing and it will be turned to be stable when the loading reaches 20Mpa. Graph EPB7-5 shows the friction factor of the bearing is also not sensitive to the shaft roughness but we still recommend that the roughness of the shaft should be neither too smooth nor too rough. It is recommended to keep the roughness of the shaft to be within the range of Ra0.3 to Ra0.6.

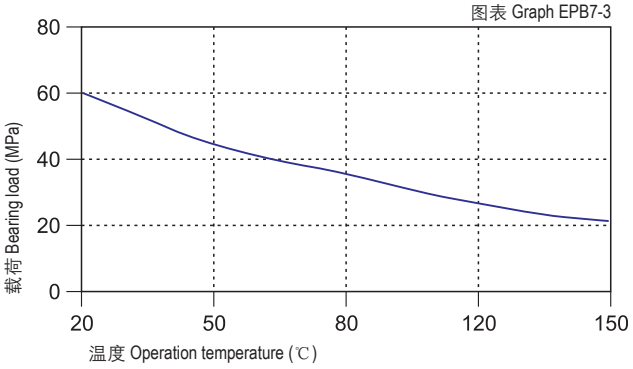
■ 载荷-温度-变形量图表 Load-Temperature deformation

图表 Graph EPB7-2



■ 载荷-温度图表 Load-Temperature diagrams

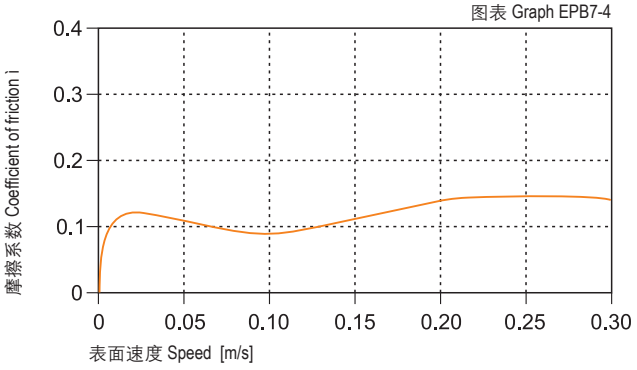
图表 Graph EPB7-3



■ 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

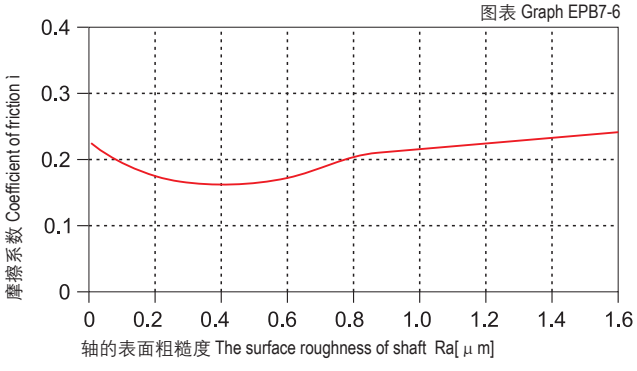
图表 Graph EPB7-4



■ 摩擦系数与轴表面粗糙度关系图表

Coefficient of friction & the surface roughness of shaft

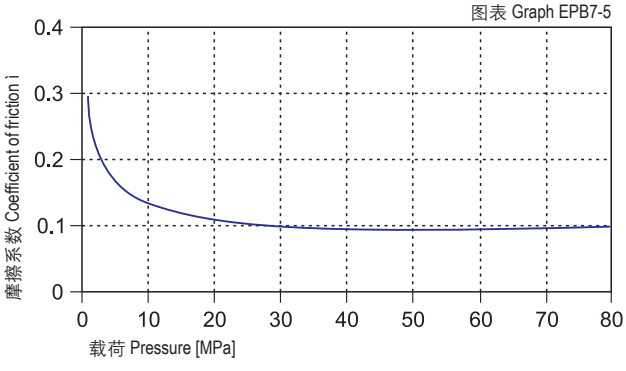
图表 Graph EPB7-6



■ 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 EPB7-5



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CSB-EPB7	干运行 Dry	油脂 Grease	油 Oil	水 Water
摩擦系数 μ Friction coef.	0.09~0.20	0.09	0.04	0.04

磨损与轴材料 Wearing and shaft material

图表EPB7-7表明CSB-EPB7塑料轴承在2Mpa下做旋转运动时，磨损随着轴材料的变化较大；通过实验表明CSB-EPB7塑料轴承在做旋转运动时比较适合用于硬铬轴，硬化钢轴和硬铬轴上用于CSB-EPB7塑料轴承能获得良好的运行效果。图表EPB7-8表明硬铬轴更适合用于高载荷下的CSB-EPB7塑料轴承，随着载荷的不断增加，轴承的磨损速率却变化较小，图表EPB7-8表明CSB-EPB7塑料轴承在不同载荷下的差异。

Graph EPB7-7 shows that the CSB-EPB7 material is not sensitive with different materials under the rotating operation. It is suitable for hard shaft and high speed steel shaft as well as hard chrome steel shaft. Graph EPB7-8 shows that the hard chrome steel shaft is most suitable for using CSB-EPB7 bearing because the wearing speed is not sensitive when the loading is increased. From the Graph EPB7-8, it shows that CSB-EP7 features different performance.

化学抗性 Chemical resistance

CSB-EPB7塑料轴承能抵抗弱碱以及各类润滑油的腐蚀。

CSB-EPB7 is good at chemical resistance against weak acidic medium and various kinds of lubricants.

吸水性 Water absorption

CSB-EPB7塑料轴承在标准大气中的吸湿率为1.3%。 浸泡在水中最高吸水率为6.5%。由于高吸水率的特性，我们必须考虑此轴承的应用环境。

The moisture absorption of CSB-EPB7 plastic plain bearings is 1.3% in standard atmosphere. The max. water absorption is 6.5% in water. The application environment has to be considered due to the high water absorbtion properties.

抗UV性能 UV resistance

CSB-EPB7塑料轴承长久暴露在紫外线下颜色会发生褪变。材料性能基本都不会发生改变。

The color of CSB-EPB7 could be dimmed when it is exposed into the UV ray. The material performance stays stable.

安装公差 Installation tolerances

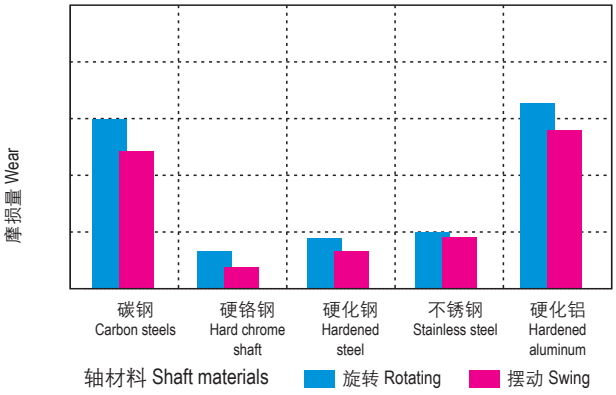
CSB-EPB7塑料轴承压装后公差 Tolerances after pressfit

直径 Di. [mm]	CSB-EPB7 E10 [mm]	座孔 Housing H7 [mm]	轴 Shaft h9 [mm]
>0 ~ 3	+0.014 ~ +0.054	0 ~ +0.010	0 ~ -0.025
>3 ~ 6	+0.020 ~ +0.068	0 ~ +0.012	0 ~ -0.030
>6 ~ 10	+0.025 ~ +0.083	0 ~ +0.015	0 ~ -0.036
>10 ~ 18	+0.032 ~ +0.102	0 ~ +0.018	0 ~ -0.043
>18 ~ 30	+0.040 ~ +0.124	0 ~ +0.021	0 ~ -0.052
>30 ~ 50	+0.050 ~ +0.150	0 ~ +0.025	0 ~ -0.062
>50 ~ 80	+0.060 ~ +0.180	0 ~ +0.030	0 ~ -0.074
>80 ~ 120	+0.072 ~ +0.212	0 ~ +0.035	0 ~ -0.087
>120 ~ 180	+0.085 ~ +0.245	0 ~ +0.040	0 ~ -0.100

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

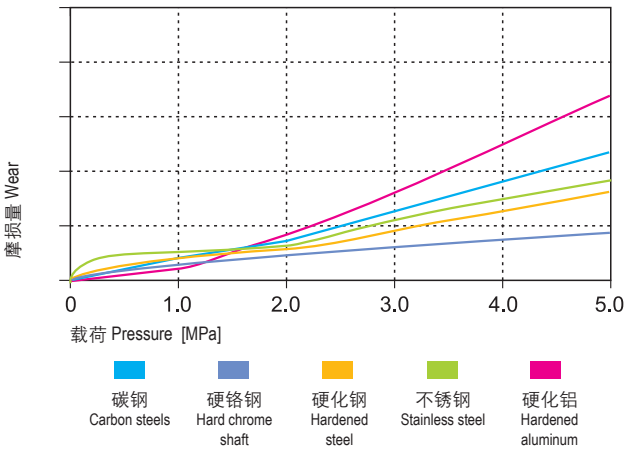
图表 Graph EPB7-7



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

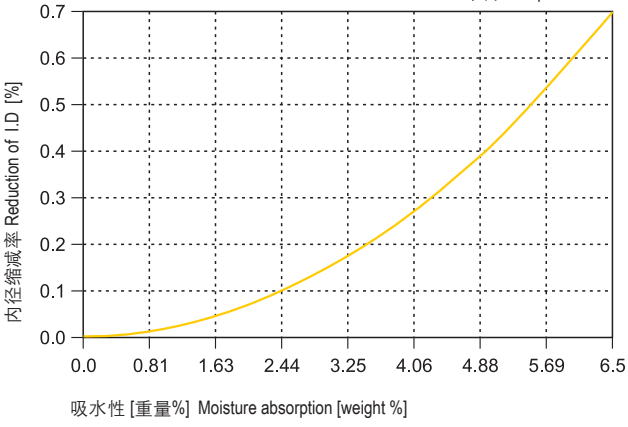
图表 Graph EPB7-8



吸水性的影响

Effect of moisture absorption on EPB7 bearings

图表 Graph EPB7-9



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