

### 产品特性 Product features

- 低摩擦系数不含PTFE和Silicon的耐磨材料。符合FDA标准可直接与食品接触。可被用于水下或零下100度场合。环境温度高于50度时需要考虑额外限位装置
- 连续使用温度: -100℃/+70℃
- 适合多数低载荷场合
- 适合低速运行, 低噪音要求
- 不含氟和硅, 符合FDA
- Wear resistance material with low friction factor without PTFE and Silicon. It conforms to the FDA standard and could be contacted with food directly. It is suitable for the applications in water or with the temperature under -100℃. If the working temperature is higher than 50℃, additional locating ring is necessary
- Continuous working temperature: -100℃/+70℃
- Suitable for low load
- Low operation speed and low noise
- No PTFE and silicon, FDA grade

### 材料数据表 Material properties data table

材料性能 Material properties	测试标准 Standard	单位 Unit	CSB-EPB11
颜色 Color	-	-	白色 White
密度 Density	ISO1183	g/cm <sup>3</sup>	0.96
最大吸湿率 Max. moisture absorption, 50%RH	ISO62	%	0.1
最大吸水率 Max. water absorption	ISO62	%	0.1
对钢动摩擦系数 Coefficient of sliding friction(steel)	ITS025	μ	0.05-0.15
极限PV值 Max. PV value	ITS026	N/mm <sup>2</sup> × m/s	0.20
弯曲模量 Flexural modulus	ISO178	MPa	1200
弯曲强度 Flexural strength	ISO178	MPa	25
最大静载荷 Max. static load	ITS027	MPa	25
最大动载荷 Max. dynamic load	ITS028	MPa	6
邵氏硬度 Shore hardness	ISO868	D	62
连续运行温度 Long-term application temperature	ITS029	℃	+70
短时运行温度 Short-term application temperature	ITS029	℃	+100
最低运行温度 Lowest application temperature	ITS029	℃	-100
导热性 Thermal conductivity	ISO22007	W/m/K	0.20
线性热膨胀系数 Coefficient of thermal expansion	ISO11359	K <sup>-1</sup> × 10 <sup>-5</sup>	19
阻燃等级 Flammability	UL94	Class	HB
体电阻率 Volume resistance	IEC60093	Ω · cm	>10 <sup>13</sup>
面电阻率 Surface resistance	IEC60093	Ω	>10 <sup>12</sup>

\*ITS: CSB内部测试标准 CSB company's internal test standards.

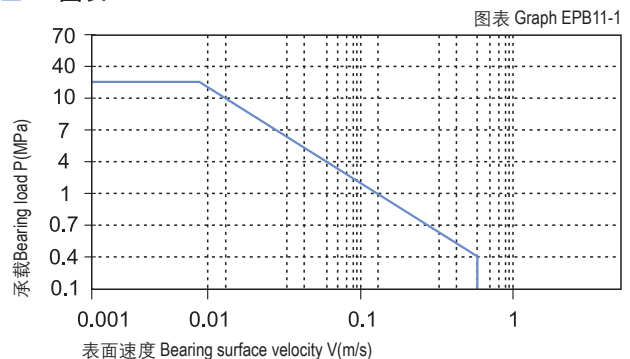
\*\*除非特殊说明测试温度为23℃ Test temperatures are 23℃ unless otherwise stated.

### 轴承PV值 PV value

CSB-EPB11塑料轴承最大运行PV值为0.2N/mm<sup>2</sup> × 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EPB11-1。

The max PV value of the CSB-EPB11 plastic bearings is 0.2N/mm<sup>2</sup> × 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 EPB11-1).

### ■ PV图表 Permissible PV value for CSB-EPB11



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

CSB-EPB11塑料轴承可承受最大静载荷为25Mpa，在此载荷下轴承的最大压缩变形量参考图表EPB11-2，轴承实际工作载荷略小于25Mpa，载荷还受到运行速度以及温度的影响，速度越快 (Vmax: 0.5m/s) 会导致摩擦温度上升，而温度上升 (Tmax: 70℃) 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EPB11-3。

CSB-EPB11 allows the Max static load of 25Mpa, The max compressive deformation rate under the max load is listed in Graph EPB11-2, The actual load capacity of bearing is slightly less than 25Mpa, The bearing load is variable against the speed and temperature, Fast speed (Vmax: 0.5m/s) results into higher temperature (Tmax: 70℃) which decreases the load capacity of the bearing. Please refer to the Graph EPB11-3 for such variation.

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

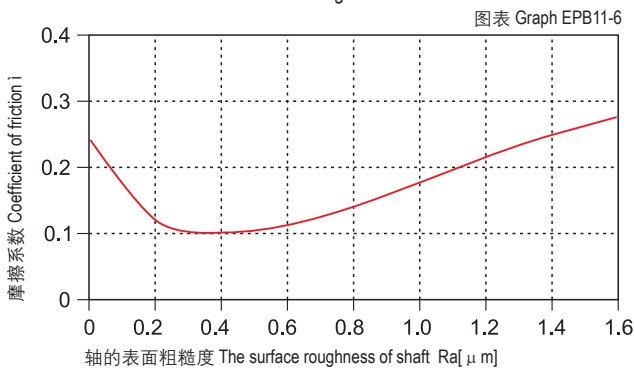
### 摩擦系数 Friction factor

EPB11-4和EPB11-5表明CSB-EPB11塑料轴承的摩擦系数受运动载荷以及速度的变化非常小，这主要是由于此轴承材料中不含有氟和硅，其低摩擦润滑完全依赖于自身材料特性。EPB11-6表明CSB-EPB11塑料轴承的摩擦系数与轴表面粗糙度有着密切的关联性，我们推荐使用粗糙度为Ra0.2 ~ 0.6um轴与CSB-EPB11塑料轴承配合使用。

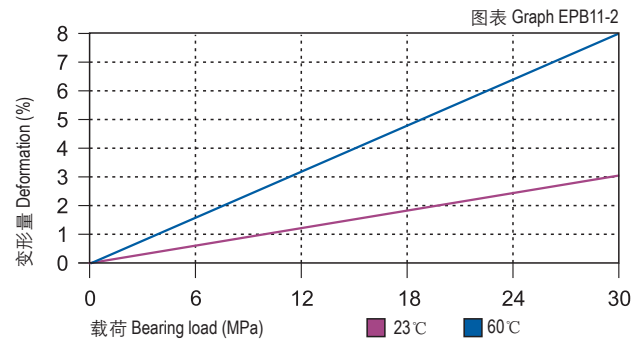
Graph EPB11-4 and Graph EPB11-5 shows that the friction factor of CSB-EPB11 is not considerably variable against the changing of the loading and operation speed because there is no Fluorine and Silicon in this material and therefore its low friction feature is completely depended on the material Features. Graph EPB11-6 shows that the friction factor of CSB-EPB11 is sensitive to the shaft roughness. The shaft roughness of Ra0.2~0.6 is recommended for the best performance of CSB-EPB11 bearings.

### 摩擦系数与轴表面粗糙度关系图表

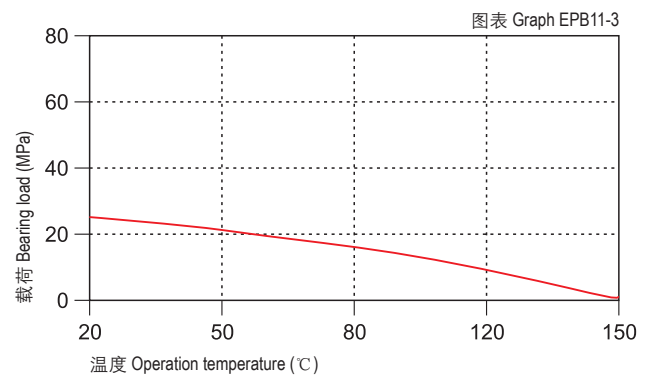
Coefficient of friction & the surface roughness of shaft



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

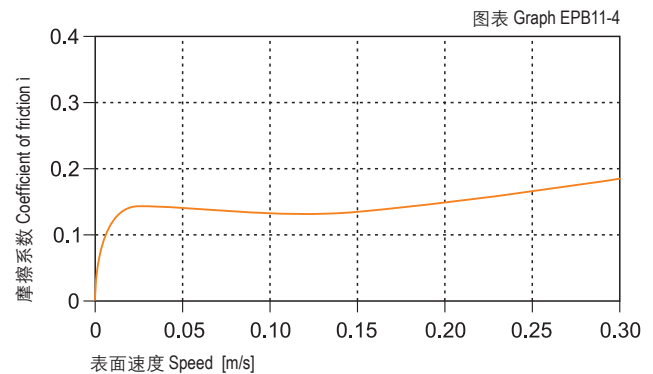


### 载荷-温度图表 Load-Temperature diagrams



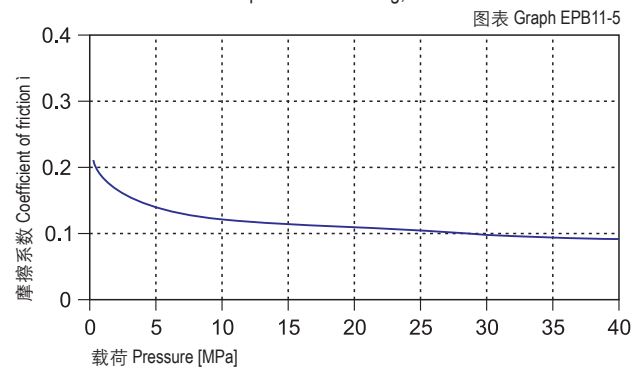
### 摩擦系数与速度变化关系图表 P=2MPa

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



### 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



CSB-EPB11	干运行 Dry	油脂 Grease	油 Oil	水 Water
摩擦系数 $\mu$ Friction coef.	0.05-0.15	0.09	0.04	0.04

### 磨损与轴材料 Wearing and shaft material

图表EPB11-7和图表EPB11-8表明了CSB-EPB11塑料轴承在不同轴材料上的运行结果；由此可以看出，硬铬钢轴最适合与CSB-EPB11塑料轴承配合使用。图表EPB11-7表明CSB-EPB11塑料轴承在载荷低于6Mpa时旋转运动比摆动运动更适合，而一旦载荷超过6Mpa则轴承的磨损性能摆动要略优越于旋转运动。

From the testing result to different materials shows in Graph EPB11-7 and Graph EPB11-8, it is found CSB-EPB11 is the best choice for hardened chrome steel shaft. Graph EPB11-7 tells that CSB-EPB11 is with better feature in rotation operation than in oscillation operation when the loading is lower than 6Mpa and the wearing feature of oscillation operation is better than of rotation operation when loading is higher than 6Mpa.

### 化学抗性 Chemical resistance

CSB-EPB11塑料轴承能抵抗弱酸、弱碱以及各类润滑油的腐蚀。

CSB-EPB11 is good at chemical resistance against mild base, weak acidic medium and various kinds of lubricants.

### 吸水性 Water absorption

CSB-EPB11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0.1%。极低吸水率不会导致轴承发生性能和尺寸变化，CSB-EPB11塑料轴承非常适合用于水下。

The moisture absorption of CSB-EPB11 plastic plain bearings is 0.1% in standard atmosphere. The max. water absorption is 0.1% in water. These values are very low, CSB-EPB11 plastic plain bearings is very well suited for used in water.

### 抗UV性能 UV resistance

CSB-EPB11塑料轴承长久暴露在紫外线下材料性能逐渐下降。

The material performance of CSB-EPB11 will be lowered if it is exposed in the UV ray for long period.

### 安装公差 Installation tolerances

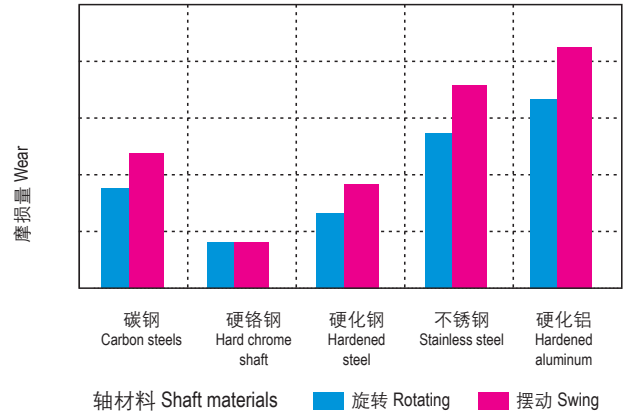
CSB-EPB11塑料轴承压装后公差 Tolerances after pressfit

直径 Di. [mm]	CSB-EPB11 D11 [mm]	座孔 Housing H7 [mm]	轴 Shaft h9 [mm]
>0 ~ 3	+0.020 ~ +0.080	0 ~ +0.010	0 ~ -0.025
>3 ~ 6	+0.030 ~ +0.105	0 ~ +0.012	0 ~ -0.030
>6 ~ 10	+0.040 ~ +0.130	0 ~ +0.015	0 ~ -0.036
>10 ~ 18	+0.050 ~ +0.160	0 ~ +0.018	0 ~ -0.043
>18 ~ 30	+0.065 ~ +0.195	0 ~ +0.021	0 ~ -0.052
>30 ~ 50	+0.080 ~ +0.240	0 ~ +0.025	0 ~ -0.062
>50 ~ 80	+0.100 ~ +0.290	0 ~ +0.030	0 ~ -0.074

### 在不同轴材料上旋转时的磨损量 $p=2\text{MPa}$ , $v=0.2\text{m/s}$

Wear under rotating with different shaft materials,  $p = 2 \text{ MPa}$ ,  $v = 0.2 \text{ m/s}$

图表 Graph EPB11-7



### 旋转磨损随轴材料与压力变化关系 $v=0.2\text{m/s}$

Wear & pressure under rotating with different shaft materials,  $v = 0.2 \text{ m/s}$

图表 Graph EPB11-8

