CSB-EPB™

工程塑料轴承 Plastic Plain Bearings EPB13

◉ 标准产品规格表 Standard specifications: P136

产品特性 Product Features

- 低摩擦系数和高耐磨性完美结合。旋转、直线和摆动应用中耐磨性和摩擦系数几乎保持一致。对轴材料硬度要求较低。不适合极高载荷。
- 连续使用温度：-50℃/+90℃
- 适合干运行、免维护
- 不同轴材料磨损很小
- 较低的摩擦系数
- 适用于软轴
- 吸水性较低
- Low friction and high wear resistance. It could maintain a good stable wear resistance and friction factor for the rotation, linear and oscilation movement. It has no critical hardness requirement to the shaft
- Continuous working temperature: -50℃/+90℃
- Maintenance-free dry operation
- Small wear off amount against various shaft materials
- Lower friction
- Suitable for soft shaft
- Low water absorption

技术数据表 Technical data tabel

材料性能 Material Properties	试验方法 Testing Method	单位 Unit	CSB-EPB13
密度 Density	ISO1183	g/cm^3	1.48
颜色 Color			黄色Yellow
对钢的动摩擦系数 Dynamic friction /steel(dry)			0.05-0.15
最大P.V值 Max. PV (dry)		N/mm^2 × m/s	0.4
最大旋转速度值 Max. roatating velocity		m/s	1.5
最大摇摆速度值 Max. oscillating velocity		m/s	1.1
最大直线速度值 Max. linear velocity		m/s	8.0
抗拉强度 Tensile strength	ISO527	MPa	75
抗压强度 (轴向) Compressive strength (Axial)		MPa	60
弹性模量 E-module	ISO527	MPa	2400
允许最大表面静压力(20℃)Max. static pressure of the surface, 20℃		MPa	35
邵氏硬度 Shore hardness	ISO 868	D	74
连续工作温度 Continuous work temperature		℃	-50/+90
短时运行温度 Short-time work temperature		℃	-50/+120
导热性 Thermal conductivity	ASTME1461	W / m × k	0.25
线性热膨胀系数 Linear coef. of thermal expansion	ASTMD696	K^{-1} × 10^{-5}	9
RH50/23℃时的吸湿性 Moisture absorption RH50/23℃	ASTMD570	%	0.2
最大吸水率23℃ Max. water absorption, 23℃		%	1.2
燃烧性能 Flammability	UL94		HB
体电阻率 Volume resistivity	IEC60093	Ω cm	>10^{13}
面电阻率 Surface resistivity	IEC60093	Ω	>10^{12}

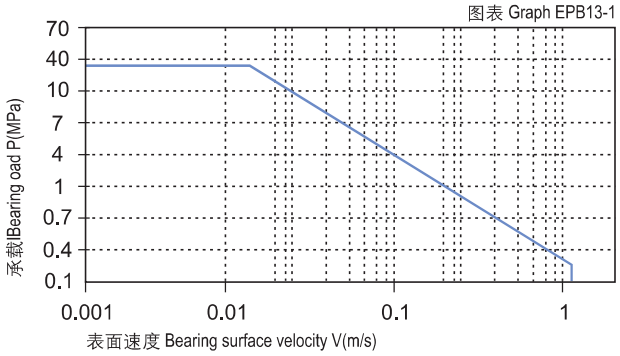
轴承PV值 PV Value

CSB-EPB13塑料轴承最大运行PV值为0.4N/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EPB13-1。

The max PV value of the CSB-EPB13 plastic bearings is 0.4N/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 EPB13-1).

PV图表 Permissible PV value for CSB-EPB13

图表 Graph EPB13-1



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轴承的载荷、速度、温度
Load, Speed and Temperature

CSB-EPB13塑料轴承可承受最大静载荷为35Mpa，在此载荷下轴承的最大压缩变形量参考图表EPB13-2，轴承实际工作载荷略小于35Mpa，载荷还受到运行速度以及温度的影响，速度越快 (Vmax: 1.5m/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EPB13-3。

CSB-EPB13 allows the Max static load of 35Mpa, The max compressive deformation rate under the max load is listed in Graph EPB13-2, The actual load capacity of bearing is slightly less than 35Mpa, The bearing load is variable against the speed and temperature, Fast speed (Vmax: 1.5m/s) results into higher temperature (Tmax: 90℃) which decreases the load capacity of the bearing. Please refer to the Graph EPB13-3 for such variation.

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

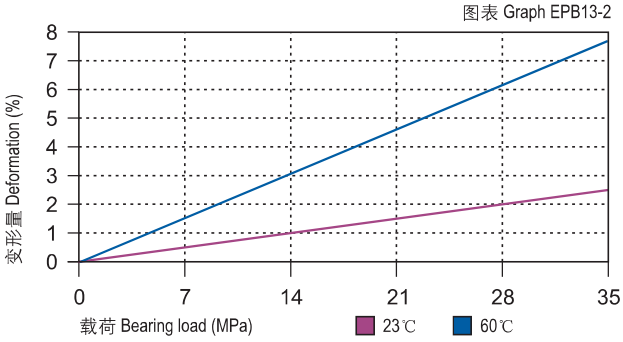
摩擦系数 Friction Factor

图表EPB13-4表明CSB-EPB13轴承摩擦系数在载荷一定随着运动速度的变化率比较小；图表EPB13-5在运动速度一定摩擦系数在载荷小于10Mpa时变化率较大，而在载荷大于10Mpa是变化率也逐渐减小；图表EPB13-6表明CSB-EPB13轴材料的粗糙度越大摩擦系数也随之越大，但当粗糙度大于Ra0.5时摩擦系数也趋于平稳；此轴承适合用于轴粗糙度为Ra=0.1 ~ 0.4um;

CSB-EPB13 Bearing friction factor varies only little amount along with the operation speed changing (See Graph EPB13-4). When the operation speed is relatively stable, the friction factor varies a lot while the load is less than 10Mpa (see Graph EPB13-5). At the same time, it does not vary much when the loading is greater than 10Mpa. Rough surface may result into the increasing of friction factor of the CSB-EPB13 material but when the roughness of the surface is greater than Ra0.5, the friction factor will remain relatively stable again. The recommended shaft surface roughness is Ra0.1~Ra0.4 for the CSB-EPB13 material.

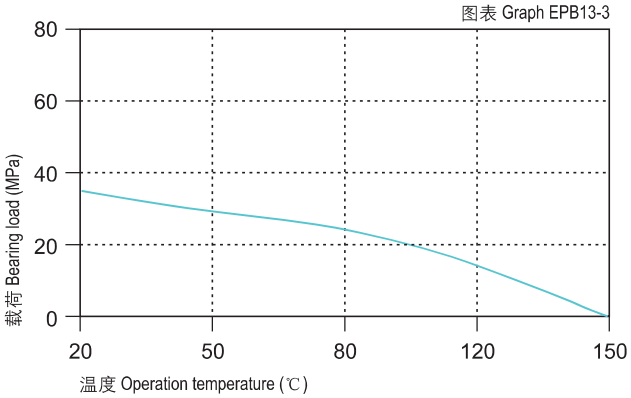
载荷-温度-变形量图表 Load-Temperature deformation

图表 Graph EPB13-2



载荷-温度图表 Load-Temperature diagrams

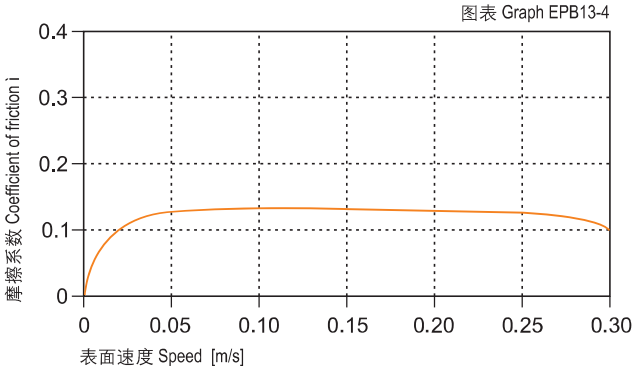
图表 Graph EPB13-3



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

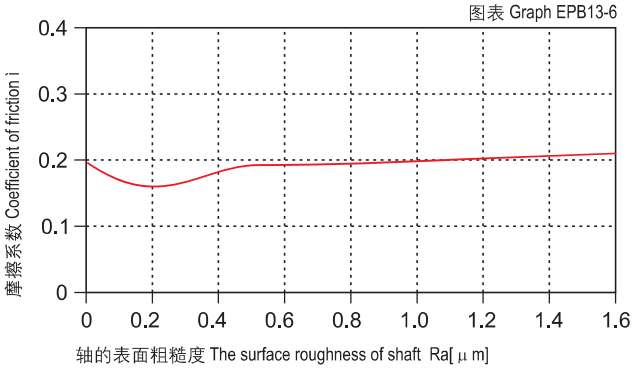
图表 Graph EPB13-4



摩擦系数与轴表面粗糙度关系图表

Coefficient of friction & the surface roughness of shaft

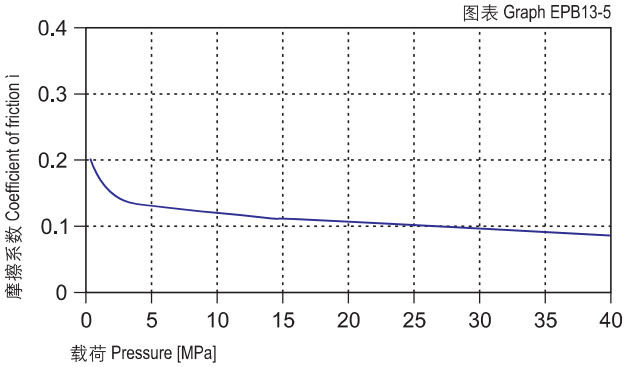
图表 Graph EPB13-6



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 EPB13-5



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CSB-EPB13	干运行 Dry	油脂 Grease	油 Oil	水 Water
摩擦系数 μ Friction coef.	0.05~0.15	0.09	0.04	0.04

磨损与轴材料 Wearing and shaft material

图表EPB13-7是CSB-EPB13轴承在不同轴上运行磨损测试结果；图表EPB13-8表明当CSB-EPB13在载荷低于2Mpa下运行时适合不同的轴材料，但在硬铬轴上的摩擦磨损最小；当载荷继续增大时，此轴承在不锈钢轴的耐磨性能尤为特出。图表EPB13-8表明CSB-EPB13轴承比较适合用于旋转运动，但无论是在旋转运动还是摆动运动此轴承在硬铬轴上的运用效果是最好的。

Test of the bearing against various shaft materials shows that the material CSB-EPB13 features the best performance where the shaft material is hard chrome steel with loading less than 2Mpa. (See Graph EPB13-7). Therefore, the higher the load is increased, the wear-resistance of the bearing will be better against the stainless steel shaft. Refer to Graph EPB13-8, the material CSB-EPB13 is suitable for rotation operation. Ether to be used under rotation operation or the oscillation operation, it is the best suitable material for the application against hard chrome steel shaft.

化学抗性 Chemical Resistance

CSB-EPB13塑料轴承能抵抗弱碱、弱酸以及各类润滑油的腐蚀。

CSB-EPB13 is good at chemical resistance against mild base, weak acidic medium and various kinds of lubricants.

吸水性 Water Absorbability

在标准大气压中，CSB-EPB13塑料轴承的吸水率为0.2%，浸泡水中最大平衡吸水率为1.2%；由于其具有低吸水率的特性，故此轴承可以用于一般潮湿环境中。

The water absorb rate of CSB-EPB13 is 0.2% under the atmospheric pressure while it is 1.2% when the material is immerged into water. With its low water absorbability, the material is suitable for humid environment applications.

抗UV性能 UV Resistance

CSB-EPB13长久暴露在紫外线下颜色基本不会改变。材料的硬度，抗压强度和耐磨性都不会改变。

CSB-EPB13 can maintain its color unchanged when it is exposed into the UV ray. The hardness, Compressive strength and wear resistance of the material is also stable under such condition.

安装公差 Installation Tolerances

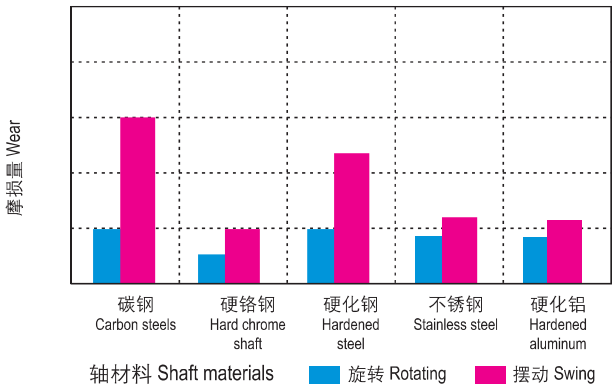
CSB-EPB13塑料轴承压装后公差 Tolerances after pressfit

直径 Di. [mm]	CSB-EPB13 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

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

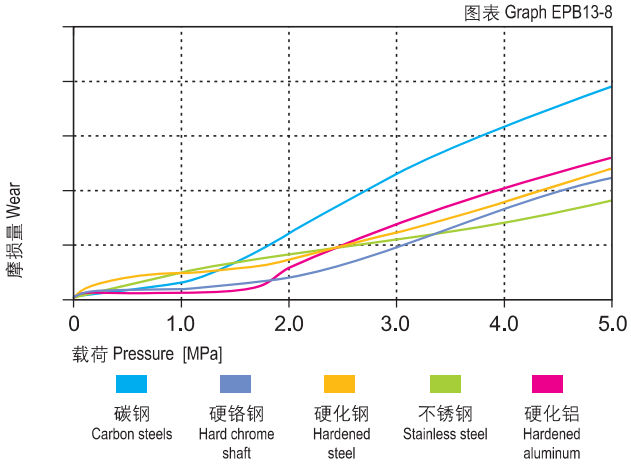
图表 Graph EPB13-7



旋转磨损随轴材料与压力变化关系 v=0.2m/s

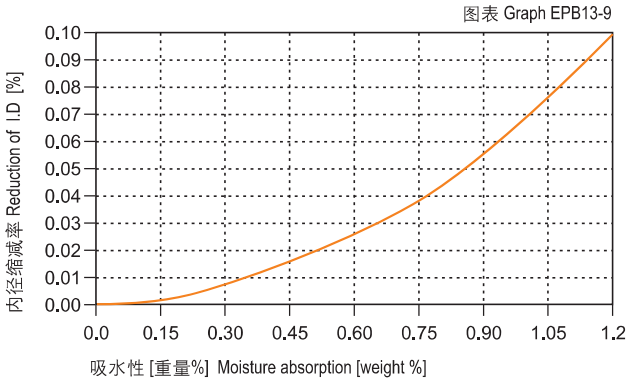
Wear & pressure under rotating with different shaft materials, v = 0.2 m/s

图表 Graph EPB13-8



吸水性的影响 Effect of moisture absorption on EPB13 bearings

图表 Graph EPB13-9



直径 Di. [mm]	CSB-EPB13 E10 [mm]	座孔 Housing H7 [mm]	轴 Shaft h9 [mm]
>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

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标准产品规格表 Standard specifications: P136