CSB-EPB®

工程塑料轴承 Plastic Plain Bearings

+90℃
-40℃

◉ 标准产品规格表 Standard specifications: P138

产品特性 Product features

- 极好的耐磨性材料。对轴材料和粗糙度要求较低。在粉尘恶劣环境中同样保持良好的耐磨性能
- 连续使用温度：-40℃/+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

- Good wear resistance and with low hardness and roughness requirement for the shaft material. The wear resistance of the material will not be weekend even under the dust environment
- Continuous working temperature: -40℃/+90℃
- Maintenance-free dry operation
- Small wear off amount against various shaft materials
- Lower friction
- Low water absorption

材料数据表 Material properties data table

| 材料性能 Material properties	测试标准 Standard	单位 Unit	CSB-EPB15
颜色 Color	-	-	黄色 Yellow
密度 Density	ISO1183	g/cm³	1.30
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	0.05-0.15
极限PV值 Max. PV value	ITS026	N/mm² × m/s	0.90
弯曲模量 Flexural modulus	ISO178	MPa	4000
弯曲强度 Flexural strength	ISO178	MPa	130
最大静载荷 Max. static load	ITS027	MPa	70
最大动载荷 Max. dynamic load	ITS028	MPa	35
邵氏硬度 Shore hardness	ISO868	D	79
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	$K^{-1} × 10^{-5}$	8
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-EPB15塑料轴承最大运行PV值为0.9N/mm² × 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EPB15-1。

The max PV value of the CSB-EPB15 plastic bearings is 0.9N/mm² × 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 EPB15-1).

■ PV图表 Permissible PV value for CSB-EPB15

图表 Graph EPB15-1

承载 Bearing load P(MPa)

表面速度 Bearing surface velocity V(m/s)
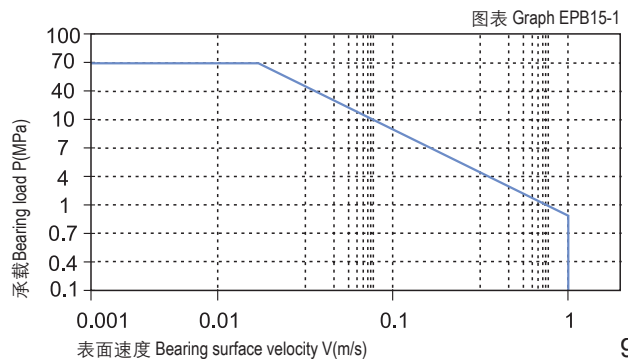
CSB-EPB®

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

CSB-EPB15塑料轴承可承受最大静载荷为70Mpa，在此载荷下轴承的最大压缩变形量参考图表EPB15-2，轴承实际工作载荷略小于70Mpa，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EPB15-3。

CSB-EPB15 allows the Max static load of 70Mpa, The max compressive deformation rate under the max load is listed in Graph EPB15-2, The actual load capacity of bearing is slightly less than 70Mpa, 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 EPB15-3 for such variation.
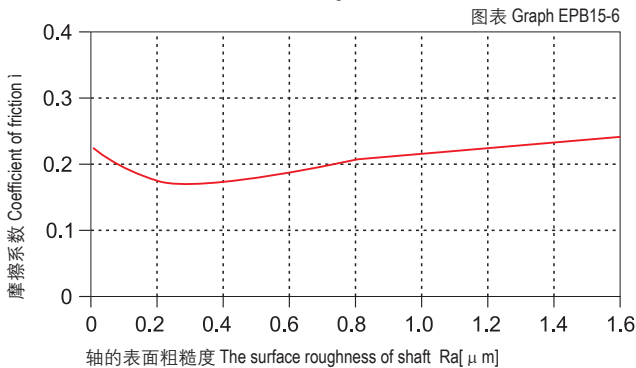
轴承的摩擦系数、磨损、轴材料
## Friction factor, wear and shaft material

摩擦系数 Friction factor

图表EPB15-4表明CSB-EPB15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EPB15-5表明CSB-EPB15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EPB15-6表明CSB-EPB15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。

Graph EPB15-4 shows that the friction factor of CSB-EPB15 is not sensitive to the operation speed and Graph EPB15-5 shows that the friction factor is CSB-EPB15 is decreased along with the loading increasing and become stable when the loading is over 20Mpa. Graph EPB15-6 tells that the friction factor of CSB-EPB15 is also not sensitive to the shaft roughness but we still recommend the shaft roughness to be Ra0.3~0.6.
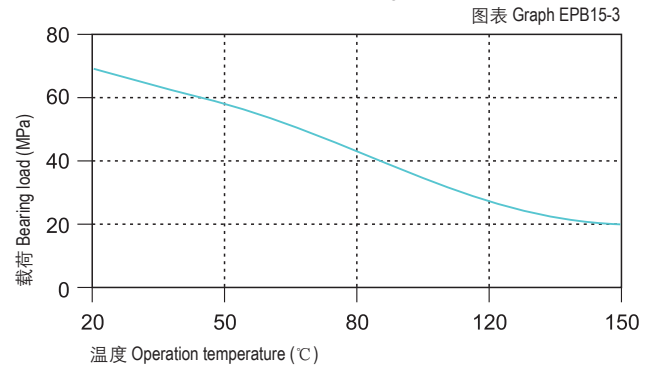
■ 载荷-温度-变形量图表 Load-Temperature deformation

图表 Graph EPB15-2

纵轴: 变形量 Deformation (%)
横轴: 载荷 Bearing load (MPa)
■ 23℃ ■ 60℃
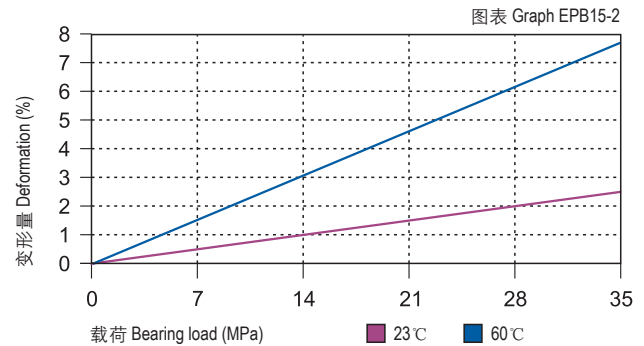
■ 载荷-温度图表 Load-Temperature diagrams

图表 Graph EPB15-3

纵轴: 载荷 Bearing load (MPa)
横轴: 温度 Operation temperature (℃)

■ 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 EPB15-4

纵轴: 摩擦系数 Coefficient of friction i
横轴: 表面速度 Speed [m/s]

■ 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 EPB15-6

纵轴: 摩擦系数 Coefficient of friction i
横轴: 轴的表面粗糙度 The surface roughness of shaft Ra[μm]
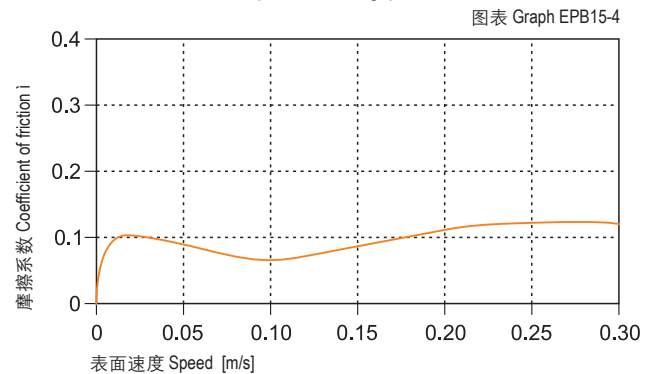
■ 摩擦系数与载荷变化关系图表 v=0.2m/s
Coefficient of friction & the pressure of bearing, v = 0.2 m/s

图表 Graph EPB15-5

纵轴: 摩擦系数 Coefficient of friction i
横轴: 载荷 Pressure [MPa]
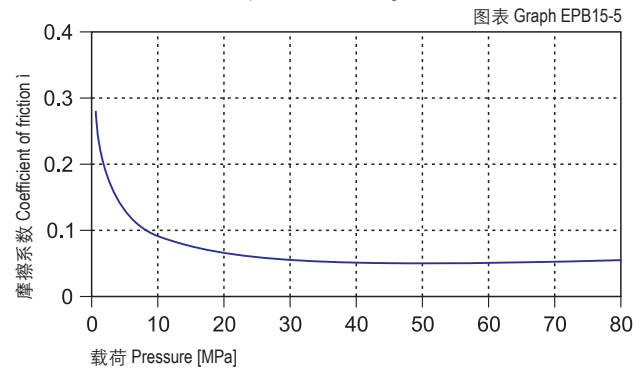
CSB-EPB15	干运行 Dry	油脂 Grease	油 Oil	水 Water
摩擦系数 μ Friction coef.	0.05~0.15	0.09	0.04	0.04

磨损与轴材料 Wearing and shaft material

图表EPB15-7表明CSB-EPB15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-EPB15塑料轴承在做旋转运动时比较适合用于硬轴，高速钢轴和硬铬轴上用于CSB-EPB15塑料轴承能获得良好的运行效果。图表EPB15-8表明硬铬轴更适合用于高载荷下的CSB-EPB15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。

Graph EPB15-7 shows that the wearing of CSB-EPB15 is sensitive to different materials under rotation operation with the loading of 2Mpa. It is suitable for hardened shaft, high speed steel shaft and hardened chrome steel shaft in the rotation operation. Hardened chrome steel shaft is the best choice for CSB-EPB15 (Graph EPB15-8). The wearing will be decreased as long as the loading increasing.

化学抗性 Chemical resistance

CSB-EPB15塑料轴承能抵抗弱碱以及各类润滑油的腐蚀。

CSB-EPB15 is good at chemical resistance against weak acidic medium and various kinds of lubricants.

吸水性 Water absorption

CSB-EPB15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-EPB15 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-EPB15塑料轴承长久暴露在紫外线下颜色基本不会改变。材料性能基本都不会发生改变。

CSB-EPB15 can maintain its color unchanged when it is exposed into the UV ray. The material performance stays stable.
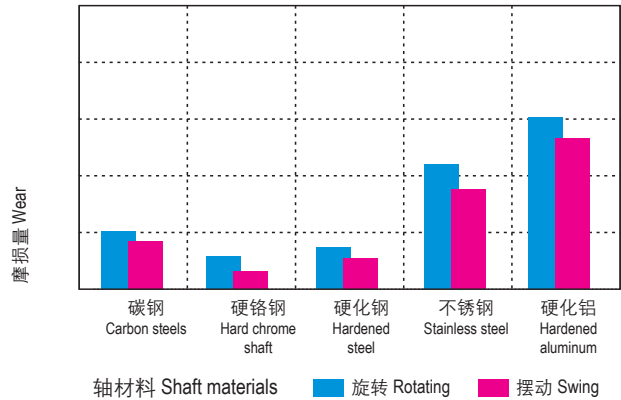
安装公差 Installation tolerances

CSB-EPB15塑料轴承压装后公差 Tolerances after pressfit

直径 Di. [mm]	CSB-EPB15 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

◉ 标准产品规格表 Standard specifications: P138

■ **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 EPB15-7

摩损量 Wear

轴材料 Shaft materials　■ 旋转 Rotating　■ 摆动 Swing

碳钢 Carbon steels | 硬铬钢 Hard chrome shaft | 硬化钢 Hardened steel | 不锈钢 Stainless steel | 硬化铝 Hardened aluminum

■ **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 EPB15-8

摩损量 Wear

载荷 Pressure [MPa]

碳钢 Carbon steels | 硬铬钢 Hard chrome shaft | 硬化钢 Hardened steel | 不锈钢 Stainless steel | 硬化铝 Hardened aluminum
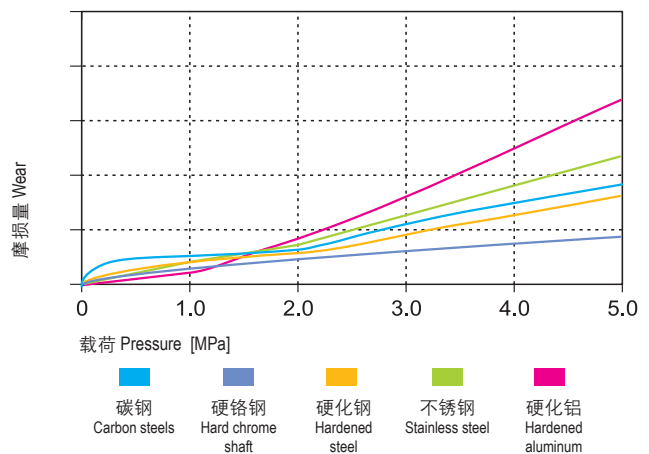
■ **吸水性的影响**
Effect of moisture absorption on EPB15 bearings

图表 Graph EPB15-9

内径缩减率 Reduction of I.D [%]

吸水性 [重量%] Moisture absorption [weight %]

EPB15

CSB-EPB®