

## HPP9-工程塑料轴承 Plastic Plain Bearings

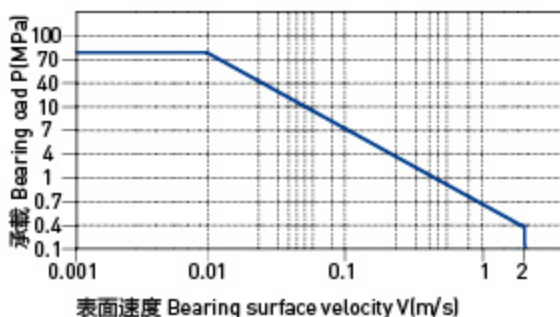
### 轴承PV值 PV Value

HPP9系列轴承最大运行PV值为 $0.7\text{N/mm}^2 \times \text{m/s}$ ;由此决定轴承所承受的载荷与速度成反比,详细查阅图表HPP9-1。

The max PV value of the HPP9 series bearing is  $0.7\text{N/mm}^2 \times \text{m/s}$  which determines the load capacity of bearing is inversely proportional to the speed. Please refer to the chart for more detailed information (Graph HPP9-1).

图表 HPP9-1: PV 图表

Graph HPP9-1: Permissible PV value for HPP9



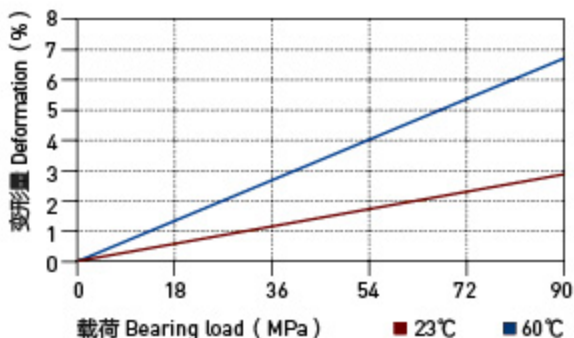
### 轴承的载荷、速度、温度 Load, Speed And Temperature

HPP9系列轴承可承受最大静载荷为20Mpa,在此载荷下轴承的最大压缩变形量参考图表HPP9-2,轴承实际工作载荷略小于20Mpa,载荷还受到运行速度以及温度的影响,速度越快(Vmax: 3.0m/s)会导致摩擦温度上升,而温度上升(Tmax: 260℃)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HPP9-3。

HPP9 allows the Max static load of 20Mpa, The max compressive deformation rate under the max load is listed in Graph HPP9-2, The actual load capacity of bearing is slightly less than 20Mpa, The bearing load is variable against the speed and temperature, Fast speed (Vmax: 3.0m/s) results into higher temperature (Tmax: 260℃) which decreases the load capacity of the bearing. Please refer to the Graph HPP9-3 for such variation.

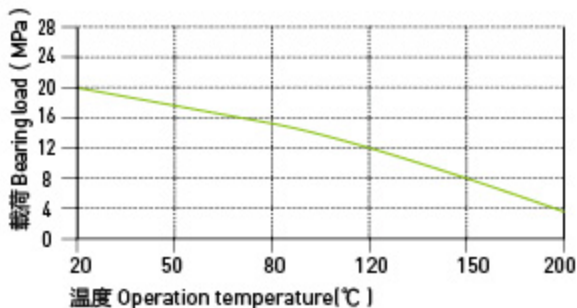
图表 HPP9-2: 载荷 - 温度 - 变形量图表

Graph HPP9-2: Load-Temperature deformation



图表 HPP9-3: 载荷 - 温度图表

Graph HPP9-3: Load-Temperature diagrams



## HPP9-工程塑料轴承 Plastic Plain Bearings

### 轴承的摩擦系数、磨损、轴材料 Friction Factor, Wear And Shaft Material

#### ■ 轴承的摩擦系数 Friction factor

HPP9轴承的摩擦系数会随着载荷的增加而快速降低；而高速对此轴承产生的变化影响也相对较小（见图HPP9-4与图HPP9-5）；此轴承适用于高速而非高载情况下的高PV值情况；根据图HPP9-6显示HPP9轴承的摩擦系数还会受到对轴表面粗糙度的影响而发生变化，我们推荐此轴承使用轴表面粗糙度值为Ra0.2- 0.5 $\mu$ m。

A rapid decrease in friction can be observed as load increases for HPP9 bearings. A higher surface speed has less impact on the coefficient of friction of this bearing. (HPP9-4 and HPP9-5) HPP9 is suitable for applications in which high pv values are given mainly through the high surface speed and not as much through the surface pressure. From the figure HPP9-6, we could see that the friction factor is variable against the changing of shaft roughness. The recommended shaft roughness is Ra0.3-0.5.

HPP9	干运行 Dry	油脂 Grease	油 Oil	水 Water
摩擦系数 $\mu$ Friction coef.	0.15-0.30	0.09	0.04	0.04

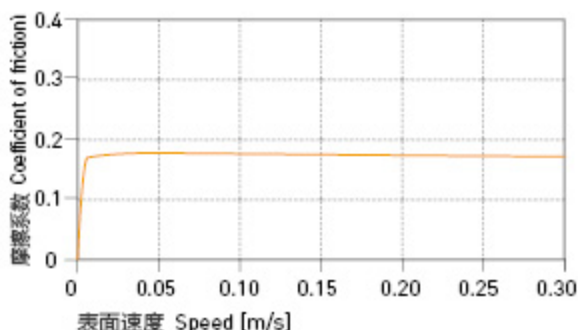
#### ■ 磨损与轴材料 Wearing and shaft material

HPP9轴承适合几乎所有的轴材料；通过图HPP9-7可以看出当使用不锈钢轴或硬化铝轴以及硬铬轴等时HPP9轴承的磨损特性都非常出色。图HPP9-7显示HPP9轴承适用于旋转运动场合，由于一开始运动就具有极低的摩擦系数，所以HPP9也适用于摆动和间歇性旋转运动场合。

HPP9 is suitable for almost all kinds of shaft materials. Graph HPP9-7 shows that the wearing feature of HPP9 is excellent when the shaft material are stainless steel, hardened Aluminum or hardened chrome steel. Graph HPP9-7 shows that the material HPP9 is most suitable for the rotation operation. Since start-up friction is extremely low, this makes HPP9 bearings the ideal choice for oscillating or start-stop applications.

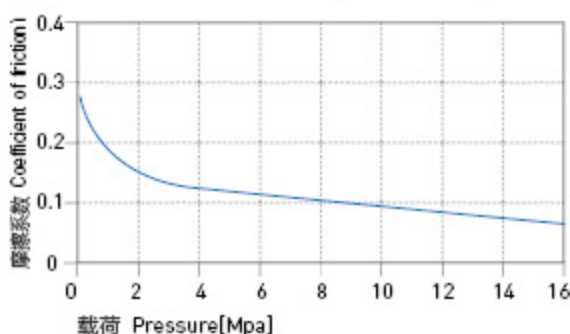
图表 HPP9-4: 摩擦系数与速度变化关系图表 P=2MPa

Graph HPP9-4: Coefficient of friction & the speed of bearing, P=2Mpa



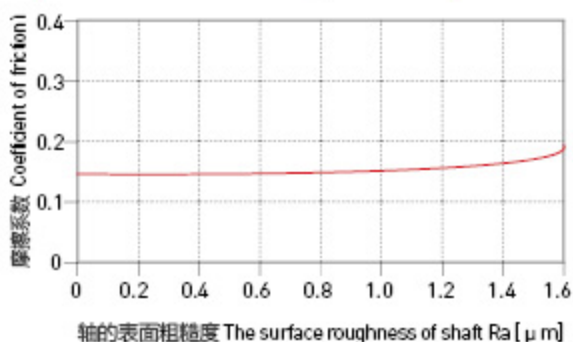
图表 HPP9-5: 摩擦系数与载荷变化关系图表 v=0.2m/s

Graph HPP9-5: Coefficient of friction & the pressure of bearing, v=0.2m/s



图表 HPP9-6: 摩擦系数与轴表面粗糙度关系图表

Graph HPP9-6: Coefficient of friction & the surface roughness of shaft



## HPP9-工程塑料轴承 Plastic Plain Bearings

### 轴承的摩擦系数、磨损、轴材料 Friction Factor, Wear And Shaft Material

#### ■ 化学抗性 Chemical Resistance

HPP9 塑料轴承具有极好的化学抗性，能抵抗大部分强酸强碱以及各类润滑剂。

HPP9 is good at chemical resistance against weak acidic medium and various kinds of lubricants.

#### ■ 吸水性 Water Absorbability

在标准大气压中，HPP9 塑料轴承的吸水率极低小于 0.1%，浸泡水中最大平衡吸水率小于 0.1%；因此材料不会吸水而发生性能和尺寸变化，适用于潮湿环境或水下。

The water absorb rate of HPP9 is less than 0.1% under the atmospheric pressure while it is less than 0.1% when the material is immersed into water. The material performance and dimensions of the material is stabilized for the applications under humid environment or even in the water.

#### ■ 抗UV性能 UV Resistance

HPP9 长久暴露在紫外线下材料性能不会发生变化。

HPP9 can maintain its performance to be stable even exposed in the UV ray for long period.

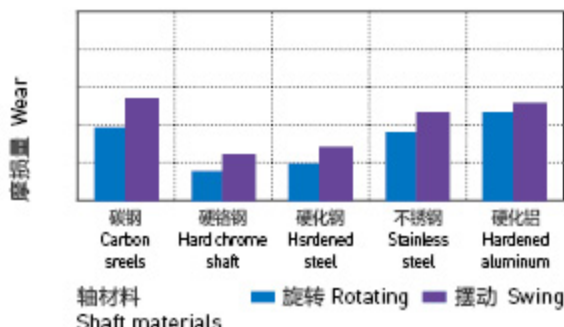
#### ■ 安装公差 Installation Tolerances

HPP8塑料轴承压装后公差Tolerances after pressfit

直径 DI. [ mm ]	HPP9 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

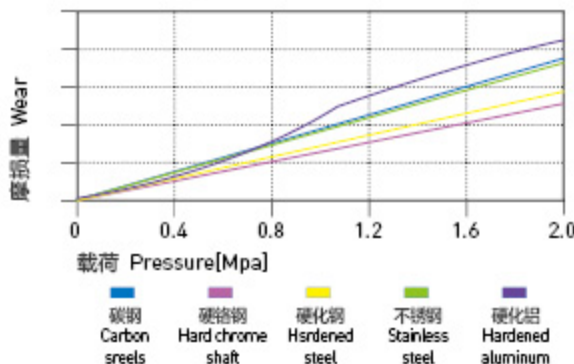
图表 HPP9-7: 在不同轴材料上旋转时的磨损量  $P=2\text{MPa}$ ,  $v=0.2\text{m/s}$

Graph HPP9-7: The bearing wear under rotating with different shaft materials,  $p=2\text{MPa}$ ,  $v=0.2\text{m/s}$



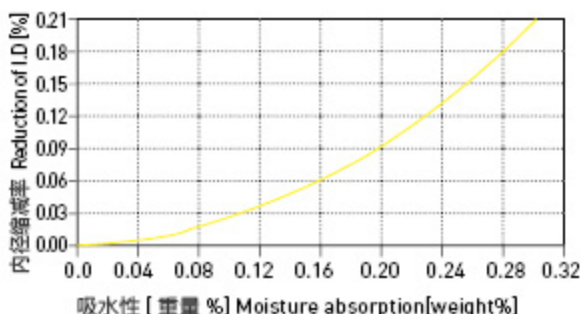
图表 HPP9-8: 旋转磨损随轴材料与压力变化关系  $v=0.2\text{m/s}$

Graph HPP9-8: The bearing wear & pressure under rotating with different shaft materials,  $v=0.2\text{m/s}$

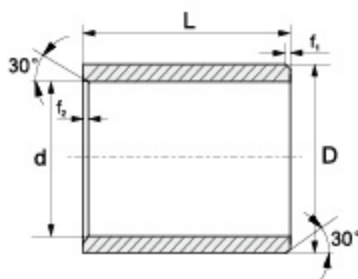


图表 HPP9-9: 吸水性的影响

Graph HPP9-9: Effect of moisture absorption on HPP9 bearings



## HPP9标准规格Standard 直套Metric Cylindrical Bushings



推荐安装公差 Recommend fitting tolerance:

座孔 Housing: H7

轴 Shaft: h9

订购编码 Order P/N:

HPP9-0508-06

d D L

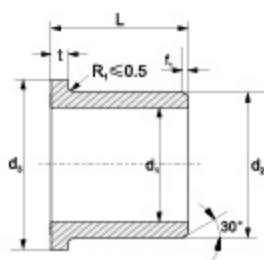
材料 Material

d	f <sub>1</sub>	f <sub>2</sub>
1-6	0.3	0.5
6-12	0.5	
12-30	0.8	
>30	1.2	

订购编码 Order PN	d [mm]	d 公差 Tolerance	D [mm]	L(h13) [mm]
HPP9-0508-06	5	+0.030/+0.105	8	6
HPP9-0609-08	6	+0.030/+0.105	9	8
HPP9-0812-08	8	+0.040/+0.130	12	8
HPP9-1014-10	10	+0.040/+0.130	14	10
HPP9-1216-10	12	+0.050/+0.160	16	10
HPP9-1521-15	15	+0.050/+0.160	21	15
HPP9-1622-15	16	+0.050/+0.160	22	15
HPP9-1824-20	18	+0.050/+0.160	24	20
HPP9-2026-20	20	+0.065/+0.195	26	20
HPP9-2228-20	22	+0.065/+0.195	28	20
HPP9-2530-25	25	+0.065/+0.195	30	25
HPP9-2532-30	25	+0.065/+0.195	32	30
HPP9-2834-30	28	+0.065/+0.195	34	30
HPP9-2836-30	28	+0.065/+0.195	36	30
HPP9-3036-30	30	+0.065/+0.195	36	30
HPP9-3038-30	30	+0.065/+0.195	38	30
HPP9-3240-30	32	+0.080/+0.240	40	30
HPP9-3543-35	35	+0.080/+0.240	43	35
HPP9-3545-40	35	+0.080/+0.240	45	40
HPP9-4048-40	40	+0.080/+0.240	48	40
HPP9-4050-40	40	+0.080/+0.240	50	40
HPP9-4553-50	45	+0.080/+0.240	53	50
HPP9-4555-40	45	+0.080/+0.240	55	40
HPP9-5060-50	50	+0.080/+0.240	60	50

\*d<sub>1</sub> 公差为压入标准 H7 座孔 (ISO3547-1) 后公差 \*Tolerance d<sub>1</sub>: after being pressed into housing H7(ISO3547-1)

## 翻边轴套 Metric Flange Bushings



推荐安装公差 Recommend fitting tolerance:

座孔 Housing: H7

轴 Shaft: h9

订购编码 Order P/N:

HPP9 E-0508-08

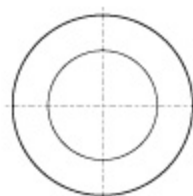
d<sub>1</sub> d<sub>2</sub> L

翻边轴套 Flange bushes  
材料 Material

d	f
1-6	0.3
6-12	0.5
12-30	0.8
>30	1.2

订购编码 Order PN	d <sub>1</sub> [mm]	d <sub>1</sub> 公差 Tolerance	d <sub>2</sub> [mm]	d <sub>3</sub> [d13] [mm]	L[h13] [mm]	t[h13][mm]
HPP9F-0508-08	5	+0.030/+0.105	8	11	8	1.5
HPP9F-0609-08	6	+0.030/+0.105	9	12	8	2
HPP9F-0812-10	8	+0.040/+0.130	12	16	10	2
HPP9F-1014-15	10	+0.040/+0.130	14	18	15	2
HPP9F-1216-15	12	+0.050/+0.160	16	20	15	2
HPP9F-1521-20	15	+0.050/+0.160	21	27	20	3
HPP9F-1622-20	16	+0.050/+0.160	22	28	20	3
HPP9F-1824-20	18	+0.050/+0.160	24	30	20	3
HPP9F-2026-25	20	+0.065/+0.195	26	32	25	3
HPP9F-2228-25	22	+0.065/+0.195	28	34	25	3
HPP9F-2530-30	25	+0.065/+0.195	30	37	30	3
HPP9F-2532-30	25	+0.065/+0.195	32	38	30	4
HPP9F-2834-30	28	+0.065/+0.195	34	40	30	3
HPP9F-2836-30	28	+0.065/+0.195	36	42	30	4
HPP9F-3036-35	30	+0.065/+0.195	36	42	35	3
HPP9F-3038-30	30	+0.065/+0.195	38	44	30	4
HPP9F-3240-35	32	+0.080/+0.240	40	48	35	4
HPP9F-3543-40	35	+0.080/+0.240	43	51	40	4
HPP9F-3545-40	35	+0.080/+0.240	45	50	40	5
HPP9F-4048-45	40	+0.080/+0.240	48	56	45	4
HPP9F-4050-40	40	+0.080/+0.240	50	56	40	5
HPP9F-4553-50	45	+0.080/+0.240	53	61	50	4
HPP9F-4555-40	45	+0.080/+0.240	55	63	40	5
HPP9F-5060-50	50	+0.080/+0.240	60	70	50	5

## 垫片Metric Thrust Washers



订购编码 Order PN:

HPP9 W-0613-008

材料 Material      垫片 Washer

d    D    T

订购编码 Order PN	d <sup>+0.25</sup> [mm]	D <sub>-0.25</sub> [mm]	T <sub>-0.05</sub> [mm]
HPP9W-0613-008	6	13	0.8
HPP9W-0815-008	8	15	0.8
HPP9W-1020-008	10	20	0.8
HPP9W-1225-008	12	25	0.8
HPP9W-1530-008	15	30	0.8
HPP9W-2040-008	20	40	0.8
HPP9W-2245-008	22	45	0.8
HPP9W-2550-008	25	50	0.8

订购编码 Order PN	d <sup>+0.25</sup> [mm]	D <sub>-0.25</sub> [mm]	T <sub>-0.05</sub> [mm]
HPP9W-2855-008	28	55	0.8
HPP9W-3060-008	30	60	0.8
HPP9W-3260-008	32	60	0.8
HPP9W-3565-008	35	65	0.8
HPP9W-4070-008	40	70	0.8
HPP9W-4575-008	45	75	0.8
HPP9W-5080-008	50	80	0.8

\* 根据要求提供定位孔设计 The fixing bore design upon request