

HPP33-工程塑料轴承 Plastic Plain Bearings

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: -40℃/+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°C. If the working temperature is higher than 50°C, additional locating ring is necessary

■ Continuous working temperature: -40°C/+70°C

■ Suitable for low load

■ Low operation speed low noise

■ No FIFE and silicon, FDA grade



材料性能 Material Properties	试验方法 Testing Method	单位 Unit	HPP33
密度 Density	ISO1183	g/cm ³	0.96
颜色 Color			白色 White
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	0.2
最大旋转速度值 Max. rotating velocity		m/s	0.5
最大摇摆速度值 Max. oscillating velocity		m/s	0.4
最大直线速度值 Max. linear velocity		m/s	1.0
抗拉强度 Tensile strength	ISO527	MPa	45
抗压强度 (轴向) Compressive strength(Axial)		MPa	35
弹性模量 E-module	ISO527	MPa	1000
允许最大表面静压力 (20℃) Max.static pressure of the surface, 20℃		MPa	30
邵氏硬度 Rockwell hardness	ISO868	D	70
连续工作温度 continuous work temperature		℃	-40/+70
短时运行温度 Short-time		℃	-40/+100
导热性 Thermal conductivity	ASTME1461	W/m × k	0.3
线性热膨胀系数 Linear coef. of thermal expansion	ASTMD696	K ⁻¹ × 10 ⁻⁵	12
RH50/23℃时的吸湿性 Moisture absorption RH50/23℃	ASTMD570	%	< 0.1
最大吸水率 23℃ Max. water absorption, 23℃		%	< 0.1
燃烧性能 Flammability	UL94		HB
体电阻率 Volume resistivity	IEC60093	Ω cm	> 10 ¹⁵
面电阻率 Surface resistivity	IEC60093	Ω	> 10 ¹⁵

HPP33-工程塑料轴承 Plastic Plain Bearings

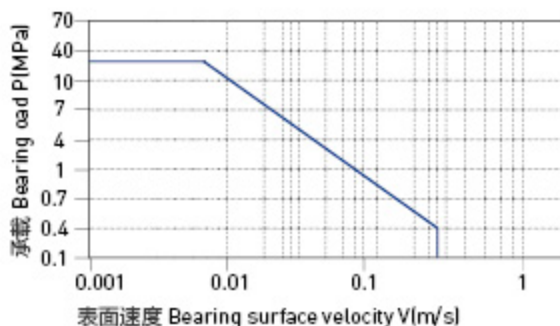
轴承PV值 PV Value

HPP33塑料轴承最大运行PV值为 $0.2\text{N/mm}^2 \times \text{m/s}$;由此决定轴承所承受的载荷与速度成反比, 详情查阅图表HPP33-1。

The max PV value of the HPP33 plastic bearing is $0.2\text{N/mm}^2 \times \text{m/s}$ which determines the load capacity of bearing is inversely proportional to the speed. Please refer to the chart for more detailed information (Graph HPP33-1).

图表 HPP33-1: PV 图表

Graph HPP33-1: Permissible PV value for HPP33



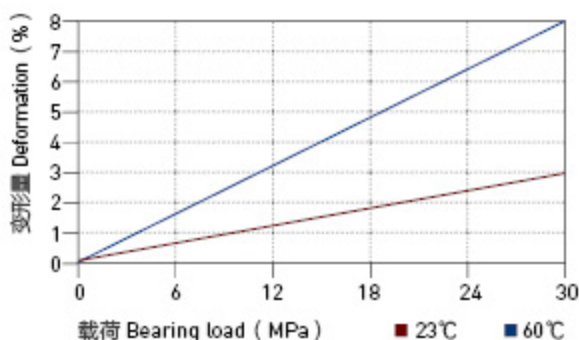
轴承的载荷、速度、温度 The Relation Of Load, Speed And Temperature

HPP33塑料轴承可承受最大静载荷为30Mpa, 在此载荷下轴承的最大压缩变形量参考图表HPP33-2; 轴承实际工作载荷小于30Mpa, 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HPP33-3。

HPP33 allows the max static load of 30Mpa, The max compressive deformation rate under the max load is listed in Graph HPP33-2; The actual load capacity of bearing is slightly less than 30Mpa, 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 HPP33-3 for such variation.

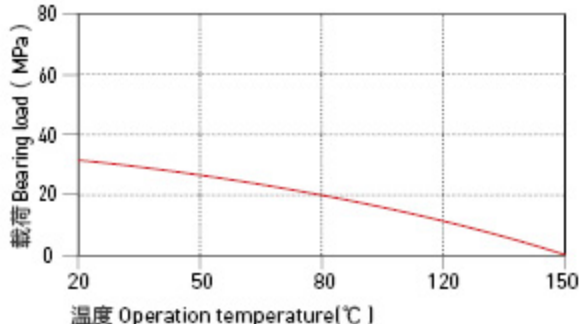
图表 HPP33-2: 载荷 - 温度 - 变形量图表

Graph HPP33-2: Load-Temperature deformation



图表 HPP33-3: 载荷 - 温度图表

Graph HPP33-3: Load-Temperature diagrams



HPP33-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

HPP33-4和HPP33-5表明HPP33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。HPP33-6表明HPP33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HPP33轴承配合使用。

Graph HPP33-4 and Graph HPP33-5 shows that the friction factor of HPP33 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 HPP33-6 shows that the friction factor of HPP33 is sensitive to the shaft roughness. The shaft roughness of Ra0.2-0.6 is recommended for the best performance of HPP33 bearings.

HPP33	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

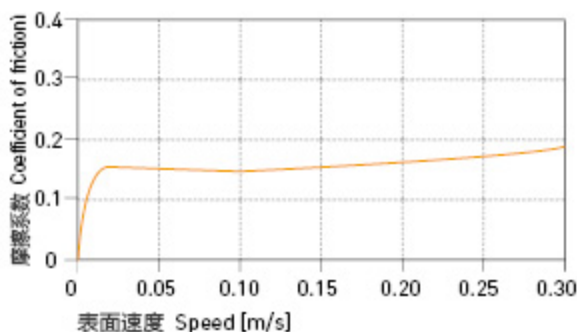
■ 磨损与轴材料 Wearing and shaft material

图表HPP33-7和图表HPP33-8表明了HPP33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HPP33轴承配合使用。图表HPP33-8表明HPP33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 HPP33-7 and Graph HPP33-8, it is found HPP33 is the best choice for hardened chrome steel shaft. Graph HPP33-8 tells that HPP33 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.

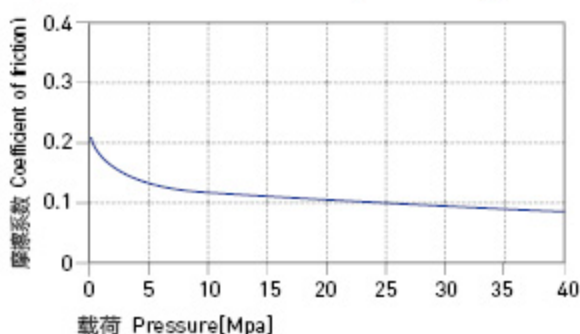
图表 HPP33-4: 摩擦系数与速度变化关系图表 P=2MPa

Graph HPP33-4: Coefficient of friction & the speed of bearing, P=2Mpa



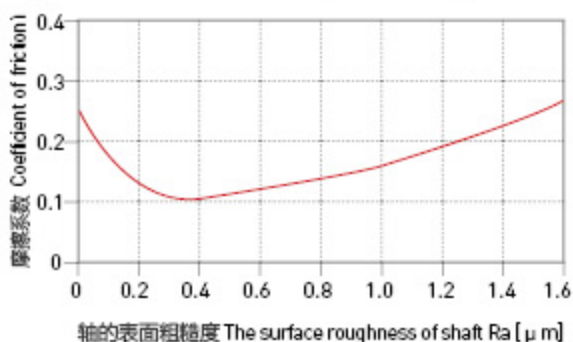
图表 HPP33-5: 摩擦系数与载荷变化关系图表 v=0.2m/s

Graph HPP33-5: Coefficient of friction & the pressure of bearing, v=0.2m/s



图表 HPP33-6: 摩擦系数与轴的表面粗糙度关系图表

Graph HPP33-6: Coefficient of friction & the surface roughness of shaft



HPP33-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

HPP33塑料轴承能抵抗弱酸、弱碱以及各类润滑油的腐蚀。

HPP33 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, HPP33塑料轴承的吸水率小于0.1%, 浸泡水中最大平衡吸水率小于0.1%; 由于此吸水率的特性, 此轴承可以应用于一般潮湿环境甚至水下。

The water absorb rate of HPP33 is less than 0.1% under the atmospheric pressure while it is less than 0.1% when the material is immersed into water. With its low water absorbability, the material is suitable for humid environment applications or even under water.

■ 抗UV性能 UV Resistance

HPP33长久暴露在紫外线下材料性能逐渐下降。

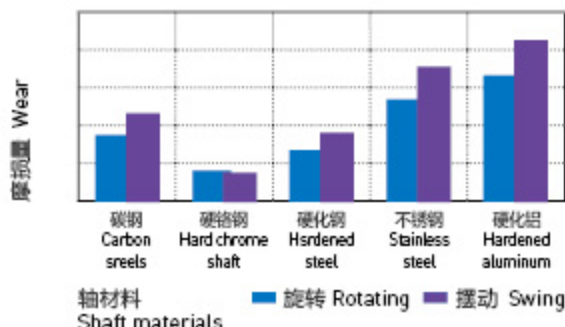
The material performance of HPP33 will be lowered if it is exposed in the UV ray for long period.

■ 安装公差 Installation Tolerances

HPP33塑料轴承压装后公差 Tolerances after pressfit

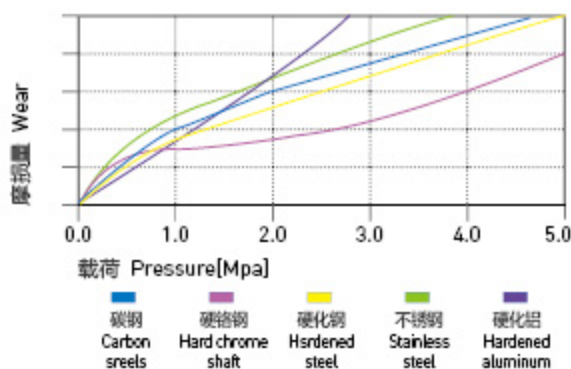
直径 Di. [mm]	HPP33 D11 [mm]	座孔 Housing H7 [mm]	轴 Shaft h9 [mm]
> 0-3	+0.020~+0.080	0~+0.010	0~-0.025
> 3-6	+0.030~+0.105	0~+0.012	0~-0.030
> 6-10	+0.040~+0.130	0~+0.015	0~-0.036
> 10-18	+0.050~+0.60	0~+0.018	0~-0.043
> 18-30	+0.065~+0.195	0~+0.021	0~-0.052
> 30-50	+0.080~+0.240	0~+0.025	0~-0.062
> 50-80	+0.100~+0.290	0~+0.030	0~-0.074

图表 HPP33-7: 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 HPP33-7: The bearing wear under rotating with different shaft materials, $p=2\text{MPa}$, $v=0.2\text{m/s}$

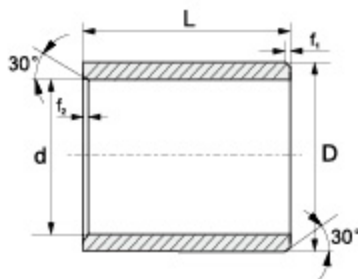


图表 HPP33-8: 旋转磨损随轴材料与压力变化关系 $v=0.2\text{m/s}$

Graph HPP33-8: The bearing wear & pressure under rotating with different shaft materials, $v=0.2\text{m/s}$



HPP33 标准规格 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:

HPP33-0508-06

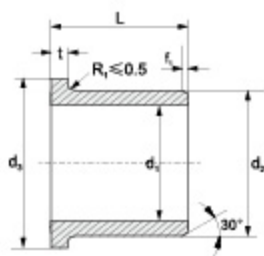
材料 Material

d	f ₁	f ₂
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]
HPP33-0508-06	5	+0.030/+0.105	8	6
HPP33-0609-08	6	+0.030/+0.105	9	8
HPP33-0812-08	8	+0.040/+0.130	12	8
HPP33-1014-10	10	+0.040/+0.130	14	10
HPP33-1216-10	12	+0.050/+0.160	16	10
HPP33-1521-15	15	+0.050/+0.160	21	15
HPP33-1622-15	16	+0.050/+0.160	22	15
HPP33-1824-20	18	+0.050/+0.160	24	20
HPP33-2026-20	20	+0.065/+0.195	26	20
HPP33-2228-20	22	+0.065/+0.195	28	20
HPP33-2530-25	25	+0.065/+0.195	30	25
HPP33-2532-30	25	+0.065/+0.195	32	30
HPP33-2834-30	28	+0.065/+0.195	34	30
HPP33-2836-30	28	+0.065/+0.195	36	30
HPP33-3036-30	30	+0.065/+0.195	36	30
HPP33-3038-30	30	+0.065/+0.195	38	30
HPP33-3240-30	32	+0.080/+0.240	40	30
HPP33-3543-35	35	+0.080/+0.240	43	35
HPP33-3545-40	35	+0.080/+0.240	45	40
HPP33-4048-40	40	+0.080/+0.240	48	40
HPP33-4050-40	40	+0.080/+0.240	50	40
HPP33-4553-50	45	+0.080/+0.240	53	50
HPP33-4555-40	45	+0.080/+0.240	55	40
HPP33-5060-50	50	+0.080/+0.240	60	50

*d₁ 公差为压入标准 H7 座孔 (ISO3547-1) 后公差 *Tolerance d₁: 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:

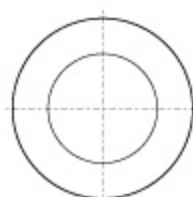
HPP33 E-0508-08

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_1 [mm]	d_1 公差 Tolerance	d_2 [mm]	$d_3(d13)$ [mm]	L(h13) [mm]	t(h13)[mm]
HPP33F-0508-08	5	+0.030/+0.105	8	11	8	1.5
HPP33F-0609-08	6	+0.030/+0.105	9	12	8	2
HPP33F-0812-10	8	+0.040/+0.130	12	16	10	2
HPP33F-1014-15	10	+0.040/+0.130	14	18	15	2
HPP33F-1216-15	12	+0.050/+0.160	16	20	15	2
HPP33F-1521-20	15	+0.050/+0.160	21	27	20	3
HPP33F-1622-20	16	+0.050/+0.160	22	28	20	3
HPP33F-1824-20	18	+0.050/+0.160	24	30	20	3
HPP33F-2026-25	20	+0.065/+0.195	26	32	25	3
HPP33F-2228-25	22	+0.065/+0.195	28	34	25	3
HPP33F-2530-30	25	+0.065/+0.195	30	37	30	3
HPP33F-2532-30	25	+0.065/+0.195	32	38	30	4
HPP33F-2834-30	28	+0.065/+0.195	34	40	30	3
HPP33F-2836-30	28	+0.065/+0.195	36	42	30	4
HPP33F-3036-35	30	+0.065/+0.195	36	42	35	3
HPP33F-3038-30	30	+0.065/+0.195	38	44	30	4
HPP33F-3240-35	32	+0.080/+0.240	40	48	35	4
HPP33F-3543-40	35	+0.080/+0.240	43	51	40	4
HPP33F-3545-40	35	+0.080/+0.240	45	50	40	5
HPP33F-4048-45	40	+0.080/+0.240	48	56	45	4
HPP33F-4050-40	40	+0.080/+0.240	50	56	40	5
HPP33F-4553-50	45	+0.080/+0.240	53	61	50	4
HPP33F-4555-40	45	+0.080/+0.240	55	63	40	5
HPP33F-5060-50	50	+0.080/+0.240	60	70	50	5

垫片 Metric Thrust Washers



订购编码 Order PN:

HPP33 W-0613-008

d D T
 垫片 Washer
 材料 Material

订购编码 Order PN	$d^{+0.25}$ [mm]	$D_{+0.25}$ [mm]	$T_{+0.05}$ [mm]
HPP33W-0613-008	6	13	0.8
HPP33W-0815-008	8	15	0.8
HPP33W-1020-008	10	20	0.8
HPP33W-1225-008	12	25	0.8
HPP33W-1530-008	15	30	0.8
HPP33W-2040-008	20	40	0.8
HPP33W-2245-008	22	45	0.8
HPP33W-2550-008	25	50	0.8

订购编码 Order PN	$d^{+0.25}$ [mm]	$D_{+0.25}$ [mm]	$T_{+0.05}$ [mm]
HPP33W-2855-008	28	55	0.8
HPP33W-3060-008	30	60	0.8
HPP33W-3260-008	32	60	0.8
HPP33W-3565-008	35	65	0.8
HPP33W-4070-008	40	70	0.8
HPP33W-4575-008	45	75	0.8
HPP33W-5080-008	50	80	0.8

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