

HPP28-工程塑料轴承 Plastic Plain Bearings

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℃/+100℃
 - 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℃/+100℃
- Maintenance-free dry operation
- Small wear off amount against various shaft materials
- Lower friction
- Low water absorption



材料性能 Material Properties	试验方法 Testing Method	单位 Unit	HPP28
密度 Density	ISO1183	g/cm ³	1.35
颜色 Color			黄色 Yellow
对钢的动态摩擦系数 Dynamic friction/steel(dry)			0.05-0.15
最大 P.V 值 Max. PV (dry)		N/mm ² × m/s	0.9
最大旋转速度值 Max. rotating 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	130
抗压强度 (轴向) Compressive strength(Axial)		MPa	70
弹性模量 E-module	ISO527	MPa	4000
允许最大表面静压力 (20℃) Max.static pressure of the surface, 20℃		MPa	70
邵氏硬度 Rockwell hardness	ISO868	D	77
连续工作温度 continuous work temperature		℃	-40/+100
短时运行温度 Short-time		℃	-40/+180
导热性 Thermal conductivity	ASTME1461	W/m × k	0.25
线性热膨胀系数 Linear coef. of thermal eapansion	ASTMD696	K ⁻¹ × 10 ⁻⁵	7
RH50/23℃时的吸湿性 Moisture absorption RH50/23℃	ASTMD570	%	1.3
最大吸水率 23℃ Max. water absorption, 23℃		%	6.5
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

HPP28-工程塑料轴承 Plastic Plain Bearings

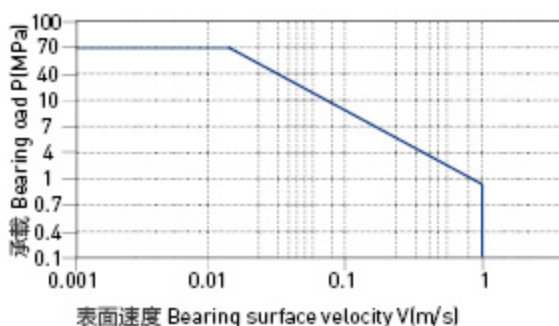
轴承PV值 PV Value

HPP28系列轴承最大运行PV值为 $0.9 \text{ N/mm}^2 \times \text{m/s}$;由此决定轴承所承受的载荷与速度成反比, 详细查阅图表HPP28-1。

The max PV value of the HPP28 series bearing is $0.9 \text{ N/mm}^2 \times \text{m/s}$ which determines the load capacity of bearing is inversely proportional to the speed. Please refer to the chart for more detailed information (Graph HPP28-1).

图表 HPP28-1: PV 图表

Graph HPP28-1: Permissible PV value for HPP28



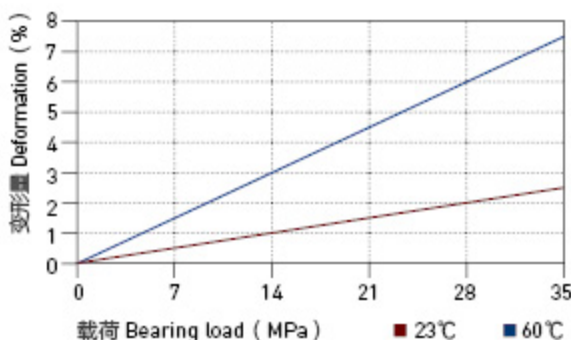
轴承的载荷、速度、温度 Load, Speed And Temperature

HPP28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HPP28-2; 轴承实际工作载荷小于70Mpa, 载荷还受到运行速度以及温度的影响, 速度越快 (Vmax: 1.5m/s)会导致摩擦温度上升, 而温度上升 (Tmax: 100℃)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HPP28-3。

HPP28 allows the max static load of 70Mpa, The max compressive deformation rate under the max load is listed in Graph HPP28-2; The actual load capacity of bearing is slightly less than 100Mpa, The bearing load is variable against the speed and temperature, Fast speed (Vmax: 1.5m/s) results into higher temperature (Tmax: 100℃) which decreases the load capacity of the bearing. Please refer to the Graph HPP28-3 for such variation.

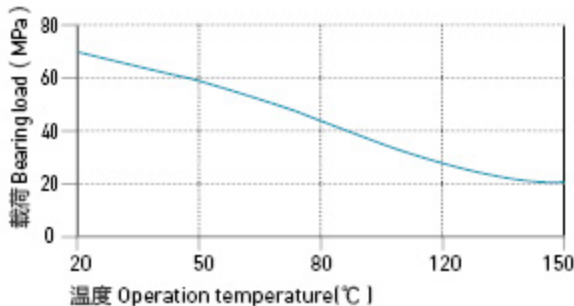
图表 HPP28-2: 载荷 - 温度 - 变形量图表

Graph HPP28-2: Load-Temperature deformation



图表 HPP28-3: 载荷 - 温度图表

Graph HPP28-3: Load-Temperature diagrams



HPP28-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

图表HPP28-4表明HPP28轴承的摩擦系数随着运动速度的变化影响较小, 而图表HPP28-5表明HPP28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HPP28-6表明HPP28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, 也不能过于粗糙, 推荐使用轴的粗糙度为Ra0.3~0.6 μ m。

Graph HPP28-4 shows that the friction factor of HPP28 is not sensitive to the operation speed and Graph HPP28-5 shows that the friction factor is HPP28 is decreased along with the loading increasing and became stable when the loading is over 20Mpa. Graph HPP28-6 tells that the friction factor of HPP28 is also not sensitive to the shaft roughness but we still recommend the shaft roughness to be Ra0.3~0.6.

HPP28	干运行 Dry	油脂 Grease	油 Oil	水 Water
摩擦系数 μ Friction coef.	0.15~0.15	0.09	0.04	0.04

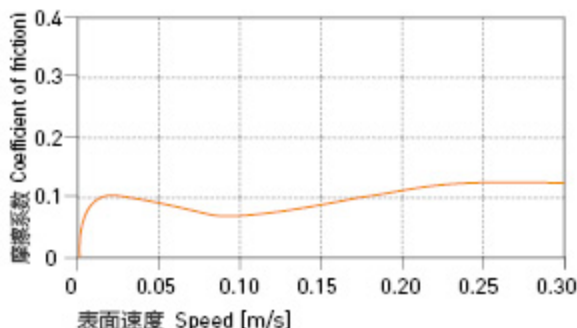
■ 磨损与轴材料 Wearing and shaft material

图表HPP28-7表明HPP28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HPP28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HPP28能获得良好的运行效果。图表HPP28-8表明硬铬轴更适合用于高载荷下的HPP28轴承, 随着载荷的不断增加, 轴承的磨损速率却变化较小。

Graph HPP28-7 shows that the wearing of HPP28 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 HPP28 (Graph HPP28-8) The wearing will be decreased as long as the loading increasing.

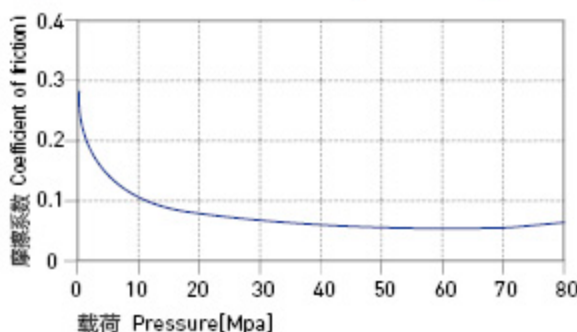
图表 HPP28-4: 摩擦系数与速度变化关系图表 P=2MPa

Graph HPP28-4: Coefficient of friction & the speed of bearing, P=2Mpa



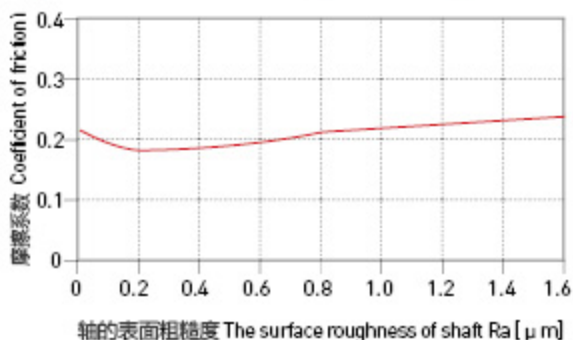
图表 HPP28-5: 摩擦系数与载荷变化关系图表 v=0.2m/s

Graph HPP28-5: Coefficient of friction & the pressure of bearing, v=0.2m/s



图表 HPP28-6: 摩擦系数与轴的表面粗糙度关系图表

Graph HPP28-6: Coefficient of friction & the surface roughness of shaft



HPP28-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

HPP28 塑料轴承能抵抗弱碱以及各类润滑油的腐蚀。

HPP28 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, HPP28 塑料轴承的吸水率为 1.3%, 浸泡水中最大平衡吸水率为 6.5%; 由于此吸水率的特性, 我们必须考虑此轴承的应用环境。

The water absorb rate of HPP28 is 1.3% under the atmospheric pressure while it is 6.5% when the material is immersed into water. The application environment has to be considered because of its water absorb properties.

■ 抗UV性能 UV Resistance

HPP28 长久暴露在紫外线下颜色基本不会变。材料性能基本都不会发生改变。

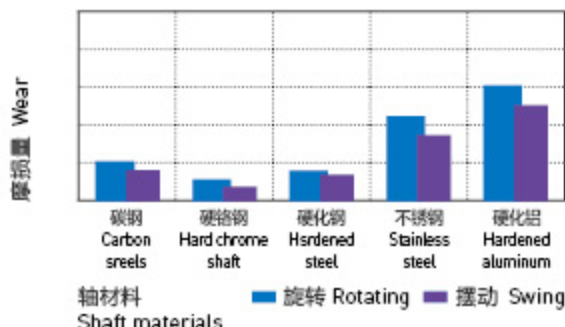
HPP28 can maintain its color unchanged when it is exposed into the UV ray. The material performance stays stable.

■ 安装公差 Installation Tolerances

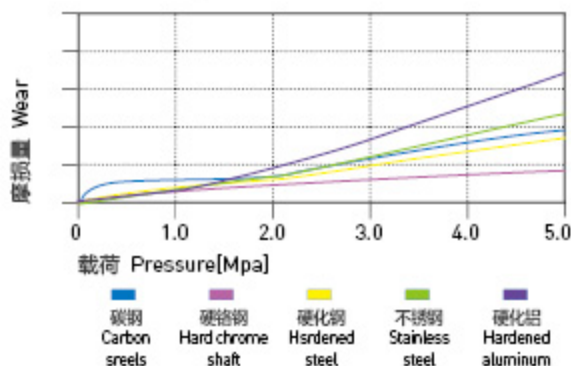
HPP28 塑料轴承压装后公差 Tolerances after pressfit

直径 DI. [mm]	HPP28 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

图表 HPP28-7: 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 HPP28-7: The bearing wear under rotating with different shaft materials, $p=2\text{MPa}$, $v=0.2\text{m/s}$

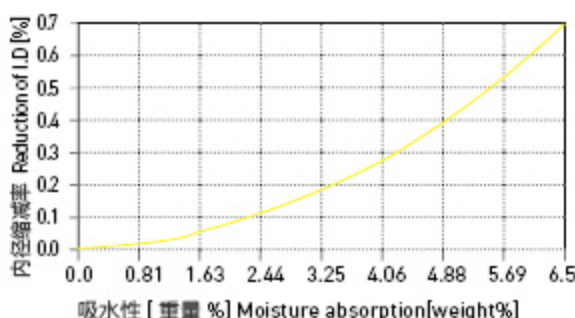


图表 HPP28-8: 旋转磨损随轴材料与压力变化关系 $v=0.2\text{m/s}$
Graph HPP28-8: The bearing wear & pressure under rotating with different shaft materials, $v=0.2\text{m/s}$

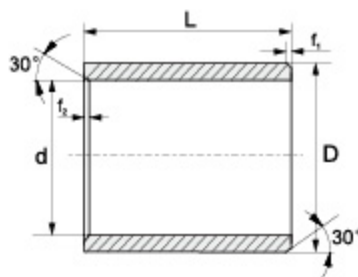


图表 HPP28-9: 吸水性的影响

Graph HPP28-9: Effect of moisture absorption on HPP28 bearings



HPP28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:

HPP28-0304-03

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 After fitting [mm]	D [mm]	L(h13) [mm]
HPP28-0304-03	3	+0.014/+0.054	4.5	3
HPP28-0304-05	3	+0.014/+0.054	4.5	5
HPP28-0304-06	3	+0.014/+0.054	4.5	6
HPP28-0405-04	4	+0.02/+0.068	5.5	4
HPP28-0405-06	4	+0.02/+0.068	5.5	6
HPP28-0405-08	4	+0.02/+0.068	5.5	8
HPP28-0405-10	4	+0.02/+0.068	5.5	10
HPP28-0507-05	5	+0.02/+0.068	7	5
HPP28-0507-08	5	+0.02/+0.068	7	8
HPP28-0507-10	5	+0.02/+0.068	7	10
HPP28-0608-06	6	+0.02/+0.068	8	6
HPP28-0608-08	6	+0.02/+0.068	8	8
HPP28-0608-09	6	+0.02/+0.068	8	9
HPP28-0608-10	6	+0.02/+0.068	8	10
HPP28-0608-11	6	+0.02/+0.068	8	11
HPP28-0810-06	8	+0.025/+0.083	10	6
HPP28-0810-08	8	+0.025/+0.083	10	8
HPP28-0810-10	8	+0.025/+0.083	10	10
HPP28-0810-12	8	+0.025/+0.083	10	12
HPP28-0810-13	8	+0.025/+0.083	10	13
HPP28-0810-15	8	+0.025/+0.083	10	15
HPP28-0810-21	8	+0.025/+0.083	10	21
HPP28-1012-04	10	+0.025/+0.083	12	4
HPP28-1012-06	10	+0.025/+0.083	12	6
HPP28-1012-08	10	+0.025/+0.083	12	8
HPP28-1012-10	10	+0.025/+0.083	12	10
HPP28-1012-12	10	+0.025/+0.083	12	12
HPP28-1012-20	10	+0.025/+0.083	12	20
HPP28-1214-05	12	+0.032/+0.102	14	5
HPP28-1214-06	12	+0.032/+0.102	14	6
HPP28-1214-10	12	+0.032/+0.102	14	10
HPP28-1214-12	12	+0.032/+0.102	14	12
HPP28-1214-15	12	+0.032/+0.102	14	15
HPP28-1214-20	12	+0.032/+0.102	14	20
HPP28-1214-25	12	+0.032/+0.102	14	25
HPP28-1416-10	14	+0.032/+0.102	16	10
HPP28-1416-15	14	+0.032/+0.102	16	15

订购编码 Order PN	d [mm]	d- 公差 After fitting [mm]	D [mm]	L(h13) [mm]
HPP28-1416-20	14	+0.032/+0.102	16	20
HPP28-1416-25	14	+0.032/+0.102	16	25
HPP28-1517-10	15	+0.032/+0.102	17	10
HPP28-1517-20	15	+0.032/+0.102	17	20
HPP28-1517-25	15	+0.032/+0.102	17	25
HPP28-1618-08	16	+0.032/+0.102	18	8
HPP28-1618-15	16	+0.032/+0.102	18	15
HPP28-1618-20	16	+0.032/+0.102	18	20
HPP28-1618-25	16	+0.032/+0.102	18	25
HPP28-1820-20	18	+0.032/+0.102	20	20
HPP28-2022-15	20	+0.04/+0.124	22	15
HPP28-2023-10	20	+0.04/+0.124	23	10
HPP28-2023-15	20	+0.04/+0.124	23	15
HPP28-2023-20	20	+0.04/+0.124	23	20
HPP28-2023-23	20	+0.04/+0.124	23	23
HPP28-2023-30	20	+0.04/+0.124	23	30
HPP28-2225-15	22	+0.04/+0.124	25	15
HPP28-2225-20	22	+0.04/+0.124	25	20
HPP28-2225-25	22	+0.04/+0.124	25	25
HPP28-2225-30	22	+0.04/+0.124	25	30
HPP28-2528-12	25	+0.04/+0.124	28	12
HPP28-2528-20	25	+0.04/+0.124	28	20
HPP28-2528-25	25	+0.04/+0.124	28	25
HPP28-2528-30	25	+0.04/+0.124	28	30
HPP28-2832-20	28	+0.04/+0.124	32	20
HPP28-2832-25	28	+0.04/+0.124	32	25
HPP28-2832-30	28	+0.04/+0.124	32	30
HPP28-3034-20	30	+0.04/+0.124	34	20
HPP28-3034-25	30	+0.04/+0.124	34	25
HPP28-3034-30	30	+0.04/+0.124	34	30
HPP28-3034-40	30	+0.04/+0.124	34	40
HPP28-3236-20	32	+0.05/+0.15	36	20
HPP28-3236-30	32	+0.05/+0.15	36	30
HPP28-3236-40	32	+0.05/+0.15	36	40
HPP28-3539-20	35	+0.05/+0.15	39	20
HPP28-3539-30	35	+0.05/+0.15	39	30
HPP28-3539-40	35	+0.05/+0.15	39	40

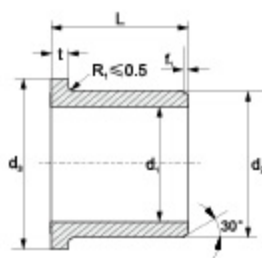
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HPP28-3539-50	35	+0.05/+0.15	39	50
HPP28-4044-20	40	+0.05/+0.15	44	20
HPP28-4044-30	40	+0.05/+0.15	44	30
HPP28-4044-40	40	+0.05/+0.15	44	40
HPP28-4044-50	40	+0.05/+0.15	44	50

订购编码 Order PN	d [mm]	d- 公差 After fitting [mm]	D [mm]	L(h13) [mm]
HPP28-5055-40	50	+0.05/+0.15	55	40
HPP28-5055-50	50	+0.05/+0.15	55	50

*d 公差为压入标准 H7 座孔 (ISO3547-1) 后公差

*Tolerance d: 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:

HPP28 F-0304-03
 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	d1 [mm]	d1- 公差 After fitting [mm]	d2 [mm]	d3[d13] [mm]	L[h13] [mm]	t0.15 [mm]
HPP28F-0304-03	3	+0.014/+0.054	4.5	7.5	3	0.75
HPP28F-0304-05	3	+0.014/+0.054	4.5	7.5	5	0.75
HPP28F-0405-03	4	+0.02/+0.068	5.5	9.5	3	0.75
HPP28F-0405-04	4	+0.02/+0.068	5.5	9.5	4	0.75
HPP28F-0405-06	4	+0.02/+0.068	5.5	9.5	6	0.75
HPP28F-0506-15	5	+0.02/+0.068	6	10	15	0.5
HPP28F-0507-04	5	+0.02/+0.068	7	11	4	1
HPP28F-0507-05	5	+0.02/+0.068	7	11	5	1
HPP28F-0507-10	5	+0.02/+0.068	7	11	10	1
HPP28F-0608-04	6	+0.02/+0.068	8	12	4	1
HPP28F-0608-06	6	+0.02/+0.068	8	12	6	1
HPP28F-0608-08	6	+0.02/+0.068	8	12	8	1
HPP28F-0608-10	6	+0.02/+0.068	8	12	10	1
HPP28F-0810-04	8	+0.025/+0.083	10	15	4	1
HPP28F-0810-05	8	+0.025/+0.083	10	15	5	1
HPP28F-0810-07	8	+0.025/+0.083	10	15	7	1
HPP28F-0810-08F2.5	8	+0.025/+0.083	10	15	8	2.5
HPP28F-0810-09	8	+0.025/+0.083	10	15	9	1
HPP28F-0810-10	8	+0.025/+0.083	10	15	10	1
HPP28F-0810-30	8	+0.025/+0.083	10	15	30	1
HPP28F-1012-06	10	+0.025/+0.083	12	18	6	1
HPP28F-1012-07	10	+0.025/+0.083	12	18	7	1
HPP28F-1012-10	10	+0.025/+0.083	12	18	10	1
HPP28F-1012-12	10	+0.025/+0.083	12	18	12	1
HPP28F-1012-15	10	+0.025/+0.083	12	18	15	1
HPP28F-1012-17	10	+0.025/+0.083	12	18	17	1

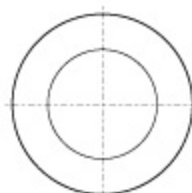
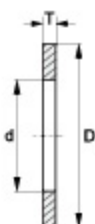
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HPP28F-1214-07	12	+0.032/+0.102	14	20	7	1
HPP28F-1214-09	12	+0.032/+0.102	14	20	9	1
HPP28F-1214-10	12	+0.032/+0.102	14	20	10	1
HPP28F-1214-11	12	+0.032/+0.102	14	20	11	1
HPP28F-1214-12	12	+0.033/+0.102	14	20	12	1
HPP28F-1214-15	12	+0.032/+0.102	14	20	15	1
HPP28F-1214-17	12	+0.032/+0.102	14	20	17	1
HPP28F-1214-20	12	+0.032/+0.102	14	20	20	1
HPP28F-1416-12	14	+0.032/+0.102	16	22	12	1
HPP28F-1416-17	14	+0.032/+0.102	16	22	17	1
HPP28F-1517-12	15	+0.032/+0.102	17	23	12	1
HPP28F-1517-17	15	+0.032/+0.102	17	23	17	1
HPP28F-1517-20	15	+0.032/+0.102	17	23	20	1
HPP28F-1618-09	16	+0.032/+0.102	18	24	9	1
HPP28F-1618-12	16	+0.032/+0.102	18	24	12	1
HPP28F-1618-17	16	+0.032/+0.102	18	24	17	1
HPP28F-1820-17	18	+0.032/+0.102	20	26	17	1
HPP28F-1820-22	18	+0.032/+0.102	20	26	22	1
HPP28F-2023-11.5	20	+0.04/+0.124	23	30	11.5	1.5
HPP28F-2023-16.5	20	+0.04/+0.124	23	30	16.5	1.5
HPP28F-2023-21.5	20	+0.04/+0.124	23	30	21.5	1.5
HPP28F-2528-11.5	25	+0.04/+0.124	28	35	11.5	1.5
HPP28F-2528-16.5	25	+0.04/+0.124	28	35	16.5	1.5
HPP28F-2528-21.5	25	+0.04/+0.124	28	35	21.5	1.5
HPP28F-3034-16	30	+0.04/+0.124	34	42	16	2

订购编码 Order PN	d ₁ [mm]	d ₁ - 公差 After fitting [mm]	d ₂ [mm]	d ₂ [d13] [mm]	L[h13] [mm]	t _{0.15} [mm]
HPP28F-3034-26	30	+0.04/+0.124	34	42	26	2
HPP28F-3034-37	30	+0.04/+0.124	34	42	37	2
HPP28F-3236-16	32	+0.05/+0.15	36	40	16	2
HPP28F-3236-26	32	+0.05/+0.15	36	40	26	2
HPP28F-3539-09	35	+0.05/+0.15	39	47	9	2
HPP28F-3539-16	35	+0.05/+0.15	39	47	16	2
HPP28F-3539-26	35	+0.05/+0.15	39	47	26	2

订购编码 Order PN	d ₁ [mm]	d ₁ - 公差 After fitting [mm]	d ₂ [mm]	d ₂ [d13] [mm]	L[h13] [mm]	t _{0.15} [mm]
HPP28F-4044-30	40	+0.05/+0.15	44	52	30	2
HPP28F-4550-50	45	+0.05/+0.15	50	58	50	2
HPP28F-5055-40	50	+0.05/+0.15	55	63	40	2

*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)

垫片 Metric Thrust Washers



订购编码 Order PN:

HPP4 W-0509-006

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]
HPP28W-0509-006	5	9	0.6
HPP28W-0615-015	6	15	1.5
HPP28W-0620-015	6	20	1.5
HPP28W-0815-005	8	15	0.5
HPP28W-0815-015	8	15	1.5
HPP28W-0818-005	8	18	0.5
HPP28W-0818-010	8	18	1.0
HPP28W-0818-015	8	18	1.5
HPP28W-1018-010	10	18	1.0
HPP28W-1018-015	10	18	1.5
HPP28W-1018-020	10	18	2.0
HPP28W-1224-012	12	24	1.2
HPP28W-1224-015	12	24	1.5
HPP28W-1426-015	14	26	1.5
HPP28W-1524-015	15	24	1.5

订购编码 Order PN	d ^{+0.25} [mm]	D _{0.25} [mm]	T _{0.05} [mm]
HPP28W-1630-015	16	30	1.5
HPP28W-1832-015	18	32	1.5
HPP28W-2032-010	20	32	1.0
HPP28W-2036-015	20	36	1.5
HPP28W-2238-015	22	38	1.5
HPP28W-2442-015	24	42	1.5
HPP28W-2644-015	26	44	1.5
HPP28W-2848-015	28	48	1.5
HPP28W-3254-015	32	54	1.5
HPP28W-3862-015	38	62	1.5
HPP28W-4266-015	42	66	1.5
HPP28W-4874-020	48	74	2.0
HPP28W-5278-020	52	78	2.0
HPP28W-6290-020	62	90	2.0

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