

HPP11-工程塑料轴承 Plastic Plain Bearings

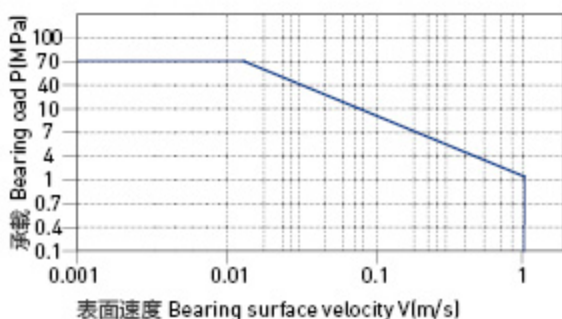
轴承PV值 PV Value

HPP11系列轴承最大运行PV值为 $0.8\text{N/mm}^2 \times \text{m/s}$;由此决定轴承所承受的载荷与速度成反比, 详细查阅图表HPP11-1。

The max PV value of the HPP11 series bearing is $0.8\text{N/mm}^2 \times \text{m/s}$ which determines the load capacity of bearing is inversely proportional to the speed. Please refer to the chart for more detailed information (Graph HPP11-1).

图表 HPP11-1: PV 图表

Graph HPP11-1: Permissible PV value for HPP11



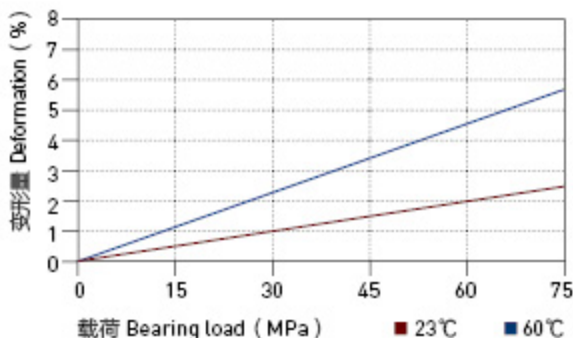
轴承的载荷、速度、温度 The Relation Of Load, Speed And Temperature

HPP11 塑料轴承可承受最大静载荷为 75Mpa, 在此载荷下轴承的最大压缩变形量参考图表 HPP11-2; 轴承实际工作载荷略小于 75Mpa, 载荷还受到运行速度以及温度的影响, 速度越快 (Vmax: 1.2m/s) 会导致摩擦温度上升, 而温度上升 (Tmax: 200℃) 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 HPP11-3。

HPP11 allows the max static load of 75Mpa, The max compressive deformation rate under the max load is listed in Graph HPP11-2; The actual load capacity of bearing is slightly less than 75Mpa, The bearing load is variable against the speed and temperature, Fast speed (Vmax: 1.2m/s) results into higher temperature (Tmax: 200℃) which decreases the load capacity of the bearing. Please refer to the Graph HPP11-3 for such variation.

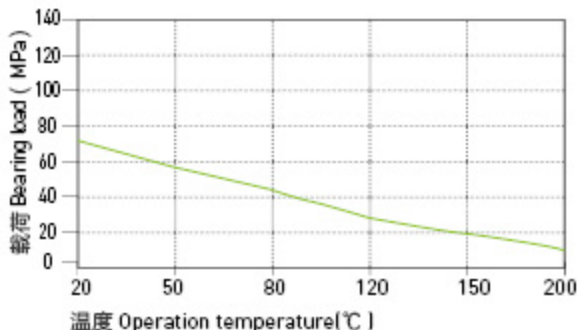
图表 HPP11-2: 载荷 - 温度 - 变形量图表

Graph HPP11-2: Load-Temperature deformation



图表 HPP11-3: 载荷 - 温度图表

Graph HPP11-3: Load-Temperature diagrams



HPP11-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HPP11-4表明HPP11轴承的摩擦系数在载荷保持不变时随着运行速度的增加影响较小；专用润滑剂的植入使得此轴承更适合用于水下。图表HPP11-5表明HPP11轴承在速度保持不变的情况下载荷超过20Mpa摩擦系数随着载荷的变化相对较小。图表HPP11-6表明轴表面粗糙度对HPP11轴承的摩擦系数影响较大，在轴表面粗糙度超过Ra0.7时趋于平稳。我们推荐使用轴的表面粗糙度为Ra0.2~0.3 μ m。

Graph HPP11-4 shows that the friction factor of HPP11 is not considerably affected by the operation speed when the loading is stable. The special embedded lubricant helps the material to be suitable for the underwater operation. When the operation speed keeps stable and the loading is over 20Mpa, the friction factor of HPP11 is not variable along with the loading change (See Graph HPP11-5). The shaft roughness highly affects the friction factor but this affecting will be stable when the shaft roughness is better than Ra0.7 (See Graph HPP11-6). The recommended shaft roughness is Ra0.2 to Ra0.3.

HPP11	干运行 Dry	油脂 Grease	油 Oil	水 Water
摩擦系数 μ Friction coef.	0.07~0.18	0.09	0.04	0.04

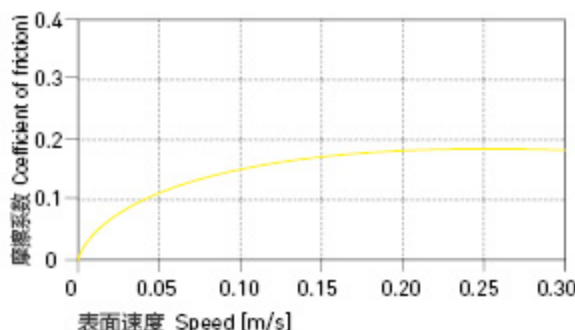
■ 磨损与轴材料 Wearing and shaft material

图表HPP11-7与图表HPP11-8对HPP11轴承在不同轴材料旋转运动下的测试结果表明，HPP11轴承最理想的轴材料是硬铬钢轴，而不锈钢轴不适合用于此轴承。图表HPP11-8表明HPP11轴承在摆动运动中采用不锈钢轴或硬铬钢轴比较适合，而在旋转运动中硬铬钢轴依然是最佳的选择。

The rotation test against different shaft material showing in Graph HPP11-7 and Graph HPP11-8 induces that the best mating shaft material for the material HPP11 is hardened chrome steel shaft but not stainless steel shaft. Graph HPP11-8 tells that HPP11 is best for stainless steel and hardened chrome steel shaft in oscillation operation and especially the hardened chrome steel shaft is the best choice in rotation operation.

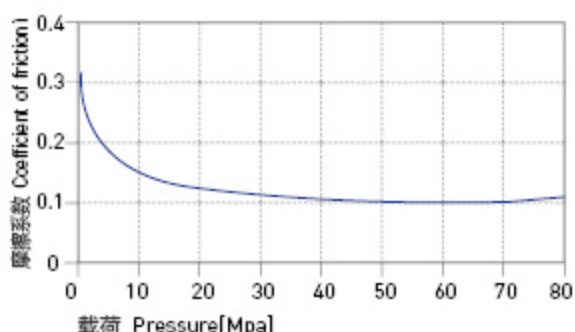
图表 HPP11-4: 摩擦系数与速度变化关系图表 P=2MPa

Graph HPP11-4: Coefficient of friction & the speed of bearing, P=2Mpa



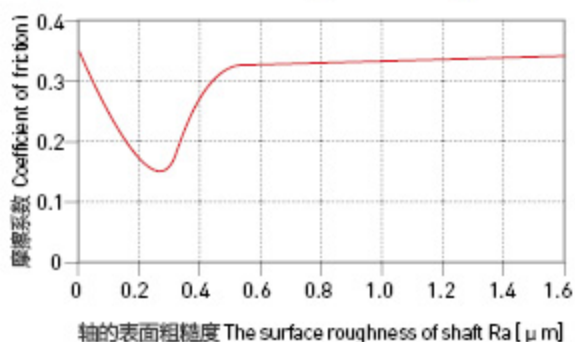
图表 HPP11-5: 摩擦系数与载荷变化关系图表 v=0.2m/s

Graph HPP11-5: Coefficient of friction & the pressure of bearing, v=0.2m/s



图表 HPP11-6: 摩擦系数轴表面粗糙度关系图表

Graph HPP11-6: Coefficient of friction & the surface roughness of shaft



HPP11-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

HPP11塑料轴承具有很好的化学抗性，能抵抗绝大多数酸碱。

The chemical Resistance of HPP11 is fairly good against most of Acid and Alkalies.

■ 吸水性 Water Absorbability

在标准大气压中，HPP11 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，适合在水下长期运行。

The water absorb rate of HPP11 is less than 0.1% under the atmospheric pressure while it is less than 0.1% when the material is stabilized for the application under humid environment or even in the water

■ 抗UV性能 UV Resistance

HPP11 长久暴露在紫外线下材料表面会发生蜕变，抗压强度会下降。

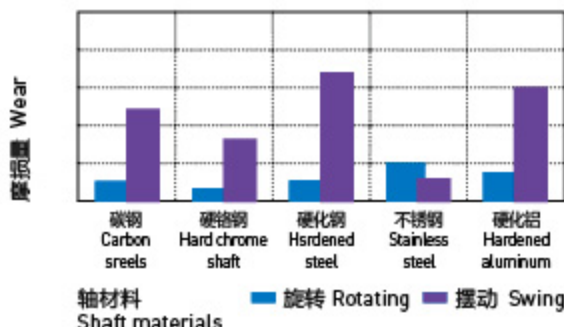
Disintegration could be possible for the material HPP11 after long period of exposing under the UV ray and therefore the compressive strength will be reduced.

■ 安装公差 Installation Tolerances

HPP11 塑料轴承压装后公差 Tolerances after pressfit

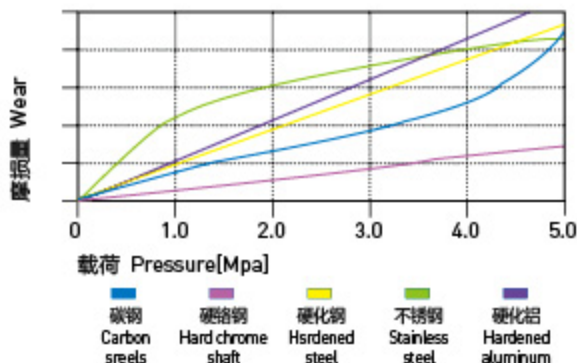
直径 Di. [mm]	HPP11 F10 [mm]	座孔 Housing H7 [mm]	轴 Shaft h9 [mm]
> 0~3	+0.006+0.046	0~+0.010	0~-0.025
> 3~6	+0.010+0.058	0~+0.012	0~-0.030
> 6~10	+0.013+0.071	0~+0.015	0~-0.036
> 10~18	+0.016+0.086	0~+0.018	0~-0.043
> 18~30	+0.020+0.104	0~+0.021	0~-0.052
> 30~50	+0.025+0.125	0~+0.025	0~-0.062
> 50~80	+0.030+0.150	0~+0.030	0~-0.074
> 80~120	+0.036+0.176	0~+0.035	0~-0.087
> 120~180	+0.043+0.203	0~+0.040	0~-0.100

图表 HPP11-7: 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 HPP11-7: The bearing wear under rotating with different shaft materials, $p=2\text{MPa}$, $v=0.2\text{m/s}$



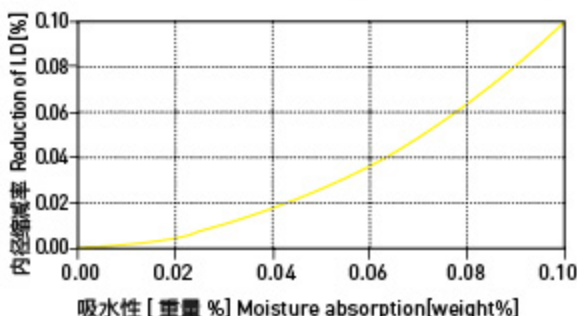
图表 HPP11-8: 旋转磨损随轴材料与压力变化关系 $v=0.2\text{m/s}$

Graph HPP11-8: The bearing wear & pressure under rotating with different shaft materials, $v=0.2\text{m/s}$

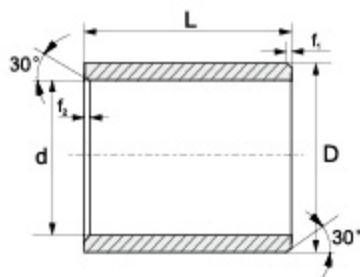


图表 HPP11-9: 吸水性的影响

Graph HPP11-9: Effect of moisture absorption on HPP11 bearings



HPP11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:

HPP11-0304-03

材料 Material
d D L

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]
HPP11-0304-03	3	+0.006/+0.046	4.5	3
HPP11-0304-06	3	+0.006/+0.046	4.5	6
HPP11-0405-04	4	+0.010/+0.058	5.5	4
HPP11-0405-06	4	+0.010/+0.058	5.5	6
HPP11-0507-05	5	+0.010/+0.058	7	5
HPP11-0507-08	5	+0.010/+0.058	7	8
HPP11-0608-06	6	+0.010/+0.058	8	6
HPP11-0608-08	6	+0.010/+0.058	8	8
HPP11-0608-10	6	+0.010/+0.058	8	10
HPP11-0810-06	8	+0.013/+0.071	10	6
HPP11-0810-08	8	+0.013/+0.071	10	8
HPP11-0810-10	8	+0.013/+0.071	10	10
HPP11-0810-12	8	+0.013/+0.071	10	12
HPP11-0810-15	8	+0.013/+0.071	10	15
HPP11-1012-06	10	+0.013/+0.071	12	6
HPP11-1012-08	10	+0.013/+0.071	12	8
HPP11-1012-10	10	+0.013/+0.071	12	10
HPP11-1012-12	10	+0.013/+0.071	12	12
HPP11-1012-15	10	+0.013/+0.071	12	15
HPP11-1012-20	10	+0.013/+0.071	12	20
HPP11-1214-06	12	+0.016/+0.086	14	6
HPP11-1214-08	12	+0.016/+0.086	14	8
HPP11-1214-10	12	+0.016/+0.086	14	10
HPP11-1214-12	12	+0.016/+0.086	14	12
HPP11-1214-15	12	+0.016/+0.086	14	15
HPP11-1214-20	12	+0.016/+0.086	14	20
HPP11-1214-25	12	+0.016/+0.086	14	25
HPP11-1416-12	14	+0.016/+0.086	16	12
HPP11-1416-15	14	+0.016/+0.086	16	15
HPP11-1416-20	14	+0.016/+0.086	16	20
HPP11-1517-07	15	+0.016/+0.086	17	7
HPP11-1517-10	15	+0.016/+0.086	17	10
HPP11-1517-15	15	+0.016/+0.086	17	15
HPP11-1517-20	15	+0.016/+0.086	17	20
HPP11-1517-25	15	+0.016/+0.086	17	25

订购编码 Order PN	d [mm]	d- 公差 After fitting [mm]	D [mm]	L(h13) [mm]
HPP11-1618-10	16	+0.016/+0.086	18	10
HPP11-1618-12	16	+0.016/+0.086	18	12
HPP11-1618-15	16	+0.016/+0.086	18	15
HPP11-1618-20	16	+0.016/+0.086	18	20
HPP11-1618-25	16	+0.016/+0.086	18	25
HPP11-1618-35	16	+0.016/+0.086	18	35
HPP11-1719-20	17	+0.016/+0.086	19	20
HPP11-1820-15	18	+0.016/+0.086	20	15
HPP11-1820-20	18	+0.016/+0.086	20	20
HPP11-1820-25	18	+0.016/+0.086	20	25
HPP11-2023-10	20	+0.020/+0.104	23	10
HPP11-2023-15	20	+0.020/+0.104	23	15
HPP11-2023-20	20	+0.020/+0.104	23	20
HPP11-2023-25	20	+0.020/+0.104	23	25
HPP11-2023-30	20	+0.020/+0.104	23	30
HPP11-2225-15	22	+0.020/+0.104	25	15
HPP11-2225-20	22	+0.020/+0.104	25	20
HPP11-2528-09	25	+0.020/+0.104	28	9
HPP11-2528-12	25	+0.020/+0.104	28	12
HPP11-2528-13	25	+0.020/+0.104	28	13
HPP11-2528-15	25	+0.020/+0.104	28	15
HPP11-2528-20	25	+0.020/+0.104	28	20
HPP11-2528-30	25	+0.020/+0.104	28	30
HPP11-2528-35	25	+0.020/+0.104	28	35
HPP11-2832-20	28	+0.020/+0.104	32	20
HPP11-2832-30	28	+0.020/+0.104	32	30
HPP11-3034-15	30	+0.020/+0.104	34	15
HPP11-3034-20	30	+0.020/+0.104	34	20
HPP11-3034-25	30	+0.020/+0.104	34	25
HPP11-3034-30	30	+0.020/+0.104	34	30
HPP11-3034-40	30	+0.020/+0.104	34	40
HPP11-3034-60	30	+0.020/+0.104	34	60
HPP11-3236-25	32	+0.025/+0.125	36	25
HPP11-3236-30	32	+0.025/+0.125	36	30
HPP11-3236-40	32	+0.025/+0.125	36	40

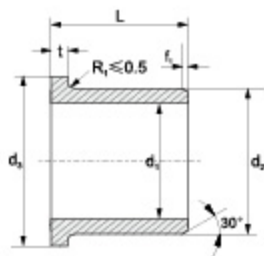
订购编码 Order PN	d [mm]	d- 公差 After fitting [mm]	D [mm]	L(h13) [mm]
HPP11-3539-20	35	+0.025/+0.125	39	20
HPP11-3539-30	35	+0.025/+0.125	39	30
HPP11-3539-40	35	+0.025/+0.125	39	40
HPP11-3539-50	35	+0.025/+0.125	39	50
HPP11-4044-20	40	+0.025/+0.125	44	20
HPP11-4044-30	40	+0.025/+0.125	44	30
HPP11-4044-40	40	+0.025/+0.125	44	40
HPP11-4044-50	40	+0.025/+0.125	44	50
HPP11-4550-30	45	+0.025/+0.125	50	30
HPP11-4550-50	45	+0.025/+0.125	50	50
HPP11-5055-30	50	+0.025/+0.125	55	30
HPP11-5055-40	50	+0.025/+0.125	55	40

订购编码 Order PN	d [mm]	d- 公差 After fitting [mm]	D [mm]	L(h13) [mm]
HPP11-5055-60	50	+0.025/+0.125	55	60
HPP11-5560-26	55	+0.030/+0.150	60	26
HPP11-5560-50	55	+0.030/+0.150	60	50
HPP11-6065-45	60	+0.030/+0.150	65	45
HPP11-6065-60	60	+0.030/+0.150	65	65
HPP11-6570-50	65	+0.030t/+0.150	70	50
HPP11-7075-50	70	+0.030/+0.150	75	50
HPP11-7075-70	70	+0.030/+0.150	75	70
HPP11-7580-60	75	+0.030/+0.150	80	60

*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:

HPP11 F-0304-05

 d₁ d₂ 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 ₁ [mm]	d ₁ - 公差 After fitting [mm]	d ₂ [mm]	d ₂ [d13] [mm]	L[h13] [mm]	t _{0.15} [mm]
HPP11F-0304-05	3	+0.006/+0.046	4.5	7.5	5	0.75
HPP11F-0405-04	4	+0.010/+0.058	5.5	9.5	4	0.75
HPP11F-0405-06	4	+0.010/+0.058	5.5	9.5	6	0.75
HPP11F-0507-05	5	+0.010/+0.058	7	11	5	1
HPP11F-0507-08	5	+0.010/+0.058	7	11	8	1
HPP11F-0608-04	6	+0.010/+0.058	8	12	4	1
HPP11F-0608-06	6	+0.010/+0.058	8	12	6	1
HPP11F-0608-08	6	+0.010/+0.058	8	12	8	1
HPP11F-0608-10	6	+0.010/+0.058	8	12	10	1
HPP11F-0810-05	8	+0.013/+0.071	10	15	5.5	1
HPP11F-0810-06	8	+0.013/+0.071	10	15	6	1
HPP11F-0810-07	8	+0.013/+0.071	10	15	7	1
HPP11F-0810-08	8	+0.013/+0.071	10	15	8	1
HPP11F-0810-09	8	+0.013/+0.071	10	15	9	1
HPP11F-0810-10	8	+0.013/+0.071	10	15	10	1
HPP11F-0810-15	8	+0.013/+0.071	10	15	15	1
HPP11F-0812-06	8	+0.025/+0.083	12	16	6	2
HPP11F-1012-04	10	+0.013/+0.071	12	18	4	1
HPP11F-1012-05	10	+0.013/+0.071	12	18	5	1

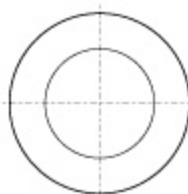
订购编码 Order PN	d ₁ [mm]	d ₁ - 公差 After fitting [mm]	d ₂ [mm]	d ₂ [d13] [mm]	L[h13] [mm]	t _{0.15} [mm]
HPP11F-1012-06	10	+0.013/+0.071	12	18	6	1
HPP11F-1012-08	10	+0.013/+0.071	12	18	8	1
HPP11F-1012-09	10	+0.013/+0.071	12	18	9	1
HPP11F-1012-10	10	+0.013/+0.071	12	18	10	1
HPP11F-1012-12	10	+0.013/+0.071	12	18	12	1
HPP11F-1012-15	10	+0.013/+0.071	12	18	15	1
HPP11F-1012-17	10	+0.013/+0.071	12	18	17	1
HPP11F-1012-20	10	+0.013/+0.071	12	18	20	1
HPP11F-1012-22	10	+0.013/+0.071	12	18	22	1
HPP11F-1012-25	10	+0.013/+0.071	12	18	25	1
HPP11F-1214-07	12	+0.016/+0.086	14	20	7	1
HPP11F-1214-09	12	+0.016/+0.086	14	20	9	1
HPP11F-1214-10	12	+0.016/+0.086	14	20	10	1
HPP11F-1214-12	12	+0.016/+0.086	14	20	12	1
HPP11F-1214-15	12	+0.016/+0.086	14	20	15	1
HPP11F-1214-20	12	+0.016/+0.086	14	20	20	1
HPP11F-1416-10	14	+0.016/+0.086	16	22	10	1
HPP11F-1416-12	14	+0.016/+0.086	16	22	12	1
HPP11F-1416-17	14	+0.016/+0.086	16	22	17	1

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]
HPP11F-1517-06	15	+0.016/+0.086	17	23	6	1
HPP11F-1517-12	15	+0.016/+0.086	17	23	12	1
HPP11F-1517-17	15	+0.016/+0.086	17	23	17	1
HPP11F-1618-10	16	+0.016/+0.086	18	24	10	1
HPP11F-1618-12	16	+0.016/+0.086	18	24	12	1
HPP11F-1618-13	16	+0.016/+0.086	18	24	13	1
HPP11F-1618-17	16	+0.016/+0.086	18	24	17	1
HPP11F-1618-25	16	+0.016/+0.086	18	24	25	1
HPP11F-1820-12	18	+0.016/+0.086	20	26	12	1
HPP11F-1820-17	18	+0.016/+0.086	20	26	17	1
HPP11F-2023-07	20	+0.020/+0.104	23	30	7	1.5
HPP11F-2023-11.5	20	+0.020/+0.104	23	30	11.5	1.5
HPP11F-2023-16.5	20	+0.020/+0.104	23	30	16.5	1.5
HPP11F-2023-21.5	20	+0.020/+0.104	23	30	21.5	1.5
HPP11F-2023-30	20	+0.020/+0.104	23	30	30	1.5
HPP11F-2528-13.5	25	+0.020/+0.104	28	35	13.5	1.5
HPP11F-2528-21.5	25	+0.020/+0.104	28	35	21.5	1.5
HPP11F-2528-30	25	+0.020/+0.104	28	35	30	1.5
HPP11F-3034-16	30	+0.020/+0.104	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]
HPP11F-3034-26	30	+0.020/+0.104	34	42	26	2
HPP11F-3034-40	30	+0.020/+0.104	34	42	40	2
HPP11F-3236-15	32	+0.025/+0.125	36	45	15	2
HPP11F-3236-26	32	+0.025/+0.125	36	45	26	2
HPP11F-3539-26	35	+0.025/+0.125	39	47	26	2
HPP11F-4044-22	40	+0.025/+0.125	44	52	22	2
HPP11F-4044-30	40	+0.025/+0.125	44	52	30	2
HPP11F-4044-40	40	+0.025/+0.125	44	52	40	2
HPP11F-4550-50	45	+0.025/+0.125	50	58	50	2
HPP11F-5055-40	50	+0.025/+0.125	55	63	40	2
HPP11F-5055-50	50	+0.025/+0.125	55	63	50	2
HPP11F-6065-40	60	+0.030/+0.150	65	75	40	2
HPP11F-6065-50	60	+0.030/+0.150	65	75	50	2
HPP11F-7075-40	70	+0.030/+0.150	75	83	40	2
HPP11F-7075-50	70	+0.030/+0.150	75	83	50	2
HPP11F-7580-50	75	+0.030/+0.150	80	88	50	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:

HPP11 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]
HPP11W-0509-006	5	9	0.6
HPP11W-0615-015	6	15	1.5
HPP11W-0620-015	6	20	1.5
HPP11W-0815-005	8	15	0.5
HPP11W-0815-015	8	15	1.5
HPP11W-0818-010	8	18	1.0
HPP11W-0818-015	8	18	1.5
HPP11W-1018-010	10	18	1.0
HPP11W-1018-015	10	18	1.5
HPP11W-1018-020	10	18	2.0
HPP11W-1224-015	12	24	1.5
HPP11W-1426-015	14	26	1.5
HPP11W-1524-015	15	24	1.5
HPP11W-1630-015	16	30	1.5

订购编码 Order PN	d ^{+0.25} [mm]	D _{-0.25} [mm]	T _{+0.05} [mm]
HPP11W-1832-015	18	32	1.5
HPP11W-2036-015	20	36	1.5
HPP11W-2238-015	22	38	1.5
HPP11W-2442-015	24	42	1.5
HPP11W-2640-0075	26	40	0.75
HPP11W-2644-015	26	44	1.5
HPP11W-2848-015	28	48	1.5
HPP11W-3254-015	32	54	1.5
HPP11W-3862-015	38	62	1.5
HPP11W-4266-015	42	66	1.5
HPP11W-4874-020	48	74	2.0
HPP11W-5278-020	52	78	2.0
HPP11W-6290-020	62	90	2.0

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