



滑动轴承
Sliding parts

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TECHNE offers the whole range of metal, polymer and resin bushes.

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When applicable, our bushes are produced according to ISO 3547.

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滑动轴承

SLIDING BUSHES

		构成 Composition			操作 Operation	工作温度 Temperature	最大载荷 Max load	
							静态 Static	动态 Dynamic
TU	TU	钢材 Steel	烧结青铜 CuSn8Zn3	PTFE/Pb	干摩擦或润滑 Dry or lubricated	-195°C à/to +280°C	250 N/mm ²	140 N/mm ²
	TU-SP			PTFE/纤维				
	TU-T			PTFE/纤维				
	TU-P			PTFE/Pb				
	TP4			PTFE/纤维				
	TU-PK	PEEK	-100°C à/to +250°C	160 N/mm ²		100 N/mm ²		
	TU-B	青铜 Bronze	CuSn8Zn3	PTFE/Pb		-195°C à/to +250°C	250 N/mm ²	140 N/mm ²
	TU-BSP	PTFE/纤维						
TU-ISP	InoxAISI 316		PTFE/纤维					
TI	TI	InoxAISI 316	烧结青铜 CuSn8Zn3 Sintered Bz CuSn8Zn3	PTFE纤维 Fiber	干摩擦或润滑 Dry or lubricated	-195°C à/to +250°C	200 N/mm ²	100 N/mm ²
TIX	TIX	钢材/steel		PTFE织物 PTFE Woven	干摩擦或润滑 Dry or lubricated	-50°C à/to +250°C	350 N/mm ²	180 N/mm ²
	TIX-316	Inox AISI 316		PTFE织物 PTFE Woven				
	TIX-625	Inconel®		PTFE织物 PTFE Woven				
	TIX-B	青铜 Bronze		PTFE织物 PTFE Woven				
TX	TX	钢材 Steel	烧结青铜 CuSn8Zn3 Sintered Bz CuSn8Zn3	POM	润滑的 Lubricated	-40°C à/to +130°C	250 N/mm ²	140 N/mm ²
	TS-SA							
	TX-PK			PEEK		-150°C à/to +250°C	250 N/mm ²	140 N/mm ²
TY	TY	钢材 +青铜 Steel + bronze	参见第25页 不同材料 See the differents materials on page 25	参见第25页 不同材料 See the differents materials on page 25	润滑的 Lubricated	-40°C à/to +250°C	60 N/mm ²	150 N/mm ²
	TYAS							
	TYSA							
	TYAL							
TZ	TZA/TZT	青铜 Bronze	CuSn8		润滑的 Lubricated	-80°C à/to +200°C	120 N/mm ²	40 N/mm ²
TBL	TBL	青铜 +石墨片 Bronze with graphit pellets	参见第36页 不同材料 See the differents materials on page 36	参见第36页 不同材料 See the differents materials on page 36		-100°C à/to +300°C	100 N/mm ²	25 N/mm ²

滑动轴承

SLIDING BUSHES

最大速度 Max speed		最大pv因数 Max Pv		应用 Applications	
干摩擦 Dry	润滑的 Lubricated	干摩擦 Dry	润滑的 Lubricated		
2,5 m/s	5,0 m/s	3,6 N/mm ² .m/s	30,0 N/mm ² .m/s	旋转运动和重载荷 Rotative movement and high load	
	10,0 m/s	3,8 N/mm ² .m/s	60,0 N/mm ² .m/s		
	5,0 m/s	3,6 N/mm ² .m/s	50,0 N/mm ² .m/s		
2 m/s	2,5 m/s	3,0 N/mm ² .m/s	40,0 N/mm ² .m/s	食品工业 Food industry	
0,5 m/s	2,0 m/s	3,6 N/mm ² .m/s	50,0 N/mm ² .m/s	重载荷 High load	
0,5 m/s	2,5 m/s	3,0 N/mm ² .m/s	22,0 N/mm ² .m/s	高频率停止和启动 Frequent stop and go	
	5,0 m/s	3,2 N/mm ² .m/s	25,0 N/mm ² .m/s		
2,0 m/s	5,0 m/s	3,6 N/mm ² .m/s	50,0 N/mm ² .m/s		
0,4 m/s	5,0 m/s	2,8 N/mm ² .m/s	10,0 N/mm ² .m/s	极低的摩擦系数 Very low friction coefficient.	
0,2 m/s	4,0 m/s	2,6 N/mm ² .m/s	15,0 N/mm ² .m/s	易于安装和润滑 Easy fitting and lubrication.	
0,4 m/s	5,0 m/s	3,8 N/mm ² .m/s		液压和制塑工业 Hydraulics and plastics industry.	

连续运动情况下，此数值除以2

Divide this value by 2 for continuous movement

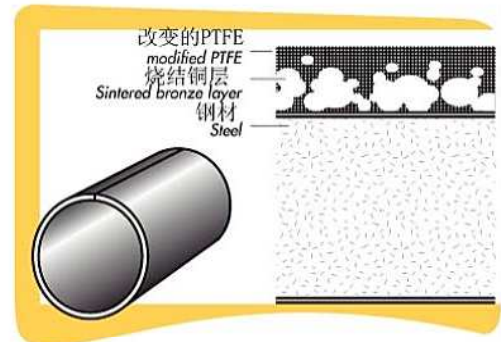
结构

自润滑TU轴承由三层材料构成:

1. 钢材或者青铜等金属材质做基底提高机械抗性
2. 一层青铜粉和四氟乙烯混合烧结层, 保证导热性, 尺寸稳定性和与滑动层的紧密连接 (0.20到0.35mm)
3. 滑动层, 基于PTFE的混合物, 提供高质量的自润滑功能 (低摩擦)。

The TUs have 3 layers :

- A steel or bronze strip to improve mechanical resistance,
- A porous sintered bronze layer for heat conductivity, dimensional stability and the bonding of the sliding layer,
- A PTFE based sliding layer with good auto lubricant quality (low wear and low friction).



金属层有镀铜或者镀锌保护层, 防腐蚀, 导热性好

The steel layer is protected by a thin tin (standard) or copper (on request) layer to improve corrosion resistance and heat conductivity.

参数见下表

See table for variants:

安装/ASSEMBLY

安装好后, 此轴套有H9的公差可以匹配精度为H7的轴

Once fitted, the bushing has a H9 tolerance to allow to work with a H7 shaft.

类型 Type		TU	TU-SP	TU-T	TU-P	TP4	TU-PK	TU-ISP	TU-B	TU-BSP	TU-A	
构成 Composition		钢材/Steel						Inox 304 stainless	青铜 Bronze		铝 Aluminium	
		Bronze fritté CuSn8Zn3 /Sintered Bz CuSN8Zn3										
操作 Operation		干摩擦/dry	++	++	++	++	++	++	++	++	++	
		润滑的/lubricated	+	+	++	+	++	++	+	+	+	
工作温度 T°		-195°C à /to+280°C	-195°C à /to+280°C	-195°C à /to+280°C	-195°C à /to+280°C	-195°C à /to+280°C	-100°C à /to+250°C	-195°C à /to+280°C	-195°C à /to+280°C	-195°C à /to+280°C	-195°C à /to+200°C	
最大 Max load	静止, 低速运动, 旋转和震动运动	MPa	250	250	250	250	250	160	250	250	250	100
			140	140	140	140	140	100	140	140	140	50
			60	60	60	60	60	60	60	60	60	20
最大 Max speed	干摩擦/dry 润滑的/lubricated	m/s	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
			5	5	10	5	5	5	5	5	5	5
最大PV Max Pv	干摩擦, 最大值 Max, dry 干摩擦, 连续值 counuous dry 润滑的/lubricated	MPa.m/s	3,6	3,6	3,8	3,8	3,6	3,6	3,6	3,6	3,6	2,8
			1,8	1,8	1,9	1,9	1,8	1,8	1,8	1,8	1,8	1,8
			30	30	60	40	40	50	30	50	50	40
摩擦系数 friction coefficient		干摩擦 dry	0.08~0.2	0.08~0.2	0.08~0.2	0.08~0.2	0.08~0.2	0.09~0.24	0.08~0.2	0.08~0.2	0.08~0.2	
		润滑的 lubricated	0.02~0.07	0.02~0.07	0.01~0.05	0.02~0.07	0.01~0.05	0.02~0.07	0.02~0.07	0.02~0.07	0.02~0.07	
热膨胀系数 Thermal expansion coefficient		/K	~12x10 ⁻⁶	~12x10 ⁻⁶	~12x10 ⁻⁶	~12x10 ⁻⁶	~12x10 ⁻⁶	~12x10 ⁻⁶	~16x10 ⁻⁶	~18x10 ⁻⁶	~18x10 ⁻⁶	~24x10 ⁻⁶
热传导 heat cond.		W/(m.K)	~40	~40	~40	~40	~40	~50	~50	~60	~60	~150
RoHS /VHU		不 No	是 Yes	按要求 On request	按要求 On request	是 Yes	是 Yes	是 Yes	是 Yes	是 Yes	是 Yes	
应用 Applications		旋转运动 和重载 Rotative movement and high load		高载荷因数, 低磨损, 旋转运动, 液泵 High Pv factor, low wear, rotative movements, hydraulics pumps.	高载荷因数, 低磨损, 线性运动, 减振器, 油缸 High Pv factor, low wear, linear movements, shock absorbers, cylinders	旋转或线性 运动, 润滑后 低磨损 Rotative and linear movements, low wear and friction if lubricated.	高温下高载荷 因数, 化学抗性, 低磨损 High Pv factor with high temperatures Chemical resistance Low wear effect	抗化学性 Chemical resistance.	旋转运动和重载 Rotative movements and high load		优秀的散 热性, 重量 轻. 适合健 身器, 自行 车等 Low weight ; fitness machines, bikes ...	
圆柱形轴承 Bushes		69.0003	69.0030	69.1005	69.1003	69.0034	69.0073		69.0010	69.0183	69.0483	
法兰型轴承 flanged bushes		69.0003	69.0301	69.2023	69.1004	69.2043	69.2073		69.0017	69.2183	69.2483	
垫片型 washer		69.0003	69.4083	69.4023	69.4093	69.4043	69.4073		69.0032	69.4183	69.4483	
直条型 strip		69.0003	69.0007	69.6023	69.6093	69.6043	69.6073		69.6103	69.6183	69.6483	

数据为室温下测量 / indicative values for room temperature

A) 参数选择

DETERMINATION OF THE DATA AND PRELIMINARY CHECK

A. 1 关联参数/ Determination of the data

在设计和计算轴承使用寿命中，须考虑以下关联参数

In order to proceed with the design and the calculation of the operating life of the TU bushes and thrust washers, the following data must be available.

轴套内径 Bush inner diameter	D1	mm	旋转速度 Speed of rotation	N	t/mm
轴外径 Shaft outer diameter	D5	mm	摆动角 Angle of oscillation	φ	C φ
轴套长度 Bush length	H	mm	震动频率 Frequency of oscillation	Nosz	cycles/mn
轴套负荷 Load on the bush	P	N			

压力P(或者特殊载荷)由以下公式计算: 功F除以投射面积D1*H

The P pressure (or specific load) is calculated as follow: F effort divided by projected surface D1xH.

$$P = \frac{F}{D1 \times H}$$

A. 2滑动速度/ Sliding speed

滑动速度与旋转速度和摆动角有关, 由以下公式计算

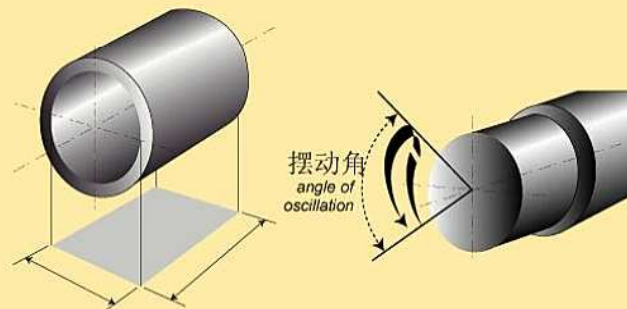
The rotating speed of the bush depends on the speed of rotation and the angle of oscillation. Calculation table:

轴承旋转
BUSH ROTATION

$$v = \frac{\pi \times D1 \times N}{60 \times 10^3}$$

杆旋转
ROD ROTATION

$$v = \frac{\pi \times D5 \times N}{60 \times 10^3}$$



轴承震动
BUSH OSCILLATION

$$v = \frac{\pi \times D1 \times 2 \varphi \times Nosz}{60 \times 10^3 \times 360}$$

杆震动
ROD OSCILLATION

$$v = \frac{\pi \times D5}{60 \times 10^3} \times \frac{2 \varphi \times Nosz}{360}$$

A. 3载荷因数/ Pv Factor

载荷因数Pv是特殊载荷与速度的乘积

The Pv Factor is the specific load multiplied by the speed.

$$P \text{ (N/mm}^2\text{)} \times v \text{ (m/s)} = Pv \text{ (N/mm}^2\text{ x m/s)}$$

载荷因数是测量受力程度的最重要系数

It is the most important factor to size an application.

A. 4初始检查/Preliminary check

必须在一开始就对特定的载荷, 速度和载荷因数进行检查是否低于轴承的极限值, 如果严格遵守, 那么轴承的正常使用寿命是可以计算出来的。

It is compulsory to check the specific load, speed and Pv factor are ALL under the bushing limit. Once this check done, it is possible to estimate the bushing lifespan.

B 计算轴承工作寿命 (Lh=小时)

CALCULATION OF THE LIFESPAN (Lh= hours)

干摩擦的TU轴承操作寿命与载荷因数Pv成反比，但是它也与另外一些因素有关，这也是为什么我们引出下面这些因数的原因：

The operating life for dry applications of the TU bushes is inversely proportional to the load factor Pv but, it also depends on other factors, that is why the following factors must be introduced :

Ka=使用类型常数/ constant relative to the type of application

Fp=载荷修正系数/ load correction factor

Fc=应用特征和温度修正系数/ application characteristics and temperature correction factor

Fd=轴承尺寸修正系数/ bush size correction factor

Fm=轴材质修正系数/ shaft material correction factor

$$Lh = \frac{Ka}{Pv^{1.2}} \times Fp \times Fc \times Fd \times Fm$$

Fc=应用特性和温度修正系数

application characteristics and temperature correction factor

特性/ Characteristics	散热性 Heat dissipation	温度/ Temperature °C					
		20	60	100	150	200	280
持续润滑/Continuous	好 Good	1,0	0,8	0,6	0,4	0,2	0,1
干摩擦操作/Dry operation							
持续润滑/Continuous	差 Poor	0,5	0,4	0,3	0,2	0,1	-
干摩擦操作/Dry operation							
间歇操作/ Intermittent operation	好 Good	2,0	1,6	1,2	0,8	0,4	0,2
间歇操作/ Intermittent operation 间隔大于10*操作时间 Interval > 10 x operating time							
持续用水降温 Constant immersion in water		2,0	1,6	0,8	-	-	-
间歇用水降温 Temporary immersion in water		0,4	0,2	0,1	-	-	-
持续润滑降温 Constant immersion in lubricant		3,0	2,4	1,8	1,2	0,8	-

Fd=轴承尺寸修正系数

bush size correction factor

轴直径/Shaft diameter (mm)				
≤ 20	20 < ø ≤ 40	40 < ø ≤ 100	100 < ø ≤ 150	> 150
1	0,9	0,7	0,5	0,4

Fm=轴材质修正系数

shaft material correction factor

低碳钢 Low carbon steel	1
高度钢/ Hardened steel	1,5
不锈钢/ Stainless steel	2
铸铁 (0.4RQ) / Cast iron (0,4 RQ)	1
铝/Aluminium	0,4

青铜/ Bronze	0,4
镉化锌/ Zinc cadmium	0,2
镍/ Nickel	0,2
铬/ Chrome	2
阳极化处理的铝/ Anodized aluminium	2

Fd=载荷修正系数

load correction factor

轴直径/ Shaft diameter (mm)				
≤ 20	20 < ϕ ≤ 40	40 < ϕ ≤ 100	100 < ϕ ≤ 150	> 150
1	0,9	0,7	0,5	0,4

Ka=使用类型系数

constant relative to the type of application

非方向性载荷 <i>Unidirectional load</i>	旋转式载荷 <i>Rotating load</i>	垫片 <i>Washer</i>
		
400	800	250

摩擦力/FRICTION

TU轴承德摩擦力由Pv载荷因数，工作温度，材质以及表面的粗糙度等影响决定。

The TU bush friction is influenced by the Pv load factor, the operating temperature and the material and finish of the mating surfaces.

滑动速度 Sliding speed v (m/s)	负载力 Specific load P (N/mm ²)	摩擦系数 Coefficient of friction
jusqu'à/up to 0,001	140	0,03
de/from 0,001 à/to 0,005	de/from 140 à/to 62	de/from 0,04 à/to 0,07
de/from 0,005 à/to 0,05	de/from 62 à/to 11	de/from 0,07 à/to 0,1
de/from 0,05 à/to 0,5	de/from 11 à/to 1	de/from 0,1 à/to 0,15
de/from 0,5 à/to 2	1	de/from 0,15 à/to 0,20

磨损性/ WEAR

TU轴承在运行过程中，轴承的外表面因受摩擦导致表面物质脱落，该物质填充到轴的表面上，使轴的表面更平，从而减小了摩擦系数。

During the running-in period the outer layer of the sliding surface of the TU bush is transferred onto the mating surface compensating for the non-smoothness of the contact and making the friction coefficient stable. The material of the mating surface is generally made of iron alloys. Stainless steel, chromium-plated steel or anodized aluminium can increase the life of the bush.

轴表面材质通常是合金、不锈钢、阳极化处理过的铝材质等，能有效延长轴承的使用寿命。

青铜、未阳极化的铝或者镀镍钢不适合做接触面。摩擦接触面的粗糙度必须要很小以延长轴承的使用寿命。粗糙度的推荐值为0.4 μ m Ra，以使轴承有最佳的性能。最好是做模拟测试，以达到最佳的使用效果。

如果您需要任何建议，请随时咨询我司技术部。

Bronze, non-anodized aluminium, phosphated or nickel-plated steel mating surfaces are not suitable. The roughness of the mating surface must be quite low to allow a good operating life. The recommended value for the best performance is 0.4 μ m Ra. It is always advisable to carry out a prototype test. Should you require advice, please contact our technical department.

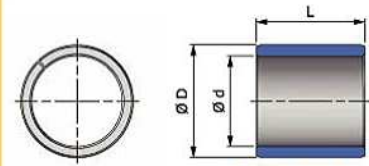
标准公制尺寸

Standard metric sizes

d : 内径 / nominal internal diameter *

D : 外径 / nominal outer diameter

L : 长度 / length



H7轴套, H9轴

TU : 69.0003

*Ød H9 after fitting in housing OD H7

d	D	L									
3	4,5	3	4	5	6						
3	5	5	6								
4	5,5	3	4	6	10						
4	6	3	4	6	8						
5	7	4	5	6	8	10					
6	8	4	5	6	8	10					
7	9	10									
8	10	6	8	10	12						
9	11	10									
10	12	4	5	6	8	10	12	15	20		
12	14	6	8	10	12	15	17	20	25		
13	15	5	10	20							
14	16	5	9	10	12	15	18	20	25		
15	17	6	10	12	15	20	25				
16	18	6	8	10	12	15	20	22	25		
17	19	7	15	20							
18	20	10	15	20	25	30					
20	22	10	15	20							
20	23	7	8	10	12	15	19	20	25	30	35
22	24	20									
22	25	5	10	12	15	20	25	30			
24	27	6	7	13	15	18	20	25	30		
24	28	15	20	25	30	50					
25	28	8	10	12	15	20	25	30	50		
26	30	30									
28	32	15	20	25	30						
30	34	10	13	15	20	23	25	30	35	40	
32	36	20	30	40							
35	39	9	13	15	20	25	30	35	40	45	50
36	40	20	25	30	35	40					
37	41	20									
38	42	15	20	30							
40	44	12	13	20	30	40	45	50	55	60	

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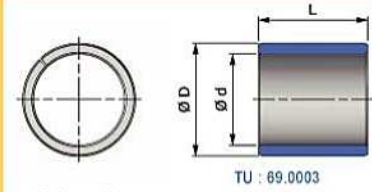
标准公制尺寸

Standard metric sizes

d: 内径 / nominal internal diameter*

D: 外径 / nominal outer diameter

L: 长度 / length



H7轴套, H9轴

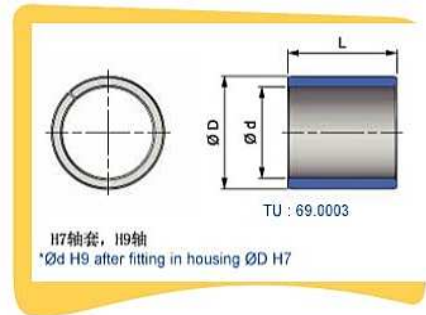
*Ød H9 after fitting in housing ØD H7

d	D	L									
		13	18	20	25	30	40	45	50	60	
45	50	13	18	20	25	30	40	45	50	60	
50	55	11	18	20	22	25	30	40	50	60	
55	60	20	25	30	35	40	50	55	60		
60	65	15	20	25	30	35	40	50	60	70	
65	70	15	30	40	50	60	70				
70	75	25	30	40	50	60	70	80	100		
75	80	15	20	30	40	45	50	60	70	80	
80	85	20	22	25	30	40	45	50	60	80	100
85	90	23	30	40	60	100					
90	95	20	23	33	40	50	60	70	90	100	
95	100	20	40	50	60	100					
100	105	20	25	50	60	70	80	100	115		
105	110	35	60	100	115						
110	115	20	23	55	60	65	80	100	115		
115	120	35	50	60	70	115					
120	125	45	50	60	100						
125	130	10	45	55	60	100					
130	135	60	100								
135	140	60	80	100							
140	145	30	60	75	80	100					
145	150	60	100								
150	155	30	50	60	80	100					
155	160	60	100								
160	165	35	60	80	100	160					
165	170	60	100								
170	175	35	60	75	100						
175	180	60	100								
180	185	60	80	100	120						
190	195	40	55	60	85	90	100				
200	205	60	100	200							
205	210	60	100								
210	215	60	100								
215	220	60	100								

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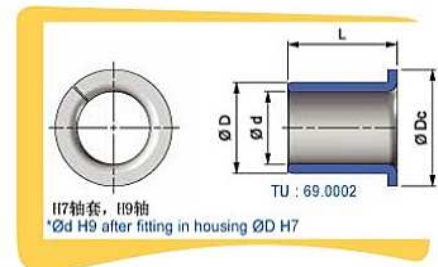
标准公制尺寸 Standard metric sizes

d : 内径 / nominal internal diameter*
 D : 外径 / nominal outer diameter
 L : 长度 / length



d	D	L			
220	225	35	60	100	150
230	235	25	60	100	
240	245	60	100		
250	255	60	80	100	
280	285	60	100	175	
300	305	60	100		
320	325	100			
380	385	100			
550	555	80			

d : 内径 / nominal internal diameter*
 D : 外径 / nominal outer diameter
 L : 长度 / length



d	D	Dc	L			
4	6	10	4,5	6		
6	8	12	4	7	7,5	8 10
8	10	15	5,5	7,5	8	9,5
10	12	18	7	9	12	17
12	14	20	7	9	12	15 17
14	16	22	12	17		
15	17	23	9	12	17	
16	18	24	12	17		
18	20	26	12	17	22	
20	23	30	11	15	16,5	21,5
25	28	35	11	16,5	21,5	
30	34	42	16	26		
35	39	47	16	26		
40	44	53	14	16	26	40
45	50	58	16	26		
50	55	65	32,5			
100	105	120	20	30		

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标准公制尺寸 Standard metric sizes

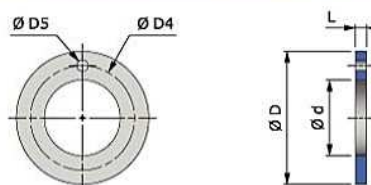
直条型 / STRIP



S	l	L
0,744 0,704	150	500
0,990 0,950	215	500
1,510 1,470	215	500

S	l	L
2,000 1,960	245	500
2,500 2,460	245	500
3,060 3,020	245	500

垫片型 / WASHER



d	D	L	D4	D5
10	20	1,500 1,450		
12	24		18	1,87 1,62
14	26		20	
16	30		22	2,37 2,12
18	32		25	
20	36		28	
22	38		30	3,37 3,12
24	42		33	

d	D	L	D4	D5
26	44	1,500 1,450	35	3,37 3,12
28	48		38	4,37 4,12
32	54		43	
38	62		50	
42	66	54		
48	74	61		
52	78	2,000 1,950	65	
62	90	2,000 2,000	76	
65	90			
80	100			

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US Standard or specific, send us your inquiries.

TI

结构

TI轴承的基材采用AISI-316 (UNIMO 1712, DIN 1.4401) 标准的不锈钢, 其具有优异的机械性能和耐腐蚀性能。聚四氟乙烯层能提供自润滑的效果。TI轴承不含铅的成份, 虽然会减少承载能力, 但却增加了耐腐蚀的性能。

The standard steel used is an AISI 316 (UNI-NIMO1712, DIN-1.4401). This steel is used for its excellent mechanical and corrosion resistance. The PTFE based treatment makes the working surface self-lubricating in dry conditions. The TI are lead free: this reduces the overall load which can be supported. However, it also makes the bushes more resistant to corrosion by improving the compatibility with the process fluids.

工作性能

TI轴承适用于静态或者低速场合, 给出的数据还受到其它因素的影响, 例如接触面的光洁度, 中心一致性, 润滑方式等等。

These bushes are mainly recommended for static applications or where slow movements are involved. The data given is however influenced by many factors such as the finish of the mating surface, the alignment, the presence of lubricants or pollutants...

由于TI轴承的耐腐蚀性, 所以其特别应用于内部有液体, 尤其是腐蚀性液体从而无法进行内部维护的密闭设备。

The TI bush is practically corrosion-proof and is ideal for use in sealed equipment where fluids, including corrosive fluids, are used and when frequent internal maintenance operations are not possible.

TI轴承的典型应用如: 阀门, 流量计及流水线上的设备等。TI轴承也具有与前述的TU轴承以及同类轴承相似的特性: Typical examples of such applications include valves, flow meters and other equipment in production lines. The other main features are the same as those previously presented for the TU and other bushes and similar products :

尺寸小巧紧凑 / reduced sizes

安装方便 / ease of fitting

摩擦系数低 / low friction coefficient

运行时无“沾、滑”现象。/ no "stick-slip" effect.

安装/ASSEMBLY

与TU轴承的尺寸与容差相同。Same dimensions and tolerances as TUs.

类型 Type		TI	
构成 Composition		不锈钢/ stainless steel AISI 316 PTFE+负载/load	
操作 / Operation		干摩擦/ dry	+
		润滑的/ lubricated	+
工作温度		-190°C à/to + 280°C	
最大载荷 Max load	静止/ static	MPa	200
	低速运动/ slow movements		100
	旋转和波动 Rotation & oscillations		40
最大速度 Max speed	干摩擦/ dry	m/s	2
	润滑的/ lubricated		2,5
最大Pv Max Pv	干摩擦时某点最大值/ Max, dry	MPa.m/s	3
	干摩擦时连续值/ coutinuous dry		1,5
	润滑的/ lubricated		40
摩擦系数/ friction coefficient		干摩擦/ dry	0.08~0.18
		润滑的/ lubricated	0.02~0.07
RoHS / VHU		是/ Yes	
应用 / Applications		优秀的抗化学性和抗腐蚀性, 良好的抗磨性, 用于化学工业, 液压泵, 与海水接触的设备等 Chemical and corrosion resistance Good wear resistance Chemical industry, pumps, sea water ...	
圆柱形轴承/ Bushes		69.0035	
法兰型轴承/ flanged bushes		不适用不锈钢 Not suitable with stainless steel.	
垫片型/ washer		69.0039	
直条型/ strip		69.6363	

所列数值在室温下测得 / indicative values for room temperature.

标准公制尺寸

Standard metric sizes

d : 内径 / nominal internal diameter*

D : 外径 / nominal outer diameter

L : 长度 / length



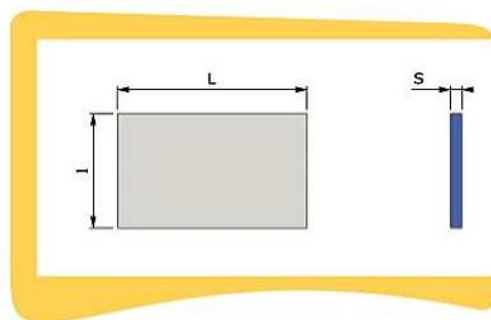
d	D	L			
10	12	10	20		
12	14	10	15	20	25
14	16	10	15	20	25
16	18	10	25		
18	20	15	20	25	
20	22	20			
20	23	10	20	30	
22	25	10	20	25	30
24	28	10	20	30	
25	28	20	25	30	
28	32	20	30		
30	34	20	25	30	40
32	36	30	40		
35	39	20	30	40	50
40	44	30	40		
45	50	30	50		
50	55	40	50	60	
60	65	40	60		
65	70	50	70		
70	75	50	70		
75	80	50	80		
80	85	40	60	100	
90	95	60	100		
95	100	60	100		
100	105	60	90	100	
110	115	50	80	100	
115	120	60	90	100	
120	125	60	100		
125	130	60	100		
130	135	60	100		
140	145	60	100		
145	150	60	100		
150	155	60	100		
160	165	100			
170	175	100			
180	185	60	100		

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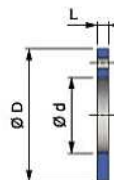
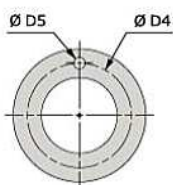
标准公制尺寸 Standard metric sizes

直条型 / STRIP

S	l	L
0,990 0,950	215	500
1,500 1,460	245	500
2,000 1,960	245	500
2,500 2,460	245	500



垫片型 / WASHER



d	D	L	D4	D5
10	20	1,500 1,450		
12	24		18	1,87 1,62
14	26		20	
16	30		22	2,37 2,12
18	32		25	
20	36		28	
22	38		30	3,37 3,12
24	42		33	

d	D	L	D4	D5
26	44	1,500 1,450	35	3,37 3,12
28	48		38	
32	54		43	
38	62		50	
42	66		54	
48	74		61	
52	78		65	
62	90		76	

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TIX

TIX轴承是将聚四氟乙烯（PTFE）纤维与金属基材组合而成。先将金属基材切割成片状，最后再加工聚四氟乙烯（PTFE）纤维层。TIX轴承具有TU轴承的所有技术特点。并由于使用了聚四氟乙烯纤维，大大提高了产品的耐冷性能（大于10倍），更适用于重载使用。另外，它还具有不错的低磨损性和抗冲击性。

TIX轴承经常应用于高载荷和低速的设备中。

TIX are produced with a PTFE layer on a metal strip. The metal part can be a strip required for the production of bushes or a defined part on which the material is applied during the final phase.

These bushings have all the advantages of the TUs. Moreover, using PTFE in fibres improves the resistance to cold flow more than 10 times, making them ideal for applications with heavy specific loads. They also have a low wear effect and high resistance to shocks.

They are usually used for applications with high loads and low speeds.

安装/ASSEMBLY

TIX轴承与TU轴承的安装条件相同。

TIX bushes fit with the same assembly conditions as TU bushes.

类型 Type		TIX	TIX-316	TIX-625	TIX-B
构成 Composition		Acier / Steel	Inox 316 / Stainless 316	Inconel® 625	Bronze
		PTFE Tissé / PTFE Woven	PTFE Tissé / PTFE Woven	PTFE Tissé / PTFE Woven	PTFE Tissé / PTFE Woven
操作 / Operation		干摩擦/dry	++	++	++
		润滑的/lubricated	+	+	+
工作温度 T°		-50°C à/to +250°C	-50°C à/to+250°C	-50°C à /to +250°C	-50°C à/to+250°C
最大载荷 Max load	静止/static	350	350	350	350
	低速运动 slow movements	180	180	180	180
	旋转和波动 Rotation & oscillations	70	70	70	70
最大速度 Max speed	干摩擦/dry	0.5	0.5	0.5	0.5
	润滑的/lubricated	2	2	2	2
最大Pv Max Pv	干摩擦时某点最大值/dry	3.6	3.6	3,6	3,6
	干摩擦时连续值/continuous dry	1.8	1.8	1.8	1.8
	润滑的/lubricated	50	50	50	50
摩擦系数 friction coefficient		干摩擦/dry	0.08~0.20	0.08~0.20	0.08~0.20
		润滑的/lubricated	0.03~0.1	0.03~0.1	0.03~0.1
热膨胀系数 Thermal expansion coefficient		/K	~11 x 10 ⁻⁶	~11 x 10 ⁻⁶	~11 x 10 ⁻⁶
电传导性 electrical conductivity		W/(m.K)	-42	-42	-42
RoHS / VHU		Oui / yes	Oui / yes	Oui / yes	Oui / yes
圆柱形轴承/ Bushes		69.0023	69.0349	69.0449	69.0149
法兰型轴承/flanged bushes		/	/	/	/
垫片/washer		69.4049	69.4349	69.4449	69.4149
直条型轴承/strip		69.6049	69.6349	69.6449	69.6149

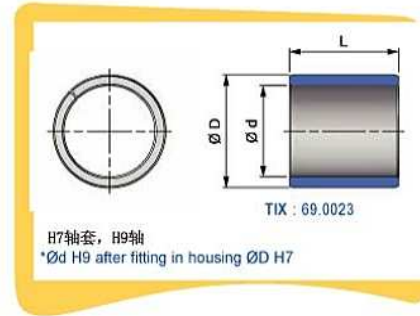
所列数值在室温下测得 / indicative values for room temperature

标准公制尺寸 Standard metric sizes

d : 内径 / nominal internal diameter *

D : 外径 / nominal outer diameter

L : 长度 / length



d	D	L
10	12	08
		10
		12
		15
		20
12	14	08
		10
		12
		15
		20
		25
14	16	05
		10
		12
		15
		20
		25
15	17	10
		12
		15
		20
		25
16	18	10
		12
		15
		20
		25
18	20	10
		15
		20
		25
		30
20	23	10
		15
		20
		25
		30
22	25	15
		20
		25
		30
24	27	15
		20
		25
		30
25	28	12
		15
		20
		25
		30
28	32	20
		30
		40
30	34	10
		15
		20
		25
		30
32	36	20
		40
		50
35	39	20
		30
		40
		50
		50

d	D	L
40	44	20
		30
		40
		50
		20
45	50	30
		40
		50
50	55	20
		30
		40
		50
		60
55	60	20
		30
		40
		60
		60
60	65	30
		40
		60
		70
		40
65	70	70
		40
70	75	40
		50
		70
		60
		80
75	80	80
		60
		100
80	85	30
		60
		100
85	90	60
		100
		60
90	95	60
		100
		60
95	100	60
		100
		50
100	105	60
		115
		60
105	110	115
		60
		115
110	115	60
		115
		50
115	120	70
		60
		100
120	125	60
		100
		100
125	130	60
		100
		60
130	135	60
		100
		60
135	140	60
		80
		60
140	145	100
		60
		100
150	155	60
		80
		100
160	165	80
		100
		100
180	185	100
		100

TX

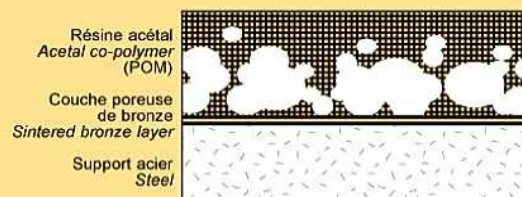
结构

TX轴承是符合结构

一层钢基材

一层烧结青铜层

蜂窝状乙缩醛表面，自润滑性能优异，以达到降低摩擦和保护接触面的目的。



The TX bush has a composite structure:

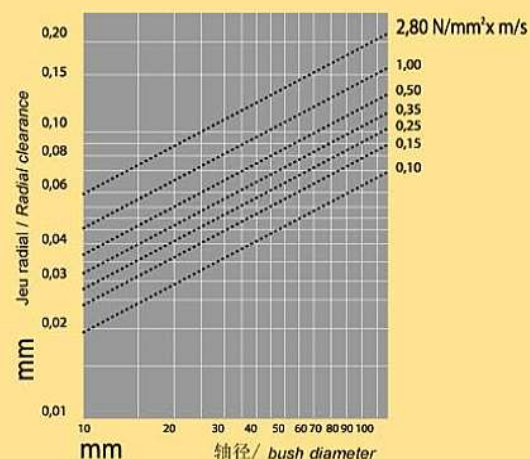
- A steel layer.
- A porous sintered bronze layer.
- An alveolate acetal surface.

尺寸因素/SIZING

TX轴承安装在H7的轴套中，安装F7轴后他们的公差为E9，随着Pv因数和温度的变化，必须调整标准光洁度。右边的曲线反映了轴承尺寸和光洁度对轴承负载力的关系。

另外温度每升高20度，光洁度也相应增加0.01mm。

TX bushes are fitted in a H7 housing. After fitting they are toleranced E9, with a F7 shaft. This standard clearance must be adjusted depending on Pv and working temperature. The table presents the necessary clearance depending on the bushing diam and the Pv. The radial clearance increases by 0,01 mm for each temperature change of 20°C.



类型 Type		TX	TS	TX-PK	TX-PV	
构成 Composition		钢材/Steel 烧结铜CuSn8 Sintered Bz CuSn8	钢材/Steel	钢材/Steel	钢材/Steel	
操作 / Operation	干摩擦/dry	/	/	=	=	
	润滑的 lubricated	++	++	++	++	
工作温度 T°		-40°C à +110°C		-150°C à +250°C	-50°C à +160°C	
最大载荷 Max load	静止/ static	250		250	250	
	低速运动 Slow movements	140		140	140	
	旋转和波动 Rotation & oscillations	70		60	70	
最大速度 Max speed	脂润滑/grease	2	2	2	2	
	油润滑/oil	3	5	4	4	
最大Pv Max Pv	间歇润滑 /intermittent lubrication	3	3,2	3,6	3,6	
	持续润滑 / continuous lubricated	22	25	50	/	
摩擦系数 friction coefficient		0,05~0,2		0,03~0,2	0,05~0,2	
热膨胀系数 Thermal expansion coefficient		/K	11x10 ⁻⁶	11x10 ⁻⁶	11x10 ⁻⁶	
热传导系数/heat cond. W/(m.K)		4		50	4	
RoHS / VHU		Oui / yes		Oui / yes	Oui / yes	
应用 Applications		间歇润滑操作 Intermittent lubricated operation.			适合连续操作，在高温高压和低速下有不错的工作性能 Suitable for continuous operation. Good performance with high load and temperature with reduced speed.	缺乏润滑时仍有不错的抗性，适合维护周期不确定的环境下使用 Better resistance when lack of lubricant. Recommended if maintenance intervals are not controlled
圆柱形轴承/Bushes		69.0021	69.0033	69.0071	69.0081	
法兰型轴承/flanged bushes		/	/	69.2071	/	
垫片/washer		69.0040	/	69.4071	69.4081	
直条型/strip		69.0041	/	69.6071	69.6081	

所列数值在室温下测得 / indicative values for room temperature

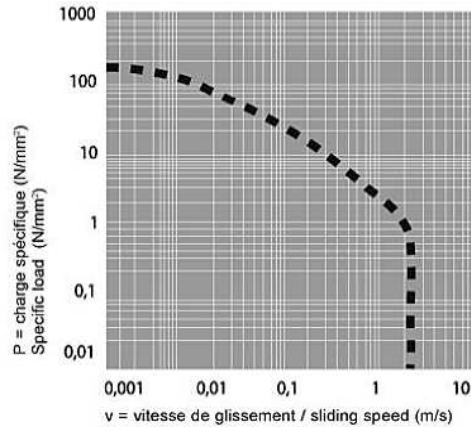
轴承性能/ PERFORMANCES

TX的负载能力由PV负载因数表达，P代表负载，v表示速度。

负载能力的最大值是在静态的，理想状态下的理论值，

大约是140N/mm²。对于实际情况，需考虑受力面得大小，这样轴承的动态负载最大值为70N/mm²。

工作温度越高，负载能力就会下降，在50度时下降20%，在70度时下降50%，在100度时下降80%

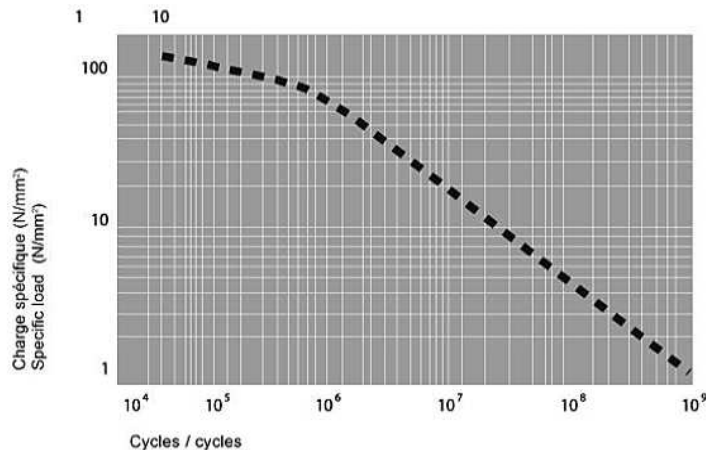


The load capacity of the TX bushes is expressed by the load factor Pv (N/mm²x m/s) where P is the specific load and v the speed. The maximum value of the specific load that can be applied under static and ideal conditions is 140 x N/mm². For the bushes, the projected surface, which is given by the result of the internal diameter multiplied by the length $d \times L$, must be considered. The value of the specific load is reduced to 70 N/mm² under dynamic conditions. The diagram shows the limit curve of Pv in a greased application at a constant temperature of 20°C.

Higher temperatures reduce the load factor by 20% at 50°C, by 50% at 70°C and 80% at 100°C.

磨损率/WEAR RATE

TX轴承的磨损率比较难计算，因为除了Pv因素外，还要考虑温度，表面光洁度，中心一致性，润滑。。。下表反映了理想状态下工作周期与负载能力间的关系。

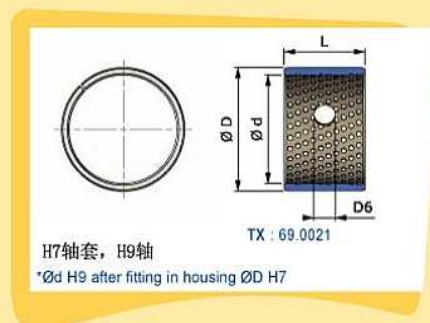


The wear rate of the TX bushes for greased applications is difficult to calculate in advance as the load factor Pv apart, other elements must be taken into consideration such as temperature, surface finish, alignment, the presence of pollutants in the lubricant...

The diagram shows the operating cycles based on a specific load under ideal operating conditions.

标准公制尺寸 Standard metric sizes

d : 内径 / nominal internal diameter*
 D : 外径 / nominal outer diameter
 L : 长度 length
 D6 : 孔洞直径 hole diameter



d	D	D6	L						
5	7	4,0	5	8	10				
6	8		6	8	10				
7	9		10						
8	10		8	10	12				
10	12		8	10	12	15	20		
12	14		8	10	12	15	20	25	
14	16		10	12	15	20	25		
15	17		10	12	15	20	25		
16	18		15	20	25				
18	20		15	20	25				
20	23	10	15	20	25	30			
22	25	6,0	15	20	25	30			
24	27		15	20	25	30			
25	28		15	20	25	30			
28	31		30						
28	32		20	25	30				
30	34		20	30	40				
32	36		20	30	35	40			
35	39		20	30	35	50			
36	40		35						
37	41		20						
40	44	8,0	20	30	40	50			
45	50		20	30	40	45	50		
50	55		40	50	60				
55	60		20	25	30	40	50	60	
60	65		30	40	60	70			
65	70		40	50	60	70			
70	75		40	50	65	70	80		
75	80		40	60	80				
80	85		9,5	40	60	80	100		

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标准公制尺寸

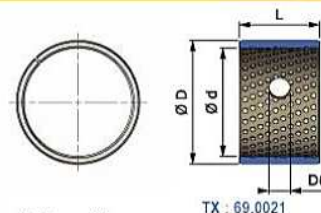
Standard metric sizes

d : 内径 / nominal internal diameter*

D : 外径 / nominal outer diameter

L : 长度 length

D6 : 孔洞直径 hole diameter



H7轴套, H9轴

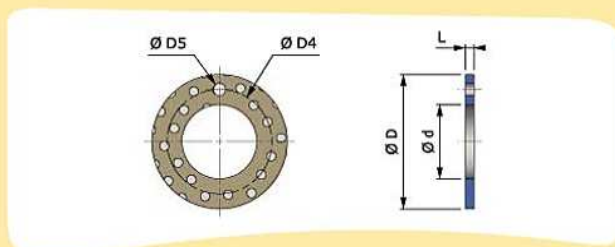
TX : 69.0021

*Ød H9 after fitting in housing ØD H7

d	D	D6	L						
85	90	9,5	30	40	60	80	95	100	115
90	95		40	60	80	90	100		
95	100		60	100					
100	105		50	60	80	95	115		
105	110		60	110	115				
110	115		60	110	115				
115	120		50	70					
120	125		60	100	110				
125	130		60	100	110				
130	135		50	60	80	100			
135	140		60	80					
140	145		50	60	80	100			
150	155		50	60	80	100			
160	165		50	60	80	100			
170	175	50	60	80	100				
180	185	50	60	80	100				
190	195	50	60	80	100	120			
200	205	50	60	80	100	120			
220	225	50	60	80	100	120			
240	245	50	60	80	100	120			
250	255	50	60	80	100	120			
260	265	50	60	80	100	120			
280	285	50	60	80	100	120			
300	305	50	60	80	100	120			

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垫片 / WASHER

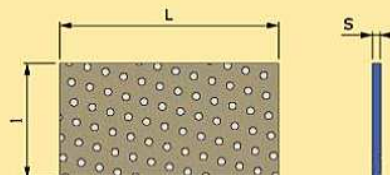


d	D	L	D4	D5
12	24	1,577 1,487	18	1,625 1,875
14	26		20	2,125 2,375
16	30		22	
18	32		25	3,125 3,375
20	36		28	
22	38		33	
24	42			

d	D	L	D4	D5
26	44	1,577 1,487		3,125 3,375
28	48		38	4,125 4,375
32	54		43	
38	62		50	
42	66	2,600 2,510	54	
48	74		61	
52	78		65	

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US Standard or specific, please send us your inquiries.

直条型 / STRIP



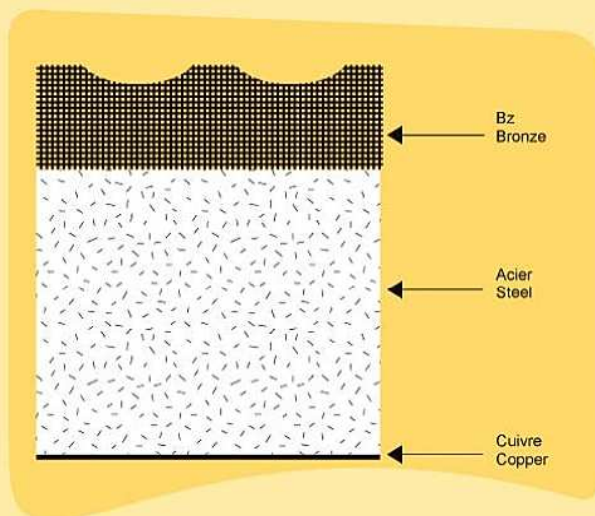
S	I	L
1,030 1,060	70	460
1,520 1,550	100	460

S	I	L
2,020 2,050	100	460
2,530 2,560	100	460

TY

TY轴承是以低碳钢为基材，表面烧结一层青铜层。青铜层为工作面。其表面在轴承运行时需要用油或脂润滑。TX轴承可以完美的应用于小空间，高度机械抗性和低摩擦的设备中。标准的直条型TX轴承的厚度为1/1.5/2/2.5mm

烧结青铜层的材料是与钢材结合的理想材料。青铜层的厚度一般为0.20-0.35mm,但也有0.40mm厚甚至更厚的。



The TY bushes represent a complete range of products. They are made of a low carbon steel backing lined with a compact layer of sintered bronze. The lubricated bronze surface is the working surface of the bush. The lubricant can be either oil or grease making these bushes ideal for applications where reduced spaces, high level mechanical resistance and low level friction are required. The standard thickness of the strips from which the TY bushes are obtained are : 1 / 1.5 / 2 and 2.5mm.

The sintered bronze layer (CuSn10Pb10) is ideal for combining with steel shafts. The standard thickness of the bronze is 0.20 – 0.35 mm but it can reach 0.40 mm and over for bushes with additional metal lining.

注意事项

TX轴承表面烧结层有3种不同类型的图形选择

TY-AS 球形孔花纹
TY-AL 菱形花纹
TY-SA 光滑表面

TY-AS和TY-AL当轴承的润滑是非持续性时，可以用这两种形式。表面的花纹可以将润滑介质保留在花纹图案中

TY-SA型是用于有持续稳定的润滑情况

TY轴承常规型式有圆柱形，法兰型和直条型，并且有以下优点：
易于安装和润滑
具有重载能力
紧凑小巧
很强的热传导性能
工作温度范围广泛
型式多样
可以加工特殊型式的产品

IMPORTANT

The TY range consists of 3 products which are characterized by the different finishes of the bronze layer :

- TY-AS= Bronze surface with spherically-shaped indentations
- TY-AL = Bronze surface with diamond-shaped indentations
 - diamond-shaped indentations can be graphited for dry environment → TY-ALG
- TY-SA= Smooth bronze surface
TY-AS and TY-AL are used when the lubrication is not constant, the indentations providing progressive lubricant release.

TY-SA requires constant lubrication. Grooves on the bronze surface can be made on request for a better release of the lubricant.

The standard range of TY bushes covers cylindrical bushes, flanged bushes, washers and strips.

Some of the many advantages of the TY bushes :

- ease of fitting and lubrication
- heavy load capacity
- compactness
- high level thermal conductivity
- wide range of operating temperatures
- availability of standard bushes
- possibility of producing special items

滑动表面/SLIDING SURFACES

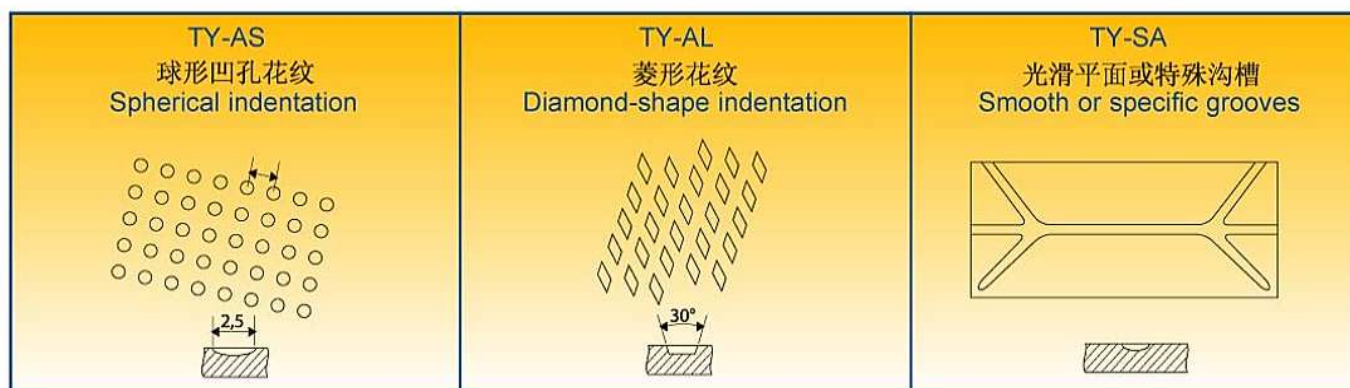
TY轴承工作时必须使用润滑介质。

润滑持续的场合推荐使用脂润滑，反之使用油润滑。润滑方式也决定了青铜烧结层的表面花纹方式。TYAS型用脂润滑，TYAL型用油润滑。在不同的应用场合下，润滑介质是决定TY轴承使用性能的关键因素。

3种花纹型式里，光滑表面和沟槽较少的TYSA轴承工作性能最好。这是从液压动态试验的测试结果得知的。

The TY bushes must always be used with lubrication. For applications where lubrication is provided only occasionally, grease must be used whereas if lubrication is frequent or continuous, oil is preferable. The choice of lubrication determines the type of TY bush: with grease, TYAS bushes are required while the TYAL series will be used with oil lubrication. Lubrication is a key factor when determining the various applications and performance of TY bushes. Pockets and a grooved finish reduce the working surface and consequently the load capacity of the TY bushes.

Maximum performance is achieved with smooth or only minimally grooved TYSA bushes. In hydrodynamic operations, these are the bushes which offer the best Pv factor (specific load x speed).



当然花纹的存在也相应的减少了轴承的负载能力：

TY-AS 负载能力下降21%

TY-AL 负载能力下降24%

TY-SA 不同的花纹情况不同，需分别计算

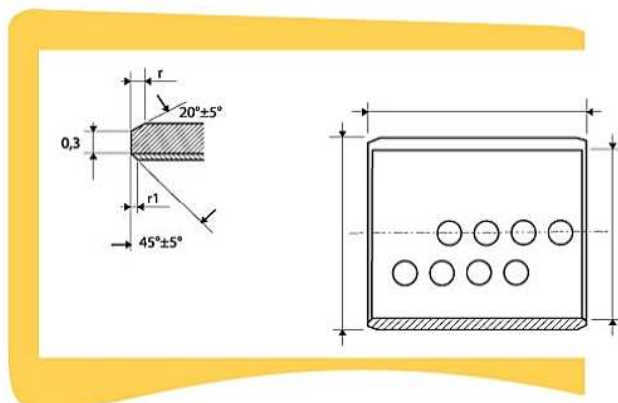
TYAS轴承的球状凹坑表面有效保留了润滑介质，使轴承的润滑均匀分布，但润滑还是最好要持续。

The presence of indentation reduces the load capacity by the following percentages :

- TY-AS reduction of 21%
- TY-AL reduction of 24%
- TY-SA with indentation to be calculated for each case.

The spherical indentation of the TYAS ensures the optimum distribution of the lubricant. These can be used with oil but in this case lubrication must be more frequent.

TY轴承倒角/ TY BUSHES CHAMFER



材料选择/CHOICE OF MATERIAL

TY轴承的尺寸是根据轴承负载的大小，运动速度，润滑方式以及接触面的情况而决定的。下表所注特性必须全部考虑在内

The size of the TY bushes depends mainly on the load applied, the sliding speed, the type and intensity of the lubrication and the hardness and finish of the mating surface. The following characteristics must be taken into consideration :

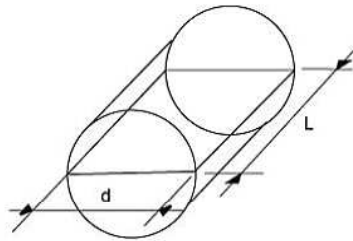
类型 Type		TY	TY-244	TY-30	TY-663	TY-20	
构成 Composition		Acier / Steel					
		CuSn10Pb10	CuPb24Sn4	CuPb30	CuSn6Zn6Pb3	AlSn20Cu	
操作 / Operation	干摩擦/dry	+ (ALG)	+ (ALG)	+ (ALG)	+ (ALG)	/	
	润滑的/lubricated	++	++	++	++	++	
工作温度 T°		-40°C à +250°C	-40°C à +170°C	-40°C à +170°C	-40°C à +250°C	-40°C à +150°C	
最大载荷 Max load	静止/static	MPa	150	130	120	250	100
	转动和波动 Rotation & oscillations		60	38	25	60	30
最大速度 Max speed	干摩擦/dry	m/s	0.4 (ALG)			0.4 (ALG)	/
	润滑的/lubricated		5	10	15	5	25
最大Pv Max Pv	脂润滑的/grease	MPa.m/s	2.8	2.8	2.8	2.8	/
	油润滑的/oil		10	10	8	10	8
摩擦系数 friction coefficient		Sec / dry	< 0.22 (ALG)		< 0.22 (ALG)		/
		Lubrifié / lubricated	0,06~0,14		0,08~0,16		0,08~0,17
热膨胀系数 Thermal expansion coefficient		/K	14x10 ⁻⁶	14x10 ⁻⁶	14x10 ⁻⁶	14x10 ⁻⁶	14x10 ⁻⁶
热传导系数/heat cond.		W/(m.K)	60	60	60	60	60
RoHS / VHU		Non / no	Non / no	Non / no	Oui / yes	Oui / yes	
应用 Applications		中速，高负载，抗冲撞，齿轮箱 Medium speed, high load, resistance to shocks. Gearboxes,	中等负载，高速，良好的抗磨性 Medium load and high speed. Good wear resistance	低负载，高速，抗引擎污染 Low loads and high speed. Resistance to contamination. Engines.	中速，高负载，抗冲撞，齿轮箱，工程机械 Medium speed, high load, resistance to shocks : gear boxes, construction equipment...	抗磨损，平移运动，高速，低负载，引擎，压缩机等 Wear resistance, translation movements, high speed, low load. Engines, compressors etc..	
圆柱形轴承/Bushes		69.0008	/	/	/	/	
法兰型轴承/flanged bushes		69.0019	/	/	/	/	
垫片/washer		69.0060	/	/	/	/	
直条型/strip		/	/	/	/	/	

其它可能性：CuSn8Zn3, CuSn6.5P0.1, SnSB8Cu3, CuPb24Sn, 请向我们咨询

Other possibility : bronze CuSn8Zn3, CuSn6.5P0.1, SnSB8Cu3, CuPb24Sn, send us your inquiries.

支持面就是垂直映射面d*L(直径*长度) 减去凹面面积

The supporting surface is the projected surface d x L (diameter x Length) minus the surface of the indentations.



F=受力, 单位牛顿 / total load in Newton
 N=每分钟转速 / rotation per minute
 d=内径 单位mm / internal diameter in mm
 L=长度 单位mm / length in mm

Charge spécifique Specific load	$= \frac{F}{d \cdot L} \text{ N/mm}^2$
Vitesse glissement v Sliding speed	$= \frac{\pi \cdot d \cdot N}{60 \cdot 10^3} \text{ m/s}$

安装 / FITTING

TY轴承安装于H7级精度的沟槽中。其润滑方式，轴的光洁度须符合下表。

The standard TY bushes are designed to be fitted in a housing with an H7 tolerance. Once they have been fitted, the internal diameter assumes an H9 tolerance. This latter tolerance is prone to variations based on the characteristics of the housing. Given the presence of the lubricant, the clearance between the bush and the shaft must comply with the indications given in the following table :

光洁度 CLEARANCE	润滑方式 LUBRICANT		负载压力 SPECIFIC LOAD		运动方式 MOVEMENT		
	脂润滑 GREASE	油润滑 OIL	高 HIGH	低 LOW	快 FAST	波动 OSCILLATING	慢 SLOW
减小 REDUCED		•	•			•	•
增加 WIDE	•			•	•		

轴承的内径公差定为H9级后，轴的公差须为e或f级。如果轴公差为h级，那么安装的精度也要相应的从H7级改为F7级

Having obtained the internal diameter with an H9 tolerance with standard bushes, shafts must be selected with an "e" or "f" field of tolerance. If shafts with an "h" field of tolerance must be used, it is advisable to widen the diameter of the housing from H7 to F.

标准公制尺寸

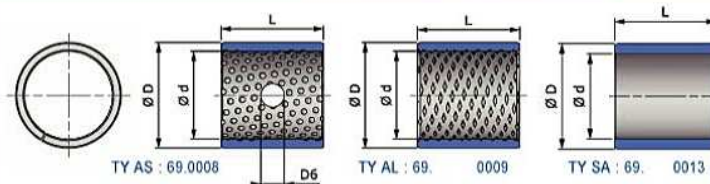
Standard metric sizes

d : 内径 / nominal internal diameter*

D : 外径 / nominal outer diameter

L : 长度 length

D6 : 孔洞直径 hole diameter



*Ød H9 après emmanchement dans un logement ØD H7/ Ød H9 after fitting in housing ØD H7

d	D	D6	L						
10	12	4,0	10	15	20				
12	14		10	15	20	25			
13	15		15	20					
14	16		10	15	20	25			
15	17		10	15	20	25			
16	18		10	15	20	25			
17	19		15	20					
18	20		15	20	25				
20	22		10	15	20	25			
20	23		10	15	20	25	30		
22	25	6,0	15	20	25	30			
24	27		15	20	25	30			
25	28		15	20	25	30	50		
28	32		15	20	25	30			
30	34		15	20	25	30	40		
32	36		20	30	40				
35	39		20	30	35	40	50		
40	44		20	30	40	50			
45	50		20	30	40	45	50		
50	55		20	30	40	50	60		
55	60	8,0	20	30	40	50	60		
60	65		30	40	50	60	70		
65	70		30	50	60	70			
70	75		40	50	60	70			
75	80		40	50	60	70	80		
80	85		9,5	40	60	80	100		
85	90			30	60	100			

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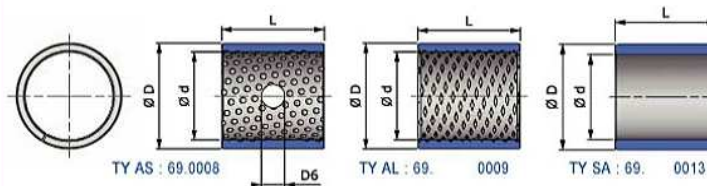
Standard metric sizes

d : 内径 / nominal internal diameter*

D : 外径 / nominal outer diameter

L : 长度 length

D6 : 孔洞直径 hole diameter



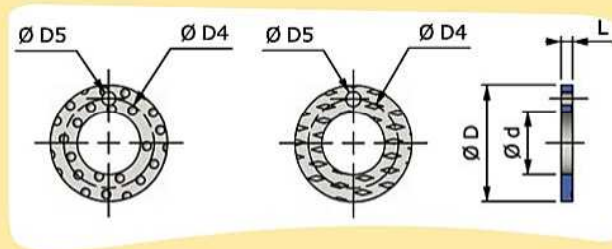
*Ød H9 après emmanchement dans un logement ØD H7/ Ød H9 after fitting in housing ØD H7

d	D	D6	L			
90	95	9,5	60	100		
95	100		60	100		
100	105		60	100	115	
105	110		60	100	115	
110	115		60	100	115	
115	120		50	60	70	100
120	125		50	60	100	
125	130		60	100		
130	135		60	100		
135	140		60	80	100	
140	145	60	100			
145	150	60	100			
150	155	60	80	100		
155	160	60	100			
160	165	60	100			
165	170	60	100			
170	175	60	100			
180	185	60	100			
185	190	60	100			
190	195	60	100			
195	200	60	100			

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标准公制尺寸
Standard metric sizes

垫片 / WASHER

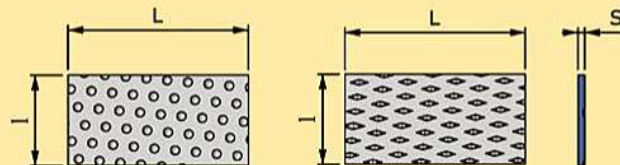


d	D	L	D4	D5
10	20	1,410 1,450		
12	24		18	1,87 1,62
14	26		20	
16	30		22	2,37 2,12
18	32		25	
20	36		28	
22	38		30	3,37 3,12
24	42		33	

d	D	L	D4	D5
26	44	1,410 1,450	35	3,37 3,12
28	48		38	4,37 4,12
32	54		43	
38	62		50	
42	66	54		
48	74	61		
52	78	1,910 1,950	65	
62	90		76	

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直条型 / STRIP



S	I	L
0,910 0,950	115	500
1,410 1,450	115	500

S	I	L
1,910 1,950	115	500
2,390 2,430	115	500

TZ

TZ轴承有一系列青铜 (CuSn8) 材质, 除了具有很高的耐腐蚀性外, TZ轴承还特别适合与建筑用钢材共同工作。在滑动表面上, 不同的表面状况能提高滑动面间的润滑性能。

TZ轴承的常规型式有圆柱形, 法兰型和直条型, 壁厚通常为1/1.5/2/2.5mm。TZ轴承包括所有经常使用的部件, 例如垫片, 直条和按要求制作的特殊部件。

The TZ bushes offer a range of bronze sliding bushes (CuSn8). Apart from being highly resistant to corrosion, this metal alloy is particularly suitable for running with structural steels. For sliding surfaces, lubrication is provided for and improved by creating indentations, grooves and holes in the sliding surface to distribute and maintain a layer of lubricant between the surfaces.

The TZ sliding bushes range including cylindrical bushes, flanged bushes and others, are produced from strips of bronze with nominal thicknesses of 1 / 1,5 / 2 and 2,5 mm.

The TZ range includes all the most frequently used components such as thrust washers, strips and specific items made on request.

与固体铜轴承相比, TZ轴承有如下的优点:

Compared to solid bronze bushes, the TZ bushes offer many advantages :

重载能力强 / heavy load capacity,

优异的耐化学腐蚀性 / excellent chemical resistance to corrosive substances,

优良的导热性 / high level thermal conductivity,

易于安装和润滑 / ease of fitting and lubrication,

标准件形式多样 / availability of standard bushes

可以加工成其他形状 / possibility of producing special items.

轴承设计

BUSH DESIGN

TZ轴承的表面花纹对有效工作面积的影响如下:

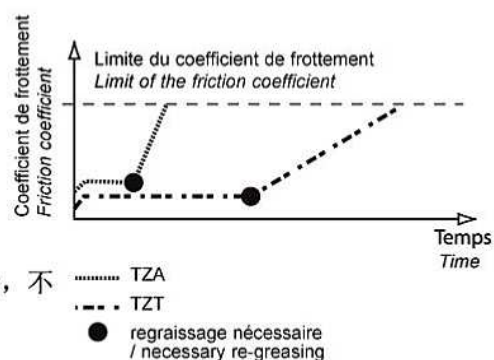
TZ-AS: 球形花纹: 下降21%

TZ-AL: 菱形花纹: 下降24%

TZ-T: 凹孔: 下降15%

球形凹坑能保留住大量的润滑介质同时也保证了能够使用油类润滑, 不过这种情况下, 必须经常添加润滑油。

TZ-T轴承能延长每次脂润滑的中间间隔时间

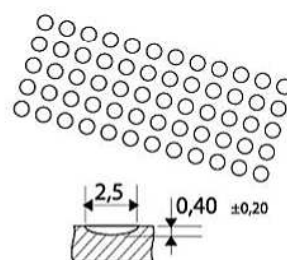
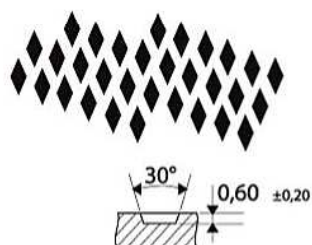


The presence of the indentations reduces the bush surfaces as follow :

- TZ-AS: spherical-shaped indentations = reduction equal to 21%
- TZ-AL: diamond-shaped indentations = reduction equal to 24%
- TZ-T: holes = reduction equal to 15%

The spherical indentation guarantees an excellent release of the lubricant and can also be used with oil, but in this case more frequent lubrication is required. The standard surfaces of the TZ bush series are shown in the diagram below.

TZ-T bushes allow longer intervals between each greasing.



设计中要考虑的参数有：载荷大小，滑动速度，加润滑的频率，滑动面的硬度和光洁度等。

下表是材料的物性

The design factors of these bushes are calculated when the applied load, the sliding speed, the lubrication frequency and the hardness and finish of the mating surface are known. Once these data are available, the mechanical characteristics listed below must be taken into consideration.

类型 Type		TZ	
构成 Composition		CuSn8P0.3 ou CuSn6.5P0.1	
操作 / Operation		干摩擦/dry	+ (ALG)
		润滑的 lubricated	++
工作温度 T°		-80°C à + 200°C	
最大负载 Max load	静止/ static	MPa	120
	旋转和波动 Rotation & oscillations		40
最大速度 Max speed	干摩擦/dry	m/s	0.2 (ALG)
	润滑的/lubricated		4
最大Pv Max Pv	干摩擦/dry	MPa.m/s	2.6 (ALG)
	脂润滑/grease		
	油润滑/oil		15
摩擦系数 friction coefficient		干摩擦/dry	
		润滑的 lubricated	0.08~0.25
热膨胀系数 Thermal expansion coefficient		/K	18.2x10 ⁻⁶
热传导系数/ heat cond.		W/(m.K)	60
RoHS / VHU		Oui / Yes	

按要求，我们也可以提供不同等级青铜材料的轴承。CuSn6Zn6Pb3, CuZn31Si, CuZn38, CuZn32.

On request we can offer bushes in different bronze grades: CuSn6Zn6Pb3, CuZn31Si, CuZn38, CuZn32.

安装/ASSEMBLY

TZ轴承安装于H7精度的沟槽中。轴的润滑方式和轴的光洁度需符合下表

The standard TZ bushes are designed to be fitted in a housing with a H7 tolerance and once they have been fitted, the internal diameter assumes an H9 tolerance. This latter tolerance is prone to variations based on the characteristics of the housing. Given the presence of the lubricant, the clearance between the bush and the shaft must comply with the indications given in the following table.

光洁度 CLEARANCE	润滑方式 LUBRICANT		负载压力 SPECIFIC LOAD		运动方式 MOVEMENT		
	脂润滑 GREASE	油润滑 OIL	高 HIGH	低 LOW	快 FAST	波动 OSCILLATING	慢 SLOW
减少 REDUCED		●	●			●	●
增加 WIDE	●			●	●		

轴承的内径定义为H9级后，轴的公差须相应的定为h级，那么安装的精度须相应的改为F7级

Having obtained the inner diameter with an H9 tolerance with standard bushes, shafts must be selected with an "e" or "f" field of tolerance. If shafts with an "h" field of tolerance must be used, it is advisable to widen the diameter of the housing from H7 to F7.

标准公制尺寸

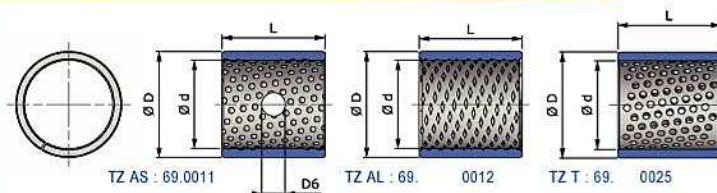
Standard metric sizes

d : 内径 / nominal internal diameter *

D : 外径 / nominal outer diameter

L : 长度 length

D6 : 孔洞直径 hole diameter



*Ød H9 après emmanchement dans un logement ØD H7/ Ød H9 after fitting in housing ØD H7

d	D	L						
10	12	10	15	20				
12	14	10	15	20				
13	15	15	20					
14	16	10	15	20	25			
15	17	10	15	20	25			
16	18	10	15	20	25			
17	19	15	20					
18	20	15	20	25				
20	22	10	15	20	25			
20	23	10	15	20	25	30		
22	25	15	20	25	30			
24	27	15	20	25	30			
24	28	15	20	25	30			
25	28	15	20	25	30	50		
28	31	15	20	25	30			
28	32	15	20	25	30			
30	34	15	20	25	30	40		
32	36	20	30	40				
35	39	20	30	35	40	50		
40	44	20	30	40	50			
45	50	20	30	40	50			
50	55	20	25	30	40	50	60	
55	60	20	25	30	40	50	60	
60	65	25	30	40	50	60	70	80
65	70	30	40	50	60	70	80	
70	75	40	50	60	70	80	90	
75	80	30	40	50	60	70	80	
80	85	30	40	60	80	100		

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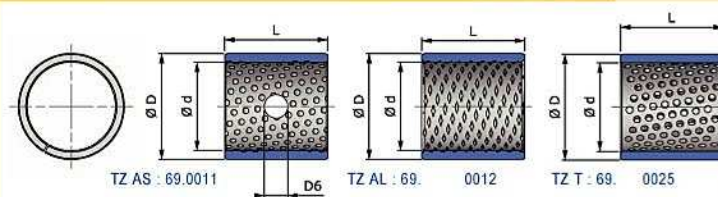
标准公制尺寸 Standard metric sizes

d : 内径 / nominal internal diameter *

D : 外径 / nominal outer diameter

L : 长度 length

D6 : 孔洞直径 hole diameter



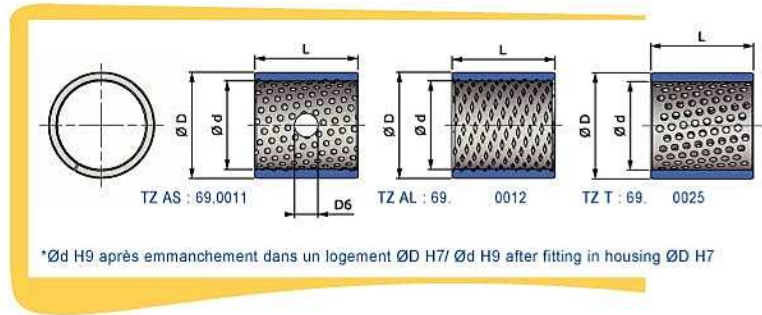
*Ød H9 après emmanchement dans un logement ØD H7/ Ød H9 after fitting in housing ØD H7

d	D	L				
85	90	30	40	60	80	100
90	95	40	60	90	100	
95	100	60	100			
100	105	40	50	60	95	100
105	110	60	100			
110	115	60	100			
115	120	60	100			
120	125	60	100			
125	130	60	100			
130	135	60	100			
135	140	60	100			
140	145	60	100			
145	150	60	100			
150	155	60	100			
155	160	60	100			
160	165	60	100			
165	170	60	100			
170	175	60	100			
175	180	60	100			
180	185	60	100			
185	190	60	100			
190	195	60	100			
195	200	60	100			
200	205	60	100			
205	210	60	100			
210	215	60	100			
215	220	60	100			
220	225	60	100			

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标准公制尺寸
Standard metric sizes

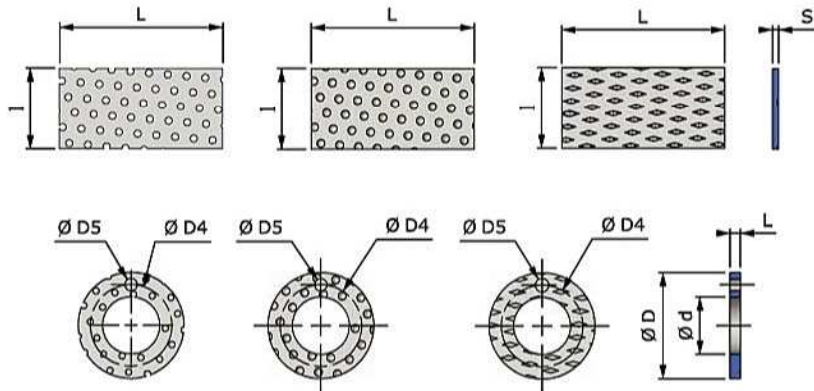
- d : 内径 / nominal internal diameter *
- D : 外径 / nominal outer diameter
- L : 长度 length
- D6 : 孔洞直径 hole diameter



*Ød H9 après emmanchement dans un logement ØD H7/ Ød H9 after fitting in housing ØD H7

d	D	L	
225	230	60	100
230	235	60	100
235	240	60	100
240	245	60	100
245	250	60	100
250	255	60	100
265	270	60	100
275	280	60	100
280	285	60	100
285	290	60	100
300	305	60	100

公制尺寸 / Metric sizes 按照要求 / on request



标准公制尺寸 / Standard metric sizes

d	D	L	D4	D5
10	20	1,410 1,450		
12	24		18	1,87 1,62
14	26		20	
16	30		22	2,37 2,12
18	32		25	
20	36		28	
22	38		30	3,37 3,12
24	42		33	

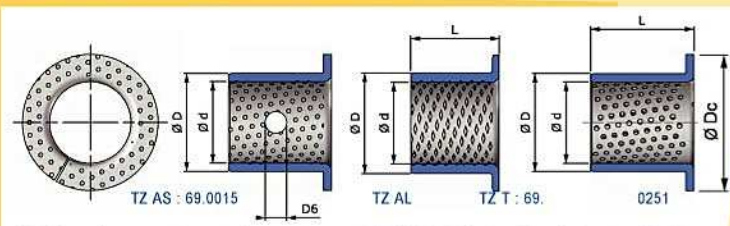
d	D	L	D4	D5	
26	44	1,410 1,450	35	3,37 3,12	
28	48		38	4,37 4,12	
32	54		43		
38	62		50		
42	66		54		
48	74		61		
52	78		1,910 1,950		65
62	90		76		

标准公制尺寸 Standard metric sizes

d : 内径 /nominal internal diameter*

D : 外径 /nominal outer diameter

L : 长度 length



*Ød H9 après emmanchement dans un logement ØD H7 / Ød H9 after fitting in housing ØD H7

d	D	Dc	L	
25	28	35	15	25
30	34	45	20	30
35	39	50	20	35
40	44	55	25	40
45	50	60	30	45
50	55	65	30	50
55	60	70	30	50
60	65	75	30	60
65	70	80	30	60
70	75	85	40	70
75	80	90	40	70
80	85	100	40	80
90	95	110	50	90
100	105	120	50	90
110	115	130	50	90
120	125	140	50	90
130	135	155	60	90
140	145	165	60	90
150	155	180	60	90
160	165	190	60	90
170	175	200	60	90
180	185	215	60	90
190	195	225	60	90
200	205	235	60	90
225	230	260	60	90
250	255	290	60	90
265	270	305	60	90
285	290	325	60	90
300	305	340	60	90

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TBL/TAL

TBL轴承是用固体润滑（PTFE/石墨MOS2）镶嵌在铜活钢套体上。这种结构使得TBL轴承能在干摩擦的状况下工作，并能承受更高的工作温度。

TBL bushes are made of bronze or steel with solid lubricant inserts (PTFE or PTFE/graphite MOS2). These inserts improve dry working and allow to withstand high temperatures.



TBL轴承多用于下述的应用中：
applications :

水下设备 submarine equipments.

熔铸工业 foundry.

钢铁工业 steel work.

磨具压制 tool and press manufactures.

矿业设备 mining industry.

工程机械 construction machines.

油缸 cylinders.

Groupes Techné :

69. 0100: 圆柱形轴承 / bushes

69. 0110: 法兰型轴承 / flanged bushes

69. 0120: 直条型 / strips

类型 Type		TBL	TBL-663	TBAL	TAL	TAL-Cr	
构成 Composition		CuZn24Al6Mn4 +石墨片 Bronze CuZn24Al6Mn4 + graphit pellets	CuSn6Zn6Pb3 +石墨片 Bronze CuSn6Zn6Pb3 + graphit pellets	钢材+ CuSn6Zn6Pb3+ 石墨片 Steel + Bronze CuSn6Zn6Pb3 + graphit pellets	钢材Ht250 +石墨片 Steel Ht250 + graphit pellets	铬合金GCr15 +石墨片 Chrome steel GCr15 + graphit pellets	
操作 / Operation		干摩擦/dry	+	+	+	+	
		润滑的 lubricated	++				
工作温度 T°		-100 à/to +300°C	-100 à/to +350°C	-100 à/to +300°C	-100 à/to +400°C	-100 à/to +350°C	
硬度 / Hardness		HB	210-250	80-120	60-90	180-230	55-60 HRC
最大载荷 Max load	静止/ static	MPa	100	60	70	60	250
	动态/ dynamic		25	15	20	15	70
最大速度 Max speed	干摩擦/ dry	m/s	0.4	2	2	0.5	0.1
	润滑的/lubricated		5				
Pv上限 Limited Pv		MPa.m/s	3.8	0.5	0.6	0.8	2.5
摩擦系数 friction coefficient		Sec / dry	<0.16	<0.15	<0.14	<0.17	<0.17
RoHS / VHU			Oui / yes	Oui / yes	Oui / yes	Oui / yes	Oui / yes
应用 Applications		中等载荷，低速， 适合压铸或采矿机械 Medium load, low speed , casting or mining machinery	低载荷，高温，中速， 适合锅炉等 Low load, high temperature, medium speed, oven etc..	TBL-663外的另一个选择，价格更低 Low cost alternative to TBL-663	适合无腐蚀和低速环境 For non corrosive environment and lower speed	高载荷，低速， 腐蚀环境 High load, low speed, corrosive environment	

所列数值在室温下测得 / indicative values for room temperature

特殊处理轴承-TAT Treated bushes - TAT

TECHNE提供可以承受极大载荷的特殊处理轴承

TECHNE proposes treated bushes to withstand very high loads.



这类型轴承可以应用在/ applications :

工程机械 construction machines
 农业机械 agricultural machinery
 压制设备 presses
 钢铁工业 steel industry
 等

类型 Type		钢材/ TAT	
构成 Composition		Steel	
操作 / Operation		干摩擦/dry	
		润滑的/lubricated	++
工作温度 T°		-70°C à to + 200°C	
最大载荷 Max load	静止/ static	MPa	140
	旋转和波动 Rotation & oscillations		70
最大速度 Max speed	干摩擦/dry	m/s	
	润滑的/lubricated		2,5
最大Pv Max PV	干摩擦/dry	MPa.m/s	
	脂润滑/grease		
	油润滑/oil		25
摩擦系数 friction coefficient		干摩擦/dry	
		润滑的/lubricated	0.08~0.25
膨胀系数 Thermal expansion coefficient		/K	15x10 ⁻⁶
导热系数/ heat cond.		W/(m.K)	60
RoHS /VHU		Oui / Yes	

所列数值在室温下测得

Indicative values for room temperature.

聚合物轴承 Polymer bushes

相关介绍 General presentation

我们使用注塑和模压方式制造聚合物轴承。为了增强机械性能，我们在聚合物中添加了纤维和润滑介质。每一个聚合物材料都有其各自的优点，包括较长的使用寿命和较低的摩擦系数。我们会帮助您选择合适的轴承，包括圆柱形，法兰型和垫片型等各种型式。

Our Bushes are produced by injection moulding process.

To improve the mechanical properties, we add fibers or lubricants to our polymers.

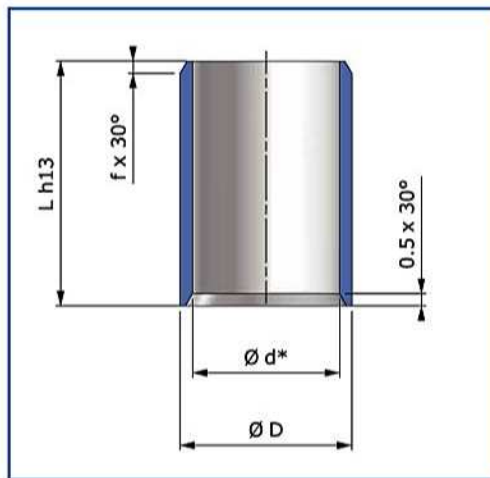
Each polymer material has its own advantages, included a long lifespan and a low coefficient of friction.

We will help you to select a suitable bush for your application.

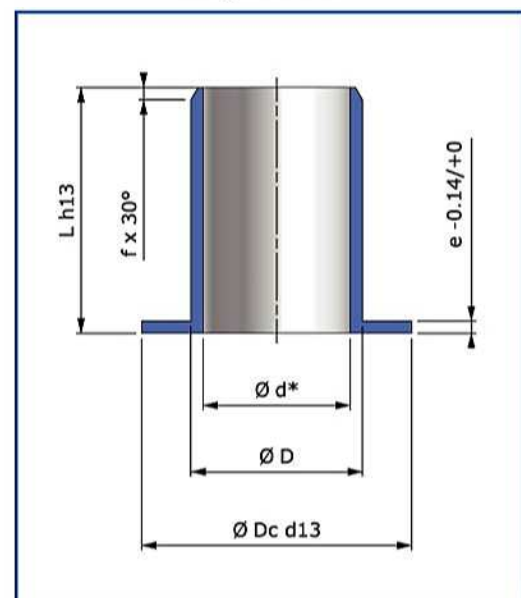
Cylindrical bushes, flanged bushes and washers are available.

设计/ OUR RANGE

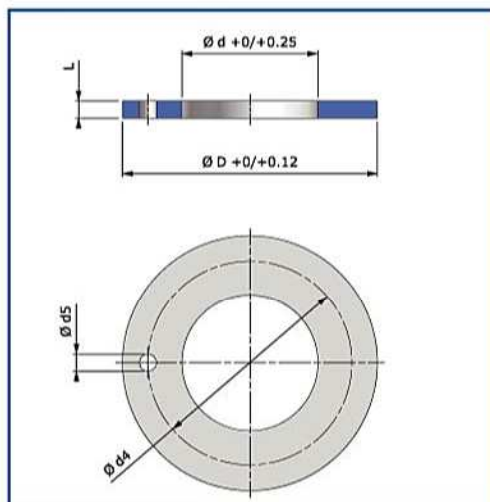
圆柱形/cylindrical



法兰型
flanged bush



垫片型/washer



E10轴承安装在H7沟槽中

* Ød E10 after fitting in housing ØD H7

轴承类别/OUR RANGE OF BUSHES

类型 KIND	应用 APPLICATIONS	工作温度 WORKING TEMPERATURE	颜色 COLOR	图片 PICTURE
TG	所有应用 All applications	- 40°C + 150°C	灰色 Grey	
TVX	使用寿命长 Very long life	- 40°C + 100°C	自然色 Natural	
TVE	高速 Very high speed	- 50°C + 80°C	乳白色 Cream	
THR	高抗性 High resistance	- 40°C + 90°C	黑灰色 Dark grey	
THT	高温 Very high temperature	- 100°C + 250°C	棕色 Brown	
THC	高技术 High technicity 高传导性 High conductivity	- 100°C + 250 °C	黑色 Black	
TCE	重载荷 High load	- 40°C + 135°C	黑色 Black	
TFE	低维护成本 Low maintenance (economical)	-40°C + 130°C	黑色 Black	
TFA	非常低的吸湿性 Very low absorption humidity	-40°C + 200°C	黑色 Black	

我们可以依照您的图纸为您特制您想要的轴承而且根据您的要求我们可以为您开发特制的材料。
详情请与我司销售部门和技术支持部门联系

We can also provide specific bushes according to customer's drawing and we can develop specific materials along your requirements. Feel free to contact our sales department for support.

TG轴承 / TG bushes

特性/Properties 经济Economical 适用性广泛 All applications 非常高的耐磨性 Very high wear resistance 干摩擦工作环境 dry working 温度适应性强 Good temperature resistance	
颜色 Color	<ul style="list-style-type: none"> • 灰色/Grey
物理和机械特性 Physical and mechanical properties 连续工作温度 Working temperature 短时间工作温度 Short time working temperature 载荷因数 Pv factor 抗压性 Compressive strength 干摩擦下的摩擦系数 Coefficient of friction (dry)	<ul style="list-style-type: none"> • - 40 / + 150 • - 70 / + 200 • 0,6 • 100 • 0,08 à/to 0,2
公差 Tolerances 安装后内径 Internal diameter after fitting	<ul style="list-style-type: none"> • E10
最小轴硬度 Minimal Shaft Hardness	<ul style="list-style-type: none"> • 50
应用 Applications 医学设备 Medical devices 电梯 Elevator 运动设备 Sport equipment	

TVX轴承 / TVX bushes

特性/Properties 耐磨性高 High wear resistance 使用寿命长 Very long life 摩擦系数低 Low friction coefficient	
颜色 Color	<ul style="list-style-type: none"> • 自然色/natural
物理和机械特性 Physical and mechanical properties 长时间连续工作温度 Working temperature 短时间工作温度 Short time working temperature Pv载荷因数 Pv factor 抗压缩性 Compressive strength 干摩擦时的摩擦系数 Coefficient of friction (dry)	<ul style="list-style-type: none"> • - 40 / + 100 • - 40 / + 180 • 0,7 • 115 • 0,09 à/to 0,2
公差 Tolerances Diamètre intérieur après emmanchement Internal diameter after fitting	<ul style="list-style-type: none"> • E10
最小轴硬度 Minimal Shaft Hardness	<ul style="list-style-type: none"> • 50
应用 Applications 包装机器 (传送带) / Packaging machine (conveyor) 旋转百叶窗 Revolving shutter	

TVE轴承 / TVE bushes

特性 Properties 高速下摩擦系数低 Low friction coefficient for high speed 耐磨性高 Good wear resistance 适合低负载 Adapted for low load 吸湿性低 Low humidity absorption 适合低硬度轴 Adapted for low Hardness Shaft	
颜色 Color	<ul style="list-style-type: none"> • 乳白色 Cream
物理和机械特性 Physical and mechanical properties 长时间连续工作温度 Working temperature 短时间工作温度 Short time working temperature Pv载荷因数 Pv factor 抗压缩性 Compressive strength 干摩擦时的摩擦系数 Coefficient of friction (dry)	<ul style="list-style-type: none"> • - 50 / + 80 • - 50 / + 120 • 0,4 • 60 • 0,05 à/to 0,18
公差 Tolerances 安装后内径 Internal diameter after fitting	<ul style="list-style-type: none"> • E10
最小轴硬度 Minimal Shaft Hardness	<ul style="list-style-type: none"> • 50
应用 Applications 办公家具 Office furniture 运动设备 Sport equipment	

THR轴承 / THR bushes

特性 Properties 摩擦系数低 Low friction coefficient 机械特性好 Good mechanical properties 抗冲击 Impact resistance 不适应潮湿环境 Not adapted to wett environment 适合尘土大的应用 For Dust application	
颜色 Color	<ul style="list-style-type: none"> • 灰黑 / Dark grey
物理和机械特性 Physical and mechanical properties 长时间连续工作温度 Working temperature 短时间工作温度 Short time working temperature Pv载荷因数 Pv factor 抗压缩性 Compressive strength 干摩擦时的摩擦系数 Coefficient of friction (dry)	<ul style="list-style-type: none"> • - 40 / + 90 • - 70 / + 170 • 0,2 • 60 • 0,09 à/to 0,3
公差 Tolerances 安装后内径 Internal diameter after fitting	<ul style="list-style-type: none"> • E10
最小轴硬度 Minimal Shaft Hardness	<ul style="list-style-type: none"> • 50
应用 Applications 农业机械 Agricultural machine 公共设备 Public work	

THT轴承 / THT bushes

特性 Properties 绝缘 Non conductor 承受极高负载 Extrem load resistance 适合非常高的速度 Very high speed 适合非常高的工作温度 Very high temperature	
颜色 Color	<ul style="list-style-type: none"> 棕色 Brown
物理和机械特性 Physical and mechanical properties 长时间连续工作温度 Working temperature 短时间工作温度 Short time working temperature Pv载荷因数 Pv factor 抗压缩性 Compressive strength 干摩擦时的摩擦系数 Coefficient of friction (dry)	<ul style="list-style-type: none"> - 100 / + 250 - 100 / + 300 1,1 75 0,05 à 0,15
公差 Tolerances 安装后内径 Internal diameter after fitting	<ul style="list-style-type: none"> E10
最小轴硬度 Minimal Shaft Hardness	<ul style="list-style-type: none"> 50
应用 Applications 叉车 Forklifts 车轴 Car axle 化学工业 Chemical industry	

THC轴承 / THC bushes

特性 Properties 抗化学性非常高 Very high chemical resistance 在所有的工作温度下抗磨性都比较高 High wear resistance for all working temperature 可以适应很高的工作温度 Very high temperature 负载承受力极好 Extrem load resistance 吸湿性很低 Very low humidity absorption 不易变形 Good dimension stability 导电性高 High conductivity	
颜色 Color	<ul style="list-style-type: none"> Noir / Black
物理和机械特性 Physical and mechanical properties 长时间连续工作温度 Working temperature 短时间工作温度 Short time working temperature Pv载荷因数 Pv factor 抗压缩性 Compressive strength 干摩擦时的摩擦系数 Coefficient of friction (dry)	<ul style="list-style-type: none"> - 100 / + 250 - 100 / + 300 2 120 0,09 à 0,25
公差 Tolerances 安装后内径 Internal diameter after fitting	<ul style="list-style-type: none"> E10
最小轴硬度 Minimal Shaft Hardness	<ul style="list-style-type: none"> 50
应用 Applications 安全阀 Safety valves 化学工业 Chemical industry	

TCE轴承 / TCE bushes

特性 Properties 负载高 For high load 绝缘 No conductor 经济 Economical	
颜色 Color	<ul style="list-style-type: none"> ● 黑色 Black
物理和机械特性 Physical and mechanical properties 长时间连续工作温度 Working temperature 短时间工作温度 Short time working temperature Pv载荷因数 Pv factor 抗压缩性 Compressive strength 干摩擦时的摩擦系数 Coefficient of friction (dry)	<ul style="list-style-type: none"> ● - 40 / + 135 ● - 70 / + 180 ● 0,6 ● 120 ● 0,05 à/to 0,20
公差 Tolerances 安装后内径 Internal diameter after fitting	<ul style="list-style-type: none"> ● E10
最小轴硬度 Minimal Shaft Hardness	<ul style="list-style-type: none"> ● 50
应用 Applications 公共工程 Public work	

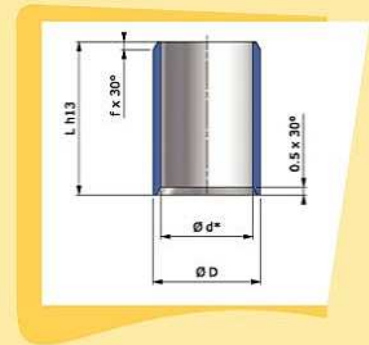
TFE轴承 / TFE bushes

特性 Properties 低维护成本 Low maintenance 耐磨性高 Good wear resistance	
颜色 Color	<ul style="list-style-type: none"> ● 黑色/black
物理和机械特性 Physical and mechanical properties 长时间连续工作温度 Working temperature 短时间工作温度 Short time working temperature Pv载荷因数 Pv factor 抗压缩性 Compressive strength 干摩擦时的摩擦系数 Coefficient of friction (dry)	<ul style="list-style-type: none"> ● - 40 / + 130 ● - 70 / + 200 ● 0,4 ● 70 ● 0,06 à/to 0
公差 Tolerances 安装后内径 Internal diameter after fitting	<ul style="list-style-type: none"> ● E10
最小轴硬度 Minimal Shaft Hardness	<ul style="list-style-type: none"> ● 50
应用 Applications 无柱硬顶工艺 Hard-Top 越野自行车换挡器 Mountain bike derailleur	

TFA轴承 / TFA bushes

特性 Properties 低吸湿性，尺寸稳定性高 Low humidity absorption, good dimension stability 抗高温 Very high temperature resistance 抗化学性高 Good chemical resistance	
颜色 Color	<ul style="list-style-type: none"> • 黑色 Black
物理和机械特性 Physical and mechanical properties 长时间连续工作温度 Working temperature 短时间工作温度 Short time working temperature Pv载荷因数 Pv factor 抗压缩性 Compressive strength 干摩擦时的摩擦系数 Coefficient of friction (dry)	<ul style="list-style-type: none"> • - 40 / + 200 • - 70 / + 240 • 1,5 • 80 • 0,1 à 0,3
公差 Tolerances 安装后内径 Internal diameter after fitting	<ul style="list-style-type: none"> • E10
最小轴硬度 Minimal Shaft Hardness	<ul style="list-style-type: none"> • 50
应用 Applications 潮湿环境下使用 For wett applications 化学工业 Chemical industry	

圆柱形轴承 CYLINDRICAL



E10轴承安装与H7沟槽中

* Ød E10 after fitting in housing ØD H7

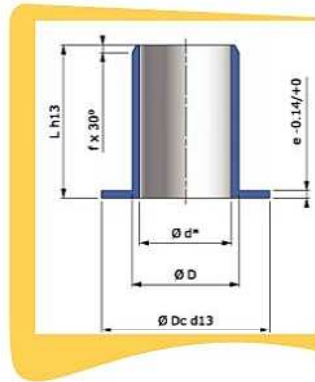
d (E10)	d (h13)	L
3	4,5	3
		5
		6
4	5,5	4
		6
5	7	5
		8
		10
6	8	6
		8
		10
8	10	6
		8
		10
		12
		15
10	12	4
		6
		8
		10
		12
		15
		18
		20
12	14	6
		8
		10
		12
		15
		20
		25
14	16	15
		20
		25
15	17	10
		15
		20
		25
16	18	12
		15
		20
		25
18	20	15
		20
		25
		25

d (E10)	d (h13)	L
20	23	15
		20
		23
		25
		30
22	25	15
		20
		25
		30
25	28	12
		15
		20
		25
		30
28	32	20
		25
		30
30	34	20
		25
		30
		40
32	36	20
		30
		40
35	39	20
		25
		30
		40
40	44	50
		20
		30
45	50	40
		50
		50
50	55	20
		30
		40
		50

法兰型轴承

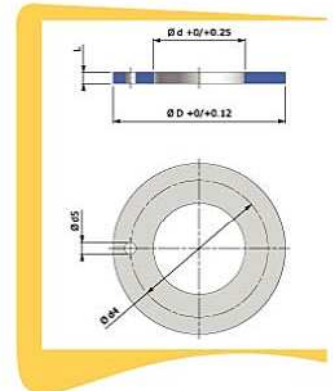
FLANGED BUSHES

d (E10)	D	Dc (d13)	L (h13)	e (-0,14)
3	4,5	7,5	3	0,75
			5	
4	5,5	9,5	3	0,75
			4	
			6	
5	7	11	4	1
			5	
6	8	12	4	1
			6	
			8	
			10	
8	10	15	5	1
			7	
			9	
			12	
10	12	18	7	1
			9	
			10	
			12	
			15	
12	14	20	7	1
			9	
			10	
			12	
14	16	22	10	1
			12	
			17	
			20	
15	17	23	9	1
			12	
			17	
			20	
16	18	24	12	1
18	20	26	12	1
			17	
			20	
20	23	30	11	1,5
			16	
			21	
25	28	35	11	1,5
			16	
			21	
30	34	42	16	2
			26	
			37	
32	36	40	16	2
			26	
			26	
35	39	47	16	2
			26	
40	44	52	30	2
			40	
45	50	58	50	2
50	55	63	40	2
			50	



E10轴承安装于H7沟槽中
* Ød E10 after fitting in housing ØD H7

垫片型 WASHER



d (+0,25)	D (-0,25)	L (-0,05)	d4 (+/-0,125)	d5 +0,1/+0,4
8	18	1,5	13	1,5
10	18		15	
12	24		18	
14	26		20	2
16	30		23	
18	32		25	3
20	36		28	
22	38		30	
24	42		33	
26	44		35	
28	48	2	38	4
32	54		43	
38	62		50	
42	66		54	
48	74		61	
52	78		65	
62	90		76	

树脂轴承TC-TRAX

Resin bushes - TC-TRAX

树脂轴承TC-TRAX多用在无法维护的恶劣环境中，由PTFE和树脂纤维组成

The resin TC-TRAX bushing is used maintenance-free in difficult environment. It is made of PTFE and resin impregnated fibbers.

TC-TRAX有下列应用：
applications :

工程机械 construction machinery
包装机器 packaging machines
阀门和促动器 valves and actuators
休闲设备 leisure equipments
农业设备 equipments
水下设备 submarine equipments



TC-T - REF. 78200

-100°C / 160°C

特性 Property	标准 Standard	单位 Unit	要求数值 Required value	数值 Value
硬度 Hardness		HRM		95
抗拉强度 Tensile strength		MPa	< 550	
密度 Specific gravity		g/cm ³		2.0
线性膨胀系数 Coefficient of linear expansion	T° 20-150 °C	10-5/ °C 1.3		
静态最大载荷 Maximum load (static)		MPa		240
动态最大载荷 Maximum load (dynamic)		MPa		140
最大速度 Maximum speed		m/s		0.2
最大pv载荷因数 Maximum Pv factor		MPa x m/s		1.8
干摩擦摩擦系数 Dry friction coefficient				0.03-0.12
抗压缩性 Compression resistance		MPa	< 430	
20度水中膨胀 Swelling in water, 20°C		%		0.15
建议轴硬度 Recommended shaft hardness		HRc	>= 35	
轴粗糙度 Shaft roughness		Ra	<= 0.4	

烧结轴承 Sintered bushes

烧结轴承由压缩的金属粉末（钢或铜）烧结而成，然后用润滑油浸透使之自润滑。
这个过程使该轴承不易被腐蚀并且在接触面保有一层润滑油

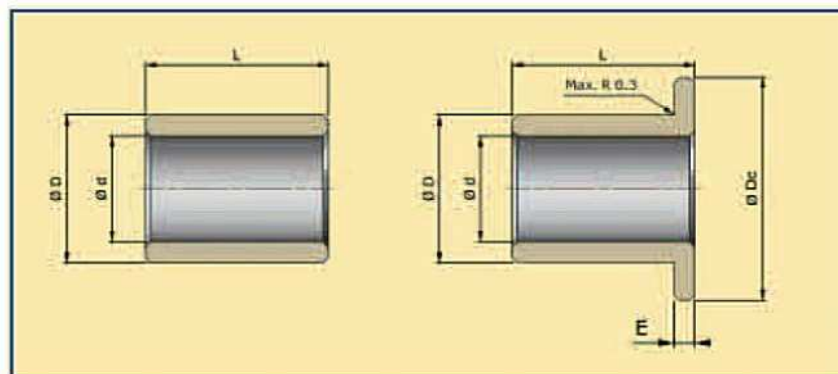
Sintered bushes are produced by compressing metal powder (steel or bronze) and stabilizing it.
They are then saturated with oil so that the bushing is self lubricating.

This process makes them less subject to corrosion and maintains an oil film between surfaces.

标准轴承 / STANDARD BUSHES

TECHNE拥有一系列如下图所示样式的自润滑轴承。

TECHNE keeps in stock a wide range of self lubricating bushes according to the following drawing:



特制轴承 / SPECIFIC BUSHES

除此之外，我们也能够生产特殊尺寸，公差或材料的非标轴承
Moreover, we offer specific bushes with specific sizes, tolerances or materials.

我们可以为您生产特制的轴承以符合您所需要的尺寸，公差和设计。

We can produce specific bushes to fit specific sizes, tolerances or specifications.

安装 ASSEMBLY

该类轴承通常安装于H7精度沟槽中，注意以下事项：

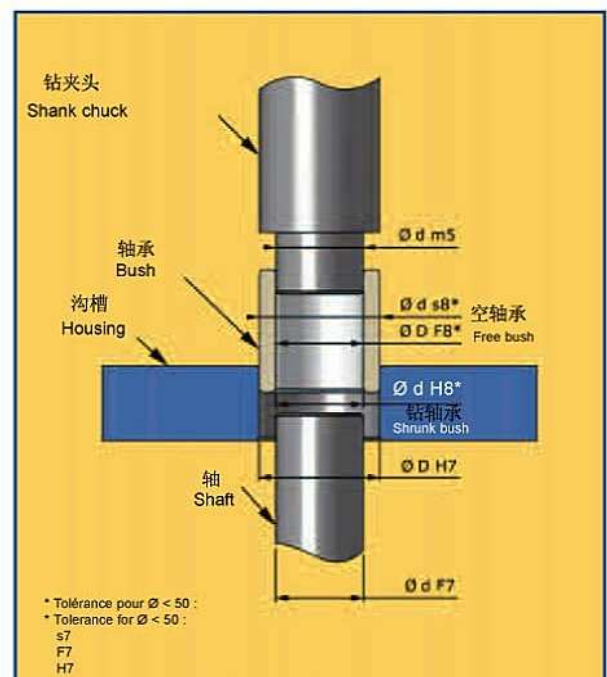
The bushes are usually fitted by force in the housing (H7)
It is important to take following into consideration:

进口处要去角
make a chamfer corresponding to the entrance,

安装前要清洗零件
clean the parts to be fitted,

润滑轴承的外表面
lubricate outside surface of the bushing,

检查沟槽和轴承的中心一致性
check alignment between housing and central axe.

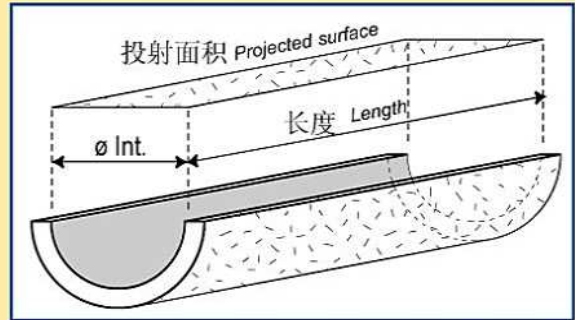


最大载荷 / MAXIMUM LOAD

载荷单位 $N/mm^2 = P$
 (投射面积=内径*长度)
 Specific load in $N/mm^2 = P$
 (projected surface : inside diameter x length)

线性旋转速度 $m/s : v$
 Linear rotation speed in $m/s : v$

Pv 因数 $P \cdot v = 1.8$
 1.8 是铜和钢轴承的标准值
 Pv factor $P \times v = 1.8$
 1.8 is the standard value for bronze and steel bushing.



计算 Calculation

A. 最大载荷

假设一个轴承
 长度 30mm, 内径 15mm
 旋转速度 700t/min
 载荷投射面积 $30mm \times 15mm = 450mm^2$

可算出
 700t/min, 轴径 15mm 的单位载荷 = $3.3 N/mm^2$
 最大载荷即 $3.3 N/mm^2 \times 450mm^2 = 1485N$

A/ Maximum load

Example:
 30 mm x ø int. 15 mm
 Rotation speed 700 t/min.
 Projected surface 30 mm x 15 mm = 450 mm²
 of specific load

For 700 t/min, shaft ø 15 mm = 3.3 N/mm²
 of specific load
 $3.3 N/mm^2 \times 450 mm^2 = 1485 N$

B. 计算轴承长度

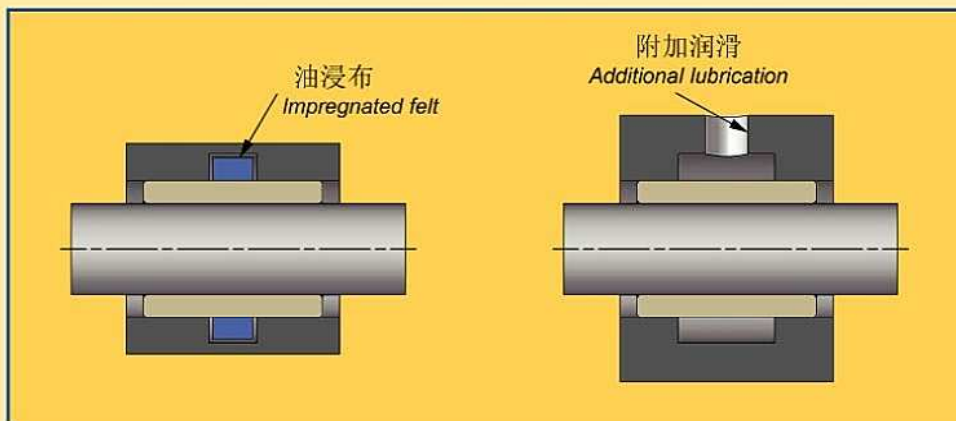
已知
 所受负载为 45N
 轴径 50mm
 旋转速度 400t/min

可算出
 400t/min, 轴径 50mm = $1.8 N/mm^2$
 最小投射面积 $45N / 1.8 N/mm^2 = 2500 mm^2$
 最小轴承长度 $2500mm^2 / 50mm (\text{ø arbre}) = 50mm$

B/ Length of bushing

1) Total load : 45 N
 2) Shaft: 50 mm
 3) Rotation speed: 400 t/min
 400 t/min, shaft ø 50 mm = 1.8 N/mm²

Minimum projected surface:
 $4500 N \div 1.8 N/mm^2 = 2500 mm^2$
 Minimum length of the bushing:
 $2500 mm^2 \div 50 mm (\text{ø arbre}) = 50 mm$



垂直轴, 过载, 污染或者大于90度的温度下建议添加更多的润滑。
 More lubrication is recommended for a vertical axe, overload, pollution or temperature higher the 90°C.

选择材料 / CHOISING YOUR MATERIAL

■ 青铜

摩擦系数非常好

抗腐蚀性好，建议使用在高速且经常停止启动的设备中

■ Bronze

Very good friction coefficient.

Good resistance to corrosion, recommended for high speed, frequent starts.

■ 钢铁:

中等速度，高静态负载，抗捶打能力强

■ Steel

Medium speed, high static load.

Good resistance to hammering.



铁/ IRON - REF. 66619 -195°C / +280°C

特性 Properties

特性 Property	单位 Unit	要求数值 Required value
硬度 Hardness	HB	> 40
密度 Specific gravity	g/cm ³	6+/-0.5
抗压缩性 Compression resistance	MPa	> 200

构成 Composition

元素 Element	成份 Component	元素符号 Symbol	最大% Maximum %
铁 IRON	铁 Iron	Fe	95
	碳/carbon	C	0,3
	红铜/copper	Cu	5

NOTE : 根据要求，我们同时为您提供各种润滑油（HT，BT等等）
 we can provide bushing with different oils on demand (eg alimentary).

青铜/ BRONZE - REF. 66620-195°C / +280°C

特性/ Properties

特性/ Property	单位 Unit	要求数值 Required value
硬度 Hardness	HB	20-50
密度 Specific gravity	g/cm ³	6-7
抗压缩性 Compression resistance	MPa	> 120
浸油率 Oil impregnation	%	> 18

构成/ Composition

元素 Element	成份 Component	元素符号 Symbol	最大% Maximum %
青铜 BRONZE	碳/carbon	C	2
	红铜/copper	Cu	73,5
	锡/Tin	Sn	11,5
	锌/Zinc	Zn	7
	铅/Lead	Pb	4
	其它/others	其它/others	2

无铅铜25-55HB/ lead free - REF. 66625

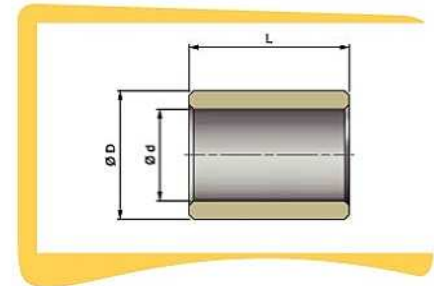
特性/ Properties

特性 Property	单位 Unit	要求数值 Required value
硬度 Hardness	HB	25-55
密度 Specific gravity	g/cm	6.6-7.2
抗压缩性 Compression resistance	MPa	> 150
浸油率 Oil impregnation	%	> 18

构成/ Composition

元素 Element	成份 Component	元素符号 Symbol	最大% Maximum %
青铜 BRONZE	碳/carbon	C	2
	红铜/copper	Cu	86
	锡/Tin	Sn	11
	其它/others	其它/others	1

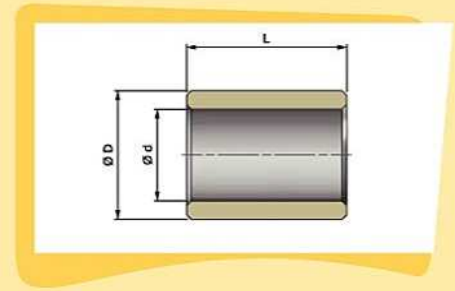
圆柱形轴承
 青铜和铁
 Cylindrical bushes
 bronze and iron



d : 内径 / nominal internal diameter*
 D : 外径 / nominal outer diameter
 L : 长度 / length

*Ød H7 après emmanchement dans un logement ØD H7 ≤50
 *Ød H7 after fitting in housing ØD H7 ≤50
 *Ød H8 après emmanchement dans un logement ØD H7 ≥50
 *Ød H8 after fitting in housing ØD H7 ≥50

d	D	L				
2	5	2	3			
3	6	4	6	10		
4	7	4	8	12		
4	8	4	8	12		
5	8	5	8	10	12	16
5	9	4	5	8		
6	9	6	10	12	16	
6	10	6	10	12	16	
6	12	6	10	12	16	
7	10	5	8	10		
8	11	8	12	16	20	
8	12	8	12	16	20	
8	14	8	12	16	20	
9	12	6	10	14		
10	13	10	16	20	25	
10	14	10	16	20	25	
10	15	10	16	20	25	
10	16	10	16	20	25	
12	15	12	16	20	25	
12	16	12	16	20	25	
12	17	12	16	20	25	
12	18	12	16	20	25	
14	18	14	18	22	28	
14	20	14	18	22	28	
15	19	16	20	25	32	
15	21	16	20	25	32	
16	20	16	20	25	32	
16	22	16	20	25	32	
18	22	18	22	28	36	
18	24	18	22	28	36	
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20	24	16	20	25	30	32
20	25	16	20	25	32	

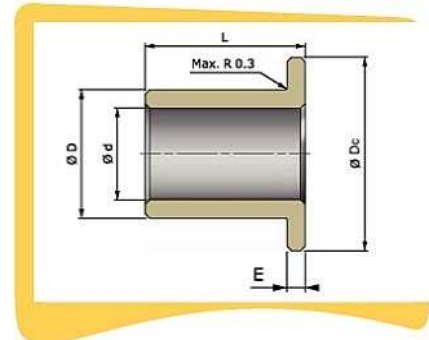


d: 内径 / nominal internal diameter*
 D: 外径 / nominal outer diameter
 L: 长度 / length

d	D	L			
20	26	16	20	25	32
20	27	16	20	25	32
20	28	16	20	25	32
22	27	18	22	28	36
22	28	18	22	28	36
22	29	18	22	28	36
25	30	20	25	32	40
25	32	20	25	32	40
28	32	22	28	36	45
28	33	22	28	36	45
28	36	22	28	36	45
30	38	24	30	38	
32	38	20	25	32	40 50
32	40	20	25	32	40 50
35	44	22	28	35	
35	45	25	35	40	50
36	42	22	28	36	45
36	45	22	28	36	45
38	44	25	35	45	
40	46	25	32	40	50
40	50	25	32	40	50
45	51	28	36	45	56
45	55	35	45	55	65
45	56	28	36	45	65
50	56	32	40	50	63
50	60	32	40	50	63
55	65	40	55	70	
60	70	50	60	90	
60	72	50	60	70	
60	80	90			
63	70	40	50		
70	80	59	90		

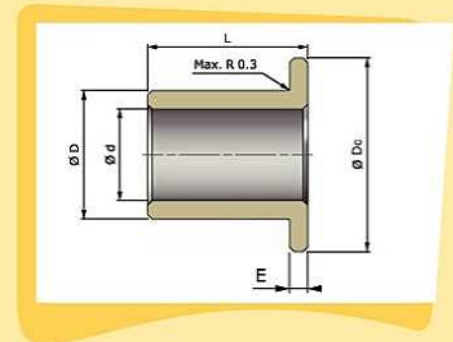
**法兰型轴承
青铜和铁**
**Flanged bushes
bronze and iron**

d : 内径 / nominal internal diameter *
 D : 外径 / nominal outer diameter
 L : 长度 / length



*Ød H7 après emmanchement dans un logement ØD H \pm 50
 *Ød H7 after fitting in housing ØD H7 \pm 50
 *Ød H8 après emmanchement dans un logement ØD H \pm 50
 *Ød H8 after fitting in housing ØD H7 \pm 50

d	D	L			E	Dc
3	6	4	6	10	1,5	9
4	8	4	8	12	2	12
6	10	6	10	16	2	14
8	12	8	12	16	2	16
9	14	6	10	14	2,5	19
10	13	10	16	20	1,5	16
10	15	10	16	20	2,5	20
10	16	8	10	16	3	22
12	15	12	16	20	1,5	18
12	17	12	16	20	2,5	22
12	18	8	12	20	3	24
14	18	14	18	22	2	22
14	20	14	18	22	3	26
15	19	16	20	25	2	23
15	21	16	20	25	3	27
16	20	16	20	25	2	24
16	22	16	20	25	3	28
18	22	18	22	28	2	26
18	24	18	22	28	3	30
20	24	16	20	25	2	28
20	26	16	20	25	3	32
22	27	18	22	28	2,5	32
22	28	15	20	25	3	34
22	29	18	22	28	3,5	36
25	30	20	25	32	2,5	35
25	32	20	25	32	3,5	39
28	33	22	28	36	2,5	38
28	36	22	28	36	4	44
30	38	20	25	30	4	46
32	38	20	25	32	3	44
32	40	20	25	30	4	48
36	42	22	28	36	3	48



d : 内径 / nominal internal diameter *
 D : 外径 / nominal outer diameter
 L : 长度 / length

*Ød H7 après emmanchement dans un logement ØD H7/50
 *Ød H7 after fitting in housing ØD H7 ≤50
 *Ød H8 après emmanchement dans un logement ØD H7/50
 *Ød H8 after fitting in housing ØD H7 ≥50

d	D	L			E	Dc
36	45	22	28	36	4,5	54
40	46	25	32	40	3	52
40	50	25	32	40	5	60
45	51	28	36	45	3	57
45	56	28	36	45	5,5	67
50	56	32	40	50	3	62
50	60	32	40	50	5	70

未安装前的轴承

FREE BUSHES

内径小于等于50时的公差

Tolerances if diameter ≤ 50

公差 tolerance d = F7

公差 tolerance D = s7

内径大于50时的公差

Tolerances if diameter > 50

公差 tolerance d = F8

公差 tolerance D = s8

安装在H7沟槽中以后

After fitting in housing diameter D H7

内径小于等于50时的公差

Tolerances if diameter ≤ 50

公差 tolerance d = F7

内径大于50时的公差

Tolerances if diameter > 50

公差 tolerance d = H8

轴公差f7

For shaft tolerance f7

特制烧结部件 Special sintered parts

TECHNE能与您一同开发您
想要的烧结部件
按照我们的生产步骤，我们
能产生出小型，中型，大型
等各式复杂的固体部件。



Techne proposes to develop with you your sintered parts.

This production process allows to produce complex and solid parts.

It is used to produce small, medium and large series.

我们有各种各样的材料来加工您的部件：青铜，钢材，不锈钢（304，316等等）

It is possible to produce parts in a large range of materials and grades : Bronze, Steel, Stainless steel (304,316 etc...).

为了更好的帮您设计，请提供下列信息：工作环境，最大和平均载荷，静态或动态使用和运动类型。

To define the best profile, please give us following information : working conditions , ie maximum and average load, static or dynamic usage and type of movement (constant etc..).

此外，如能告知部件安装在何种机器之上对我们也大有帮助。

It is also very usefull to have the type of machines or fitting in which the part will be used.

生产流程 / PRODUCTION PROCESS

部件由特别制作的金属颗粒烧结生产而成。

Parts are produced from metal powders specifically manufactured for sintered parts.

第一步我们使用高压将金属颗粒压缩，一旦完成，该部件就有了初始形状

The first step is to compress this powder in a tool with high pressure. Once pressed, parts have their end-shape.

然后将此部件放入炉中根据其材料不同使用不同的温度进行多步烧结

Second operation consists in sintering the parts in a oven in several steps with temperatures depending on the material.

烧结完成后，我们能够对部件进行热处理以加强它的机械性能

It is possible to make a heat tretament after sintering to reinforce the mecanical properties.

部件生产后，我们还能对其进行其它的处理/ Several treatements are possible after production

校准：以适应特殊的公差 Calibrating : to fit specific tolerances

再压缩以适应特殊密度要求 Second compression to fit special density requirements

铜处理降低部件的气孔 Copper treatment to reduce porosity

表面氧化以降低腐蚀和提高表面抗性 / Oxydation to decrease corrosion and increase surface resistance

油处理 / Oil treatment

机加工成特殊形状 Machining for special shapes

处理 / TREATMENTS

新

PTFE处理以增强机械性能。在某些场合，这种处理能降低部件的噪音也同时能避免腐蚀。
部件加固：适用于齿轮牙，梢，键的高负载。

New

PTFE treatement to increase mecanical properties. It allows for instance to reduce the noisiness of the part. It also avoid corrosion.
Hardening of the parts : for high loads on teeth, pins or keys.

泰克尼尔的产品目录 Techné's catalogues



TECHNE信息
Techné's
informations



表面处理
Surface treatments



旋转密封件
Rotary sealing



橡胶密封件
Rubber sealing



液压密封件
Hydraulic seals



轴衬
Gaskets



卫生级密封件
Aseptic seals



机加工作件
Machined parts

Techné

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