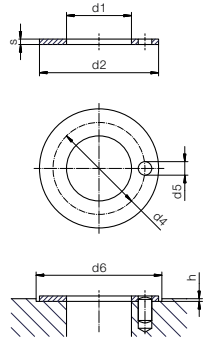


Bearing technology | Plain bearing | iglidur® Z

Thrust washer (form T)



i Dimensions according to ISO 3547-1 and special dimensions

i Order example: **ZTM-1430-015** – no minimum order quantity.
Z iglidur® material T Thrust washer M Metric 14 Inner Ø d1 30 Outer Ø d2 015 Thickness s

d1	d2	d4	d5	h	d6	s	Part No.
+0.25	-0.25	-0.12 +0.12	+0.375 +0.125	+0.2/-0.2	+0.12	-0.05	
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
14	30	25	2	1	30	1.5	ZTM-1430-015 ¹⁴⁶⁾
15	27	⁴⁾	⁴⁾	1	27	1.5	ZTM-1527-015
15	35	⁴⁾	⁴⁾	1	35	1.5	ZTM-1535-015
15	40	⁴⁾	⁴⁾	1	35	1.5	ZTM-1540-015
16	23	⁴⁾	⁴⁾	1	23	1.5	ZTM-1623-015
20	36	28	3	1	36	1.5	ZTM-2036-015
22	38	30	3	1	38	1.5	ZTM-2238-015
22	50	30	3	1	38	0.5	ZTM-2250-005
22	50	30	3	1	38	1.5	ZTM-2250-015
28	38	⁴⁾	⁴⁾	1	38	1.5	ZTM-2838-015
32	54	43	4	1	54	1.5	ZTM-3254-015
62	90	⁴⁾	⁴⁾	1.5	90	2	ZTM-6290-020

⁴⁾ Design without fixing hole ¹⁴⁶⁾ d4 +/-0,2, d5 +/-0,1

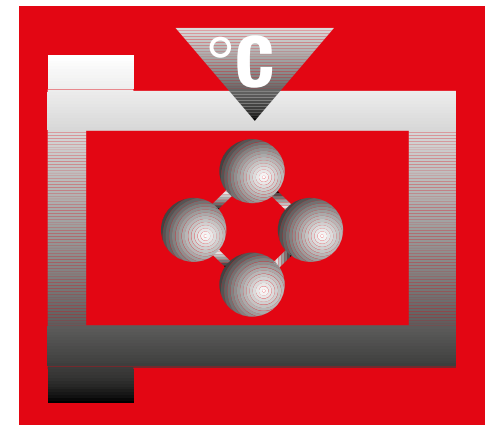
i Available from stock
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i Online ordering
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No low-quantity surcharges.
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The high temperature specialist up to +250°C Up to six times more wear-resistant than iglidur® X iglidur® X6



When to use it?

- When temperatures are higher than +150°C
- When the wear resistance of iglidur® X in pivoting and rotating applications is not sufficient
- When the press-fit should be improved over iglidur® X
- When high media resistance is required
- When a bearing which is free of PTFE is required



When not to use?

- When a cost-effective universal plain bearing is required
iglidur® G
- When a plain bearing for underwater use is required
iglidur® UW500, iglidur® H370
- When a wear-resistant high-temperature plain bearing for linear motion is required
iglidur® Z

Bearing technology | Plain bearing | iglidur® X6



Ø
3.0 – 50.0mm



Also available as:



Bar stock, round bar
Page 657



Bar stock, plate
Page 683



tribo-tape liner
Page 691



Piston rings
Page 581



Two hole flange bearings
Page 603



Moulded special parts
Page 624



igubal® spherical balls
Page 841

The high temperature specialist up to +250°C Up to six times more wear-resistant than iglidur® X

Due to nanotechnology, iglidur® X6 shows up to six longer service life than iglidur® X in many pivoting and rotating applications – even at temperatures over +100°C.

- Continuous operating temperatures up to +250°C
- Up to 50% better press-fit than iglidur® X
- High compressive strength
- Extremely high chemical resistance
- PTFE-free
- Lubrication-free
- Maintenance-free

Typical application areas

- Glass industry
- Food industry
- Fluid technology
- Textile industry
- Mechanical engineering

Descriptive technical specifications

Wear resistance at +23°C	-	<div style="width: 100%; height: 10px; background-color: red;"></div>	+
Wear resistance at +90°C	-	<div style="width: 80%; height: 10px; background-color: red;"></div>	+
Wear resistance at +150°C	-	<div style="width: 60%; height: 10px; background-color: red;"></div>	+
Low coefficient of friction	-	<div style="width: 80%; height: 10px; background-color: red;"></div>	+
Low moisture absorption	-	<div style="width: 80%; height: 10px; background-color: red;"></div>	+
Wear resistance under water	-	<div style="width: 80%; height: 10px; background-color: red;"></div>	+
High media resistance	-	<div style="width: 80%; height: 10px; background-color: red;"></div>	+
Resistant to edge pressures	-	<div style="width: 80%; height: 10px; background-color: red;"></div>	+
Suitable for shock and impact loads	-	<div style="width: 80%; height: 10px; background-color: red;"></div>	+
Resistant to dirt	-	<div style="width: 80%; height: 10px; background-color: red;"></div>	+

Online product finder
www.igus.eu/igidur-finder

Online service life calculation
www.igus.eu/igidur-expert

Technical data

General properties		Testing method	
Density	g/cm ³	1.53	
Colour		dark blue	
Max. moisture absorption at +23°C and 50% r.h.	% weight	0.1	DIN 53495
Max. moisture absorption	% weight	0.5	
Coefficient of friction, dynamic, against steel	μ	0.09 – 0.25	
pv value, max. (dry)	MPa · m/s	1.35	
Mechanical properties			
Flexural modulus	MPa	16,000	DIN 53457
Flexural strength at +20°C	MPa	290	DIN 53452
Compressive strength	MPa	190	
Max. recommended surface pressure (+20°C)	MPa	150	
Shore D hardness		89	DIN 53505
Physical and thermal properties			
Max. application temperature long-term	°C	+250	
Max. application temperature short-term	°C	+315	
Min. application temperature	°C	-100	
Thermal conductivity	W/m · K	0.55	ASTM C 177
Coefficient of thermal expansion (at +23°C)	K ⁻¹ · 10 ⁻⁵	1.1	DIN 53752
Electrical properties ⁹⁾			
Specific contact resistance	Ωcm	< 10 ⁵	DIN IEC 93
Surface resistance	Ω	< 10 ³	DIN 53482

⁹⁾ The good conductivity of this material can favour the generation of corrosion on the metallic contact components.

Table 01: Material properties

With respect to its general mechanical and thermal specifications, iglidur® X6 is directly comparable to our high-temperature classic, iglidur® X, and may even provide advantages, such as its wear behaviour.

Moisture absorption

Under standard climatic conditions, the moisture absorption of iglidur® X6 plain bearings is approximately 0.1% weight. The saturation limit in water is 0.5% weight. These values are so low that a moisture expansion need to be considered only in extreme cases.

Vacuum

In vacuum, any present moisture is released as vapour. The use in vacuum is generally possible.

Radiation resistance

Resistant to radiation up to an intensity of 2 · 10⁵Gy.

Resistance to weathering

igidur® X6 plain bearings are continuously resistant to weathering. The material properties are only slightly affected. Possible discolorations are only superficial.

Mechanical properties

With increasing temperatures, the compressive strength of iglidur® X6 plain bearings decreases. Diagram 02 shows this inverse relationship. The maximum recommended surface pressure is a mechanical material parameter. No conclusions regarding the tribological properties can be drawn from this.

Diagram 03 shows the elastic deformation of iglidur® X6 at radial loads. At the maximum recommended surface pressure of 150MPa the deformation is less than 2%. A possible deformation could be, among others, dependant on the duty cycle of the load.

Surface pressure, page 41



-100°C up to +250°C



150MPa



Permissible surface speeds

The high temperature resistance and good thermal conductivity values mean that iglidur® X6 is suitable for high-speed applications. At the given speeds, friction can cause a temperature increase to maximum permissible levels. In practice, though, this level is rarely reached due to varying application conditions.

Surface speed, page 44

Temperature

The ambient temperatures strongly influence the properties of plain bearings. With regard to temperature resistance, iglidur® X6 is among the highest in the iglidur® range. In many tests it has shown a six times higher wear resistance compared to the established high-temperature specialist iglidur® X. For temperatures over +165°C an additional securing is required.

Application temperatures, page 49

Additional securing, page 49

Friction and wear

Similar to wear resistance, the coefficient of friction μ also changes with the load. The coefficient of friction of iglidur® X6 declines with higher pressure and is practically constant for pressures above 30MPa. A higher speed of the shaft also results in a lower coefficient of friction (diagram 04 and 05).

Coefficient of friction and surfaces, page 47

Wear resistance, page 50

Shaft materials

The friction and wear are also dependent, to a large degree, on the shaft material. Shafts that are too smooth, increase both the coefficient of friction and the wear of the bearing. The best case for iglidur® X6 is a ground surface with an average surface finish $R_a = 0.4 - 0.7\mu\text{m}$. Diagram 06 shows the test results of iglidur® X6 plain bearings running against various shaft materials. The best performance is achieved with the plain shaft materials free cutting steel and plain steel 1.0037. At higher loads, we recommend harder steel qualities. Non-hardened steel shafts can be worn by the bearing at pressures over 2MPa. The wear database shows that iglidur® X6 is more suitable for rotating than for pivoting applications (diagram 07). If the shaft material you plan on using is not shown in these test results, please contact us.

Shaft materials, page 52

Installation tolerances

iglidur® X6 plain bearings are standard bearings for shafts with h tolerance (recommended minimum h9). The bearings are designed for press-fit into a housing machined to a H7 tolerance. After being assembled into a nominal size housing, in standard cases the inner diameter automatically adjusts to the F10 tolerances. For particular dimensions the tolerance differs depending on the wall thickness (please see product range table). In relation to the installation tolerance, the inner diameter changes with the absorption of humidity.

Testing methods, page 57

Chemicals	Resistance
Alcohols	+
Diluted acids	+
Diluted alkalines	+
Fuels	+
Greases, oils without additives	+
Hydrocarbons	+
Strong acids	+
Strong alkalines	+

All information given at room temperature [+20°C]

Table 02: Chemical resistance

Chemical table, page 1636

		Rotating	Oscillating	linear
long-term	m/s	1.5	1.1	5.0
short-term	m/s	3.5	2.5	10.0

Table 03: Maximum surface speeds

	Dry	Greases	Oil	Water
Coefficient of friction μ	0.09 – 0.25	0.09	0.04	0.04

Table 04: Coefficient of friction against steel ($R_a = 1\mu\text{m}$, 50HRC)

\varnothing d1 [mm]	Housing		Plain bearing		Shaft	
	H7 [mm]	F10 [mm]	F10 [mm]	h9 [mm]	h9 [mm]	h9 [mm]
0 – 3	+0.000 +0.010	+0.006 +0.046	-0.025 +0.000			
> 3 – 6	+0.000 +0.012	+0.010 +0.058	-0.030 +0.000			
> 6 – 10	+0.000 +0.015	+0.013 +0.071	-0.036 +0.000			
> 10 – 18	+0.000 +0.018	+0.016 +0.086	-0.043 +0.000			
> 18 – 30	+0.000 +0.021	+0.020 +0.104	-0.052 +0.000			
> 30 – 50	+0.000 +0.025	+0.025 +0.125	-0.062 +0.000			
> 50 – 80	+0.000 +0.030	+0.030 +0.150	-0.074 +0.000			
> 80 – 120	+0.000 +0.035	+0.036 +0.176	-0.087 +0.000			
> 120 – 180	+0.000 +0.040	+0.043 +0.203	+0.000 +0.100			

Table 05: Important tolerances for plain bearings according to ISO 3547-1 after press-fit

Technical data

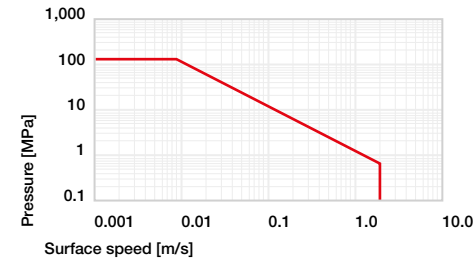


Diagram 01: Permissible pv values for iglidur® X6 plain bearings with a wall thickness of 1mm, dry operation against a steel shaft, at +20°C, mounted in a steel housing

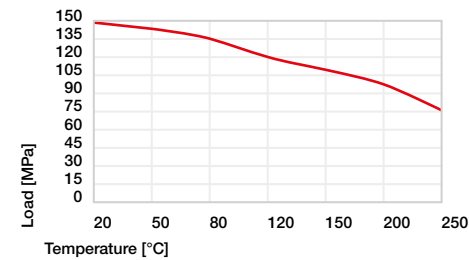


Diagram 02: Maximum recommended surface pressure as a function of temperature (150MPa at +20°C)

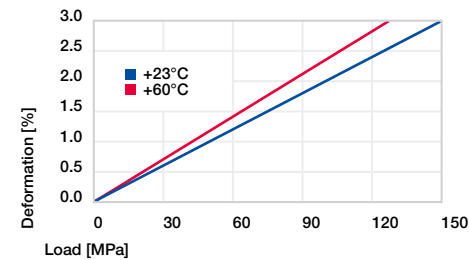


Diagram 03: Deformation under pressure and temperature

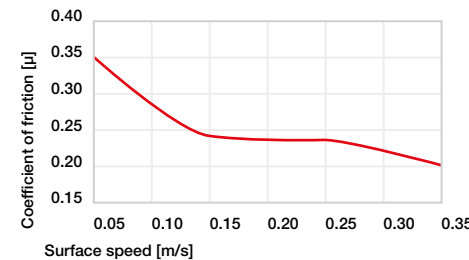


Diagram 04: Coefficient of friction as a function of the surface speed, $p = 0.75\text{MPa}$

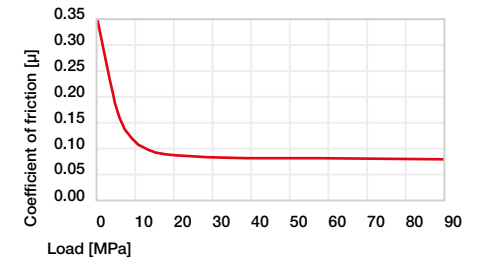


Diagram 05: Coefficient of friction as a function of the load, $v = 0.01\text{m/s}$

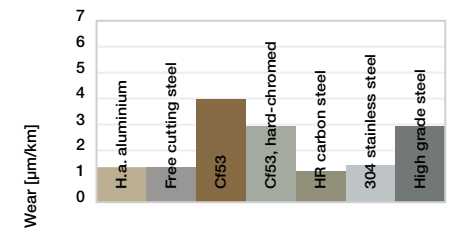


Diagram 06: Wear, rotating with different shaft materials, pressure, $p = 1\text{MPa}$, $v = 0.3\text{m/s}$

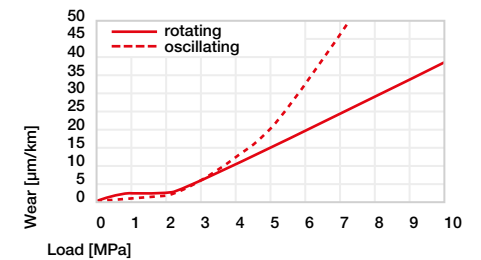
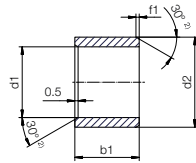


Diagram 07: Wear for oscillating and rotating applications with shaft material Cf53 hardened and ground steel, as a function of the load

Bearing technology | Plain bearing | iglidur® X6

Sleeve bearing (form S)



²⁾ Thickness < 0.6mm: Chamfer = 20°

Chamfer in relation to d1

d1 [mm]	Ø 1–6	Ø 6–12	Ø 12–30	Ø > 30
f1 [mm]	0.3	0.5	0.8	1.2

i Dimensions according to ISO 3547-1 and special dimensions



Order example: X6SM-0304-03 – no minimum order quantity.

X6 iglidur® material S Sleeve bearing M Metric 03 Inner Ø d1 04 Outer Ø d2 03 Total length b1

d1	d1	d2	b1	Part No.
[mm]	Tolerance ³⁾	[mm]	h13 [mm]	
3.0		4.5	3.0	X6SM-0304-03
5.0	+0.010 +0.058	7.0	5.0	X6SM-0507-05
6.0		8.0	6.0	X6SM-0608-06
8.0	+0.013 +0.071	10.0	10.0	X6SM-0810-10
10.0		12.0	10.0	X6SM-1012-10
12.0	+0.016 +0.086	14.0	12.0	X6SM-1214-12
16.0		18.0	15.0	X6SM-1618-15
20.0		23.0	20.0	X6SM-2023-20
25.0	+0.020 +0.104	28.0	30.0	X6SM-2528-30
30.0		34.0	30.0	X6SM-3034-30
35.0		39.0	40.0	X6SM-3539-40
40.0	+0.025 +0.125	44.0	40.0	X6SM-4044-40
50.0		55.0	40.0	X6SM-5055-40

³⁾ After press-fit. Testing methods, page 57



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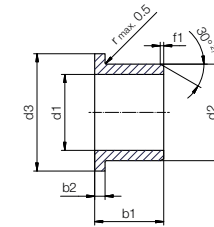
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Bearing technology | Plain bearing | iglidur® X6

Flange bearing (form F)



²⁾ Thickness < 0.6mm: Chamfer = 20°

Chamfer in relation to d1

d1 [mm]	Ø 1–6	Ø 6–12	Ø 12–30	Ø > 30
f1 [mm]	0.3	0.5	0.8	1.2

i Dimensions according to ISO 3547-1 and special dimensions



Order example: X6FM-0304-05 – no minimum order quantity.

X6 iglidur® material F Flange bearing M Metric 03 Inner Ø d1 04 Outer Ø d2 05 Total length b1

d1	d1	d2	d3	b1	b2	Part No.
[mm]	Tolerance ³⁾	[mm]	d13 ³⁾ [mm]	h13 [mm]	h13 [mm]	
3.0		4.5	7.5	5.0	0.75	X6FM-0304-05
5.0	+0.010 +0.058	7.0	11.0	5.0	1.00	X6FM-0507-05
6.0		8.0	12.0	6.0	1.00	X6FM-0608-06
8.0	+0.013 +0.071	10.0	15.0	10.0	1.00	X6FM-0810-10
10.0		12.0	18.0	10.0	1.00	X6FM-1012-10
10.0		12.0	18.0	25.0	1.00	X6FM-1012-25
12.0		14.0	20.0	12.0	1.00	X6FM-1214-12
16.0	+0.016 +0.086	18.0	24.0	12.0	1.00	X6FM-1618-12
16.0		18.0	24.0	17.0	1.00	X6FM-1618-17
20.0		23.0	30.0	21.5	1.50	X6FM-2023-21
25.0	+0.020 +0.104	28.0	35.0	21.5	1.50	X6FM-2528-21
30.0		34.0	42.0	40.0	2.00	X6FM-3034-40
35.0		39.0	47.0	26.0	2.00	X6FM-3539-26
40.0	+0.025 +0.125	44.0	52.0	40.0	2.00	X6FM-4044-40

³⁾ After press-fit. Testing methods, page 57



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