Plain bearing materials for high temperatures

Contraction of the

Bearing technology | Plain bearing | iglidur®

Plain bearing materials for high temperatures

Here you will find high-temperature specialists for continuous operating temperatures up to +250°C (exception: iglidur[®] V400 with +200°C).

In the meantime, the iglidur® X6 surpasses the standard iglidur® X here in many rotating and pivoting applications. iglidur® Z has also been long established as standard with extremely low wear rates under high loads and/or temperatures. iglidur® V400 is characterised as a problem solver in many special cases, and iglidur® UW500 is the specialist for hot liquids.

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



High temperatures

iglidur[®] UW500 For hot liquids



iglidur[®] HSD350 All-rounder for steam sterilisation

Surface pressure [MPa] ¹²⁴⁾	30 -	+
Coefficient of friction [µ] $^{\scriptscriptstyle 125)}$	1.15 -	+
Wear [µm/km] 125)	2.00 -	+
Price index	-	+
Temperature [°C] 123)	+250 -	+
Surface pressure [MPa] ¹²⁴⁾	140 –	+
Coefficient of friction [µ] $^{\scriptscriptstyle 125)}$	0.33 -	+
Wear [µm/km] 125)	2.20 -	+
Price index	_	+

+180

Temperature [°C] 123)

		Temperature [°C] 123)	+250 -			+
	iglidur [®] X	Surface pressure [MPa] ¹²⁴⁾	150 —			+
\bigcirc	The chemical and temperature	Coefficient of friction [µ] $^{\rm 125)}$	0.31 –			+
	specialist	Wear [µm/km] 125)	6.30 -			+
		Price index	-			+
		Temperature [°C] 123)	+250 -			+
	iglidur [®] Z	Surface pressure [MPa] 124)	150 –			+
	Long service life under extreme	Coefficient of friction [µ] $^{\scriptscriptstyle 125)}$	0.18 -			+
	conditions	Wear [µm/km] 125)	1.00 -			+
		Price index	-			+
		Temperature [°C] 123)	+250 -			+
	iglidur [®] X6	Surface pressure [MPa] ¹²⁴⁾	150 –			+
	The high temperature specialist	Coefficient of friction [µ] $^{\scriptscriptstyle 125)}$	-			+
	up to +250°C	Wear [µm/km] 125)	-			+
		Price index	-			+
		Temperature [°C] 123)	+200 -			+
	iglidur [®] V400	Surface pressure [MPa] ¹²⁴⁾	45 –			+
	For soft shafts and high	Coefficient of friction [µ] $^{\scriptscriptstyle 125\!\!}$	0.19 -			+
	temperatures	Wear [µm/km] 125)	0.30 -			+
		Price index	_			+

 1230 max. long-term application temperature 1240 max. recommended surface pressure at +20°C 1250 best combination for p = 1MPa, v = 0.3m/s, rotating





The chemical and temperature specialist Up to 150MPa iglidur[®] X

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When to use it?

- For pressure loads up to 150MPa
- For linear movements with stainless steel at high temperatures
- Universal chemical resistance
- For temperature resistance from -100°C to +250°C (short-term up to +315°C)
- For very low moisture absorption
- For high wear resistance over the entire temperature range

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- For very low wear at high loads
- iglidur® Q, iglidur® Z
- When a cost-effective plain bearing for underwater use is required iglidur® H, iglidur® H370
- For edge loads
- iglidur® Z

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120.0mm





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Bar stock.

plate Page 683

The chemical and temperature specialist Up to 150MPa

iglidur® X is defined by its combination of very high temperature resistance with high compressive strength, along with high resistance to chemicals. iglidur® X is designed for higher speeds than other iglidur® bearings.

- Continuous operating temperature from -100°C to +250°C
- Extremely high chemical resistance
- High compressive strength
- Very low moisture absorption
- High wear resistance

Typical application areas

- Beverage industry
- Woodworking
- Plastic processing industry tribo-tape liner
 - Aerospace engineering
 - Cleanroom



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Descriptive technical specifications		
Wear resistance at +23°C	- +	
Wear resistance at +90°C	- +	
Wear resistance at +150°C	- +	
Low coefficient of friction	- +	
Low moisture absorption	- +	
Wear resistance under water	- +	
High media resistance	- +	
Resistant to edge pressures	- +	
Suitable for shock and impact loads	- +	
Resistant to dirt	- +	
Online product finder	Online service life calculation	
	Descriptive technical specifications Wear resistance at +23°C Wear resistance at +90°C Wear resistance at +150°C Low coefficient of friction Low moisture absorption Wear resistance under water High media resistance Resistant to edge pressures Suitable for shock and impact loads Resistant to dirt Online product finder www.igus.eu/iglidur-finder	Descriptive technical specifications Wear resistance at +23°C - Wear resistance at +90°C - Wear resistance at +150°C - Low coefficient of friction - Low moisture absorption - Wear resistance under water - High media resistance - Resistant to edge pressures - Suitable for shock and impact loads - + + Resistant to dirt - Online product finder Online service life calculation www.igus.eu/iglidur-expert

Technical data

General properties			Testing method	
Density	g/cm ³	1.44		-1
Colour		black		+2
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 - 0.27		15
pv value, max. (dry)	MPa · m/s	1.32		
Mechanical properties				
Flexural modulus	MPa	8,100	DIN 53457	1
Flexural strength at +20°C	MPa	170	DIN 53452	
Compressive strength	MPa	100		
Max. recommended surface pressure (+20°C)	MPa	150		
Shore D hardness		85	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	0.60	ASTM C 177	B
Coefficient of thermal expansion (at +23°C)	K⁻¹ · 10⁻⁵	5	DIN 53752	
Electrical properties ⁵⁾				
Specific contact resistance	Ωcm	< 105	DIN IEC 93	
Surface resistance	Ω	< 10 ³	DIN 53482	38

⁵ The good conductivity of this material can favour the generation of corrosion on the metallic contact components.

Table 01: Material properties

iglidur® X has an excellent combination of high temperature resistance, high compressive strength, and excellent resistance to chemicals. The aspect of temperature resistance and pressure susceptibility is also reflected in the pv graph.

Moisture absorption

The moisture absorption of iglidur® X plain bearings is very low. It is approximately 0.1% weight under standard climatic conditions. The maximum moisture absorption is 0.5% weight.

Vacuum

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

Radiation resistance

Plain bearings made from iglidur® X are resistant up to a radiation intensity of 1 · 10⁵Gy.

Resistance to weathering

iglidur® X 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® X 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® X at radial loads.

Surface pressure, page 41



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Permissible surface speeds

iglidur[®] X is designed for higher speeds than other iglidur[®] bearings. This is enabled by its high temperature resistance and excellent thermal conductivity. This is also made clear by the max. pv value of 1.32MPa. However, in this case, only the smallest radial loads may act on the bearings. At the given speeds, friction can cause a temperature increase to maximum permissible levels. Surface speed, page 44

Temperature

In the case of a permissible long-term application temperature of +250°C, iglidur® X will even withstand +315°C for short periods. As in the case of all thermoplastics, the compression strength of iglidur® X decreases when temperatures rise. For temperatures over +135°C an additional securing is required. At temperatures over +170°C the axial security of the bearing in the housing needs to be tested. Please contact us if you have questions on bearing use.

Application temperatures, page 49

Additional securing, page 49

Friction and wear

Similar to wear resistance, the coefficient of friction μ also changes with the surface speed and load (diagrams 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. For iglidur® X a ground surface with an average surface finish Ra = 0.6 - 0.8µm is recommended. Diagrams 06 and 07 show the test results of iglidur® X plain bearings running against various shaft materials. 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® X 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).

Testing methods, page 57

Chemicals	Resistance
Alcohols	+
Diluted acids	+
Diluted alkalines	+
Fuels	+
Greases, oils without additives	+
Hydrocarbons	+
Strong acids	0 up to –
Strong alkalines	+
All information given at room temperatu	ure [+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: Max	imum s	urface speed	s	

Dry Greases Oil Water Coefficient of friction µ 0.09 - 0.27 0.09 0.04 0.04 Table 04: Coefficient of friction against steel (Ra = 1µm. 50HRC)

	Housing	Plain bearing	Shaft
Ø d1 [mm]	H7 [mm]	F10 [mm]	h9 [mm]
0-3	+0.000 +0.010	+0.006 +0.046	-0.025 +0.000
> 3 - 6	+0.000 +0.012	2 +0.010 +0.058	-0.030 +0.000
> 6 - 10	+0.000 +0.015	5 +0.013 +0.071	-0.036 +0.000
> 10 - 18	+0.000 +0.018	8 +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	5 +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	5 +0.036 +0.176	-0.087 +0.000
> 120 - 180	+0.000 +0.040	+0.043 +0.203	+0.000 +0.100
Table 05: Imp	ortant toleranc	es for plain beari	ngs according

to ISO 3547-1 after press-fit

Technical data





Diagram 01: Permissible pv values for iglidur® X 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)

+23°C +60°C

25

50

Diagram 03: Deformation under pressure and temperature

75

100

8

6

4

2

ſ

0.4

0.2

0.1

iqus

0.05

0.10

0

Load [MPa]

Deformation [%]

of friction [µ] 0.3

Coefficient

35.0

Diagram 05: Coefficient of friction as a function of the

pressure, v = 0.01 m/s



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



Diagram 07: Wear for rotating and oscillating applications with different shaft materials. p = 2MPa



0.15

0.20

0.25

0.30 0.35 iglidur® X

3D CAD, finder and service life calculation ... www.igus.eu/X 282

Bearing technology | **Plain bearing** | iglidur[®] X

Sleeve bearing (form S)





²⁾ Thickness < 0.6mm: Chamfer = 20°

Chamfer in relation to d1

d1 [mm]	Ø1-6	Ø 6–12	Ø 12-30	Ø > 30
f1 [mm]	0.3	0.5	0.8	1.2

Dimensions according to ISO 3547-1 and special dimensions

Order example: XSM-0203-03 – no minimum order quantity.

X iglidur[®] material S Sleeve bearing M Metric 02 Inner Ø d1 03 Outer Ø d2 03 Total length b1

d1	d1 Talaran aa 3	d2	b1	Part No.	d1	d1 Tolorence3	d2	b1	Part No.
[mm]	Tolerances	[mm]	[mm]		[mm]	Tolerance	լաայ	[mm]	
2.0		3.5	3.0	XSM-0203-03	12.0		14.0	3.5	XSM-1214-035
3.0	+0.006	4.5	3.0	XSM-0304-03	12.0		14.0	6.0	XSM-1214-06
3.0	+0.046	4.5	6.0	XSM-0304-06	12.0		14.0	8.0	XSM-1214-08
4.0		5.5	4.0	XSM-0405-04	12.0		14.0	10.0	XSM-1214-10
4.0		5.5	6.0	XSM-0405-06	12.0		14.0	12.0	XSM-1214-12
4.0		5.5	9.0	XSM-0405-09	12.0		14.0	15.0	XSM-1214-15
4.0		5.5	10.0	XSM-0405-10	12.0		14.0	20.0	XSM-1214-20
5.0		7.0	3.5	XSM-0507-035	12.0		14.0	25.0	XSM-1214-25
5.0	+0.010	7.0	5.0	XSM-0507-05	13.0		15.0	10.0	XSM-1315-10
5.0	+0.058	7.0	8.0	XSM-0507-08	13.0		15.0	20.0	XSM-1315-20
5.0		7.0	10.0	XSM-0507-10	14.0		16.0	12.0	XSM-1416-12
6.0		8.0	6.0	XSM-0608-06	14.0		16.0	15.0	XSM-1416-15
6.0		8.0	8.0	XSM-0608-08	14.0		16.0	20.0	XSM-1416-20
6.0		8.0	10.0	XSM-0608-10	14.0	0.016	16.0	25.0	XSM-1416-25
6.0		8.0	13.8	XSM-0608-13	15.0	+0.010	17.0	7.0	XSM-1517-07
7.0		9.0	10.0	XSM-0709-10	15.0	+0.000	17.0	10.0	XSM-1517-10
7.0		9.0	12.0	XSM-0709-12	15.0		17.0	15.0	XSM-1517-15
8.0		10.0	6.0	XSM-0810-06	15.0		17.0	20.0	XSM-1517-20
8.0		10.0	8.0	XSM-0810-08	15.0		17.0	25.0	XSM-1517-25
8.0		10.0	10.0	XSM-0810-10	16.0		18.0	10.0	XSM-1618-10
8.0		10.0	12.0	XSM-0810-12	16.0		18.0	12.0	XSM-1618-12
8.0	+0.013	10.0	15.0	XSM-0810-15	16.0		18.0	15.0	XSM-1618-15
10.0	+0.071	12.0	3.5	XSM-1012-035	16.0		18.0	20.0	XSM-1618-20
10.0		12.0	6.0	XSM-1012-06	16.0		18.0	25.0	XSM-1618-25
10.0		12.0	8.0	XSM-1012-08	16.0		18.0	35.0	XSM-1618-35
10.0		12.0	10.0	XSM-1012-10	17.0		19.0	20.0	XSM-1719-20
10.0		12.0	12.0	XSM-1012-12	18.0		20.0	15.0	XSM-1820-15
10.0		12.0	15.0	XSM-1012-15	18.0		20.0	20.0	XSM-1820-20
10.0		12.0	20.0	XSM-1012-20	18.0		20.0	25.0	XSM-1820-25

Product range

d1	d1 Tolerance ³⁾	d2	b1 h13	Part No.	d1	d1 Tolerance ³⁾	d2	b1 h13	Part No.
[mm]		[mm]	[mm]		[mm]		[mm]	[mm]	
20.0	+0.016	22.0	14 0	XSM-2022-140	30.0		34.0	20.0	XSM-3034-20
2010	+0.086	22.0			30.0	+0.020	34.0	25.0	XSM-3034-25
20.0		22.0	14.5	XSM-2022-145	30.0	+0.104	34.0	30.0	XSM-3034-30
20.0		22.0	17.0	XSM-2022-17	30.0		34.0	40.0	XSM-3034-40
20.0		22.0	18.0	XSM-2022-18	32.0		36.0	20.0	XSM-3236-20
20.0		22.0	20.0	XSM-2022-20	32.0		36.0	25.0	XSM-3236-25
20.0		23.0	7.0	XSM-2023-07	32.0		36.0	30.0	XSM-3236-30
20.0		23.0	10.0	XSM-2023-10	32.0		36.0	35.0	XSM-3236-35
20.0		23.0	15.0	XSM-2023-15	32.0		36.0	40.0	XSM-3236-40
20.0		23.0	20.0	XSM-2023-20	32.0		36.0	54.0	XSM-3236-54
20.0		23.0	25.0	XSM-2023-25	35.0		39.0	20.0	XSM-3539-20
20.0		23.0	30.0	XSM-2023-30	35.0		39.0	30.0	XSM-3539-30
22.0		25.0	15.0	XSM-2225-15	35.0		39.0	40.0	XSM-3539-40
22.0		25.0	20.0	XSM-2225-20	35.0		39.0	50.0	XSM-3539-50
22.0		25.0	25.0	XSM-2225-25	40.0	0.005	44.0	20.0	XSM-4044-20
22.0		25.0	30.0	XSM-2225-30	40.0	+0.025	44.0	30.0	XSM-4044-30
24.0		26.0	20.0	XSM-2426-20	40.0	+0.125	44.0	40.0	XSM-4044-40
24.0		27.0	6.0	XSM-2427-06	40.0		44.0	50.0	XSM-4044-50
24.0		27.0	15.0	XSM-2427-15	45.0		50.0	20.0	XSM-4550-20
24.0	. 0. 000	27.0	20.0	XSM-2427-20	45.0		50.0	30.0	XSM-4550-30
24.0	+0.020	27.0	25.0	XSM-2427-25	45.0		50.0	40.0	XSM-4550-40
24.0	+0.104	27.0	30.0	XSM-2427-30	45.0		50.0	50.0	XSM-4550-50
25.0		28.0	7.7	XSM-2528-077	50.0		55.0	20.0	XSM-5055-20
25.0		28.0	9.0	XSM-2528-09	50.0		55.0	30.0	XSM-5055-30
25.0		28.0	12.0	XSM-2528-12	50.0		55.0	40.0	XSM-5055-40
25.0		28.0	13.0	XSM-2528-13	50.0		55.0	50.0	XSM-5055-50
25.0		28.0	15.0	XSM-2528-15	50.0		55.0	60.0	XSM-5055-60
25.0		28.0	20.0	XSM-2528-20	55.0		60.0	50.0	XSM-5560-50
25.0		28.0	25.0	XSM-2528-25	60.0		65.0	45.0	XSM-6065-45
25.0		28.0	30.0	XSM-2528-30	60.0	0.000	65.0	60.0	XSM-6065-60
25.0		28.0	35.0	XSM-2528-35	65.0	+0.030	70.0	50.0	XSM-6570-50
26.0		28.0	10.0	XSM-2628-10	70.0	+0.150	75.0	70.0	XSM-7075-70
27.0		30.0	5.7	XSM-2730-05	75.0		80.0	60.0	XSM-7580-60
28.0		32.0	20.0	XSM-2832-20	80.0		85.0	100.0	XSM-8085-100
28.0		32.0	25.0	XSM-2832-25	90.0		95.0	100.0	XSM-9095-100
28.0		32.0	30.0	XSM-2832-30	100.0	+0.036	105.0	100.0	XSM-100105-100
28.0		32.0	69.0	XSM-2832-69	110.0	+0.176	115.0	100.0	XSM-110115-100
30.0		34.0	10.0	XSM-3034-10	120.0		125.0	100.0	XSM-120125-100
30.0		34.0	15.0	XSM-3034-15					

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



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Flange bearing (form F)





 $^{\rm 2)}$ Thickness < 0.6mm: Chamfer = 20°

Chamfer in relation to d1

d1 [mm]	Ø1-6	Ø 6-12	Ø 12–30	Ø > 30
f1 [mm]	0.3	0.5	0.8	1.2

Dimensions according to ISO 3547-1 and special dimensions

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

X 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.	d1	d1	d2	d3	b1	b2	Part No.	
	Tolerance ³⁾		d13 ³⁾	h13	h13			Tolerance ³⁾		d13 ³⁾	h13	h13		
[mm]		[mm]	[mm]	[mm]	[mm]		[mm]		[mm]	[mm]	[mm]	[mm]		
2.0	+0.006	4.0	6.0	3.0	1.00	XFM-020406-03	12.0	_	14.0	18.0	3.9	1.00	XFM-12141	8-039
3.0	+0.046	4.5	7.5	5.0	0.75	XFM-0304-05	12.0	_	14.0	20.0	5.5	1.00	XFM-1214-	055
4.0		5.5	9.5	4.0	0.75	XFM-0405-04	12.0	_	14.0	18.0	5.9	1.00	XFM-12141	8-059
4.0		5.5	9.5	6.0	0.75	XFM-0405-06	12.0	_	14.0	20.0	9.0	1.00	XFM-1214-	09
4.0	+0.010	5.5	8.0	6.0	0.75	XFM-040508-06	12.0	_	14.0	20.0	12.0	1.00	XFM-1214-	12
5.0	+0.058	7.0	11.0	5.0	1.00	XFM-0507-05	12.0		14.0	20.0	15.0	1.00	XFM-1214-	15
6.0		8.0	12.0	4.0	1.00	XFM-0608-04	12.0	_	14.0	20.0	17.0	1.00	XFM-1214-	17
6.0		8.0	12.0	8.0	1.00	XFM-0608-08	14.0		16.0	22.0	10.0	1.00	XFM-1416-	10
6.0		8.0	12.0	10.0	1.00	XFM-0608-10	14.0	- +0.016	16.0	22.0	12.0	1.00	XFM-1416-	12
8.0		10.0	12.0	4.0	1.00	XFM-081012-04	14.0	- +0.010	16.0	22.0	17.0	1.00	XFM-1416-	17
8.0		10.0	15.0	5.5	1.00	XFM-0810-05	15.0		17.0	23.0	6.0	1.00	XFM-1517-	06
8.0		10.0	15.0	7.5	1.00	XFM-0810-07	15.0		17.0	23.0	9.0	1.00	XFM-1517-	09
8.0		10.0	15.0	8.0	1.00	XFM-0810-08	15.0		17.0	23.0	12.0	1.00	XFM-1517-	12
8.0		10.0	15.0	9.5	1.00	XFM-0810-09	15.0		17.0	23.0	17.0	1.00	XFM-1517-	17
8.0		10.0	14.0	31.5	1.00	XFM-081014-31	16.0		18.0	24.0	12.0	1.00	XFM-1618-	12
9.0		11.0	15.0	18.0	0.50	XFM-0911-18	16.0	_	18.0	24.0	17.0	1.00	XFM-1618-	17
10.0		12.0	18.0	5.0	1.00	XFM-1012-05	18.0		20.0	26.0	12.0	1.00	XFM-1820-	12
10.0	+0.013	12.0	18.0	6.0	1.00	XFM-1012-06	18.0		20.0	26.0	17.0	1.00	XFM-1820-	17
10.0	+0.071	12.0	18.0	7.0	1.00	XFM-1012-07	18.0		20.0	26.0	22.0	1.00	XFM-1820-	22
10.0		12.0	15.0	8.0	1.00	XFM-1012-08	20.0	_	23.0	30.0	6.5	1.50	XFM-2023-	065
10.0		12.0	18.0	9.0	1.00	XFM-1012-09	20.0		23.0	30.0	7.5	1.50	XFM-2023-	075
10.0		12.0	18.0	12.0	1.00	XFM-1012-12	20.0	_	23.0	30.0	11.5	1.50	XFM-2023-	11
10.0		12.0	18.0	15.0	1.00	XFM-1012-15	20.0	0.000	23.0	30.0	16.5	1.50	XFM-2023-	16
10.0		12.0	18.0	17.0	1.00	XFM-1012-17	20.0	+0.020	23.0	30.0	21.0	1.50	XFM-2023-	21
10.0		12.0	18.0	18.0	1.00	XFM-1012-18	25.0	+0.104	28.0	33.0	8.0	1.00	XFM-25283	33-08
10.0		12.0	15.0	22.0	1.00	XFM-1012-22	25.0		28.0	35.0	11.5	1.50	XFM-2528-	11
10.0		12.0	18.0	25.0	1.00	XFM-1012-25	25.0		28.0	35.0	13.5	1.50	XFM-2528-	13
							25.0		28.0	35.0	16.5	1.50	XFM-2528-	16

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



Product range

d1	d1	d2	d3	b1	b2	Part No.
	Tolerance ³		d133)	h13	h13	
[mm]		[mm]	[mm]	[mm]	[mm]	
25.0		28.0	35.0	21.0	1.50	XFM-2528-21
27.0	.0.000	30.0	38.0	20.0	1.50	XFM-2730-20
30.0	+0.020	34.0	42.0	16.0	2.00	XFM-3034-16
30.0	+0.104	34.0	42.0	26.0	2.00	XFM-3034-26
30.0		34.0	42.0	40.0	2.00	XFM-3034-40
32.0		36.0	45.0	15.0	2.00	XFM-3236-15
32.0	+0.025	36.0	45.0	26.0	2.00	XFM-3236-26
35.0	+0.125	39.0	47.0	16.0	2.00	XFM-3539-16
35.0		39.0	47.0	26.0	2.00	XFM-3539-26

d1	d1	d2	d3	b1	b2	Part No.
	Tolerance ³⁾		d133)	h13	h13	
mm]		[mm]	[mm]	[mm]	[mm]	
0.0		44.0	52.0	22.0	2.00	XFM-4044-22
0.0	0.005	44.0	52.0	30.0	2.00	XFM-4044-30
0.0	+0.025	44.0	52.0	40.0	2.00	XFM-4044-40
5.0	+0.125	50.0	58.0	50.0	2.00	XFM-4550-50
0.0		55.0	63.0	40.0	2.00	XFM-5055-40
0.0	+0.030	65.0	73.0	40.0	2.00	XFM-6065-40
0.0		75.0	83.0	40.0	2.00	XFM-7075-40
5.0	+0.150	80.0	88.0	50.0	2.00	XFM-7580-50

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

Available from stock Detailed information at

Detailed information about delivery time online. www.igus.eu/24

Online ordering Including delivery times, prices, online tools www.igus.eu/X

Our prices are scaled according to order quantities, current prices can be found online.

Discount scaling										
1 – 9	50 - 99	500 - 999								
10 – 24	100 - 199	1,000 - 2,499								
25 – 49	200 - 499	2,500 - 4,999								

No minimum order value. No low-quantity surcharges. Free shipping within Germany for orders above €150.





Bearing technology | Plain bearing | iglidur® X

Thrust washer (form T)





Dimensions according to ISO 3547-1 and special dimensions

Order example: XTM-0620-015 – no minimum order quantity.

X iglidur[®] material T Thrust washer M Metric 06 Inner Ø d1 20 Outer Ø d2 015 Thickness s

d1 +0.25	d2 -0.25	d4 -0.12	d5 +0.375	h +0.2/-0.2	d6 +0.12	s -0.05	Part No.
		+0.12	+0.125				
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
6	20	13	1.5	1	20	1.5	XTM-0620-015
8	18	13	1.5	1	18	1.5	XTM-0818-015
8	29	4)	4)	1	29	1.5	XTM-0829-015
8	30	4)	4)	1	30	1.5	XTM-0830-015
10	18	4)	4)	0.7	18	1	XTM-1018-010
12	24	18	1.5	1	24	1.5	XTM-1224-015
14	26	20	2	1	26	1.5	XTM-1426-015
15	22	4)	4)	0.5	22	0.8	XTM-1522-008
15	24	19.5	1.5	1	24	1.5	XTM-1524-015
16	30	22	2	1	30	1.5	XTM-1630-015
18	32	25	2	1	32	1.5	XTM-1832-015
20	36	28	3	1	36	1.5	XTM-2036-015
22	38	30	3	1	38	1.5	XTM-2238-015
24	42	33	3	1	42	1.5	XTM-2442-015
26	44	35	3	1	44	1.5	XTM-2644-015
28	48	38	4	1	48	1.5	XTM-2848-015
32	54	43	4	1	54	1.5	XTM-3254-015
38	62	50	4	1	62	1.5	XTM-3862-015
42	66	54	4	1	66	1.5	XTM-4266-015
48	74	61	4	1.5	74	2	XTM-4874-020
52	78	65	4	1.5	78	2	XTM-5278-020
62	90	76	4	1.5	90	2	XTM-6290-020

⁴⁾ Design without fixing hole



Long service life under extreme conditions

Resistant to wear and impact even at high loads and temperatures **iglidur**[®] **Z**

0

When to use it?

- For temperatures up to +250°C long-term or +310°C short-term
- When low wear is required especially under high radial loads
- For high surface speeds
- For edge pressure in connection with high surface pressures

C

- For low loads and temperatures iglidur[®] P
- When a cost-effective all-round plain bearing is required iglidur[®] G
- When electrically conductive plain bearings are required iglidur[®] F, iglidur[®] H, iglidur[®] H370

Bearing technology | Plain bearing | iglidur[®] Z



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Also available as:

Bar stock round bar Page 657



Extremely high compressive strength coupled with high flexibility enables iglidur® Z bearings to attain their prominent properties in association with soft shafts, edge loads and impacts. At the same time the bearings suitable for temperatures up to +250°C.



• Excellent wear resistance especially with high loads

- High temperature resistance
- Suitable for very high loads
- Suitable for high surface speeds
- Suitable for high edge pressures
- Lubrication-free
- Maintenance-free

Textile industry

tribo-tape liner Page 691

Typical application areas

Mechanical engineering

Construction machinery industry

Descriptive technical specifications

- - Aerospace engineering Glass industry

Piston rings Page 584





Wear resistance at +23°C	-		+	
Wear resistance at +90°C	-		+	
Wear resistance at +150°C	-		+	
Low coefficient of friction	-		+	
Low moisture absorption	-		+	
Wear resistance under water	-		+	
High media resistance	-		+	
Resistant to edge pressures	-		+	
Suitable for shock and impact loads	-		+	
Resistant to dirt	-		+	

igubal® spherical balls Page 841

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Online service life calculation

www.igus.eu/iglidur-expert

Technical data

General properties			Testing method	
Density	g/cm ³	1.40		–100°C u
Colour		brown		+250°C
Max. moisture absorption at +23°C and 50% r.h.	% weight	0.3	DIN 53495	
Max. moisture absorption	% weight	1.1		
Coefficient of friction, dynamic, against steel	μ	0.06 - 0.14		150MPa
pv value, max. (dry)	MPa · m/s	0.84		
Mechanical properties				. . .
Flexural modulus	MPa	2,400	DIN 53457	V-0
Flexural strength at +20°C	MPa	95	DIN 53452	
Compressive strength	MPa	65		
Max. recommended surface pressure (+20°C)	MPa	150		
Shore D hardness		81	DIN 53505	
Physical and thermal properties				
Max. application temperature long-term	°C	+250		
Max. application temperature short-term	°C	+310		
Min. application temperature	°C	-100		
Thermal conductivity	W/m · K	0.62	ASTM C 177	BoHS-
Coefficient of thermal expansion (at +23°C)	K ⁻¹ · 10 ⁻⁵	4	DIN 53752	
Electrical properties				
Specific contact resistance	Ωcm	> 1011	DIN IEC 93	ISO
Surface resistance	Ω	> 1011	DIN 53482	3547-1

Table 01: Material properties

In addition to iglidur® X, iglidur® Z is among the best-selling iglidur® high-temperature materials. Specifically worth noting is the outstanding wear behaviour under extreme conditions (high loads and temperatures)

Moisture absorption

Under standard climatic conditions, the moisture absorption of iglidur® Z plain bearings is approximately 0.3% weight. The saturation limit in water is 1.1% weight.

Vacuum

In vacuum, any present moisture is released as vapour. Use in vacuum is only possible with dehumidified iglidur® Z bearings.

Radiation resistance

Plain bearings made from iglidur® Z are resistant up to a radiation intensity of 1 · 10⁵Gy.

Resistance to weathering

iglidur® Z 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® Z 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.

iglidur® Z is suitable for both medium and - due to its high heat resistance - high speeds. Diagram 03 shows the elastic deformation of iglidur® Z at radial loads. At the maximum recommended surface pressure of 150MPa the deformation is about 5.5% at room temperature. Surface pressure, page 41



Bearing technology | Plain bearing | iglidur® Z

Permissible surface speeds

iglidur® Z is a high temperature bearing material, which is suitable for applications involving very high specific loads. The maximum values shown in table 03 can only be achieved at low pressures. 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 iglidur® Z plain bearings can be used in short-term temperatures up to +310°C. The temperatures prevailing in the bearing system also have an influence on the wear. The wear rises with increasing temperatures. At high temperatures iglidur® Z is also the most wear-resistant material in drv operation. For temperatures over +145°C an additional securing is required.

Application temperatures, page 49 Additional securing, page 49

Friction and wear

The coefficient of friction declines just as the wear resistance with increasing load (diagrams 04 and 05). Coefficient of friction and surfaces, page 47

Wear resistance, page 50

Shaft materials

Diagram 06 shows wear rates in the lower load range, which are very similar to those of other wear-resistant iglidur® materials. However, in the upper load range iglidur® Z outperforms all other materials in wear resistance. Provided a Cf53 hardened and ground steel shaft is used. the wear is still only 15µm/km at 45MPa. At low loads iglidur® Z plain bearings wear less in pivoting applications than in rotating applications. 304 stainless steel and hard-chromed shafts are of interest here.

Shaft materials, page 52

Installation tolerances

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iglidur® Z 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). Testing methods, page 57

Chemicais	Resistance
Alcohols	0
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 6.0

Table 03: Maximum surface speeds

Greases Oil Water Dry Coefficient of friction µ 0.06 - 0.14 0.09 0.04 0.04 Table 04: Coefficient of friction against steel (Ra = 1µm, 50HRC)

	Ηοι	Ising	Plain I	bearing) Sh	naft
Ø d1 [mm]	H7	[mm]	F10	[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: Imp	ortant to	olerance	s for pla	ain beari	ngs acc	ording
to ISO 3547-	1 after p	ress-fit				

Technical data





iglidur[®] Z

+250°C

150MPa



Diagram 02: Maximum recommended surface pressure as a

function of temperature (150MPa at +20°C)

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 = 1MPa, v = 0.3m/s



Diagram 03: Deformation under pressure and temperature



Diagram 04: Coefficient of friction as a function of the surface speed, p = 0.75MPa



Load [MPa]

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

Surface speed [m/s]

iqus

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

Bearing technology | Plain bearing | iglidur[®] Z

Sleeve bearing (form S)





²⁾ Thickness < 0.6mm: Chamfer = 20°

Chamfer in relation to d1

d1 [mm]	Ø1-6	Ø6-12	Ø 12–30	Ø > 30
f1 [mm]	0.3	0.5	0.8	1.2

Dimensions according to ISO 3547-1 and special dimensions

Order example: ZSM-0405-04 – no minimum order quantity.

Z iglidur[®] material S Sleeve bearing M Metric 04 Inner Ø d1 05 Outer Ø d2 04 Total length b1

d1	d1	d2	b1	Part No.	d1	d1	d2	b1	Part No.
[mana]	Iolerance	[h13		[Iolerance	[h13	
[mm]		[mm]	[mm]	7014 0405 04				[mm]	70M 1416 05
4.0		5.5	4.0	ZSIM-0405-04	14.0		17.0	25.0	ZSIVI-1410-25
4.0		5.5	0.0	ZSIM-0405-06	15.0		17.0	10.0	ZSIVI-1517-15
4.0			0.U	ZSIM-0405-06	15.0		17.0	20.0	ZSIVI-1517-20
5.0		7.0	0.0	ZSIM-0507-05	15.0		17.0	22.0	ZSIVI-1517-22
5.0	+0.010	7.0	9.0	ZSIM-0507-09	16.0		10.0	10.0	ZSIVI-1517-25
0.0	+0.058	7.0	10.0	ZSM-0507-10	10.0	+0.016	10.0	12.0	ZSIVI-1010-12
0.0		0.0	0.0	ZSIM-0000-00	10.0	+0.086	10.0	10.0	ZSIVI-1010-15
6.0		0.0	10.0	ZSIM-0608-06	16.0		10.0	20.0	ZSIVI-1010-20
6.0		0.0	10.0	ZSIVI-0000-10	10.0		20.0	15.0	ZSIM-1010-25
6.0		10.0	6.0	ZSIM-0000-12	10.0		20.0	20.0	ZSIM-1620-15
0.0		10.0	6.0	ZSIM-0010-00	18.0		20.0	20.0	ZSIM-1820-20
0.0		10.0	0.0	ZSIM-0010-00	10.0		20.0	24.0	ZSIVI-1020-24
0.0		10.0	10.0	ZSM-0010-00	20.0		20.0	10.0	ZSIN-1020-25
0.0		10.0	10.0	ZSIM-0010-10	20.0		23.0	15.0	ZSM-2023-10
10.0	+0.013	12.0	12.0	ZSM-0010-12	20.0		23.0	20.0	ZSM-2023-13
10.0	+0.071	12.0	10.0	ZSM-1012-00	20.0		23.0	20.0	ZSM-2023-20
10.0		12.0	12.0	ZSM-1012-10	20.0		23.0	30.0	ZSM-2023-23
10.0		12.0	15.0	ZSM-1012-12	20.0		23.0	35.0	ZSM-2023-35
10.0		12.0	20.0	ZSM-1012-15	20.0		24.0	30.0	ZSM-2020-00
12.0		14.0	20.0	ZSM-1012-20	22.0	+0.020	24.0	15.0	ZSM-2224-00
12.0		14.0	10.0	ZSM-1214-00	22.0	+0.104	25.0	20.0	ZSM-2225-20
12.0		14.0	12.0	ZSM-1214-10	22.0	10.104	25.0	25.0	ZSM-2225-25
12.0		14.0	15.0	ZSM-1214-12	22.0		25.0	30.0	ZSM-2225-25
12.0	+0.016	14.0	20.0	ZGM-1214-15	24.0		27.0	15.0	ZSM-2/27-15
13.0	+0.086	15.0	10.0	ZSM-1214-20	24.0		27.0	20.0	ZSM-2427-10
13.0		15.0	20.0	ZSM-1315-20	24.0		27.0	25.0	ZSM-2427-20
14.0		16.0	15.0	ZSM-1015-20	24.0		27.0	30.0	ZSM-2427-20
14.0		16.0	20.0	ZSM-1410-13	25.0		28.0	15.0	ZSM-2528-15
14.0		10.0	20.0	2011-1410-20	20.0		20.0	15.0	20101-2020-10

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



Product range

d1	d1 Tolerance ³⁾	d2	b1 h13	Part No.	d1	d1 Tolerance ³⁾	d2	b1 h13	Part No.
[mm]		[mm]	[mm]		[mm]		[mm]	[mm]	
25.0		28.0	20.0	ZSM-2528-20	40.0		44.0	40.0	ZSM-4044-40
25.0		28.0	25.0	ZSM-2528-25	40.0		44.0	47.0	ZSM-4044-47
25.0		28.0	30.0	ZSM-2528-30	40.0		44.0	50.0	ZSM-4044-50
25.0		28.0	48.0	ZSM-2528-48	45.0		50.0	20.0	ZSM-4550-20
25.0		30.0	20.0	ZSM-2530-20	45.0		50.0	30.0	ZSM-4550-30
26.0		30.0	34.0	ZSM-2630-34	45.0	+0.025	50.0	40.0	ZSM-4550-40
28.0	+0.020	32.0	20.0	ZSM-2832-20	45.0	+0.125	50.0	50.0	ZSM-4550-50
28.0	+0.104	32.0	25.0	ZSM-2832-25	50.0		55.0	20.0	ZSM-5055-20
28.0		32.0	30.0	ZSM-2832-30	50.0		55.0	30.0	ZSM-5055-30
28.0		34.0	29.0	ZSM-2834-29	50.0		55.0	40.0	ZSM-5055-40
30.0		34.0	20.0	ZSM-3034-20	50.0		55.0	50.0	ZSM-5055-50
30.0		34.0	25.0	ZSM-3034-25	50.0		55.0	60.0	ZSM-5055-60
30.0		34.0	30.0	ZSM-3034-30	55.0		60.0	60.0	ZSM-5560-60
30.0		34.0	40.0	ZSM-3034-40	60.0	0.020	65.0	60.0	ZSM-6065-60
32.0		35.0	44.0	ZSM-3235-44	70.0	+0.030	75.0	70.0	ZSM-7075-70
32.0		36.0	20.0	ZSM-3236-20	80.0	+0.150	85.0	60.0	ZSM-8085-60
32.0		36.0	30.0	ZSM-3236-30	80.0		85.0	80.0	ZSM-8085-80
32.0		36.0	40.0	ZSM-3236-40	85.0	.0.026	90.0	100.0	ZSM-8590-100
35.0	.0.005	39.0	20.0	ZSM-3539-20	85.0	+0.030	90.0	60.0	ZSM-8590-60
35.0	+0.025	39.0	30.0	ZSM-3539-30	95.0	+0.176	100.0	60.0	ZSM-95100-60
35.0	+0.125	39.0	40.0	ZSM-3539-40	100.0	+0.072	105.0	100.0	ZOM 100105 100
35.0		39.0	50.0	ZSM-3539-50	100.0	+0.212	105.0	100.0	ZSIVI-100105-100
40.0		44.0	15.0	ZSM-4044-15	100.0	+0.043	105.0	100.0	ZOM 100105 100
40.0		44.0	20.0	ZSM-4044-20	120.0	+0.203	123.0	100.0	ZSIVI-120125-100
40.0		44.0	30.0	ZSM-4044-30					

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

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Discount scaling									
1 – 9	50 - 99	500 - 999							
10 – 24	100 – 199	1,000 - 2,499							
25 – 49	200 - 499	2,500 - 4,999							

No minimum order value. No low-quantity surcharges. Free shipping within Germany for c

Free shipping within Germany for orders above \leq 150.

Bearing technology | Plain bearing | iglidur® Z

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

Dimensions according to ISO 3547-1 and special dimensions

Order example: ZFM-0405-04 – no minimum order quantity.

Z iglidur[®] material F Flange bearing M Metric 04 Inner Ø d1 05 Outer Ø d2 04 Total length b1

d1	d1	d2	d3	b1	b2	Part No.	c	11	d1	d2	d3	b1	b2	Part No.
	Tolerance ³⁾		d133)	h13	h13				Tolerance ³⁾		d133)	h13	h13	
[mm]		[mm]	[mm]	[mm]	[mm]		[1	mm]		[mm]	[mm]	[mm]	[mm]	
4.0		5.0	9.0	4.0	0.75	ZFM-0405-04	1	6.0		18.0	24.0	12.0	1.00	ZFM-1618-12
5.0	+0.010	7.0	11.0	5.0	1.00	ZFM-0507-05	1	6.0		18.0	24.0	17.0	1.00	ZFM-1618-17
6.0	+0.058	8.0	12.0	4.0	1.00	ZFM-0608-04	1	8.0	+0.016	20.0	26.0	4.0	1.00	ZFM-1820-04
6.0		8.0	12.0	8.0	1.00	ZFM-0608-08	1	8.0	+0.086	20.0	26.0	12.0	1.00	ZFM-1820-12
8.0		10.0	15.0	5.0	1.00	ZFM-0810-05	1	8.0		20.0	26.0	17.0	1.00	ZFM-1820-17
8.0		10.0	15.0	7.5	1.00	ZFM-0810-07	1	8.0		20.0	26.0	22.0	1.00	ZFM-1820-22
8.0		10.0	15.0	9.0	1.00	ZFM-0810-09	2	0.0		22.0	30.0	21.0	1.00	ZFM-2022-21
9.0		11.0	17.0	20.0	0.50	ZFM-091117-20	2	0.0		23.0	30.0	11.5	1.50	ZFM-2023-11
10.0	+0.013	12.0	18.0	5.0	1.00	ZFM-1012-05	2	0.0		23.0	30.0	15.5	1.50	ZFM-2023-155
10.0	+0.013	12.0	18.0	7.0	1.00	ZFM-1012-07	2	0.0		23.0	30.0	16.5	1.50	ZFM-2023-16
10.0	+0.071	12.0	18.0	9.0	1.00	ZFM-1012-09	2	0.0		23.0	30.0	21.5	1.50	ZFM-2023-21
10.0		12.0	18.0	12.0	1.00	ZFM-1012-12	2	0.0		23.0	30.0	31.5	1.50	ZFM-2023-31
10.0		12.0	18.0	15.0	1.00	ZFM-1012-15	2	5.0	+0.020 -	28.0	35.0	11.5	1.50	ZFM-2528-11
10.0		12.0	18.0	17.0	1.00	ZFM-1012-17	2	5.0	+0.020	28.0	35.0	16.5	1.50	ZFM-2528-16
10.0		13.0	15.0	5.5	1.50	ZFM-101315-05	2	5.0	10.104	28.0	35.0	21.5	1.50	ZFM-2528-21
12.0		14.0	20.0	7.0	1.00	ZFM-1214-07	2	5.0		28.0	35.0	31.5	1.50	ZFM-2528-31
12.0		14.0	20.0	9.0	1.00	ZFM-1214-09	3	0.0		34.0	42.0	13.0	2.00	ZFM-3034-13
12.0		14.0	20.0	12.0	1.00	ZFM-1214-12	3	0.0		34.0	42.0	16.0	2.00	ZFM-3034-16
12.0		14.0	20.0	17.0	1.00	ZFM-1214-17	3	0.0		34.0	42.0	20.0	2.00	ZFM-3034-20
12.0		14.0	20.0	20.0	1.00	ZFM-1214-20	3	0.0		34.0	42.0	26.0	2.00	ZFM-3034-26
14.0	±0.016	16.0	22.0	12.0	1.00	ZFM-1416-12	3	0.0		34.0	42.0	37.0	2.00	ZFM-3034-37
14.0	10.010	16.0	22.0	17.0	1.00	ZFM-1416-17	3	5.0		39.0	47.0	16.0	2.00	ZFM-3539-16
15.0	+0.000	17.0	23.0	9.0	1.00	ZFM-1517-09	3	5.0		39.0	47.0	26.0	2.00	ZFM-3539-26
15.0		17.0	23.0	11.0	1.00	ZFM-1517-11	4	0.0	+0.025	44.0	52.0	20.0	2.00	ZFM-4044-20
15.0		17.0	23.0	12.0	1.00	ZFM-1517-12	4	0.0	+0.025	44.0	52.0	30.0	2.00	ZFM-4044-30
15.0		17.0	23.0	15.0	1.00	ZFM-1517-15	4	0.0	+0.120	44.0	52.0	40.0	2.00	ZFM-4044-40
15.0		17.0	23.0	17.0	1.00	ZFM-1517-17	4	5.0		50.0	58.0	50.0	2.00	ZFM-4550-50
15.0		17.0	23.0	23.0	1.00	ZFM-151723-23	5	0.0		55.0	63.0	20.0	2.00	ZFM-5055-20

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



d1	d1	d2	d3	b1	b2	Part No.	d1	d1	d2	d3	b1	b2	Part No.
	Tolerance ³⁾		d133)	h13	h13			Tolerance ³⁾		d133)	h13	h13	
[mm]		[mm]	[mm]	[mm]	[mm]		[mm]		[mm]	[mm]	[mm]	[mm]	
0.0	+0.025	55.0	62.0	50.0	2.00	ZEM 5055 50	60.0	0.020	65.0	73.0	50.0	2.00	ZFM-6065-50
0.0	+0.125	55.0	03.0	50.0	2.00	2.00 ZFIVI-3033-30	75.0	+0.030	80.0	88.0	50.0	2.50	ZFM-7580-50
							75.0	+0.150	80.0	94.0	65.0	2.00	ZFM-758094-65

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

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10 – 24	100 – 199	1,000 - 2,499							
25 – 49	200 - 499	2,500 - 4,999							

No minimum order value. No low-quantity surcharges. Free shipping within Germany for

Free shipping within Germany for orders above €150.



Bearing technology | Plain bearing | iglidur® Z

Thrust washer (form T)





Dimensions according to ISO 3547-1 and special dimensions

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 +0.25	d2 -0.25	d4 -0.12 +0.12	d5 +0.375 +0.125	h +0.2/–0.2	d6 +0.12	s -0.05	Part No.
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
14	30	25	2	1	30	1.5	ZTM-1430-015146)
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

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1 – 9	50 – 99	500 - 999
10 – 24	100 – 199	1,000 - 2,499
25 – 49	200 – 499	2,500 - 4,999

No minimum order value. No low-quantity surcharges. Free shipping within Germany for orders above €150.



The high temperature specialist up to +250°C Up to six times more wear-resistant than iglidur[®] X iglidur[®] X6

0

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

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- 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



(1N)



Also available as:



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.

Bar stock.

plate Page 683

- Up to 50% better press-fit than iglidur[®] X High compressive strength
- Extremely high chemical resistance

Continuous operating temperatures up to +250°C

- PTFE-free
- Lubrication-free
- Maintenance-free

• Glass industry tribo-tape liner Page 691

- Food industry Fluid technology
- Textile industry
- Mechanical engineering

Typical application areas

Piston rings Page 581

	Descriptive technical specifications		
	Wear resistance at +23°C	-	+
	Wear resistance at +90°C	-	+
Two hole flange	Wear resistance at +150°C	-	+
bearings Page 603	Low coefficient of friction	-	+
	Low moisture absorption	-	+
	Wear resistance under water	-	+
Moulded	High media resistance	-	+
Page 624	Resistant to edge pressures	-	+
	Suitable for shock and impact loads	-	+
	Resistant to dirt	-	+
igubal [®] spherical balls Page 841	Online product finder www.igus.eu/iglidur-finder	Online so www.igu	ervice life calculation Is.eu/iglidur-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 ⁵⁾			
Specific contact resistance	Ωcm	< 10 ⁵	DIN IEC 93
Surface resistance	Ω	< 10 ³	DIN 53482

⁵ 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

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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

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

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.

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Surface pressure, page 41

Mechanical properties



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Bearing technology | Plain bearing | iglidur® X6

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 Ra = $0.4 - 0.7\mu$ 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

long-term m/s 1.5 1.1 5.0 short-term m/s 3.5 2.5 10.0			Rotating	Oscillating	linear
short-term m/s 3.5 2.5 10.0	long-term r	m/s	1.5	1.1	5.0
	short-term r	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 (Ra = 1μm, 50HRC)
 50HRC)
 50HRC
 50HRC
 50HRC

	Housing	Plain bearing	Shaft					
Ø d1 [mm]	H7 [mm]	F10 [mm]	h9 [mm]					
0-3	+0.000 +0.01	0 +0.006 +0.046	-0.025 +0.000					
> 3 - 6	+0.000 +0.01	2 +0.010 +0.058	-0.030 +0.000					
> 6 - 10	+0.000 +0.01	5 +0.013 +0.071	-0.036 +0.000					
> 10 - 18	+0.000 +0.01	8 +0.016 +0.086	-0.043 +0.000					
> 18 - 30	+0.000 +0.02	1 +0.020 +0.104	-0.052 +0.000					
> 30 - 50	+0.000 +0.02	5 +0.025 +0.125	-0.062 +0.000					
> 50 - 80	+0.000 +0.03	0 +0.030 +0.150	-0.074 +0.000					
> 80 - 120	+0.000 +0.03	5 +0.036 +0.176	-0.087 +0.000					
> 120 - 180	+0.000 +0.04	0 +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

Temperature [°C]



Diagram 01: Permissible pv values for iglidur® X6 plain

bearings with a wall thickness of 1mm, dry operation against



iglidur[®] X6

+250°C

150MPa



Diagram 05: Coefficient of friction as a function of the load, v = 0.01m/s



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



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 = 0.75MPa

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Load [MPa]

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

speed [m/s] I: Coefficient of friction as a function of the

302 3D CAD, finder and service life calculation ... www.igus.eu/X6

iglidur® X6 +250°C 150MPa

Bearing technology | Plain bearing | iglidur® X6

Sleeve bearing (form S)





²⁾ Thickness < 0.6mm: Chamfer = 20°

Chamfer in relation to d1

d1 [mm]	Ø1-6	Ø 6–12	Ø 12–30	Ø > 30
f1 [mm]	0.3	0.5	0.8	1.2

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 Tolerance ³⁾	d2	b1 h13	Part No.
[mm]		[mm]	[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	.0.0100.071	10.0	10.0	X6SM-0810-10
10.0	+0.013 +0.071	12.0	10.0	X6SM-1012-10
12.0		14.0	12.0	X6SM-1214-12
16.0	+0.010 +0.000	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	+0.025 +0.125	39.0	40.0	X6SM-3539-40
40.0		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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Discount scaling						
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10 – 24	100 – 199	1,000 - 2,499				
25 – 49	200 - 499	2,500 - 4,999				

No minimum order value. No low-quantity surcharges. Free shipping within Germany for orders above €150.



Bearing technology | Plain bearing | iglidur® X6

Flange bearing (form F)





²⁾ Thickness < 0.6mm: Chamfer = 20°

Chamfer in relation to d1

d1 [mm] Ø1-6 Ø6-12 Ø12-30 Ø>30 f1 [mm] 0.3 0.5 0.8 1.2 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 Tolerance ³⁾	d2	d3 d13 ³⁾	b1 h13	b2 h13	Part No.
[mm]		[mm]	[mm]	[mm]	[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		10.0	15.0	10.0	1.00	X6FM-0810-10
10.0	+0.013 +0.071	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	0.025 0.125	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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Discount scaling							
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10 – 24	100 – 199	1,000 - 2,499					
25 – 49	200 - 499	2,500 - 4,999					

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No minimum order value. No low-quantity surcharges. Free shipping within Germany for orders above €150.



For soft shafts and high temperatures Wear and media-resistant iglidur[®] V400

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When to use it?

- When extreme wear resistance is required with soft shafts
- When the highest wear resistance at temperatures above +100°C is required
- When vibrations and edge loads are present
- When the bearing should be resistant to chemicals

- For hardened shafts
 iglidur[®] W300
- For applications at normal temperatures iglidur[®] G, iglidur[®] J, iglidur[®] W300
- When a cost-effective universal plain bearing is required *iglidur*[®] G

Bearing technology | Plain bearing | iglidur® V400

(1N)





Also available as:



For soft shafts and high temperatures Wear and media-resistant

and excellent resistance to chemicals.

High chemical resistance

Highly wear-resistant bearings for soft shafts and temperatures up to +200°C with low moisture absorption

Excellent wear resistance with soft shaft materials and for temperatures up to +200°C

Bar stock.

plate

6

- High elasticity
- Lubrication-free Maintenance-free
- Page 683

Typical application areas

- Plant construction
- Automotive industry Automation
- tribo-tape liner Page 699
 - Aerospace engineering
 - Mechatronics



Descriptive technical specifications	
Wear resistance at +23°C	- +
Wear resistance at +90°C	- +
Wear resistance at +150°C	- +
Low coefficient of friction	- +
Low moisture absorption	- +
Wear resistance under water	- +
High media resistance	- +
Resistant to edge pressures	- +
Suitable for shock and impact loads	- +
Resistant to dirt	-
Online product finder	Online service life calculation
	Descriptive technical specifications Wear resistance at +23°C Wear resistance at +90°C Wear resistance at +150°C Low coefficient of friction Low moisture absorption Wear resistance under water High media resistance Resistant to edge pressures Suitable for shock and impact loads Resistant to dirt Online product finder www.igus.eu/iglidur-finder

308 3D CAD, finder and service life calculation ... www.igus.eu/V400

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Technical data

General properties			Testing method
Density	g/cm ³	1.51	
Colour		cream	
Max. moisture absorption at +23°C and 50% r.h.	% weight	0.1	DIN 53495
Max. moisture absorption	% weight	0.2	
Coefficient of friction, dynamic, against steel	μ	0.15 – 0.20	
ov value, max. (dry)	MPa · m/s	0.50	
Mechanical properties			
Flexural modulus	MPa	4,500	DIN 53457
lexural strength at +20°C	MPa	95	DIN 53452
compressive strength	MPa	47	
lax. recommended surface pressure (+20°C)	MPa	45	
hore D hardness		74	DIN 53505
hysical and thermal properties			
fax. application temperature long-term	°C	+200	
Nax. application temperature short-term	°C	+240	
In. application temperature	°C	-50	
Thermal conductivity	W/m ⋅ K	0.24	ASTM C 177
Coefficient of thermal expansion (at +23°C)	K ⁻¹ · 10 ⁻⁵	3	DIN 53752
lectrical properties			
Specific contact resistance	Ωcm	> 1012	DIN IEC 93
Surface resistance	Ω	> 1012	DIN 53482

Table 01: Material properties

iglidur® V400 plain bearings are not suitable for high pressures or static high loads. However they are characterised by a high wear resistance all the way up to the maximum recommended surface pressure.

Moisture absorption

The moisture absorption of iglidur® V400 plain bearings is only 0.2% weight after saturation in water.

Vacuum

In vacuum, any present moisture is released as vapour. The use in vacuum is only possible to a limited extent.

Radiation resistance

Plain bearings made from iglidur® V400 are resistant up to a radiation intensity of 2 · 10⁴Gy. Higher radiation affects their mechanical properties.

Resistance to weathering

iglidur® V400 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® V400 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.

Moreover the limit of the permitted loads at +100°C is still very high with 20MPa. The high flexibility is shown in diagram 03.

Surface pressure, page 41

Bearing technology | Plain bearing | iglidur® V400

Permissible surface speeds

iglidur® V400 also permits high surface speeds due to the high temperature resistance. The very favourable coefficient of friction of the bearing enables maximum surface speeds up to 1.3m/s. In linear applications, the permissible speeds are even higher and can be up to 3.0m/s. Surface speed, page 44

Temperature

The maximum long-term application temperature is +200°C. For temperatures over +100°C an additional securing is required. Then, however, the wear resistance of the bearings is very good and adopts a leading position among all iglidur® materials. With increasing temperatures, the compressive strength of iglidur® V400 plain bearings decreases. Diagram 02 shows this inverse relationship.

Application temperatures, page 49 Additional securing, page 49

Friction and wear

The coefficient of friction is dependent on the bearing's stressing capacity (diagrams 04 and 05). The coefficient of friction of iglidur® V400 is very constant. No other iglidur® plain bearing material exhibits a lower variance in the coefficients of friction, even when the shaft material is altered. Coefficient of friction and surfaces, page 47 Wear resistance, page 50

Shaft materials

The influence of the shaft material on the wear resistance is bigger than on the friction. Here, even at low loads (0.75MPa), significant differences occur, as shown in diagram 06. With regard to wear, iglidur® V400 plain bearings show better values in rotating applications than in pivoting movements (diagram 07).

Shaft materials, page 52

Installation tolerances

iglidur® V400 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). 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	0.9	0.6	2.0	
short-term	m/s	1.3	0.9	3.0	
Table 03: Maximum surface speeds					

Greases Oil Water Dry Coefficient of friction µ 0.15 - 0.20 0.09 0.04 0.04 Table 04: Coefficient of friction against steel (Ra = 1µm, 50HRC)

	Housing	Plain bearing	Shaft
Ø d1 [mm]	H7 [mm]	F10 [mm]	h9 [mm]
0-3	+0.000 +0.01	0 +0.006 +0.046	-0.025 +0.000
>3-6	+0.000 +0.01	2 +0.010 +0.058	-0.030 +0.000
> 6 - 10	+0.000 +0.01	5 +0.013 +0.071	-0.036 +0.000
> 10 - 18	+0.000 +0.01	8 +0.016 +0.086	-0.043 +0.000
> 18 - 30	+0.000 +0.02	1 +0.020 +0.104	-0.052 +0.000
> 30 - 50	+0.000 +0.02	25 +0.025 +0.125	-0.062 +0.000
> 50 - 80	+0.000 +0.03	80 +0.030 +0.150	-0.074 +0.000
> 80 - 120	+0.000 +0.03	85 +0.036 +0.176	-0.087 +0.000
> 120 - 180	+0.000 +0.04	0 +0.043 +0.203	+0.000 +0.100
Table 05: Imp	ortant toleran	ces for plain beari	ngs according
to ISO 3547-1	1 after press-fi	t	

Technical data



Diagram 01: Permissible pv values for iglidur® V400 plain

bearings with a wall thickness of 1mm, dry operation against





12 11 10 9 6

Diagram 05: Coefficient of friction as a function of the load,



pressure, p = 1MPa, v = 0.3m/s

Temperature [°C] Diagram 02: Maximum recommended surface pressure as a

80

50

20

function of temperature (45MPa at +20°C)



Diagram 03: Deformation under pressure and temperature



Diagram 04: Coefficient of friction as a function of the surface speed, p = 0.75MPa

Diagram 06: Wear, rotating with different shaft materials,

120

150

200



 $v = 0.01 \, \text{m/s}$

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

30 35 40 45

Bearing technology | Plain bearing | iglidur[®] V400

Sleeve bearing (form S)





²⁾ Thickness < 0.6mm: Chamfer = 20°

Chamfer in relation to d1

d1 [mm] Ø1-6 Ø6-12 Ø12-30 f1 [mm] 0.3 0.5 0.8 Dimensions according to ISO 3547-1 and special dimensions

Order example: VSM-0608-06 – no minimum order quantity.

V400 iglidur[®] material S Sleeve bearing M Metric 06 Inner Ø d1 08 Outer Ø d2 06 Total length b1

d1	d1 Tolerance ³⁾	d2	b1 h13	Part No.
[mm]		[mm]	[mm]	
6.0	+0.010 +0.058	8.0	6.0	VSM-0608-06
8.0	+0.013 +0.071	10.0	10.0	VSM-0810-10
10.0		12.0	10.0	VSM-1012-10
12.0	+0.016 +0.086	14.0	12.0	VSM-1214-12
16.0		18.0	15.0	VSM-1618-15
20.0	+0.020 +0.104	23.0	20.0	VSM-2023-20

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

Bearing technology | Plain bearing | iglidur® V400

Flange bearing (form F)



Chamfer in relation to d1

Ø1-6

0.3

Ø 6-12 Ø 12-30

0.8

0.5



²⁾ Thickness < 0.6mm: Chamfer = 20°

Dimensions according to ISO 3547-1 and special dimensions

glidur[®] V400

+200°C

45MPa



d1 [mm]

f1 [mm]

Order example: VFM-0608-06 – no minimum order quantity. V400 iglidur® material F Flange bearing M Metric 06 Inner Ø d1 08 Outer Ø d2 06 Total length b1

d1	d1 Tolerance ³⁾	d2	d3 d13 ³⁾	b1 h13	b2 h13	Part No.
[mm]		[mm]	[mm]	[mm]	[mm]	
6.0	+0.010 +0.058	8.0	12.0	6.0	1.00	VFM-0608-06
8.0	0.012 0.071	10.0	15.0	10.0	1.00	VFM-0810-10
10.0	+0.013 +0.071	12.0	18.0	10.0	1.00	VFM-1012-10
12.0	0.016 0.096	14.0	20.0	12.0	1.00	VFM-1214-12
16.0	+0.010 +0.060	18.0	24.0	17.0	1.00	VFM-1618-17
18.0	0.000 0.104	20.0	26.0	20.0	1.00	VFM-1820-20
20.0	+0.020 +0.104	23.0	30.0	21.5	1.50	VFM-2023-21

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

Available from stock

www.igus.eu/24

Online ordering

www.igus.eu/V400

Detailed information about delivery time online.

Including delivery times, prices, online tools



Detailed information about delivery time online. www.igus.eu/24

Online ordering

Including delivery times, prices, online tools www.igus.eu/V400



Our prices are scaled according to order quantities, current prices can be found online.

Discount scaling						
1 – 9	50 – 99	500 - 999				
10 – 24	100 – 199	1,000 - 2,499				
25 – 49	200 – 499	2,500 - 4,999				

No minimum order value. No low-quantity surcharges. Free shipping within Germany for orders above €150.



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above €150.

No minimum order value.

No low-quantity surcharges.

Ordering note

Discount scaling

1-9

10 - 24

25 - 49

Our prices are scaled according to order

50 - 99

100 - 199

200 - 499

Free shipping within Germany for orders

500 - 999

1.000 - 2.499

2,500 - 4,999

quantities, current prices can be found online.



All-rounder for steam sterilisation Low-cost, media-resistant and hygienic iglidur[®] HSD350

0

When to use it?

- $\bullet\,$ If the bearing point is regularly sterilised with hot steam
- When a low-cost material is required at the same time
- When good chemical resistance is required
- Low moisture absorption

C

- When high pressures occur iglidur[®] G, iglidur[®] W300
- When continuous operating temperatures are higher than +180°C iglidur® G, iglidur® Z
- When a cost-effective bearing for occasional movements is necessary iglidur[®] G



Bearing technology | Plain bearing | iglidur® HSD350





Also available as:

6.0 - 20.0mm



Page 679

Bar stock,

plate Page 683

All-rounder for steam sterilisation
Low-cost, media-resistant and hygienic

The new material enables continuous operation where hygiene is important, including regular sterilisation, with an outstanding price-performance ratio.

- Temperature-resistant up to +180°C
- Suitable for wet environments
- High media resistance
- Corrosion-free
- Lubrication-free
- Sterilisable
- Maintenance-free

Typical application areasFilling technology

tribo-tape liner Page 691

691 Medical and laboratory technology



Descriptive technical specifications Wear resistance at +23°C + Wear resistance at +90°C + Two hole Wear resistance at +150°C + flange bearings Low coefficient of friction Page 603 Low moisture absorption + Wear resistance under water + High media resistance Moulded + special parts Page 624 Resistant to edge pressures Suitable for shock and impact loads + Resistant to dirt _ + igubal® Online product finder Online service life calculation spherical balls \sim www.igus.eu/iglidur-finder www.igus.eu/iglidur-expert Page 841

Technical data

General properties			Testing method	
Density	g/cm ³	1.39		
Colour		beige		
Max. moisture absorption at +23°C and 50% r.h.	% weight	0.6	ISO 175	
Max. moisture absorption	% weight	1.2	ISO 62	
Coefficient of friction, dynamic, against steel	μ	0.07 – 0.23		
pv value, max. (dry)	MPa · m/s	0.30		
Mechanical properties				
Flexural modulus	MPa	2,150	DIN EN ISO 178	
Flexural strength at +20°C	MPa	67	DIN EN ISO 178	
Compressive strength	MPa	44		
Max. recommended surface pressure (+20°C)	MPa	30		
Shore D hardness		77	DIN 53505	
Physical and thermal properties				
Max. application temperature long-term	°C	+180		
Max. application temperature short-term	°C	+210		
Min. application temperature	°C	-40		
Thermal conductivity	W/m · K	0.24	ASTM C 177	
Coefficient of thermal expansion (at +23°C)	K ⁻¹ · 10 ⁻⁵	7	DIN 53752	
Electrical properties				
Specific contact resistance	Ωcm	> 1013	DIN IEC 93	
Surface resistance	Ω	> 1014	DIN 53482	

Table 01: Material properties

iglidur[®] HSD350 was specially developed for use in applications where decontamination by steam (e.g. in autoclaves) is necessary. iglidur[®] HSD350 offers an excellent price-performance ratio.

Moisture absorption

Under standard climatic conditions, the moisture absorption of iglidur[®] HSD350 plain bearings is approximately 0.6% weight. The saturation limit in water is 1.2% weight. These values are so low that a moisture expansion need to be considered only in extreme cases.

Vacuum

In vacuum, the moisture content is released as vapour. Due to its low moisture absorption, use in a vacuum is possible.

Radiation resistance

Plain bearings made from iglidur® HSD350 are resistant up to a radiation intensity of $3 \cdot 10^2$ Gy.

Resistance to weathering

iglidur[®] HSD350 plain bearings are continuously resistant to weathering. The material properties are only slightly affected. Possible discolorations are only superficial.

iglidur[®] HSD350 +180°C 30MPa

Mechanical properties

With increasing temperatures, the compressive strength of iglidur[®] HSD350 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® HSD350 at radial loads. At the maximum recommended surface pressure of 30MPa 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





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Bearing technology | Plain bearing | iglidur[®] HSD350

Chomicals

Permissible surface speeds

Due to its rather good thermal conductivity and thermal resistance, iglidur® HSD350 is suitable for speeds in the medium range. The permissible surface speed decreases with increasing surface pressure. Surface speed, page 44

Temperature

The ambient temperatures strongly influence the properties of plain bearings. According to its field of application as autoclavable material, iglidur® HSD350 offers good thermal resistance. For temperatures over +130°C an axial securing is required.

Application temperatures, page 49 Additional securing, page 49

Friction and wear

The coefficient of friction increases constantly and slowly over the speed, but remains below 0.3µ up to a speed of 2.0m/s.

Coefficient of friction and surfaces, page 47 Wear resistance, page 50

Shaft materials

Diagrams 06 and 07 display a summary of the test results with different shaft materials conducted with plain bearings made from iglidur® HSD350. At 0.3m/s and 1MPa surface pressure, a wide variety of shafts are suitable and provide good wear results. Hard-anodised aluminium, free cutting steel, hard-chromed Cf53, 304 stainless steel and high grade steel exhibit low wear. If the shaft material you plan on using is not shown in these test results, please contact us.

Shaft materials, page 52

Installation tolerances

ialidur® HSD350 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

ononnoulo	ricolotarioo
Alcohols	+ up to 0
Diluted acids	+
Diluted alkalines	+
Fuels	+ up to 0
Greases, oils without additives	+
Hydrocarbons	+
Strong acids	0
Strong alkalines	0

Posistanco

All information given at room temperature [+20°C] Table 02: Chemical resistance

Chemical table, page 1636

		Rotating	Oscillating	linear
long-term	m/s	1.1	0.8	3.0
short-term	m/s	1.2	1.0	3.2

Table 03: Maximum surface speeds

Greases Oil Water Dry Coefficient of friction µ 0.07 - 0.23 0.09 0.04 0.04 Table 04: Coefficient of friction against steel (Ra = 1µm, 50HRC)

	Housing	Plain bearing	Shaft
Ø d1 [mm]	H7 [mm]	F10 [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: Imp	ortant toleranc	es for plain beari	ngs according
to ISO 3547-	1 after press-fit		

Technical data





ialidu HSD350 +180°C 30MPa

Diagram 01: Permissible pv values for iglidur® HSD350 plain bearings with a wall thickness of 1mm, dry operation against a steel shaft, at +20°C, mounted in a steel housing

Diagram 05: Wear, rotating with different shaft materials, pressure, p = 1MPa, v = 0.3m/s



Diagram 02: Maximum recommended surface pressure as a function of temperature (30MPa at +20°C)



Diagram 03: Deformation under pressure and temperature



Diagram 04: Coefficient of friction as a function of the surface speed, p = 1MPa



Diagram 06: 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® HSD350

Sleeve bearing (form S)





²⁾ Thickness < 0.6mm: Chamfer = 20°

 Chamfer in relation to d1

 d1 [mm]
 Ø 6–12
 Ø 12–30

 f1 [mm]
 0.5
 0.8



Order example: HSD350SM-0608-06 – no minimum order quantity.

HSD350 iglidur® material S Sleeve bearing M Metric 06 Inner Ø d1 08 Outer Ø d2 06 Total length b1

d1	d1 Tolerance ³⁾	d2	b1 h13	Part No.
[mm]		[mm]	[mm]	
6.0	+0.010 +0.058	8.0	6.0	HSD350SM-0608-06
8.0	0.012.0071	10.0	10.0	HSD350SM-0810-10
10.0	+0.013 +0.071	12.0	10.0	HSD350SM-1012-10
12.0	0.016.0096	14.0	12.0	HSD350SM-1214-12
16.0	+0.010 +0.060	18.0	15.0	HSD350SM-1618-15
20.0	+0.020 +0.104	23.0	20.0	HSD350SM-2023-20

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

Bearing technology | Plain bearing | iglidur® HSD350

Flange bearing (form F)



 Chamfer in relation to d1

 d1 [mm]
 Ø 6-12
 Ø 12-30

 f1 [mm]
 0.5
 0.8



²⁾ Thickness < 0.6mm: Chamfer = 20°

Dimensions according to ISO 3547-1 and special dimensions

iglidur® HSD350 +180°C 30MPa



Order example: HSD350FM-0608-06 – no minimum order quantity. HSD350 iglidur[®] material **F** Flange bearing **M** Metric 06 Inner Ø d1 08 Outer Ø d2 06 Total length b1

d1	d1 Tolerance ³⁾	d2	d3 d13 ³⁾	b1 h13	b2 h13	Part No.
[mm]		[mm]	[mm]	[mm]	[mm]	
6.0	+0.010 +0.058	8.0	12.0	6.0	1.00	HSD350FM-0608-06
8.0		10.0	15.0	10.0	1.00	HSD350FM-0810-09
10.0	+0.013 +0.071	12.0	18.0	9.0	1.00	HSD350FM-1012-09
12.0	0.016.0096	14.0	20.0	12.0	1.00	HSD350FM-1214-12
16.0	+0.010 +0.060	18.0	24.0	17.0	1.00	HSD350FM-1618-17
20.0	+0.020 +0.104	23.0	30.0	21.5	1.50	HSD350FM-2023-21

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

Available from stock

Detailed information about delivery time online. www.igus.eu/24

Online ordering

Including delivery times, prices, online tools www.igus.eu/HSD350



Our prices are scaled according to order quantities, current prices can be found online.

Discount scaling					
1 – 9	50 – 99	500 - 999			
10 – 24	100 – 199	1,000 - 2,499			
25 – 49	200 – 499	2,500 - 4,999			

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No minimum order value. No low-quantity surcharges. Free shipping within Germany for orders above €150.



Online ordering Including delivery times, prices, online tools

www.igus.eu/HSD350

Ordering note

Our prices are scaled according to order quantities, current prices can be found online.

Discount Sound	9	
1 – 9	50 - 99	500 - 999
10 – 24	100 – 199	1,000 - 2,499
25 – 49	200 - 499	2,500 - 4,999

No minimum order value.

No low-quantity surcharges. Free shipping within Germany for orders above €150.



For hot liquids Continuous wear resistance in liquids iglidur[®] UW500

0

When to use it?

- When plain bearings need to be used in liquids
- For high speeds
- For high temperatures
- When a high chemical resistance is required

0

- When a cost-effective underwater plain bearing for the standard temperature range is required iglidur[®] UW
- When a cost-effective underwater plain bearing is required for rare operations *iglidur*® *H*
- When a cost-effective universal plain bearing is required iglidur[®] G



Bearing technology | Plain bearing | iglidur® UW500

ø



Continuous wear resistance in liquids

Also available as:

Bar stock

round bar Page 657

Bar stock,

iglidur® UW500 was developed for underwater applications at higher temperatures up to +250°C. In

addition, the plain bearings will run in chemicals which would act as a lubricant. • High temperature resistance

Suitable for high surface speeds

For hot liquids

Lubrication-free

Suitable for underwater applications

plate Page 683 Maintenance-free

Typical application areas

- Plant construction
- Pumps

 Chemical industry tribo-tape liner Page 691



Descriptive technical specifications Wear resistance at +23°C Wear resistance at +90°C Two hole Wear resistance at +150°C + flange bearings Low coefficient of friction Page 603 Low moisture absorption Wear resistance under water High media resistance Moulded special parts Page 624 Resistant to edge pressures Suitable for shock and impact loads + Resistant to dirt + igubal® Online product finder Online service life calculation spherical balls www.igus.eu/iglidur-finder www.igus.eu/iglidur-expert Page 841



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Technical data

General properties			Testing method	
Density	g/cm ³	1.49		-10
Colour		black		+2
Max. moisture absorption at +23°C and 50% r.h.	% weight	0.1	DIN 53495	
Max. moisture absorption6)	% weight	0.5		Ċ
Coefficient of friction, dynamic, against steel	μ	0.20 - 0.36		140
pv value, max. (dry)	MPa ⋅ m/s	0.35		
Mechanical properties				
Flexural modulus	MPa	16,000	DIN 53457	1
Flexural strength at +20°C	MPa	260	DIN 53452	
Compressive strength	MPa	140		
Max. recommended surface pressure (+20°C)	MPa	140		
Shore D hardness		86	DIN 53505	
Physical and thermal properties				
Max. application temperature long-term	°C	+250		
Max. application temperature short-term	°C	+300		
Min. application temperature	°C	-100		
Thermal conductivity	W/m ⋅ K	0.60	ASTM C 177	Bol
Coefficient of thermal expansion (at +23°C)	K⁻¹ · 10⁻⁵	4	DIN 53752	
Electrical properties ⁵⁾				
Specific contact resistance	Ωcm	< 109	DIN IEC 93	K
Surface resistance	Ω	< 109	DIN 53482	35

⁵) The good conductivity of this material can favour the generation of corrosion on the metallic contact components.

⁹ All results were obtained under laboratory conditions with demineralised water. For application with direct water contact, we recommend tests under real application conditions.

Table 01: Material properties

The plain bearings made from iglidur® UW500 were developed for underwater applications with high temperatures. Examples for this are water pumps in automotive engineering, but also the field of medical engineering and related sectors. Unless the underwater operation is explicitly stated, the information in this chapter describes iglidur® UW500 in dry operation.

Moisture absorption

Under standard climatic conditions, the moisture absorption of iglidur® UW500 plain bearings is below 0.1% weight. The maximum moisture absorption is 0.5% weight. iglidur® UW500 plain bearings can be used for underwater applications.

Vacuum

iqus

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

Radiation resistance

Plain bearings made from iglidur® UW500 are resistant up to a radiation intensity of 1 · 10⁵Gy. They resist to hard gamma radiation (1,000Mrad) and alpha or beta radiation (10,000Mrad).

Resistance to weathering

iglidur® UW500 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® UW500 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® UW500 at radial loads.

Surface pressure, page 41



Bearing technology | Plain bearing | iglidur® UW500

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Permissible surface speeds

iglidur[®] UW500 plain bearings can be used in applications involving dry operation as well as in liquids in a wide variety of applications. Due to hydrodynamic lubrication at high speeds, surface speeds far above 1.5m/s can be achieved. Surface speed, page 44

Temperature

iglidur® UW500 can be used in applications where there are continuous temperatures of +150°C. If the bearings are mechanically secured, these temperatures can be even higher than +200°C. iglidur® UW500 belongs to the most temperature-resistant iglidur® materials. For temperatures over +150°C an additional securing is required.

Application temperatures, page 49 Additional securing, page 49

Friction and wear

Diagrams 04 and 05 show the coefficient of friction of iglidur® UW500 plain bearings as a function of surface speed and pressure. The friction and wear are also dependent, to a large degree, on the shaft material. Ideal are ground surfaces with an average surface finish of 0.1 - 0.4µm.

Coefficient of friction and surfaces, page 47 Wear resistance, page 50

Shaft materials

Diagram 06 shows results of testing different shaft materials with plain bearings made from iglidur® UW500. Shaft materials, page 52

Installation tolerances

iglidur® UW500 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).

Testing methods, page 57

Ghernicais	nesistance
Alcohols	+
Diluted acids	+
Diluted alkalines	+
Fuels	+
Greases, oils without additives	+
Hydrocarbons	+
Strong acids	+
Strong alkalines	+

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All information given at room temperature [+20°C] Table 02: Chemical resistance

Chemical table, page 1636

		Rotating	Oscillating	linear		
long-term	m/s	0.8	0.6	2.0		
short-term	m/s	1.5	1.1	3.0		
Table 03: Maximum surface speeds						

Greases Oil Water Dry Coefficient of friction µ 0.20 - 0.36 0.09 0.04 0.04 Table 04: Coefficient of friction against steel (Ra = 1µm, 50HRC)

	Housing	Plain bearing	Shaft			
Ø d1 [mm]	H7 [mm]	F10 [mm]	h9 [mm]			
0-3	+0.000 +0.010	+0.006 +0.046	-0.025 +0.000			
> 3 - 6	+0.000 +0.012	2 +0.010 +0.058	-0.030 +0.000			
> 6 - 10	+0.000 +0.015	5 +0.013 +0.071	-0.036 +0.000			
> 10 - 18	+0.000 +0.018	8 +0.016 +0.086	-0.043 +0.000			
> 18 - 30	+0.000 +0.02	+0.020 +0.104	-0.052 +0.000			
> 30 - 50	+0.000 +0.025	5 +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	5 +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						

iglidur® UW500 plain bearings are manufactured to special order.

Technical data







iglidur







Diagram 02: Maximum recommended surface pressure as a Diagram 06: Wear, rotating with different shaft materials, pressure, p = 1MPa, v = 0.3m/s





Diagram 03: Deformation under pressure and temperature



Diagram 04: Coefficient of friction as a function of the surface speed, p = 0.75MPa

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



Deformation [%]

function of the load

Diagram 01: Permissible pv values for iglidur® UW500 plain

a steel shaft, at +20°C, mounted in a steel housing

function of temperature (140MPa at +20°C)