



iglidur® X6

runs up to six times
longer than iglidur® X

Standard range from stock ► from page 291



iglidur® V400

for soft shafts, up to +200 °C

Standard range from stock ► from page 301



iglidur® Z

For high dynamic loads,
wear resistant

Standard range from stock ► from page 311

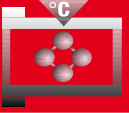

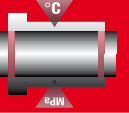
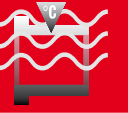














iglidur® UW500

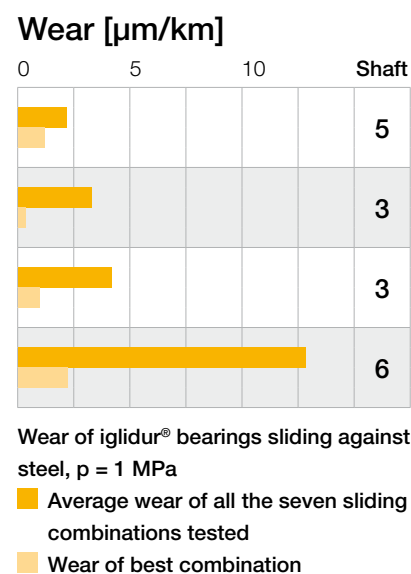
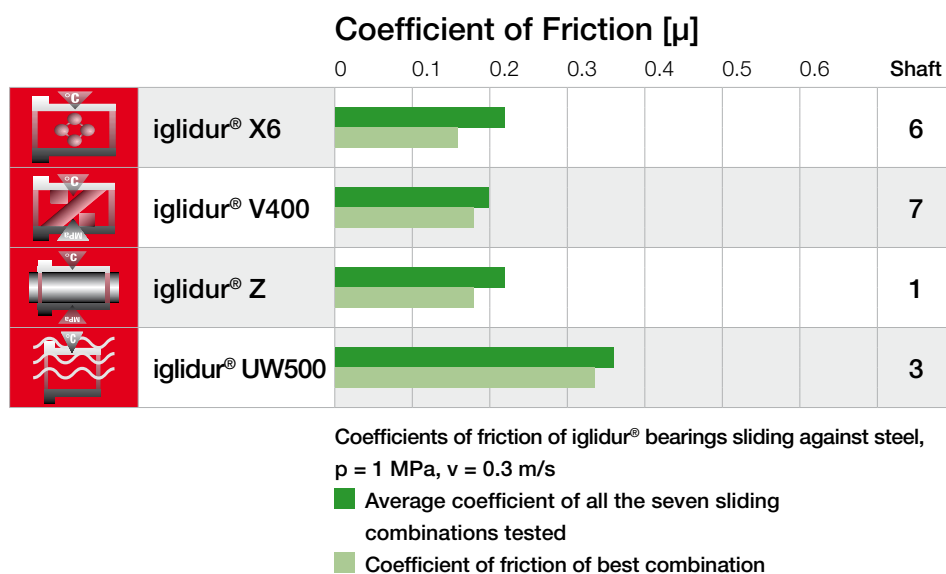
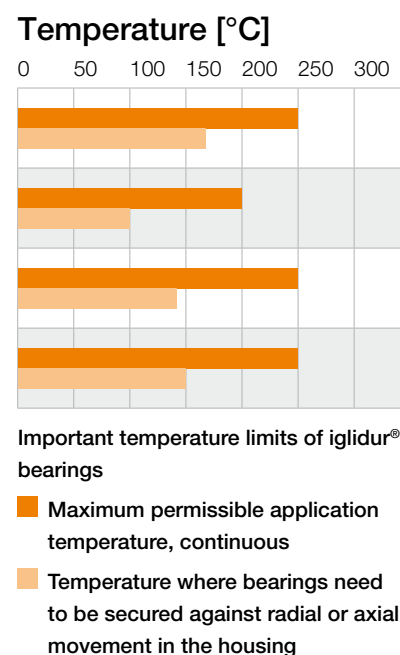
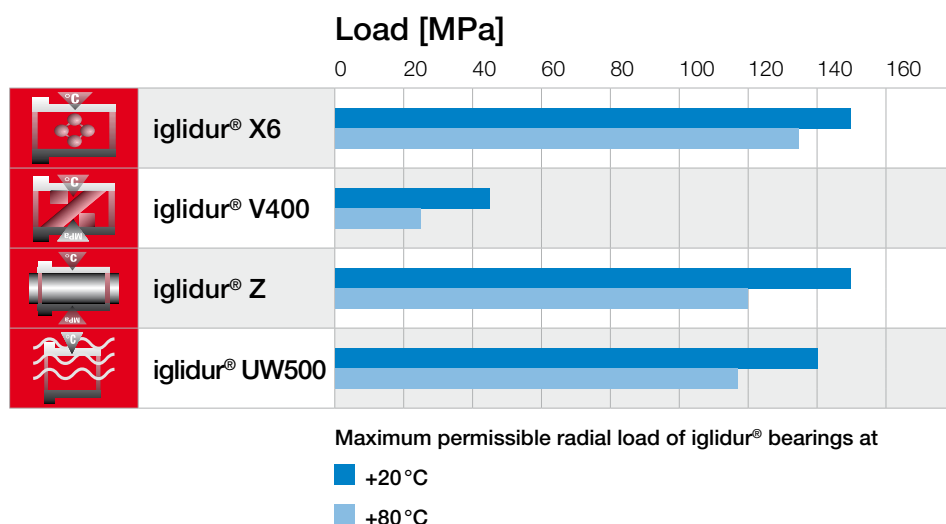
for hot liquids

On request ► from page 325

iglidur®- Specialists – High Temperatures

				
	iglidur® X6	iglidur® V400	iglidur® Z	iglidur® UW500
 Long life dry running	●	●	●	
 For high loads	●		●	
 For high temperatures	●	●	●	●
 Low friction/high speed	●	●	●	
 Dirt resistant				
 Chemicals resistant	●	●	●	●
 Low water absorption	●	●	●	●
 Food-suitable				
 Vibration-dampening				
 Edge pressure		●	●	
 For under water use				●
 Cost-effective				
from page	291	301	311	325

iglidur® Specialists | Selection According to Main Criteria



Shaft material:

1 = Cf53

2 = Cf53, hard chromed

3 = Aluminum, hc

4 = Automatic screw steel

5 = HR carbon steel

6 = 304 SS

7 = High grade steel

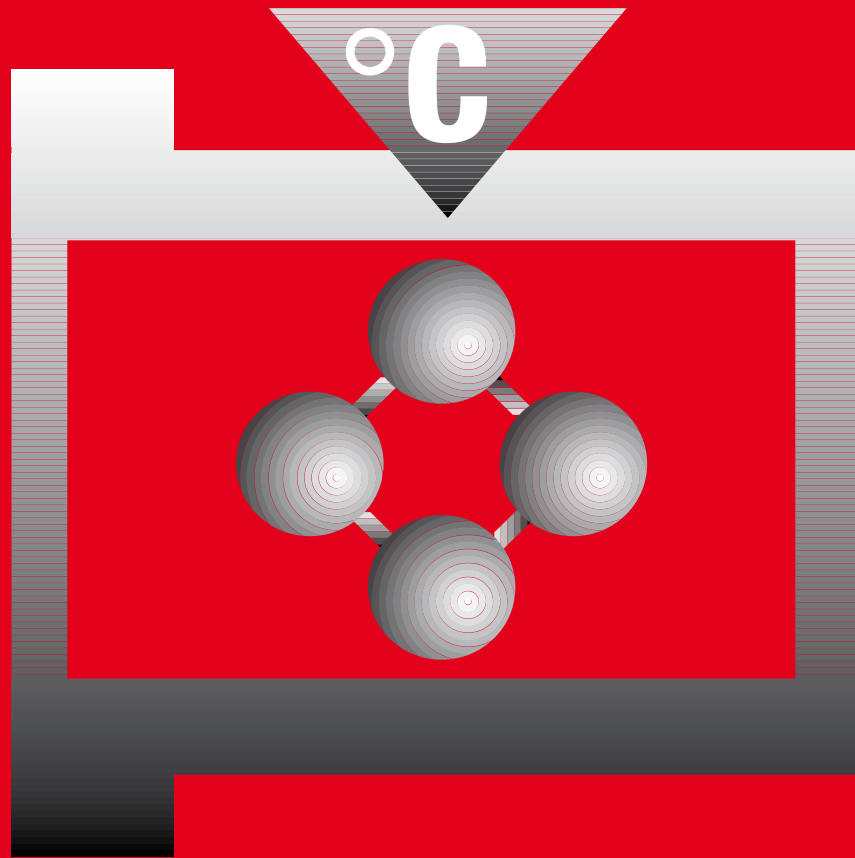
Material properties table					
General properties	Unit	iglidur® X6	iglidur® V400	iglidur® Z	iglidur® UW500
Density	g/cm³	1.53	1.51	1.40	1.49
Colour		dark blue	white	brown	black
Max. moisture absorption at +23 °C/50 % r.h.	% weight	0.1	0.1	0.3	0.1
Max. water absorption	% weight	0.5	0.2	1.1	0.5
Coefficient of sliding friction, dynamic against steel	μ	0.09–0.25	0.15–0.20	0.06–0.14	0.20–0.36
pv value, max. (dry)	MPa · m/s	1.35	0.5	0.84	0.35
Mechanical properties					
Modulus of elasticity	MPa	16,000	4,500	2,400	16,000
Tensile strength at +20 °C	MPa	290	95	95	260
Compressive strength	MPa	190	47	65	140
Max. recommended surface pressure (+20 °C)	MPa	150	45	150	140
Shore D hardness		89	74	81	86
Physical and thermal properties					
Max. long term application temperature	°C	+250	+200	+250	+250
Max. short term application temperature	°C	+315	+240	+310	+300
Min. application temperature	°C	–100	–50	–100	–100
Thermal conductivity	W/m · K	0.55	0.24	0.62	0.60
Coefficient of thermal expansion (at +23 °C)	K⁻¹ · 10⁻⁵	1.1	3	4	4
Electrical properties					
Specific volume resistance	Ωcm	< 10⁵	> 10¹²	> 10¹¹	< 10⁹
Surface resistance	Ω	< 10³	> 10¹²	> 10¹¹	< 10⁹

Material resistance (at +20 °C)				
Chemical resistance	iglidur® X6	iglidur® V400	iglidur® Z	iglidur® UW500
Alcohol	+	+	0	+
Hydrocarbons	+	+	+	+
Greases, oils without additives	+	+	+	+
Fuels	+	+	+	+
Diluted acids	+	+	+	+
Strong acids	+	+	–	+
Diluted alkalines	+	+	+	+
Strong alkalines	+	–	–	+
Radiation resistance [Gy] to	2 · 10⁵	2 · 10⁴	1 · 10⁵	1 · 10⁵

+ resistant 0 conditionally resistant – not resistant

My Sketches





**Runs up to six times longer than
iglidur® X – iglidur® X6**



Standard range from stock

Lubrication and maintenance-free

Long term service temperature up to +250 °C

Up to 50 % better press fit than iglidur® X

High compressive strength

Very good chemical resistance

PTFE-free

iglidur® X6

Runs up to six times longer than iglidur® X. Due to nano-technology, iglidur® X6 shows up to six times better performance than iglidur® X in many oscillating and rotating applications – even at temperatures over +100 °C.



When to use it?

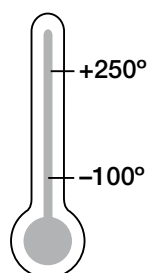
- If temperatures are higher than +150 °C
- When the wear performance of iglidur® X in oscillation and rotation is not sufficient.
- If the pressfit should be improved over iglidur® X
- If high media-resistance is required
- If you need a bearing which is free of PTFE



When not to use it?

- When you need a cost-effective universal bearing
▶ iglidur® G, page 65
- If you need a bearing for underwater use
▶ iglidur® UW500, page 325
▶ iglidur® H370, page 359
- When a wear-resistant high temperature bearing for linear movements is needed.
▶ iglidur® Z, page 311

Temperature



Product range

2 types
Ø 3–40 mm
more dimensions
on request





Typical sectors of industry and application areas

- Glass industry ● Food industry
- Fluid technology ● Textile technology
- Machine building etc.

Improve technology and reduce costs –
310 exciting examples for iglidur® plain
bearings online

► www.igus.co.uk/iglidur-applications



► www.igus.co.uk/pies



► www.igus.co.uk/baking-oven

Material properties table

General properties	Unit	iglidur® X6	Testing method
Density	g/cm ³	1.53	
Colour		dark blue	
Max. moisture absorption at +23 °C/50 % r.h.	% weight	0.1	DIN 53495
Max. water absorption	% weight	0.5	
Coefficient of sliding friction, dynamic against steel	μ	0.09–0.25	
pv value, max. (dry)	MPa · m/s	1.35	
Mechanical properties			
Modulus of elasticity	MPa	16,000	DIN 53457
Tensile 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. long term application temperature	°C	+250	
Max. short term application temperature	°C	+315	
Max. ambient temperature, short term ¹⁾	°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 ²⁾			
Specific volume resistance	Ωcm	< 10 ⁵	DIN IEC 93
Surface resistance	Ω	< 10 ³	DIN 53482

¹⁾ Without additional load; no sliding movement; relaxation possible

²⁾ The good conductivity of this product might lead to the corrosion of metallic counterparts under certain conditions.

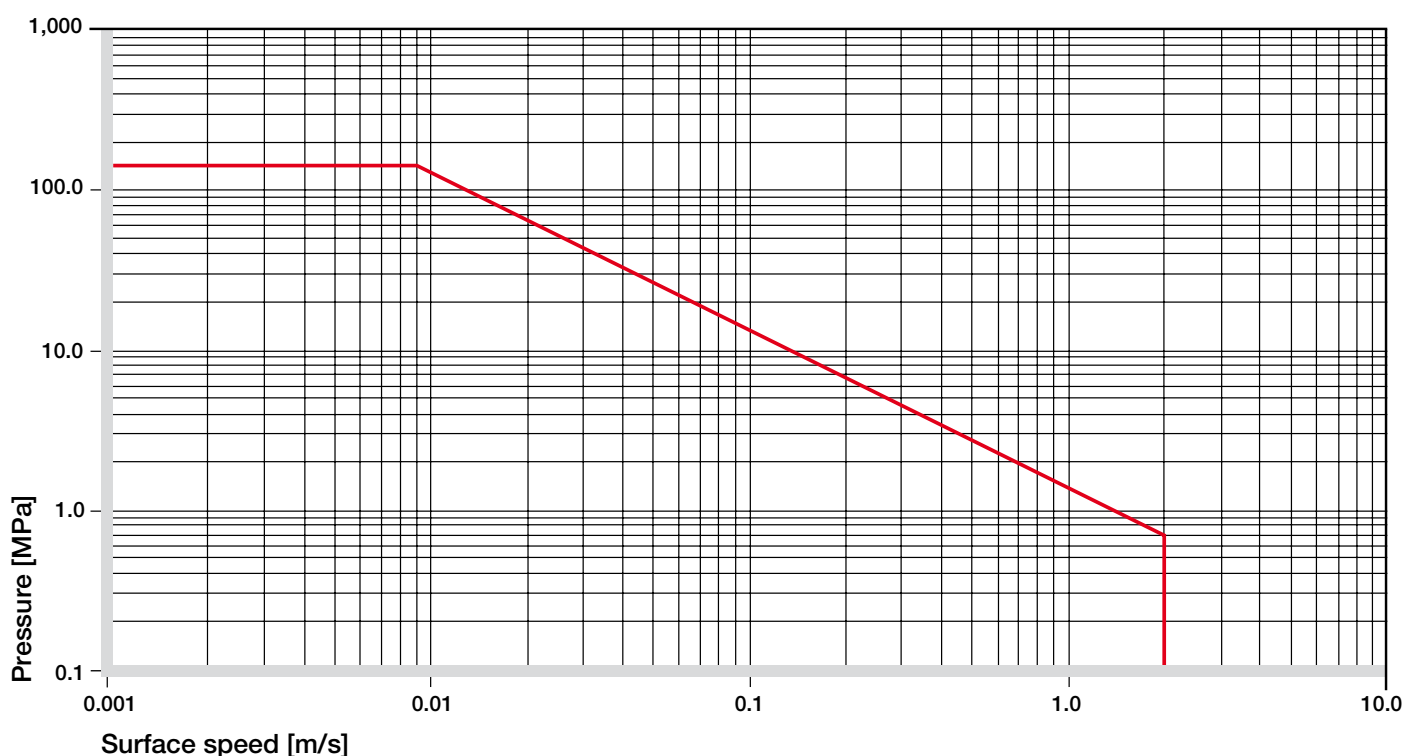
Table 01: Material properties table


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

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 behavior.

Mechanical Properties

With increasing temperatures, the compressive strength of iglidur® X6 plain bearings decreases. The Diagram 02 shows this inverse relationship. However, at the longterm maximum temperature of +250 °C the permissible surface pressure is almost 50 MPa. The recommended maximum surface pressure is a mechanical material parameter. No conclusions regarding the tribological properties can be drawn from this.

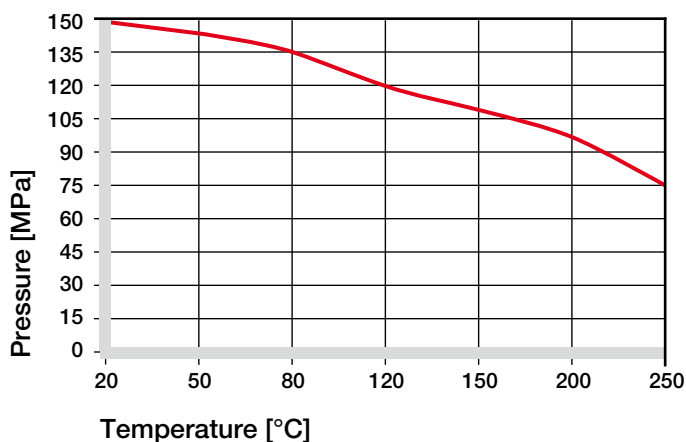


Diagram 02: Recommended maximum surface pressure as a function of temperature (150 MPa at +20 °C)

Diagram 03 shows the elastic deformation of iglidur® X6 at radial loads. At a surface pressure of 100 MPa the deformation is less than 2 % at room temperature. A possible deformation could be, among others, dependent on the duty cycle of the pressure.

► Surface Pressure, page 47

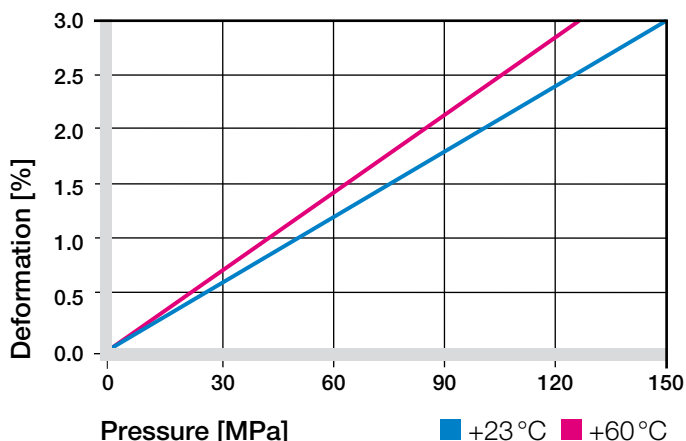


Diagram 03: Deformation under pressure and temperature

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 temperature level is rarely reached, due to varying application conditions.

► Surface Speed, page 49

m/s	Rotating	Oscillating	Linear
Continuous	1.5	1.1	5
Short Term	3.5	2.5	10

Table 02: Maximum running speed

Temperatures

The ambient temperatures greatly influence the wear performance of plastic bearings. The temperature resistance of iglidur® X6 is among the highest in the iglidur® range. In many tests it has shown a six times higher wear performance compared to the established high-temperature specialist iglidur® X. Also, the temperature induced relaxation of the bearing in the housing bore is much lower so that iglidur® X6 required additional axial securing only above +165 °C.

► Application Temperatures, page 50

iglidur® X6	Application temperature
Minimum	–100 °C
Max. long term	+250 °C
Max. short term	+315 °C
Add. securing is required from	+165 °C

Table 03: Temperature limits

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 30 MPa. A higher speed of the shaft also results in a lower coefficient of friction (Diagram. 04 and 05).

► Coefficients of Friction and Surfaces, **page 52**

► Wear Resistance, **page 53**

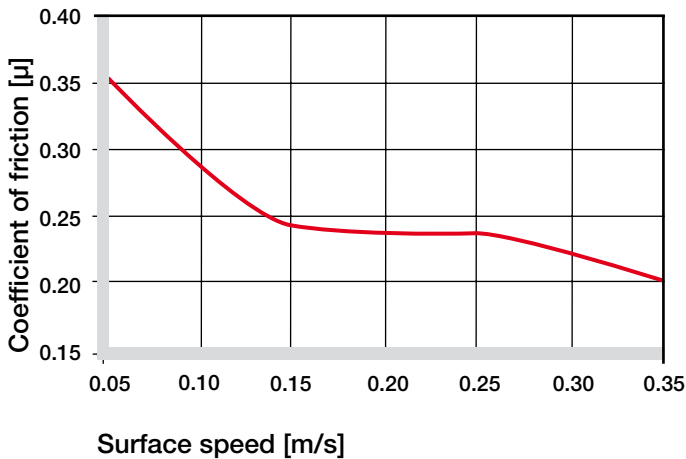


Diagram 04: Coefficient of friction as a function of the running speed, $p = 0.75$ MPa

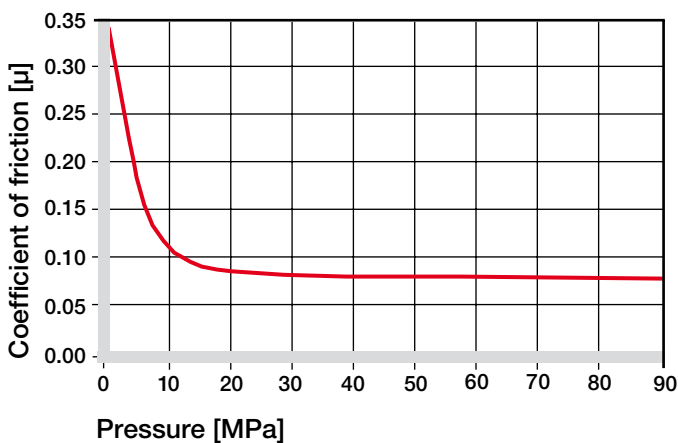


Diagram 05: Coefficient of friction as a function of the pressure, $v = 0.01$ m/s

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 roughness $R_a = 0.4\text{--}0.7 \mu\text{m}$ (Diagram 06). Diagrams 07 and 09 show results of testing different shaft materials with plain bearings made of iglidur® X6. In Diagram 07 it shows that iglidur® X6 can be combined with 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 2 Mpa.

The wear database shows that iglidur® X6 is more suitable for rotating than for oscillating applications. If the shaft material you plan on using is not shown in these test results, please contact us.

► Shaft Materials, **page 55**

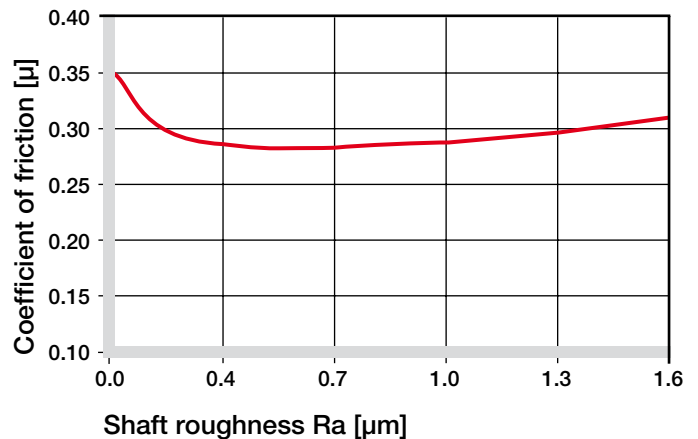


Diagram 06: Coefficient of friction as function of the shaft surface (Cf53 hardened and ground steel)

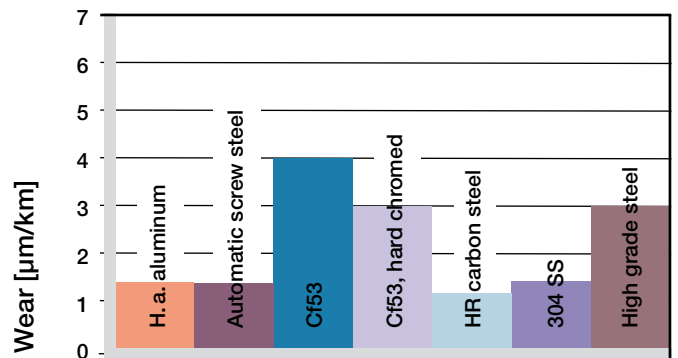


Diagram 07: Wear, rotating with different shaft materials, pressure $p = 1$ MPa, $v = 0.3$ m/s

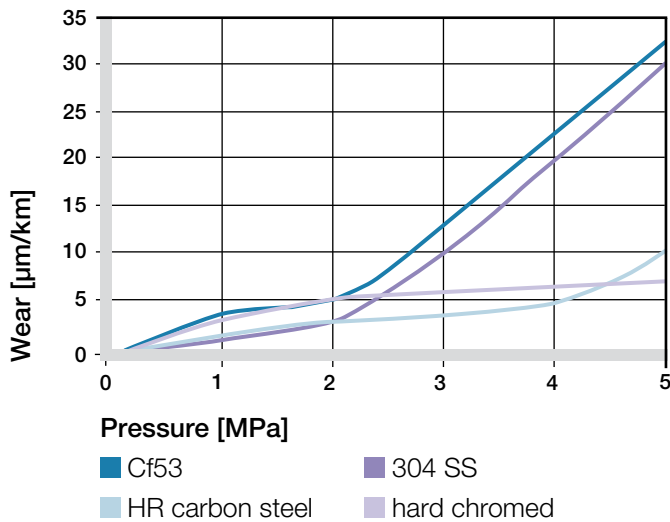


Diagram 08: Wear with different shaft materials in rotational operation, as a function of the pressure

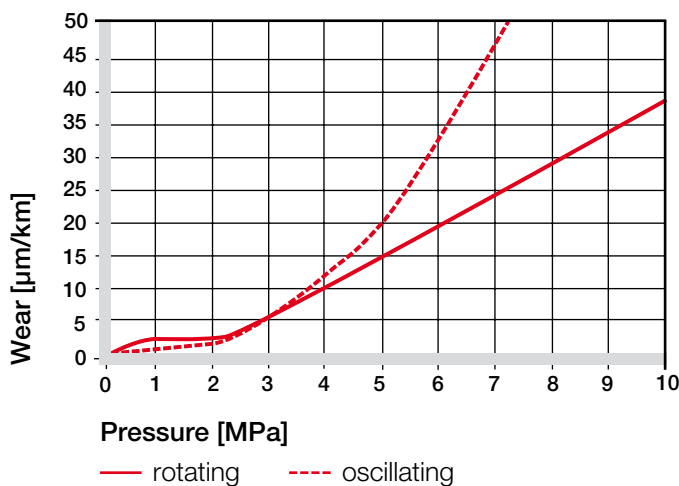


Diagram 09: Wear for oscillating and rotating applications with shaft material Cf53 hardened and ground steel, as a function of the pressure

iglidur® X6	Dry	Greases	Oil	Water
C.o.f. μ	0.09–0.25	0.09	0.04	0.04

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

Additional Properties

Chemical Resistance

iglidur® X6 bearings have almost universal chemical resistance. They are affected only by concentrated nitric acid and sulphuric acid. Due to the low water absorption, the material can be used in humid environment without problems. iglidur® X6 is resistant to most typical detergents used in the food and packaging industries.

► Chemical Table, **page 1118**

Medium	Resistance
Alcohol	+
Hydrocarbons	+
Greases, oils without additives	+
Fuels	+
Diluted acids	+
Strong acids	+
Diluted alkalines	+
Strong alkalines	+

+ resistant 0 conditionally resistant – not resistant

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

Table 05: Chemical resistance

Radiation Resistance

Resistant to radiation up to an intensity of $2 \cdot 10^5 \text{ Gy}$.

UV Resistance

Partly resistant against UV rays.

Vacuum

In a vacuum environment iglidur® X6 plain bearings can be used virtually without restrictions. Outgassing takes place to a very limited extent.

Electrical Properties

iglidur® X6 plain bearings are electrically insulating.

Volume resistance	$< 10^5 \Omega\text{cm}$
Surface resistance	$< 10^3 \Omega$

Moisture Absorption

The moisture absorption of iglidur® X6 plain bearings is approximately 0.1 % in the standard atmosphere. The saturation limit submerged in water is 0.5 %. These values are so low that the swelling only has to be considered in extreme applications.

Maximum moisture absorption

At +23 °C/50 % r.h.	0.1 % weight
Max. water absorption	0.5 % weight

Table 06: Moisture absorption

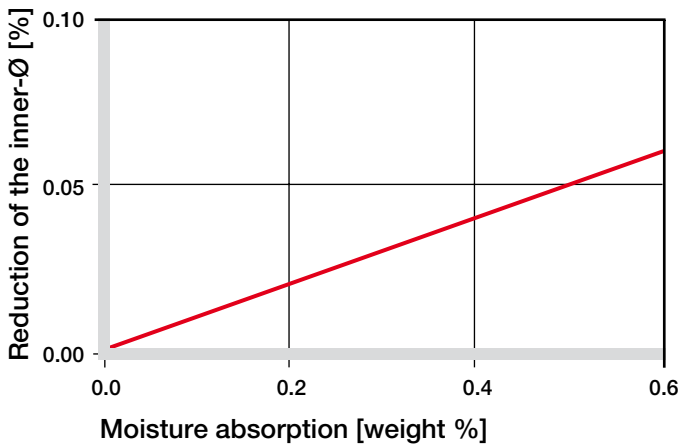


Diagram 10: Effect of moisture absorption on plain bearings

Installation Tolerances

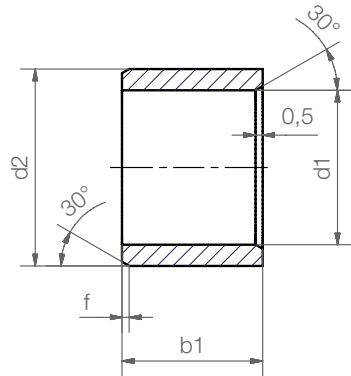
iglidur® X6 plain bearings are standard bearings for shafts with h-tolerance (recommended minimum h9). The bearings are designed for pressfit into a housing machined to a H7 tolerance. After being assembled into a nominal size housing, in standard cases the inner diameter automatically adjusts to the 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 59

Diameter d1 [mm]	Shaft h9 [mm]	iglidur® X6 F10 [mm]	Housing H7 [mm]
up to 3	0–0.025	+0.006 +0.046	0 +0.010
> 3 to 6	0–0.030	+0.010 +0.058	0 +0.012
> 6 to 10	0–0.036	+0.013 +0.071	0 +0.015
> 10 to 18	0–0.043	+0.016 +0.086	0 +0.018
> 18 to 30	0–0.052	+0.020 +0.104	0 +0.021
> 30 to 50	0–0.062	+0.025 +0.125	0 +0.025
> 50 to 80	0–0.074	+0.030 +0.150	0 +0.030

Table 07: Important tolerances for plain bearings according to ISO 3547-1 after pressfit

Sleeve bearing



Order key

X6SM-0304-03



Length b1
Outer diameter d2
Inner diameter d1
Metric
Type (Form S)
Material iglidur® X6

Dimensions according to ISO 3547-1 and special dimensions

Chamfer in relation to the d1

d1 [mm]:	Ø 1-6	Ø 6-12	Ø 12-30	Ø > 30
f [mm]:	0.3	0.5	0.8	1.2

Dimensions [mm]

Part number	d1	d1-Tolerance*	d2	b1 h13
X6SM-0304-03	3.0	+0.006 +0.046	4.5	3.0
X6SM-0507-05	5.0	+0.010 +0.058	7.0	5.0
X6SM-0608-06	6.0	+0.010 +0.058	8.0	6.0
X6SM-0810-10	8.0	+0.013 +0.071	10.0	10.0
X6SM-1012-10	10.0	+0.013 +0.071	12.0	10.0
X6SM-1214-12	12.0	+0.016 +0.086	14.0	12.0
X6SM-1618-15	16.0	+0.016 +0.086	18.0	15.0
X6SM-2023-20	20.0	+0.020 +0.104	23.0	20.0
X6SM-2528-30	25.0	+0.020 +0.104	28.0	30.0
X6SM-3034-30	30.0	+0.020 +0.104	34.0	30.0
X6SM-3539-40	35.0	+0.025 +0.125	39.0	40.0
X6SM-4044-40	40.0	+0.025 +0.125	44.0	40.0

* after pressfit. Testing methods ► page 59

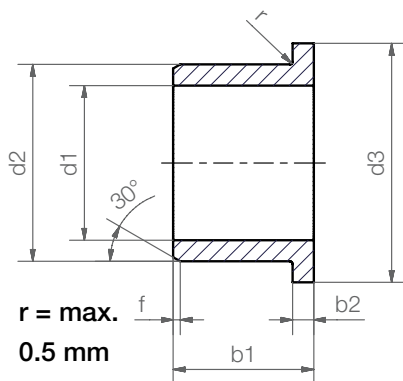


delivery from stock
time



prices price list online
www.igus.co.uk/en/x6

Flange bearing



Order key

X6FM-0304-05



Length b1
Outer diameter d2
Inner diameter d1
Metric
Type (Form F)
Material iglidur® X6

Dimensions according to ISO 3547-1 and special dimensions

Chamfer in relation to the d1

d1 [mm]:	Ø 1-6	Ø 6-12	Ø 12-30	Ø > 30
f [mm]:	0.3	0.5	0.8	1.2

Dimensions [mm]

Part number	d1	d1-Tolerance*	d2	d3 d13	b1 h13	b2 -0.14
X6FM-0304-05	3.0	+0.006 +0.046	4.5	7.5	5.0	0.75
X6FM-0507-05	5.0	+0.010 +0.058	7.0	11.0	5.0	1.0
X6FM-0608-06	6.0	+0.010 +0.058	8.0	12.0	6.0	1.0
X6FM-0810-10	8.0	+0.013 +0.071	10.0	15.0	10.0	1.0
X6FM-1012-10	10.0	+0.013 +0.071	12.0	18.0	10.0	1.0
X6FM-1214-12	12.0	+0.016 +0.086	14.0	20.0	12.0	1.0
X6FM-1618-17	16.0	+0.016 +0.086	18.0	24.0	17.0	1.0
X6FM-2023-21	20.0	+0.020 +0.104	23.0	30.0	21.5	1.5
X6FM-2528-21	25.0	+0.020 +0.104	28.0	35.0	21.5	1.5
X6FM-3034-40	30.0	+0.020 +0.104	34.0	42.0	40.0	2.0
X6FM-3539-26	35.0	+0.025 +0.125	39.0	47.0	26.0	2.0
X6FM-4044-40	40.0	+0.025 +0.125	44.0	52.0	40.0	2.0

* after pressfit. Testing methods ► page 59



Don't find your size?

Do you need another length, other dimensions or tolerances? You need a particular design or alternative for your application? Please call us. igus® listens to your needs and provides you a solution in a very short time.



delivery from stock
time



prices price list online
www.igus.co.uk/en/x6



**For soft shafts, up to +200 °C –
iglidur® V400**



Standard range from stock

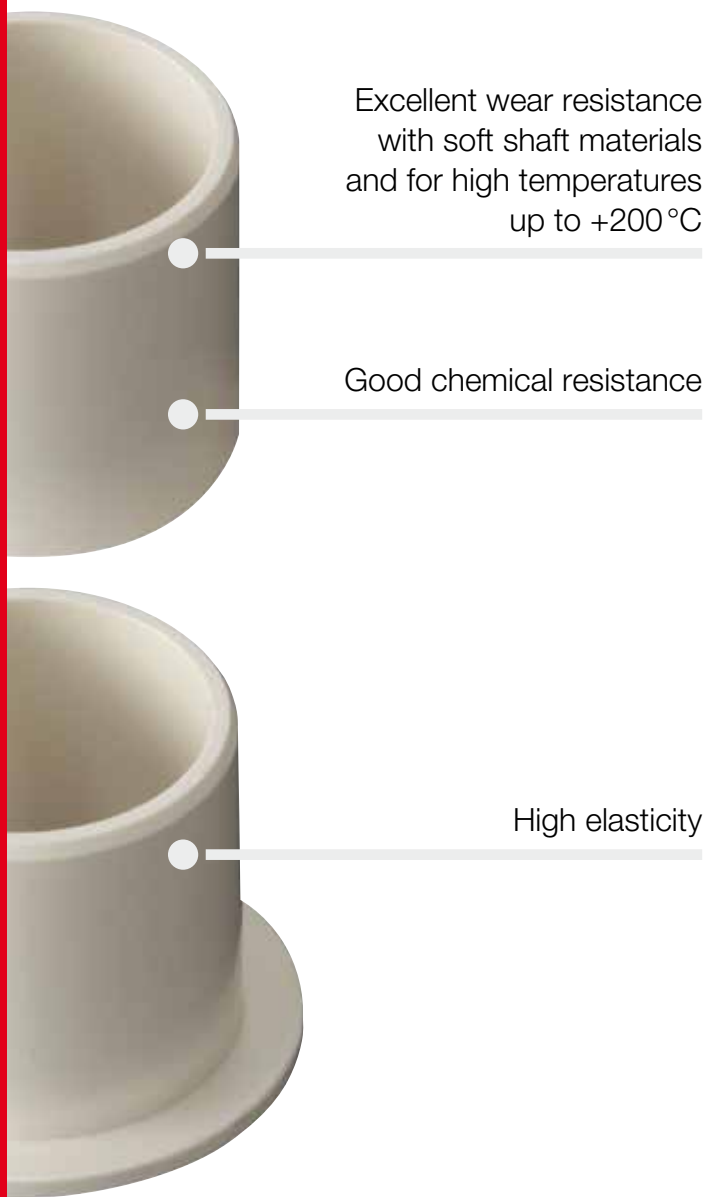
Excellent wear resistance with soft shaft
materials and for temperatures up to +200 °C

Good chemical resistance

High elasticity

iglidur® V400

For soft shafts, up to +200 °C. Highly wear-resistant bearing for soft shafts and temperatures up to +200 °C with low moisture absorption and excellent resistance to chemicals.



When to use it?

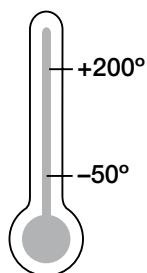
- When extreme wear resistance is required with soft shafts
- For applications at temperatures higher than +100 °C
- When vibrations and edge pressure are present
- When the bearing should be resistant to chemicals



When not to use it?

- For hardened shafts
 - ▶ iglidur® W300, page 135
- For applications at normal temperatures
 - ▶ iglidur® G, page 65
 - ▶ iglidur® J, page 93
 - ▶ iglidur® W300, page 135
- When a cost-effective universal bearing is required
 - ▶ iglidur® G, page 65

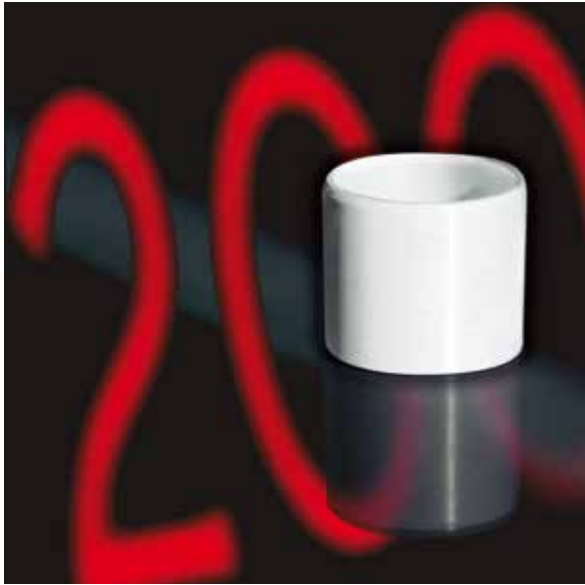
Temperature



Product range

2 types
Ø 6–20 mm
more dimensions
on request





Typical sectors of industry and application areas

- Plant construction ● Automotive
- Automation ● Aerospace engineering
- Mechatronics etc.

Improve technology and reduce costs –
310 exciting examples for iglidur® plain
bearings online

► www.igus.co.uk/iglidur-applications



► www.igus.co.uk/blown-film-line

Material properties table

General properties	Unit	iglidur® V400	Testing method
Density	g/cm ³	1.51	
Colour		white	
Max. moisture absorption at +23 °C/50 % r.h.	% weight	0.1	DIN 53495
Max. water absorption	% weight	0.2	
Coefficient of sliding friction, dynamic against steel	μ	0.15–0.20	
pv value, max. (dry)	MPa · m/s	0.50	
Mechanical properties			
Modulus of elasticity	MPa	4,500	DIN 53457
Tensile strength at +20 °C	MPa	95	DIN 53452
Compressive strength	MPa	47	
Max. recommended surface pressure (+20 °C)	MPa	45	
Shore D hardness		74	DIN 53505
Physical and thermal properties			
Max. long term application temperature	°C	+200	
Max. short term application temperature	°C	+240	
Max. ambient temperature, short term ¹⁾	°C	+250	
Min. 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
Electrical properties			
Specific volume resistance	Ωcm	> 10 ¹²	DIN IEC 93
Surface resistance	Ω	> 10 ¹²	DIN 53482

¹⁾ Without additional load; no sliding movement; relaxation possible

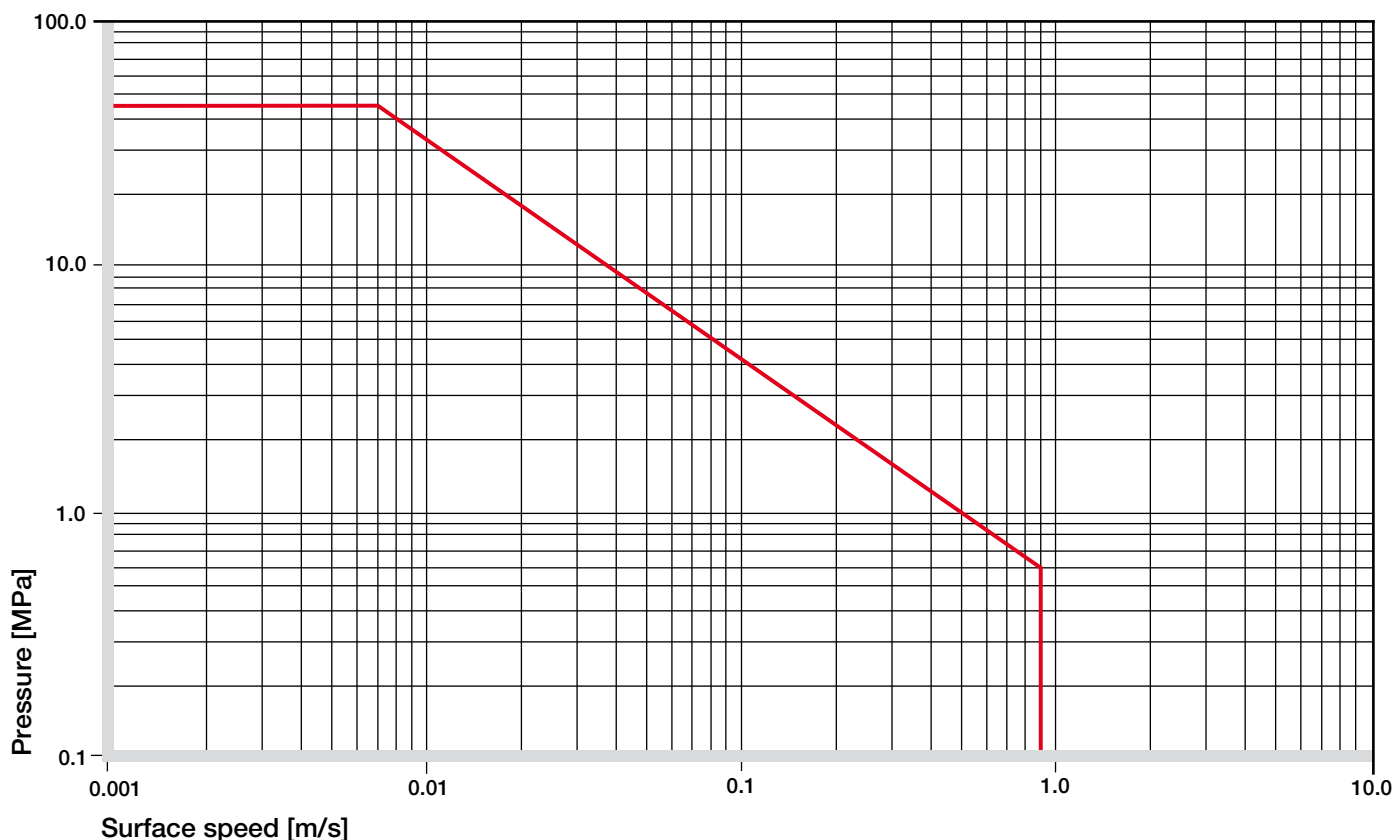
Table 01: Material properties table


Diagram 01: Permissible pv values for iglidur® V400 with a wall thickness of 1 mm dry running against a steel shaft at +20 °C, mounted in a steel housing

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

Mechanical Properties

With increasing temperatures, the compressive strength of iglidur® V400 plain bearings decreases. The Diagram 02 shows this inverserelationship. However, at the longterm maximum temperature of +200 °C the permissible surface pressure is almost 10 MPa. The recommended maximum surface pressure is a mechanical material parameter. No conclusions regarding the tribological properties can be drawn from this.

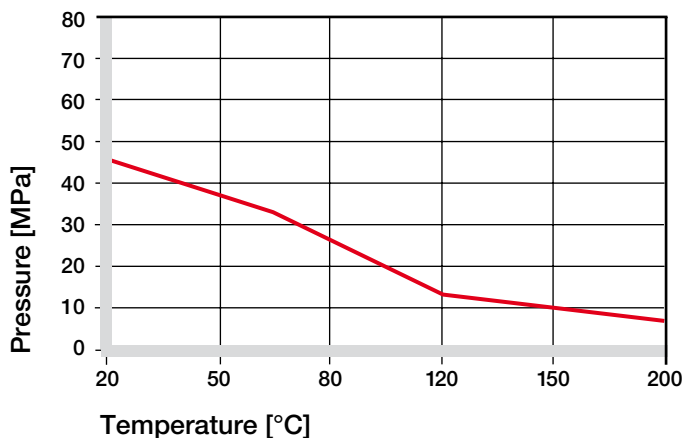


Diagram 02: Recommended maximum surface pressure as a function of temperature (45 MPa at +20 °C)

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

► Surface Pressure, page 47

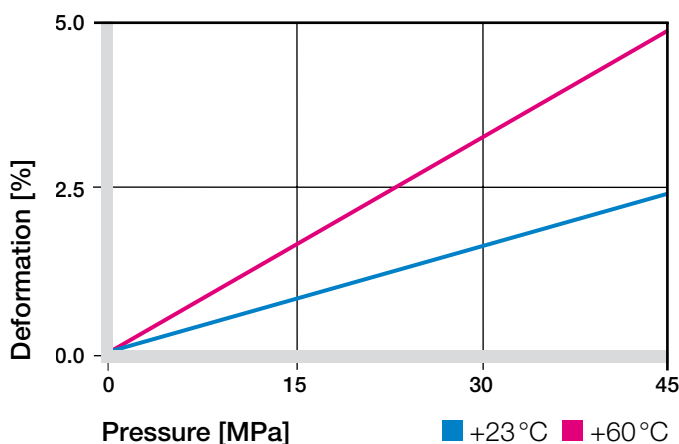


Diagram 03: Deformation under pressure and temperature

Permissible Surface Speeds

iglidur® V400 also permits high surface speeds due to the high temperature resistance. The very favorable coefficients of friction of the bearing enable maximum surface speeds up to 1.3 m/s. Even higher are the permitted speeds for linear movement and 3 m/s can be attained on the short term.

► Surface Speed, page 49

m/s	Rotating	Oscillating	Linear
Continuous	0.9	0.6	2
Short term	1.3	0.9	3

Table 02: Maximum running speed

Temperatures

The long-term maximum permissible application temperature is +200 °C, although at these temperatures the bearings have to be mechanically secured. Then, however, the wear resistance of the bearings is very good and adopts a leading position among all iglidur® materials. The compressive strength of iglidur® V400 plain bearings decreases with increasing temperatures. Diagram 02 clarifies this connection.

► Application Temperatures, page 50

iglidur® V400	Application temperature
Minimum	-50 °C
Max. long term	+200 °C
Max. short term	+240 °C
Add. securing is required from	+100 °C

Table 03: Temperature limits

Friction and Wear

The coefficient of friction is dependent on the bearing's stressing capacity. When pv values exceed the permitted range, the bearings respond with a rise in coefficient of friction. As long as the loads are in the permitted range, the coefficient of friction of the bearing is very low. Furthermore, the coefficients of friction of iglidur® V400 are very constant. No other iglidur® bearing material exhibits a lower variance in the coefficients of friction, even when the shaft material is altered.

► Coefficients of Friction and Surfaces, **page 52**

► Wear Resistance, **page 53**

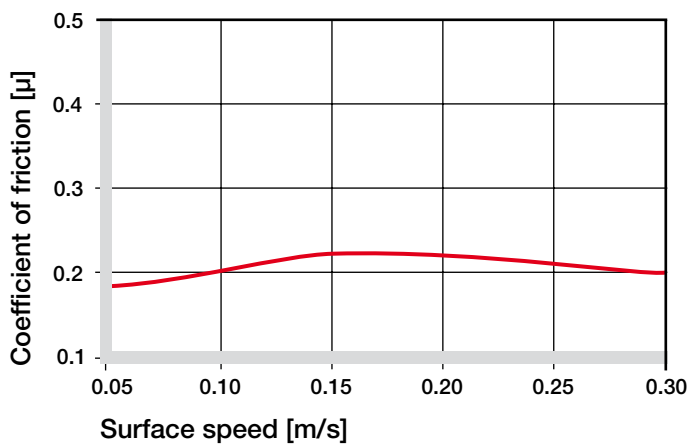


Diagram 04: Coefficient of friction as a function of the running speed, $p = 0.75 \text{ MPa}$

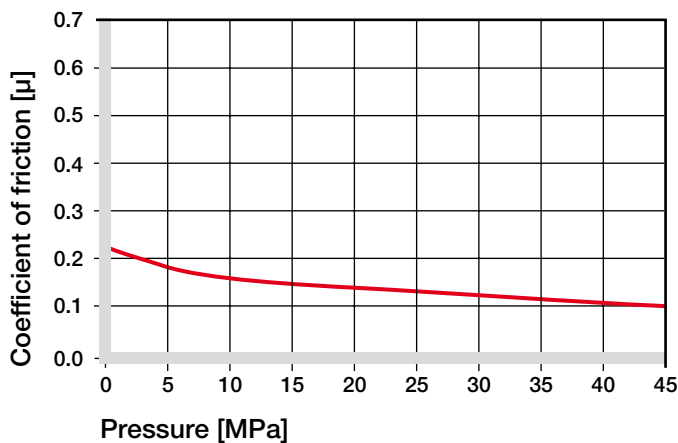


Diagram 05: Coefficient of friction as a function of the pressure, $v = 0.01 \text{ m/s}$

Shaft Materials

The influence of the shaft material on the wear resistance is bigger than on the friction. Here, even at low loads (0.75 MPa), significant differences occur, as shown in Diagram 07. With regard to wear, iglidur® V400 is better suitable for rotating applications rather than oscillating applications.

► Shaft Materials, **page 55**

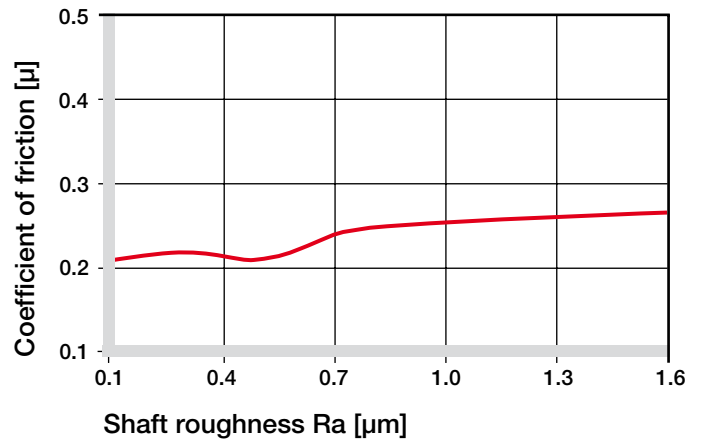


Diagram 06: Coefficient of friction as function of the shaft surface (Cf53 hardened and ground steel)

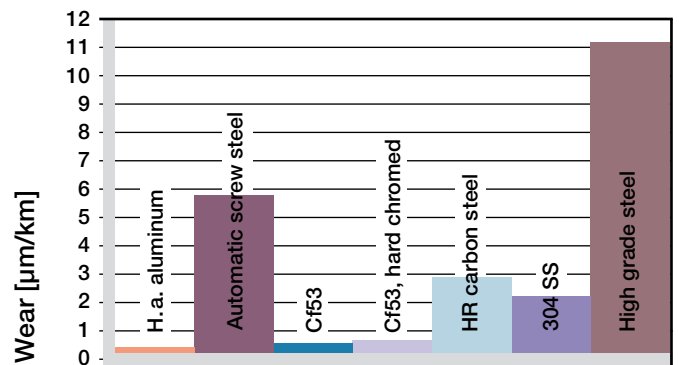


Diagram 07: Wear, rotating with different shaft materials, pressure $p = 1 \text{ MPa}$, $v = 0.3 \text{ m/s}$

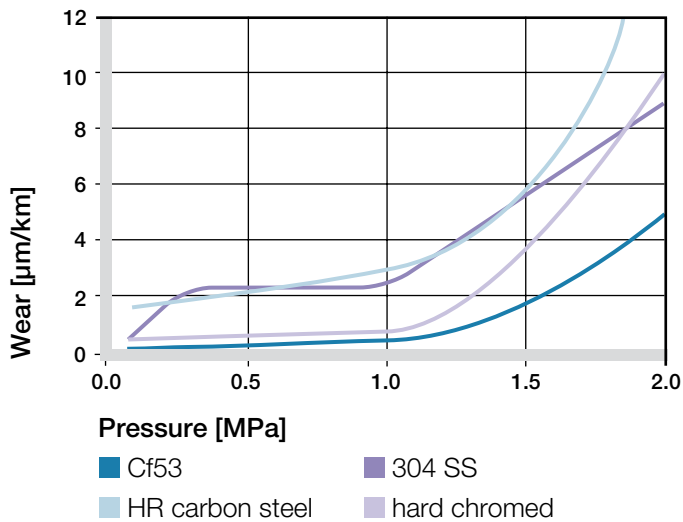


Diagram 08: Wear with different shaft materials in rotational operation, as a function of the pressure

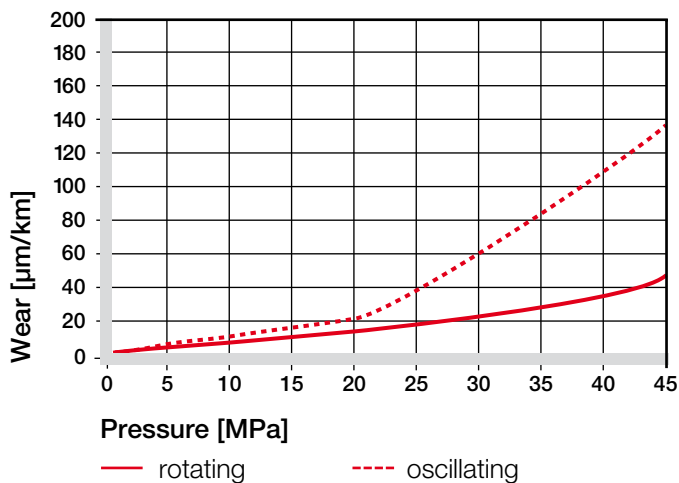


Diagram 09: Wear for oscillating and rotating applications with shaft material Cf53 hardened and ground steel, as a function of the pressure

iglidur® V400	Dry	Greases	Oil	Water
C.o.f. μ	0.15–0.20	0.09	0.04	0.04

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

Additional Properties

Chemical Resistance

iglidur® V400 plain bearings feature good chemical resistance. They are resistant to detergents, greases, oils, alcohol, solvents, diluted bases, as well as to diluted acids.

► Chemical Table, page 1118

Medium	Resistance
Alcohol	+
Hydrocarbons	+
Greases, oils without additives	+
Fuels	+
Diluted acids	+
Strong acids	+
Diluted alkalines	+
Strong alkalines	–

+ resistant 0 conditionally resistant – not resistant
All data given at room temperature [$+20^\circ\text{C}$]

Table 05: Chemical resistance

Radiation Resistance

Plain bearings of iglidur® V400 are resistant to a radiation intensity of $2 \cdot 10^4 \text{ Gy}$. Higher radiation affects the material and can result in a loss of important mechanical characteristics.

UV Resistance

iglidur® V400 plain bearings are resistant to UV radiation to a large extent.

Vacuum

In the vacuum, iglidur® V400 plain bearings can only be used to a limited extent. Outgassing takes place.

Electrical Properties

iglidur® V400 plain bearings are electrically insulating.

Volume resistance	$> 10^{12} \Omega\text{cm}$
Surface resistance	$> 10^{12} \Omega$

Moisture Absorption

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

Maximum moisture absorption

At +23 °C/50 % r.h. 0.1 % weight

Max. water absorption 0.2 % weight

Table 06: Moisture absorption

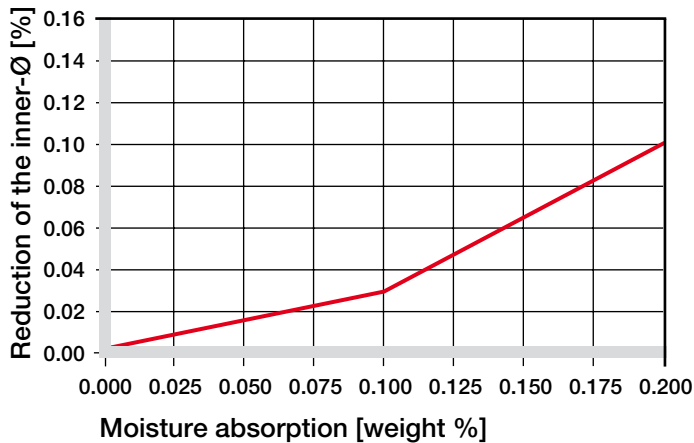


Diagram 10: Effect of moisture absorption on plain bearings

Installation Tolerances

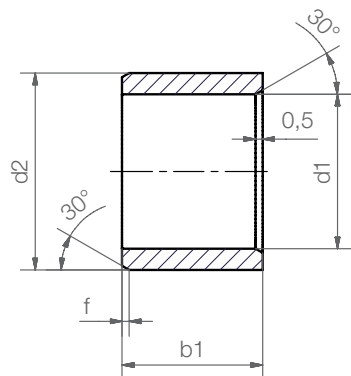
iglidur® V400 plain bearings are standard bearings for shafts with h-tolerance (recommended minimum h9). The bearings are designed for pressfit into a housing machined to a H7 tolerance. After being assembled into a nominal size housing, in standard cases the inner diameter automatically adjusts to the F10 tolerances. For particular dimensions the tolerance differs depending on the wall thickness (please see product range table).

► Testing Methods, **page 59**

Diameter d1 [mm]	Shaft h9 [mm]	iglidur® V400 F10 [mm]	Housing H7 [mm]
up to 3	0–0.025	+0.006 +0.046	0 +0.010
> 3 to 6	0–0.030	+0.010 +0.058	0 +0.012
> 6 to 10	0–0.036	+0.013 +0.071	0 +0.015
> 10 to 18	0–0.043	+0.016 +0.086	0 +0.018
> 18 to 30	0–0.052	+0.020 +0.104	0 +0.021
> 30 to 50	0–0.062	+0.025 +0.125	0 +0.025
> 50 to 80	0–0.074	+0.030 +0.150	0 +0.030

Table 07: Important tolerances for plain bearings according to ISO 3547-1 after pressfit

Sleeve bearing



Order key

VSM-0608-06



Length b1
Outer diameter d2
Inner diameter d1
Metric
Type (Form S)
Material iglidur® V400

Dimensions according to ISO 3547-1 and special dimensions

Chamfer in relation to the d1

d1 [mm]:	Ø 1-6	Ø 6-12	Ø 12-30	Ø > 30
f [mm]:	0.3	0.5	0.8	1.2

Dimensions [mm]

Part number	d1	d1-Tolerance*	d2	b1 h13
VSM-0608-06	6.0	+0.010 +0.058	8.0	6.0
VSM-0810-10	8.0	+0.013 +0.071	10.0	10.0
VSM-1012-10	10.0	+0.013 +0.071	12.0	10.0
VSM-1214-12	12.0	+0.016 +0.086	14.0	12.0
VSM-1618-15	16.0	+0.016 +0.086	18.0	15.0
VSM-2023-20	20.0	+0.020 +0.104	23.0	20.0

* after pressfit. Testing methods ► page 59



Even more dimensions from stock

More than 300 dimensions are now available. Search online for your required bearing.

► www.igus.co.uk/iglidur-specialbearings

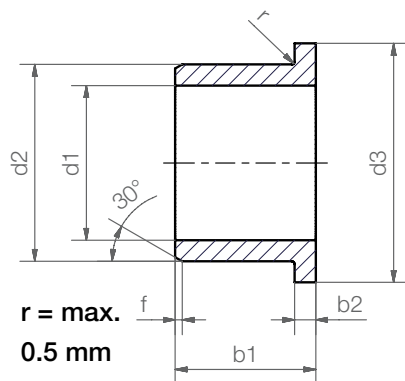


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time



prices price list online
www.igus.co.uk/en/v400

Flange bearing



Order key

VFM-0608-06



Length b1

Outer diameter d2

Inner diameter d1

Metric

Type (Form F)

Material iglidur® V400

Dimensions according to ISO 3547-1 and special dimensions

Chamfer in relation to the d1

d1 [mm]:	Ø 1-6	Ø 6-12	Ø 12-30	Ø > 30
f [mm]:	0.3	0.5	0.8	1.2

Dimensions [mm]

Part number	d1	d1-Tolerance*	d2	d3 d13	b1 h13	b2 -0.14
VFM-0608-06	6.0	+0.010 +0.058	8.0	12.0	6.0	1.0
VFM-0810-10	8.0	+0.013 +0.071	10.0	15.0	10.0	1.0
VFM-1012-10	10.0	+0.013 +0.071	12.0	18.0	10.0	1.0
VFM-1214-12	12.0	+0.016 +0.086	14.0	20.0	12.0	1.0
VFM-1618-17	16.0	+0.016 +0.086	18.0	24.0	17.0	1.0
VFM-1820-20	18.0	+0.020 +0.104	20.0	26.0	20.0	1.0
VFM-2023-21	20.0	+0.020 +0.104	23.0	30.0	21.5	1.5

* after pressfit. Testing methods ► page 59



Don't find your size?

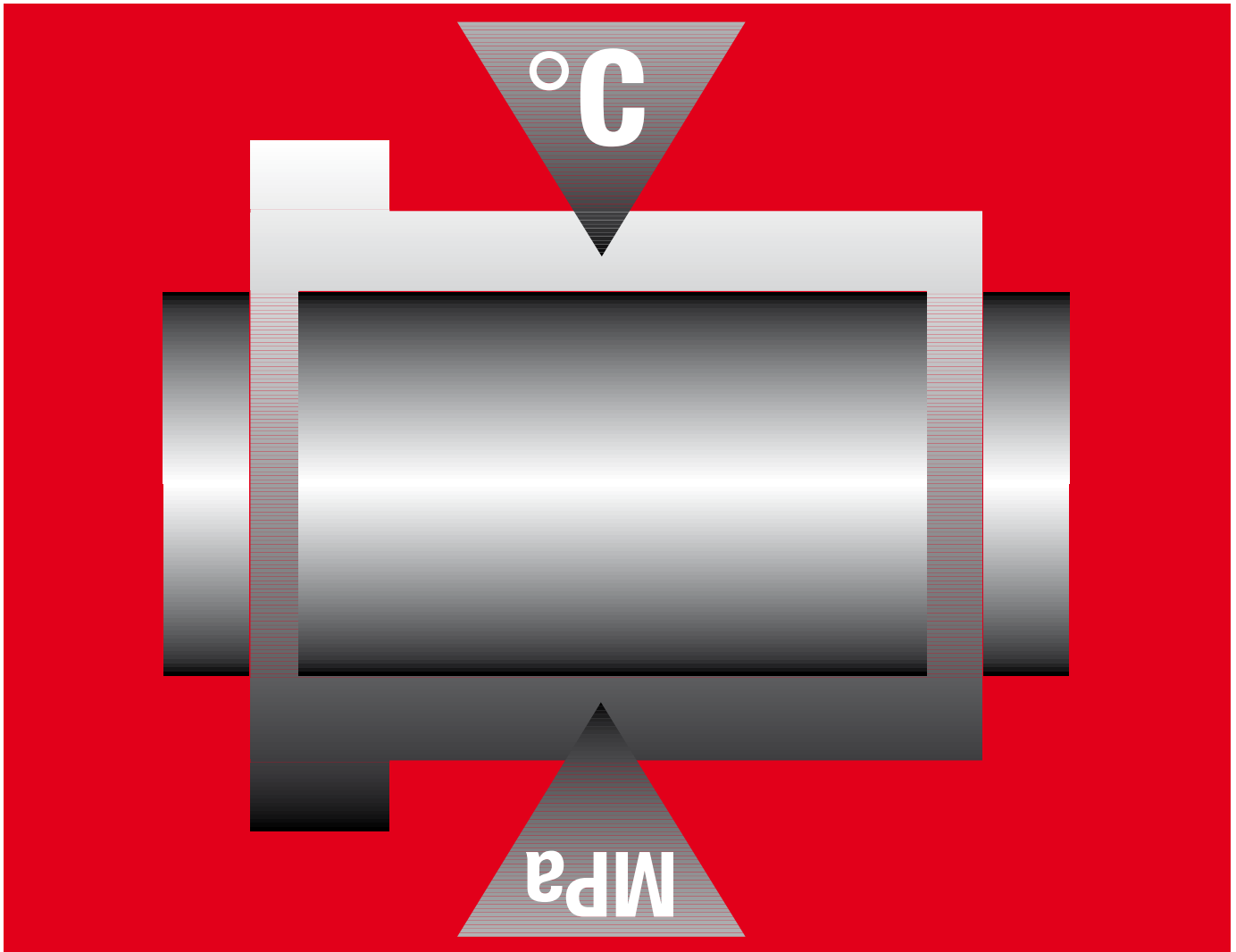
Do you need another length, other dimensions or tolerances? You need a particular design or alternative for your application? Please call us. igus® listens to your needs and provides you a solution in a very short time.



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For high dynamic loads, wear resistant – iglidur® Z



Standard range from stock

Excellent wear resistance especially with high loads

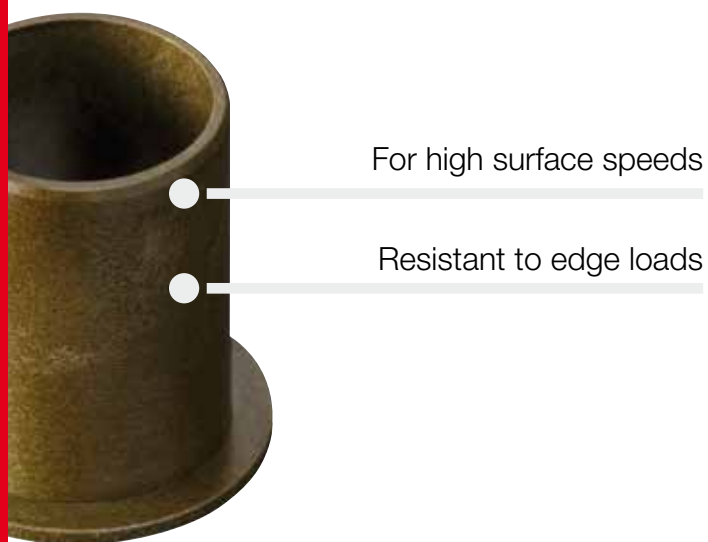
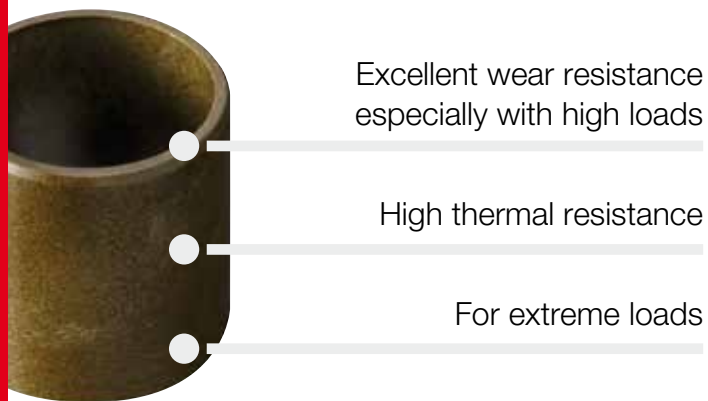
High thermal resistance

For extreme loads

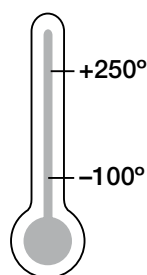
For high surface speeds

Resistant to edge loads

For high dynamic loads, wear resistant. Extremely high compressive strength coupled with high elasticity enables iglidur® Z bearings to attain their prominent features in association with soft shafts, edge loads and impacts. The bearings are at the same time suitable for temperatures up to +250 °C.



Temperature



When to use it?

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



When not to use it?

- For low loads and temperatures
▶ iglidur® P, page 179
- When a cost-effective general purpose bearing is sought
▶ iglidur® G, page 65
- When electrically conductive bearings are needed
▶ iglidur® F, page 302
▶ iglidur® H, page 337
▶ iglidur® H370, page 359

Product range

3 types
Ø 4–100 mm
more dimensions
on request

iglidur® Z | Application Examples



Typical sectors of industry and application areas

- Construction machinery
- Machine building ● Textile technology
- Aerospace engineering
- Glass industry etc.

Improve technology and reduce costs –
310 exciting examples for iglidur® plain bearings online

► www.igus.co.uk/iglidur-applications



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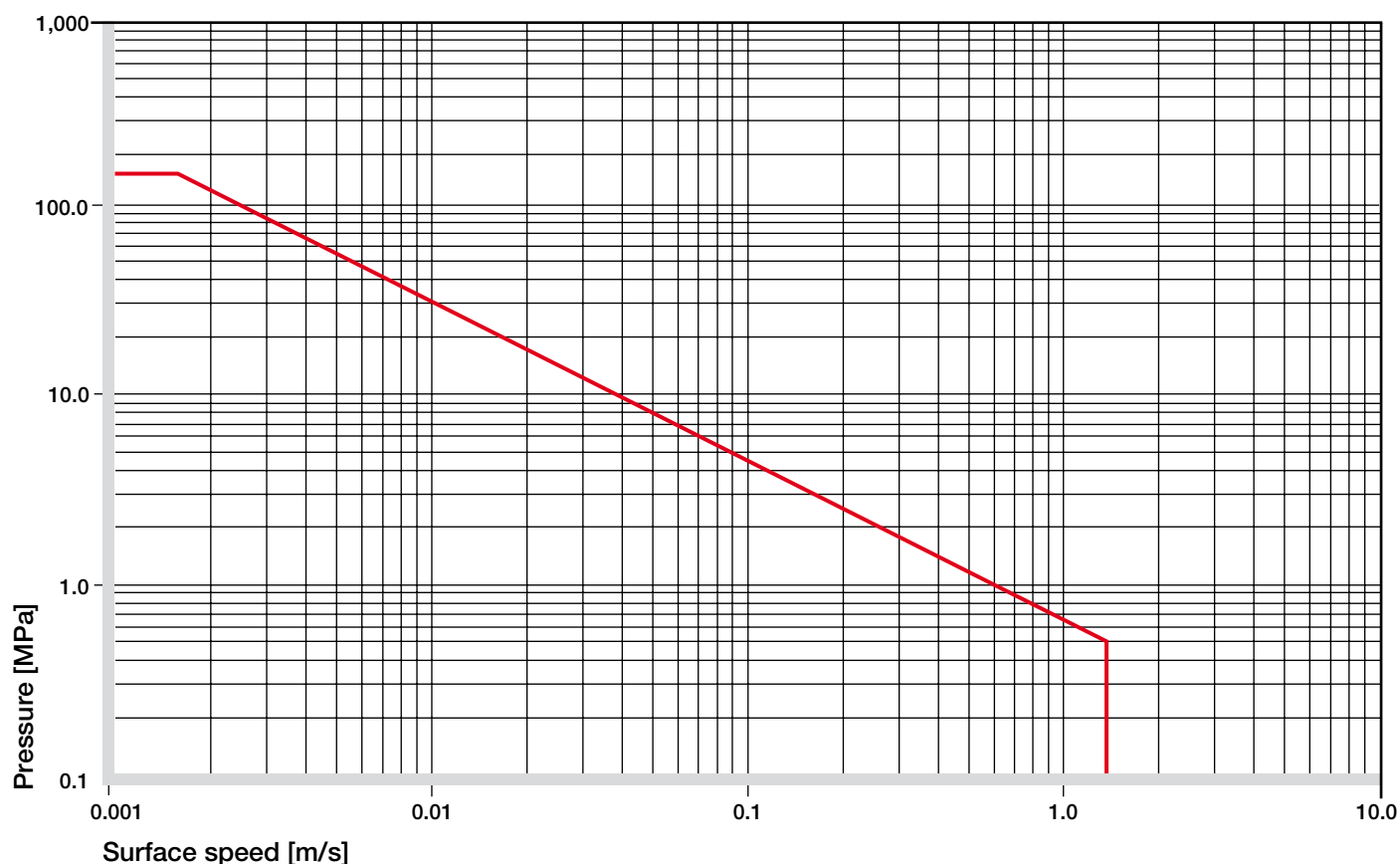
► www.igus.co.uk/mooring-system



► www.igus.co.uk/railroad-platform

Material properties table

General Properties	Unit	iglidur® Z	Testing method
Density	g/cm ³	1.40	
Colour		brown	
Max. moisture absorption at +23 °C/50 % r.h.	% weight	0.3	DIN 53495
Max. water absorption	% weight	1.1	
Coefficient of sliding friction, dynamic against steel	μ	0.06–0.14	
pv value, max. (dry)	MPa · m/s	0.84	
Mechanical properties			
Modulus of elasticity	MPa	2,400	DIN 53457
Tensile 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. long term application temperature	°C	+250	
Max. short term application temperature	°C	+310	
Min. application temperature	°C	–100	
Thermal conductivity	W/m · K	0.62	ASTM C 177
Coefficient of thermal expansion (at +23 °C)	K ^{–1} · 10 ^{–5}	4	DIN 53752
Electrical properties			
Specific volume resistance	Ωcm	> 10 ¹¹	DIN IEC 93
Surface resistance	Ω	> 10 ¹¹	DIN 53482

Table 01: Material properties table

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

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

Mechanical Properties

With increasing temperatures, the compressive strength of iglidur® Z plain bearings decreases. The Diagram 02 shows this inverse relationship. However, at the longterm maximum temperature of +250 °C the permissible surface pressure is almost 45 MPa. The recommended maximum surface pressure is a mechanical material parameter. No conclusions regarding the tribological properties can be drawn from this.

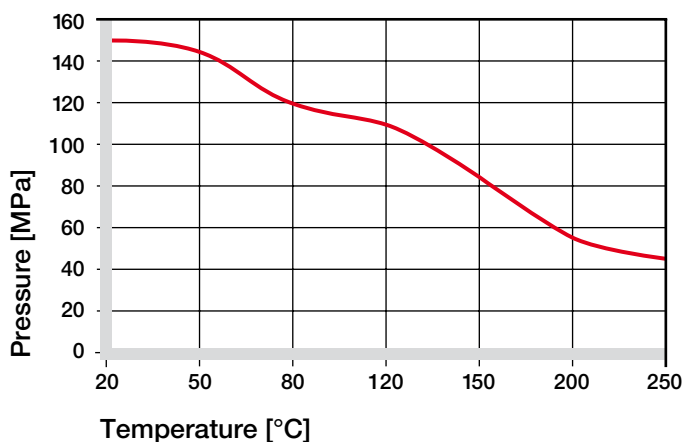


Diagram 02: Recommended maximum surface pressure as a function of temperature (150 MPa at +20 °C)

iglidur® Z is suited for both average and high speeds due to its high thermal resistance. Diagram 03 shows the elastic deformation of iglidur® Z at radial loads. At the recommended maximum surface pressure of 150 MPa the deformation is ca. 5.5 %.

► Surface Pressure, page 47

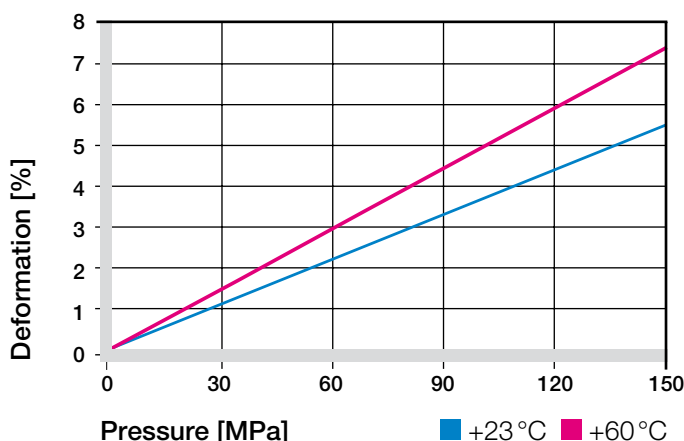


Diagram 03: Deformation under pressure and temperature

Permissible Surface Speeds

iglidur® Z is a high temperature bearing material, which is suited for applications with very high specific loads. The maximum values shown in table 02 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 temperature level is rarely reached, due to varying application conditions.

► Surface Speed, page 49

m/s	Rotating	Oscillating	Linear
Continuous	1.5	1.1	5
Short term	3.5	2.5	6

Table 02: Maximum running speed

Temperatures

The maximum permissible short term temperature is +310 °C. This is among the highest thermal resistance of any iglidur® material. Abb. 02 shows this relationship.

The ambient temperatures in the bearing system also have an effect on the bearing wear. With increasing temperatures, the wear rate increases.

At high temperatures iglidur® Z is also the most wear resistant material when running dry.

► Application Temperatures, page 50

iglidur® Z	Application temperature
Minimum	-100 °C
Max. long term	+250 °C
Max. short term	+310 °C
Add. securing is required from	+145 °C

Table 03: Temperature limits

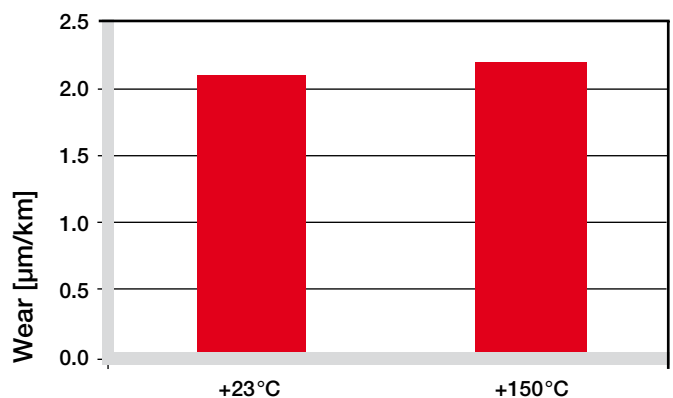


Diagram 04: Wear as a function of temperature, rotation with p = 0.75 MPa, v = 0.5 m/s (CF53 hardened and ground steel)

Friction and Wear

The coefficient of friction declines just as the wear resistance with increasing load.

Friction and wear also depend to a high degree on the reverse partner. Very smooth shafts increase the coefficient of both friction and wear. iglidur® Z proves to be relatively insensitive with regard to the shaft surface. The best suited is a smoothed surface with an average surface finish coefficient of friction 0.4 to 0.7 μm , if the friction should be minimized.

► Coefficients of Friction and Surfaces, **page 52**

► Wear Resistance, **page 53**

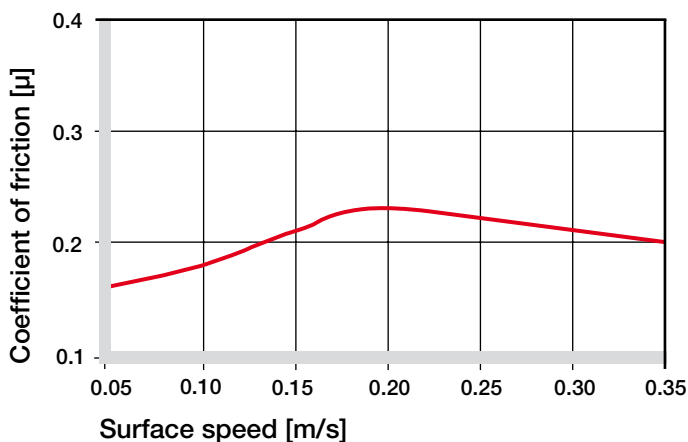


Diagram 05: Coefficient of friction as a function of the running speed, $p = 0.75 \text{ MPa}$

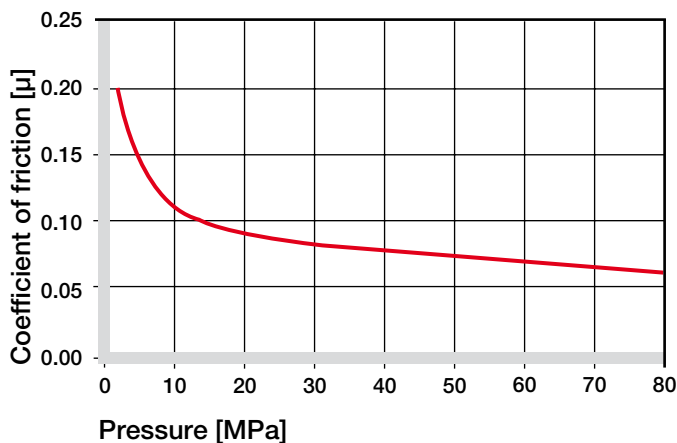


Diagram 06: Coefficient of friction as a function of the pressure, $v = 0.01 \text{ m/s}$

Shaft Materials

Diagrams 08-11 show 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 at 45 MPa still only 15 $\mu\text{m}/\text{km}$.

At low loads iglidur® Z plain bearings wear less in oscillating operation than in rotation. 304 Stainless Steel and hard chromed shaft are of interest here.

► Shaft Materials, **page 55**

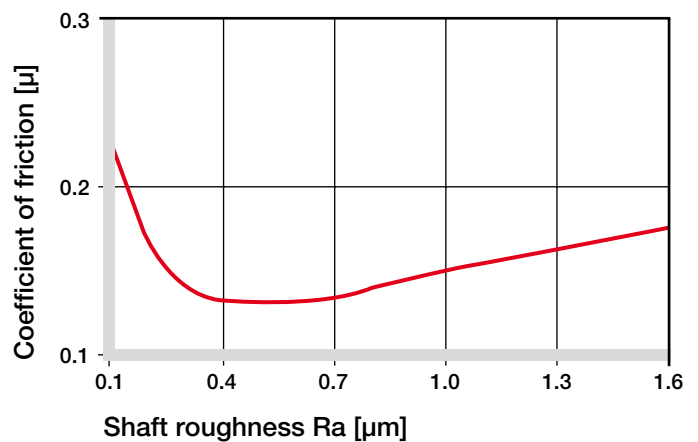


Diagram 07: Coefficient of friction as a function of the shaft surface (Cf53 hardened and ground steel)

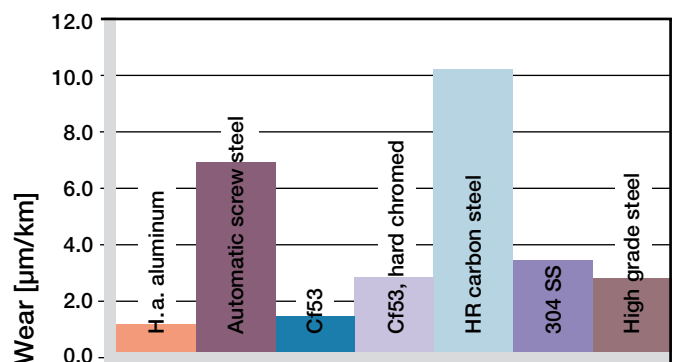


Diagram 08: Wear, rotating with different shaft materials, pressure $p = 1 \text{ MPa}$, $v = 0.3 \text{ m/s}$

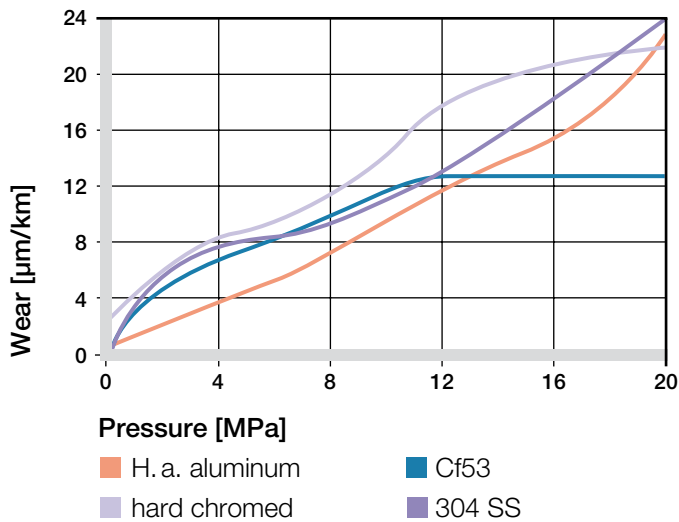


Diagram 09: Wear with different shaft materials in rotational operation, as a function of the pressure

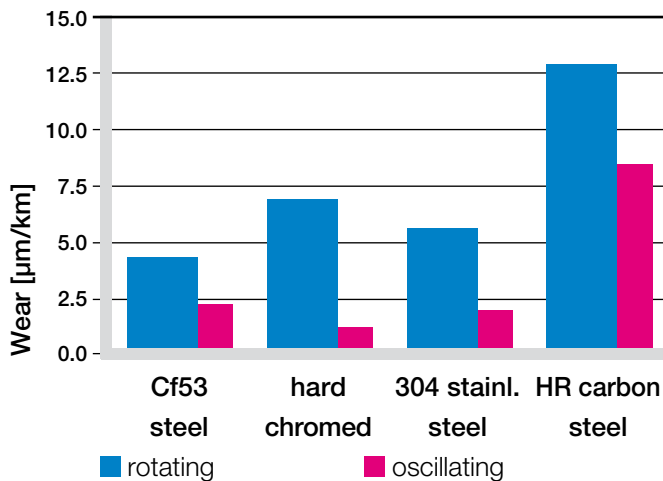


Diagram 10: Wear for rotating and oscillating applications with different shaft materials, $p = 2$ MPa

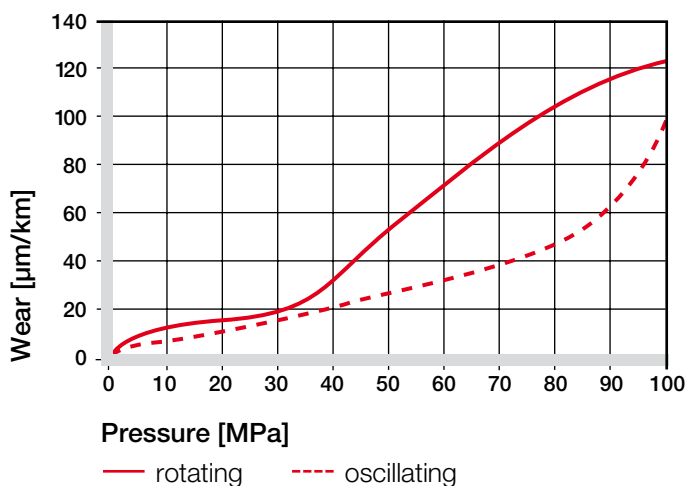


Diagram 11: Wear for oscillating and rotating applications with shaft material Cf53 hardened and ground steel, as a function of the pressure

iglidur® Z	Dry	Greases	Oil	Water
C.o.f. μ	0.06–0.14	0.09	0.04	0.04

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

Additional Properties

Chemical Resistance

iglidur® Z plain bearings have a very good resistance to chemicals. They have an excellent resistance against organic solvents, fuels, oils and greases. The material is only partially resistant against weak acids.

► Chemical Table, page 1118

Medium	Resistance
Alcohol	0
Hydrocarbons	+
Greases, oils without additives	+
Fuels	+
Diluted acids	+
Strong acids	–
Diluted alkalines	+
Strong alkalines	–

+ resistant 0 conditionally resistant – not resistant

All data given at room temperature [$+20^\circ\text{C}$]

Table 05: Chemical resistance

Radiation Resistance

Plain bearings made from iglidur® Z are resistant to radiation up to an intensity of $1 \cdot 10^5$ Gy.

UV Resistance

UV radiation causes approximately 50 % decline of the tribological properties (wear resistance) of plain bearings made from iglidur® Z.

Vacuum

For use in a vacuum environment, moisture content is released as vapour. Therefore, only dehumidified bearings made of iglidur® Z are suitable for a vacuum environment.

Electrical Properties

iglidur® Z plain bearings are electrically insulating.

Volume resistance	$> 10^{11} \Omega\text{cm}$
Surface resistance	$> 10^{11} \Omega$

Moisture Absorption

The moisture absorption of iglidur® Z plain bearings is approximately 0.3% in standard atmosphere. The saturation limit in water is 1.1%.

Maximum moisture absorption

At +23 °C/50 % r.h. 0.3 % weight

Max. water absorption 1.1 % weight

Table 06: Moisture absorption

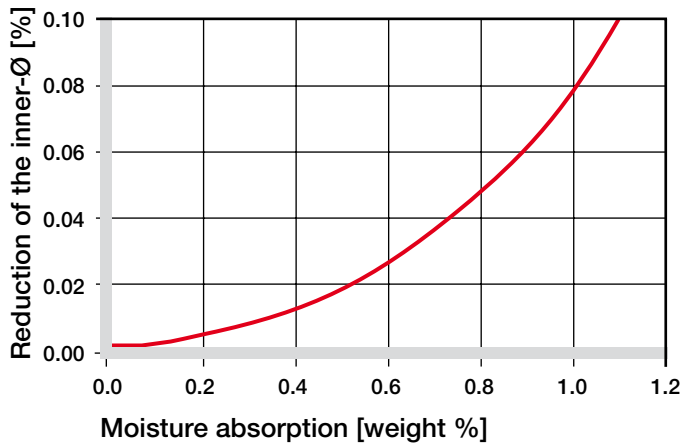


Diagram 12: Effect of moisture absorption on plain bearings

Installation Tolerances

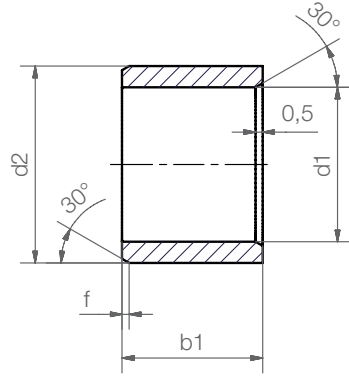
iglidur® Z plain bearings are standard bearings for shafts with h-tolerance (recommended minimum h9). The bearings are designed for pressfit into a housing machined to a H7 tolerance. After being assembled into a nominal size housing, in standard cases the inner diameter automatically adjusts to the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

► Testing Methods, page 59

Diameter d1 [mm]	Shaft h9 [mm]	iglidur® Z F10 [mm]	Housing H7 [mm]
up to 3	0–0.025	+0.006 +0.046	0 +0.010
> 3 to 6	0–0.030	+0.010 +0.058	0 +0.012
> 6 to 10	0–0.036	+0.013 +0.071	0 +0.015
> 10 to 18	0–0.043	+0.016 +0.086	0 +0.018
> 18 to 30	0–0.052	+0.020 +0.104	0 +0.021
> 30 to 50	0–0.062	+0.025 +0.125	0 +0.025
> 50 to 80	0–0.074	+0.030 +0.150	0 +0.030

Table 07: Important tolerances for plain bearings according to ISO 3547-1 after pressfit

Sleeve bearing



Order key

ZSM-0405-04



Length b1
Outer diameter d2
Inner diameter d1
Metric
Type (Form S)
Material iglidur® Z

Dimensions according to ISO 3547-1 and special dimensions

Chamfer in relation to the d1

d1 [mm]:	Ø 1-6	Ø 6-12	Ø 12-30	Ø > 30
f [mm]:	0.3	0.5	0.8	1.2

Dimensions [mm]

Part number	d1	d1-Tolerance*	d2	b1 h13
ZSM-0405-04	4.0	+0.010 +0.058	5.5	4.0
ZSM-0507-05	5.0	+0.010 +0.058	7.0	5.0
ZSM-0507-09	5.0	+0.010 +0.058	7.0	9.0
ZSM-0608-06	6.0	+0.010 +0.058	8.0	6.0
ZSM-0608-08	6.0	+0.010 +0.058	8.0	8.0
ZSM-0608-12	6.0	+0.010 +0.058	8.0	12.0
ZSM-0610-06	6.0	+0.010 +0.058	10.0	6.0
ZSM-0810-06	8.0	+0.013 +0.071	10.0	6.0
ZSM-0810-08	8.0	+0.013 +0.071	10.0	8.0
ZSM-0810-10	8.0	+0.013 +0.071	10.0	10.0
ZSM-1012-08	10.0	+0.013 +0.071	12.0	8.0
ZSM-1012-10	10.0	+0.013 +0.071	12.0	10.0
ZSM-1012-12	10.0	+0.013 +0.071	12.0	12.0
ZSM-1214-08	12.0	+0.016 +0.086	14.0	8.0
ZSM-1214-15	12.0	+0.016 +0.086	14.0	15.0
ZSM-1416-20	14.0	+0.016 +0.086	16.0	20.0
ZSM-1517-15	15.0	+0.016 +0.086	17.0	15.0
ZSM-1517-20	15.0	+0.016 +0.086	17.0	20.0
ZSM-1517-22	15.0	+0.016 +0.086	17.0	22.0
ZSM-1618-12	16.0	+0.016 +0.086	18.0	12.0
ZSM-1618-15	16.0	+0.016 +0.086	18.0	15.0
ZSM-1820-20	18.0	+0.016 +0.086	20.0	20.0
ZSM-1820-24	18.0	+0.016 +0.086	20.0	24.0
ZSM-2023-10	20.0	+0.020 +0.104	23.0	10.0
ZSM-2023-15	20.0	+0.020 +0.104	23.0	15.0
ZSM-2023-20	20.0	+0.020 +0.104	23.0	20.0

Part number	d1	d1-Tolerance*	d2	b1 h13
ZSM-2023-30	20.0	+0.020 +0.104	23.0	30.0
ZSM-2023-35	20.0	+0.020 +0.104	23.0	35.0
ZSM-2224-30	22.0	+0.020 +0.104	24.0	30.0
ZSM-2225-20	22.0	+0.020 +0.104	25.0	20.0
ZSM-2528-15	25.0	+0.020 +0.104	28.0	15.0
ZSM-2528-20	25.0	+0.020 +0.104	28.0	20.0
ZSM-2528-30	25.0	+0.020 +0.104	28.0	30.0
ZSM-2528-48	25.0	+0.020 +0.104	28.0	48.0
ZSM-2630-34	26.0	+0.020 +0.104	30.0	34.0
ZSM-2834-29	28.0	+0.020 +0.104	34.0	29.0
ZSM-3034-20	30.0	+0.020 +0.104	34.0	20.0
ZSM-3034-30	30.0	+0.020 +0.104	34.0	30.0
ZSM-3034-40	30.0	+0.020 +0.104	34.0	40.0
ZSM-3539-20	35.0	+0.025 +0.125	39.0	20.0
ZSM-4044-15	40.0	+0.025 +0.125	44.0	15.0
ZSM-4044-40	40.0	+0.025 +0.125	44.0	40.0
ZSM-4044-47	40.0	+0.025 +0.125	44.0	47.0
ZSM-4550-40	45.0	+0.025 +0.125	50.0	40.0
ZSM-5055-50	50.0	+0.025 +0.125	55.0	50.0
ZSM-5055-60	50.0	+0.025 +0.125	55.0	60.0
ZSM-5560-60	55.0	+0.030 +0.150	60.0	60.0
ZSM-6065-60	60.0	+0.030 +0.150	65.0	60.0
ZSM-7075-70	70.0	+0.030 +0.150	75.0	70.0
ZSM-8085-60	80.0	+0.030 +0.150	85.0	60.0
ZSM-100105-100	100.0	+0.072 +0.212	105.0	100.0

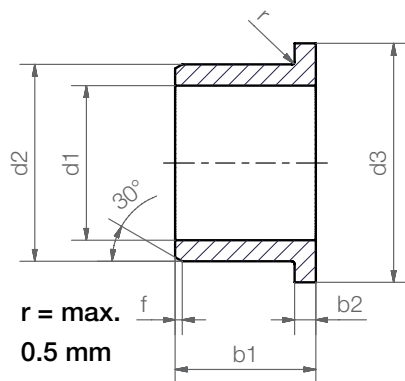
* after pressfit. Testing methods ► page 59



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Flange bearing

Order key
ZFM-0405-04


Length b1
Outer diameter d2
Inner diameter d1
Metric
Type (Form F)
Material iglidur® Z

Dimensions according to ISO 3547-1 and special dimensions
Chamfer in relation to the d1

d1 [mm]:	Ø 1-6	Ø 6-12	Ø 12-30	Ø > 30
f [mm]:	0.3	0.5	0.8	1.2

Dimensions [mm]

Part number	d1	d1-Tolerance*	d2	d3 d13	b1 h13	b2 -0.14
ZFM-0405-04	4.0	+0.010 +0.058	5.5	9.5	4.0	0.75
ZFM-0507-05	5.0	+0.010 +0.058	7.0	11.0	5.0	1.0
ZFM-0608-08	6.0	+0.010 +0.058	8.0	12.0	8.0	1.0
ZFM-0810-055	8.0	+0.013 +0.071	10.0	15.0	5.5	1.0
ZFM-0810-09	8.0	+0.013 +0.071	10.0	15.0	9.0	1.0
ZFM-1012-05	10.0	+0.013 +0.071	12.0	18.0	5.0	1.0
ZFM-1012-09	10.0	+0.013 +0.071	12.0	18.0	9.0	1.0
ZFM-1012-15	10.0	+0.013 +0.071	12.0	18.0	15.0	1.0
ZFM-101315-05	10.0	+0.013 +0.071	13.0	15.0	5.5	1.5
ZFM-1214-09	12.0	+0.016 +0.086	14.0	20.0	9.0	1.0
ZFM-1214-12	12.0	+0.016 +0.086	14.0	20.0	12.0	1.0
ZFM-1214-20	12.0	+0.016 +0.086	14.0	20.0	20.0	1.0
ZFM-1416-17	14.0	+0.016 +0.086	16.0	22.0	17.0	1.0
ZFM-1517-11	15.0	+0.016 +0.086	17.0	23.0	11.0	1.0
ZFM-1517-15	15.0	+0.016 +0.086	17.0	23.0	15.0	1.0
ZFM-151723-23	15.0	+0.016 +0.086	17.0	23.0	23.0	1.0
ZFM-1618-12	16.0	+0.016 +0.086	18.0	24.0	12.0	1.0
ZFM-1820-04	18.0	+0.016 +0.086	20.0	26.0	4.0	1.0
ZFM-1820-17	18.0	+0.016 +0.086	20.0	26.0	17.0	1.0
ZFM-2022-21	20.0	+0.020 +0.104	22.0	30.0	21.0	1.0
ZFM-2023-11	20.0	+0.020 +0.104	23.0	30.0	11.5	1.5
ZFM-2023-155	20.0	+0.020 +0.104	23.0	30.0	15.5	1.5
ZFM-2023-16	20.0	+0.020 +0.104	23.0	30.0	16.5	1.5
ZFM-2023-21	20.0	+0.020 +0.104	23.0	30.0	21.5	1.5
ZFM-2023-31	20.0	+0.020 +0.104	23.0	30.0	31.5	1.5

* after pressfit. Testing methods ► page 59


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Flange bearing

Dimensions [mm]

Part number	d1	d1-Tolerance*	d2	d3 d13	b1 h13	b2 -0.14
ZFM-2528-16	25.0	+0.020 +0.104	28.0	35.0	16.5	1.5
ZFM-2528-21	25.0	+0.020 +0.104	28.0	35.0	21.5	1.5
ZFM-2528-31	25.0	+0.020 +0.104	28.0	35.0	31.5	1.5
ZFM-3034-13	30.0	+0.020 +0.104	34.0	42.0	13.0	2.0
ZFM-3034-20	30.0	+0.020 +0.104	34.0	42.0	20.0	2.0
ZFM-3034-26	30.0	+0.020 +0.104	34.0	42.0	26.0	2.0
ZFM-3034-37	30.0	+0.020 +0.104	34.0	42.0	37.0	2.0
ZFM-3539-26	35.0	+0.025 +0.125	39.0	47.0	26.0	2.0
ZFM-4044-20	40.0	+0.025 +0.125	44.0	52.0	20.0	2.0
ZFM-4044-40	40.0	+0.025 +0.125	44.0	52.0	40.0	2.0
ZFM-4550-50	45.0	+0.025 +0.125	50.0	58.0	50.0	2.0
ZFM-5055-20	50.0	+0.025 +0.125	55.0	63.0	20.0	2.0
ZFM-5055-50	50.0	+0.025 +0.125	55.0	63.0	50.0	2.0
ZFM-6065-50	60.0	+0.030 +0.150	65.0	73.0	50.0	2.5
ZFM-7580-50	75.0	+0.030 +0.150	80.0	88.0	50.0	2.5

* after pressfit. Testing methods ► page 59



Don't find your size?

Do you need another length, other dimensions or tolerances? You need a particular design or alternative for your application? Please call us. iglus® listens to your needs and provides you a solution in a very short time.

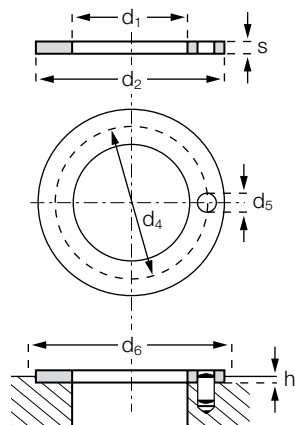


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Thrust washer



Order key

ZTM-1527-015



Thickness s
Outer diameter d2
Inner diameter d1
Metric
Type (Form T)
Material iglidur® Z

Dimensions according to ISO 3547-1 and special dimensions

Dimensions [mm]

Part number	d1 +0.25	d2 -0.25	s -0.05	d4 -0.12 +0.12	d5 +0.375 +0.125	h +0.2 -0.2	d6 +0.12
ZTM-1430-015	14.0	30.0	1.5	25+/-0.20	2+0.10	1.0	30.0
ZTM-1527-015	15.0	27.0	1.5	**	**	1.0	27.0
ZTM-1535-015	15.0	35.0	1.5	**	**	1.0	35.0
ZTM-1623-015	16.0	23.0	1.5	**	**	1.0	23.0
ZTM-2838-015	28.0	38.0	1.5	**	**	1.0	38.0
ZTM-3254-015	32.0	54.0	1.5	43.0	4.0	1.0	54.0
ZTM-4874-020	48.0	74.0	2.0	61.0	4.0	1.5	74.0
ZTM-6290-020	62.0	90.0	2.0	**	**	1.5	90.0

** design without fixing bore



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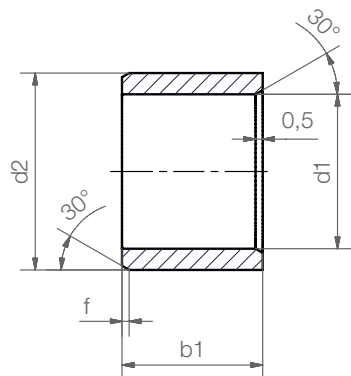


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Sleeve bearings



Order key

ZSI-0203-03



Length b1

Outer diameter d2

Inner diameter d1

Inch

Type (Form S)

Material iglidur® Z

Chamfer in relation to the d1

d1 [Inch]: Ø 0.040–0.236

Ø 0.236–0.472

Ø 0.472–1.18

Ø > 1.18

f [Inch]: 0.012

0.019

0.031

0.047

Dimensions [Inch]

Part number	d1	d2	b1	d1*		Housing bore		Shaft size	
				max.	min.	max.	min.	max.	min.
ZSI-0203-03	1/8	3/16	3/16	.1269	.1251	.1878	.1873	.1243	.1236
ZSI-0506-06	5/16	3/8	3/8	.3148	.3125	.3753	.3747	.3115	.3106
ZSI-0607-04	3/8	15/32	1/4	.3768	.3745	.4691	.4684	.3740	.3731
ZSI-0607-06	3/8	15/32	3/8	.3768	.3745	.4691	.4684	.3740	.3731
ZSI-0607-08	3/8	15/32	1/2	.3768	.3745	.4691	.4684	.3740	.3731
ZSI-0708-08	7/16	17/32	1/2	.4399	.4371	.5316	.5309	.4365	.4355
ZSI-0809-12	1/2	19/32	3/4	.5024	.4996	.5941	.5934	.4990	.4980
ZSI-0810-12	1/2	5/8	3/4	.5034	.5006	.6260	.6250	.5000	.4990
ZSI-1011-12	5/8	23/32	3/4	.6274	.6246	.7192	.7184	.6240	.6230
ZSI-1214-12	3/4	7/8	3/4	.7532	.7499	.8755	.8747	.7491	.7479
ZSI-1214-16	3/4	7/8	1	.7532	.7499	.8755	.8747	.7491	.7479
ZSI-1416-16	7/8	1	1	.8782	.8749	1.0005	.9997	.8741	.8729
ZSI-1618-16	1	1 1/8	1	1.0032	.9999	1.1255	1.1247	.9991	.9979
ZSI-1618-24	1	1 1/8	1 1/2	1.0032	.9999	1.1255	1.1247	.9991	.9979
ZSI-1820-24	1 1/8	1 9/32	1 1/2	1.1279	1.1246	1.2818	1.2808	1.1238	1.1226
ZSI-2022-20	1 1/4	1 13/32	1 1/4	1.2537	1.2498	1.4068	1.4058	1.2488	1.2472
ZSI-2426-24	1 1/2	1 21/32	1 1/2	1.5037	1.4998	1.6568	1.6558	1.4988	1.4972
ZSI-2831-32	1 3/4	1 15/16	2	1.7536	1.7497	1.9381	1.9371	1.7487	1.7471
ZSI-3235-16	2	23/16	1	2.0040	1.9993	2.1883	2.1871	1.9981	1.9969
ZSI-3235-32	2	23/16	2	2.0040	1.9993	2.1883	2.1871	1.9981	1.9969
ZSI-3639-32	2 1/4	27/16	2	2.2556	2.2519	2.4377	2.4365	2.2507	2.2489

* after pressfit. Testing methods ► page 59

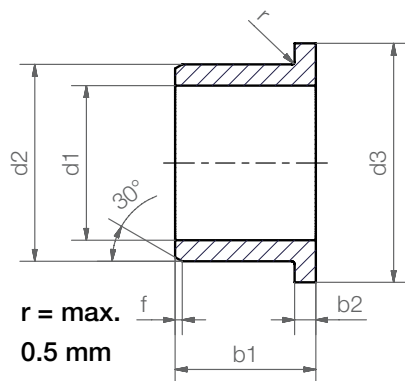


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Flange bearing



Order key

ZFI-0607-08



Length b1
Outer diameter d2
Inner diameter d1
Inch
Type (Form F)
Material iglidur® Z

Chamfer in relation to the d1

d1 [Inch]:	Ø 0.040–0.236	Ø 0.236–0.472	Ø 0.472–1.18	Ø > 1.18
f [Inch]:	0.012	0.019	0.031	0.047

Dimensions [Inch]

Part number	d1	d2	b1	d3	b2	d1*		Housing bore		Shaft size	
						max.	min.	max.	min.	max.	min.
ZFI-0607-08	3/8	15/32	1/2	.687	.046	.3768	.3745	.4691	.4684	.3740	.3731
ZFI-0809-08	1/2	19/32	1/2	.875	.046	.5024	.4996	.5941	.5934	.4990	.4980
ZFI-1012-08	5/8	3/4	3/4	1.000	.046	.6284	.6256	.7510	.7500	.6250	.6240
ZFI-1214-12	3/4	7/8	3/4	1.125	.062	.7532	.7499	.8755	.8747	.7491	.7479
ZFI-1214-16	3/4	7/8	1	1.125	.062	.7532	.7499	.8755	.8747	.7491	.7479
ZFI-1416-12	7/8	1	1	1.250	.062	.8782	.8749	1.0005	.9997	.8741	.8729
ZFI-1416-16	7/8	1	1	1.250	.062	.8782	.8749	1.0005	.9997	.8741	.8729
ZFI-1618-08	1	1 1/8	1	1.375	.062	1.0032	.9999	1.1255	1.1247	.9991	.9979
ZFI-1618-16	1	1 1/8	1	1.375	.062	1.0032	.9999	1.1255	1.1247	.9991	.9979
ZFI-1820-12	1 1/8	1 9/32	1 1/2	1.562	.078	1.1279	1.1246	1.2818	1.2808	1.1238	1.1226
ZFI-1820-24	1 1/8	1 9/32	1 1/2	1.562	.078	1.1279	1.1246	1.2818	1.2808	1.1238	1.1226
ZFI-2022-20	1 1/4	1 13/32	1 1/4	1.687	.078	1.2537	1.2498	1.4068	1.4058	1.2488	1.2472
ZFI-2022-24	1 1/4	1 13/32	1 1/4	1.687	.078	1.2537	1.2498	1.4068	1.4058	1.2488	1.2472
ZFI-2426-24	1 1/2	1 21/32	1 1/2	2.000	.078	1.5037	1.4998	1.6568	1.6558	1.4988	1.4972
ZFI-2831-32	1 3/4	1 15/16	2	2.375	.093	1.7536	1.7497	1.9381	1.9371	1.7487	1.7471
ZFI-3235-32	2	2 3/16	2	2.625	.093	2.0040	1.9993	2.1883	2.1871	1.9981	1.9969

* after pressfit. Testing methods ► page 59



Don't find your size?

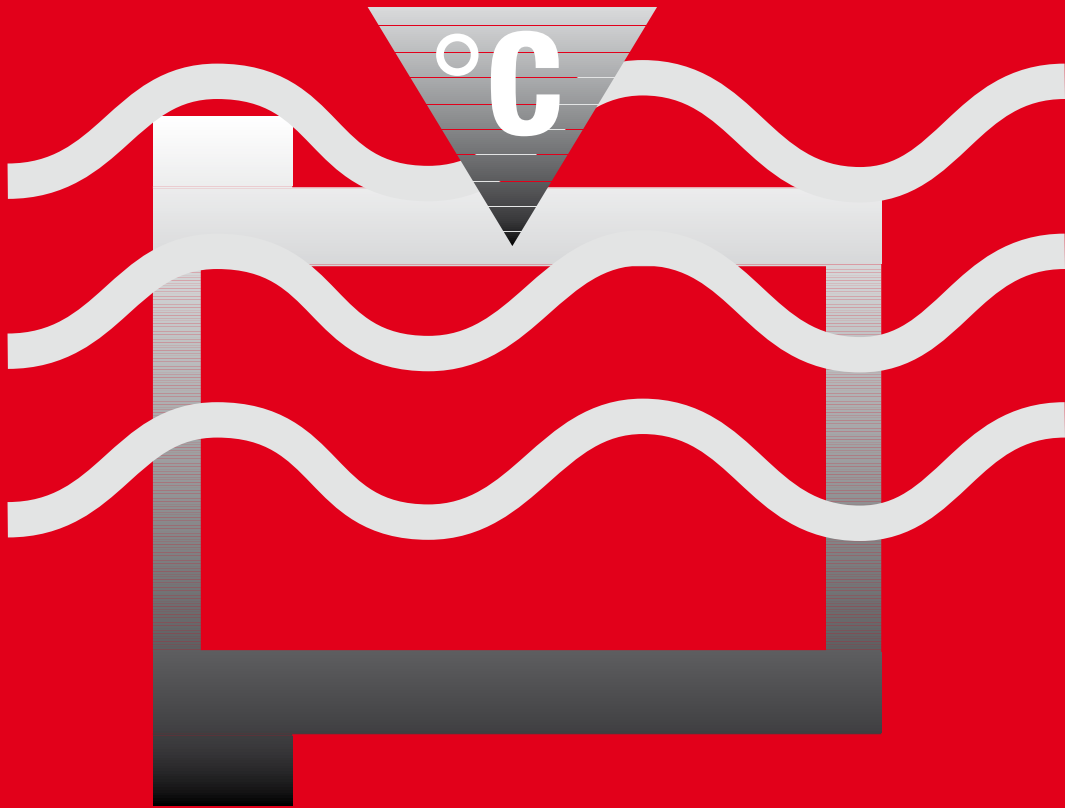
Do you need another length, other dimensions or tolerances? You need a particular design or alternative for your application? Please call us. igus® listens to your needs and provides you a solution in a very short time.



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For hot liquids – iglidur® UW500



For underwater use at high temperatures

For fast and constant movements

iglidur® UW500

For hot liquids. iglidur® UW500 was developed for underwater applications at temperatures up to +250 °C. In addition, the bearings will run in chemicals which would act as a lubricant.



When to use it?

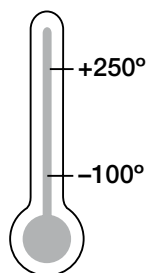
- When bearings need to be used in liquids
- For high speeds
- For high temperatures
- When a high chemical resistance is required



When not to use it?

- When a cost-effective underwater bearing is required
▶ iglidur® UW, page 509
- When a cost-efficient underwater bearing is sought for rare operations
▶ iglidur® H, page 337
- When a cost-effective universal bearing is required
▶ iglidur® G, page 65

Temperature



Product range

on request



Material properties table

General properties	Unit	iglidur® UW 500	Testing method
Density	g/cm ³	1.49	
Colour		black	
Max. moisture absorption at +23 °C/50 % r.h.	% weight	0.1	DIN 53495
Max. water absorption ³⁾	% weight	0.5	
Coefficient of sliding friction, dynamic against steel	μ	0.20–0.36	
pv value, max. (dry)	MPa · m/s	0.35	
Mechanical properties			
Modulus of elasticity	MPa	16,000	DIN 53457
Tensile 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. long term application temperature	°C	+250	
Max. short term application temperature	°C	+300	
Min. application temperature ¹⁾	°C	+315	
untere Anwendungstemperatur	°C	–100	
Thermal conductivity	W/m · K	0.60	ASTM C 177
Coefficient of thermal expansion (at +23 °C)	K ⁻¹ · 10 ⁻⁵	4	DIN 53752
Electrical properties ²⁾			
Specific volume resistance	Ωcm	< 10 ⁹	DIN IEC 93
Surface resistance	Ω	< 10 ⁹	DIN 53482

¹⁾ Without additional load; no sliding movement; relaxation possible

²⁾ The good conductivity of this plastic material under certain circumstances can favour the formation of corrosion on the metallic contact component

³⁾ With respect to the use of the material in direct contact with water, it has to be pointed out that all results have been attained under laboratory conditions DW (fully demineralised water). We therefore recommend custom-designed tests under real application conditions.

Table 01: Material properties table

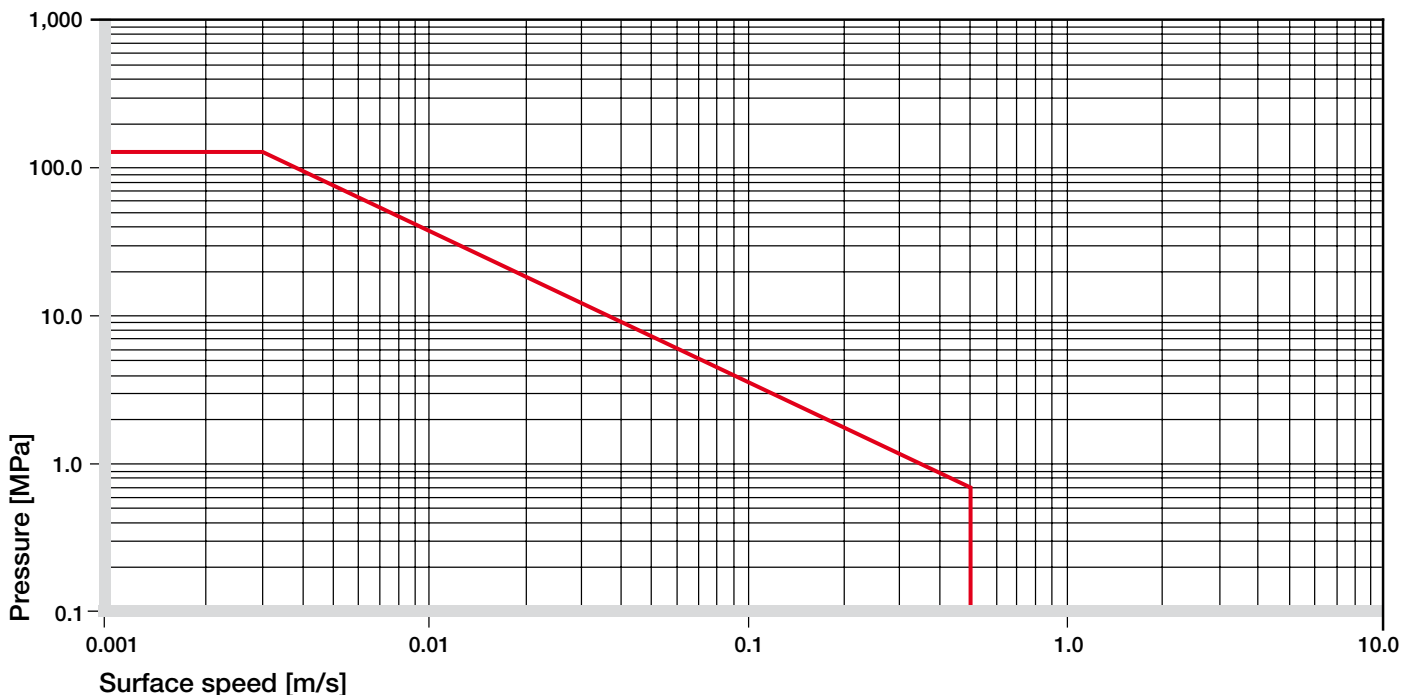


Diagram 01: Permissible pv values for iglidur® UW500 with a wall thickness of 1 mm dry running against a steel shaft at +20 °C, mounted in a steel housing

The plain bearings of 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 fields. Unless the underwater operation is explicitly stated, the information in this chapter describes iglidur® UW500 when running dry.

Mechanical Properties

With increasing temperatures, the compressive strength of iglidur® UW500 plain bearings decreases. The Diagram 02 shows this inverse relationship. At +250 °C the permissible surface pressure is almost 35 MPa. The recommended maximum surface pressure is a mechanical material parameter. No conclusions regarding the tribological properties can be drawn from this.

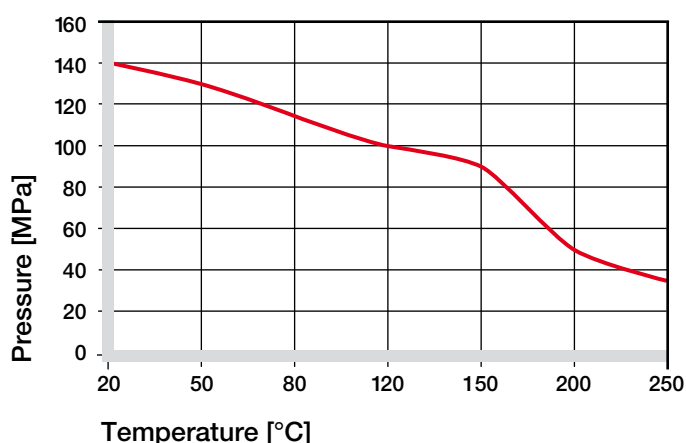


Diagram 02: Recommended maximum surface pressure as a function of temperature (140 MPa at +20 °C)

Diagram 03 shows the elastic deformation of iglidur® UW500 bearings at radial loads. Diagram 01 on the preceding page shows the maximum pv values at room temperature. The high pv values are attained by the high temperature resistance.

► Surface Pressure, [page 47](#)

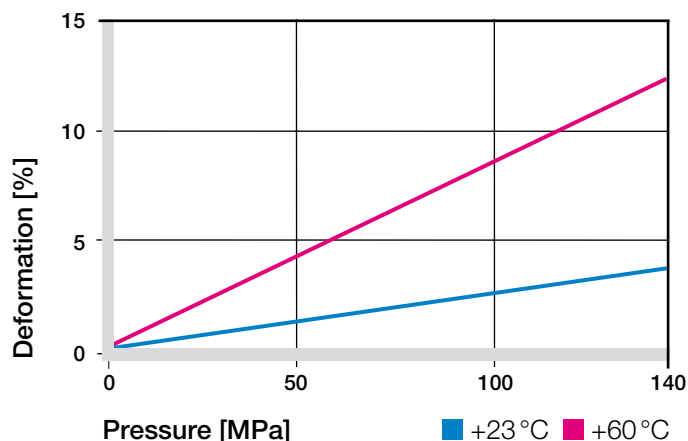


Diagram 03: Deformation under pressure and temperature

Permissible Surface Speeds

iglidur® UW500 bearings can be used both dry running and in media like water in a wide range of conditions. Through a hydrodynamic lubrication, attained under water with high speeds, surface speeds far above 2 m/s can be achieved. In dry operation the iglidur® UW500 bearings can be used anyhow up to 1.5 m/s on the short term.

► Surface Speed, [page 49](#)

m/s	Rotating	Oscillating	Linear
Continuous	0.8	0.6	2
Short term	1.5	1.1	3

Table 02: Maximum running speed

Temperatures

iglidur® UW500 can be used in applications with permanent temperatures of +150 °C. If the bearings are fixed specially, the temperatures can even be higher than +200 °C.

iglidur® UW500 are among the most temperature-resistant iglidur materials, tolerating temperatures of up to +250 °C permanently. Short-term it can even be heated up to +300 °C. Nonetheless, the pressfit can be loosened over a temperature of +150 °C due to relaxation. We therefore recommend to secure the bearing axially if these temperatures are reached in the application.

► Application Temperatures, [page 50](#)

iglidur® UW500	Application temperature
Minimum	-100 °C
Max. long term	+250 °C
Max. short term	+300 °C
Add. securing is required	+150 °C

Table 03: Temperature limits

Friction and Wear

With increasing load the friction of the bearing system with iglidur® UW500 bearings declines. Instead of that the coefficient of friction rises with increasing speed. This illustrates the excellent suitability of iglidur® UW500 bearings with high loads. Friction and wear also depend to a high degree on the shaft surface. Extremely smooth and extremely coarse shafts enhance the coefficient of friction of the bearing. Ideal are smoothed surfaces with an average surface finish of Ra of 0.1 to 0.4.

- Coefficients of Friction and Surfaces, **page 52**
- Wear Resistance, **page 53**

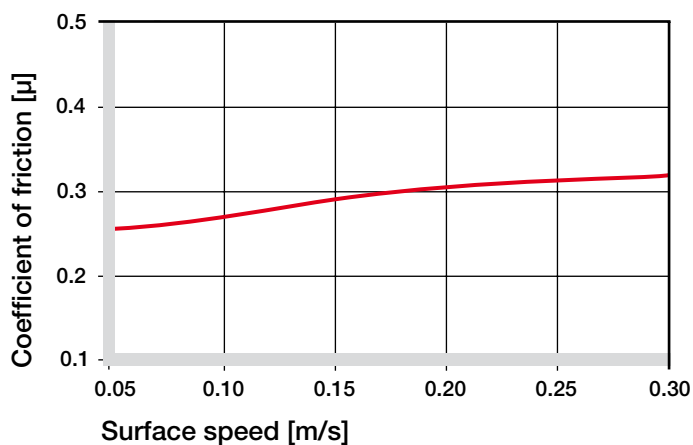


Diagram 04: Coefficient of friction as a function of the running speed, p = 0.75 MPa

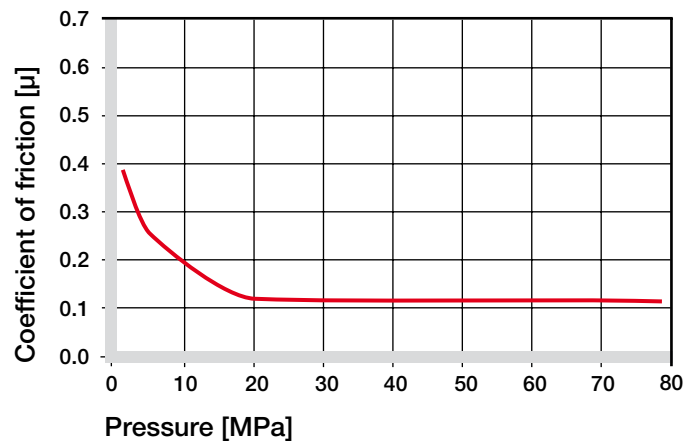


Diagram 05: Coefficient of friction as a function of the pressure, v = 0.01 m/s

Shaft Materials

The Diagrams 06–09 display a summary of the results of tests with different shaft materials conducted with bearings made of iglidur® UW500.

- Shaft Materials, **page 55**

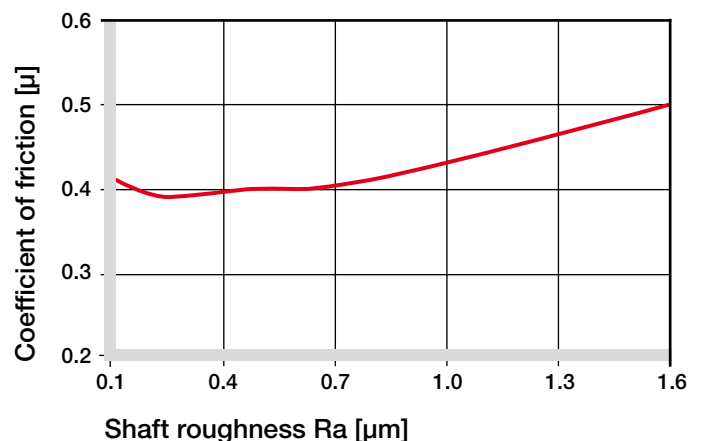


Diagram 06: Coefficient of friction as function of the shaft surface (Cf53 hardened and ground steel)

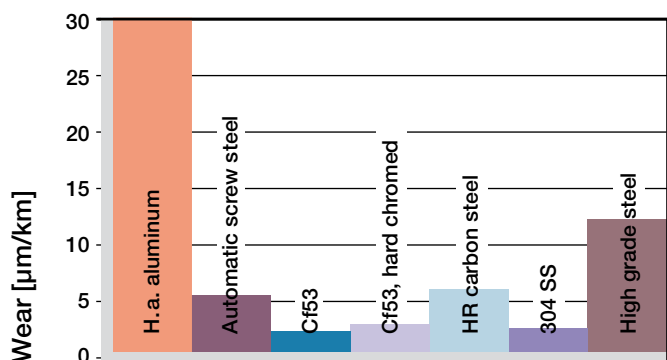


Diagram 07: Wear, rotating with different shaft materials, pressure $p = 1 \text{ MPa}$, $v = 0.3 \text{ m/s}$

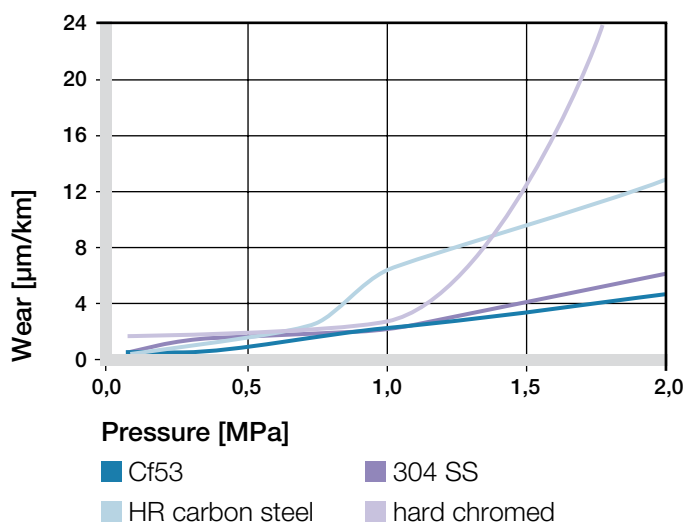


Diagram 08: Wear with different shaft materials in rotational operation, as a function of the pressure

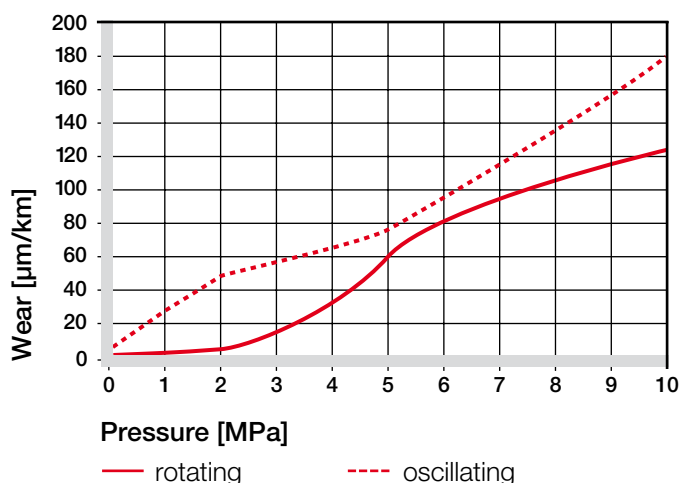


Diagram 09: Wear for oscillating and rotating applications with shaft material Cf53 hardened and ground steel, as a function of the pressure

iglidur® UW500	Dry	Greases	Oil	Water
C.o.f. μ	0.2–0.36	0.09	0.04	0.04

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

Additional Properties

Chemical Resistance

iglidur® UW500 bearings have almost universal chemical resistance. They are affected only by concentrated nitric acid and sulfuric acid.

► Chemical Table, page 1118

Medium	Resistance
Alcohol	+
Hydrocarbons	+
Greases, oils without additives	+
Fuels	+
Diluted acids	+
Strong acids	+
Diluted alkalines	+
Strong alkalines	+

+ resistant 0 conditionally resistant – not resistant

All data given at room temperature $[+20 \text{ °C}]$

Table 05: Chemical resistance

Radiation Resistance

Plain bearings of iglidur® UW500 are radiation resistant up to a radiation intensity of $1 \cdot 10^5 \text{ Gy}$. With regard to radiation, iglidur® UW500 is one of the most resistant materials of the iglidur® range.

iglidur® UW500 is very resistant to hard gamma radiation and endures a radiation dose of 1,000 Mrad without noticeable losses of its characteristics. The material also endures an alpha or beta radiation 10,000 Mrad with practically no effect.

UV Resistance

Under UV radiation and other atmospheric influences, the excellent material characteristics of iglidur® UW500 are not affected.

Vacuum

Also in vacuum atmosphere, iglidur® UW500 plain bearings can be used almost without restrictions. Outgassing only takes place to a minor degree.

Electrical Properties

iglidur® UW500 plain bearings are electrically conductive.

Volume resistance $< 10^9 \Omega \text{cm}$

Surface resistance $< 10^9 \Omega 10$

Moisture Absorption

The moisture absorption of iglidur® UW500 plain bearings is extremely low. In standard atmosphere it is below 0.1 % by weight. Therefore, even with regard to applications under water, iglidur® UW500 plain bearings can be used without adjusting the fitting conditions. The maximum moisture absorption is 0.5 % by weight.

Maximum moisture absorption

At +23 °C/50 % r.h. 0.1 % weight

Max. water absorption 0.5 % weight

Table 06: Moisture absorption

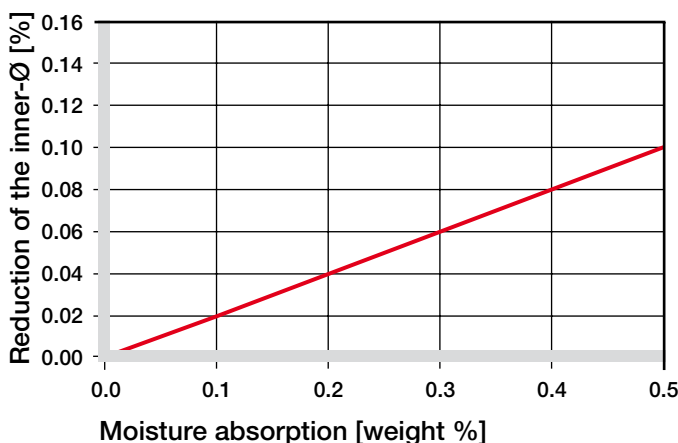


Diagram 10: Effect of moisture absorption on plain bearings

Installation Tolerances

iglidur® UW500 plain bearings are standard bearings for shafts with h-tolerance (recommended minimum h9). The bearings are designed for pressfit 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 59

Diameter d1 [mm]	Shaft h9 [mm]	iglidur® UW500 F10 [mm]	Housing H7 [mm]
up to 3	0–0.025	+0.006 +0.046	0 +0.010
> 3 to 6	0–0.030	+0.010 +0.058	0 +0.012
> 6 to 10	0–0.036	+0.013 +0.071	0 +0.015
> 10 to 18	0–0.043	+0.016 +0.086	0 +0.018
> 18 to 30	0–0.052	+0.020 +0.104	0 +0.021
> 30 to 50	0–0.062	+0.025 +0.125	0 +0.025
> 50 to 80	0–0.074	+0.030 +0.150	0 +0.030

Table 07: Important tolerances for plain bearings according to ISO 3547-1 after pressfit

Product Range

iglidur® UW500 plain bearings are manufactured to special order.