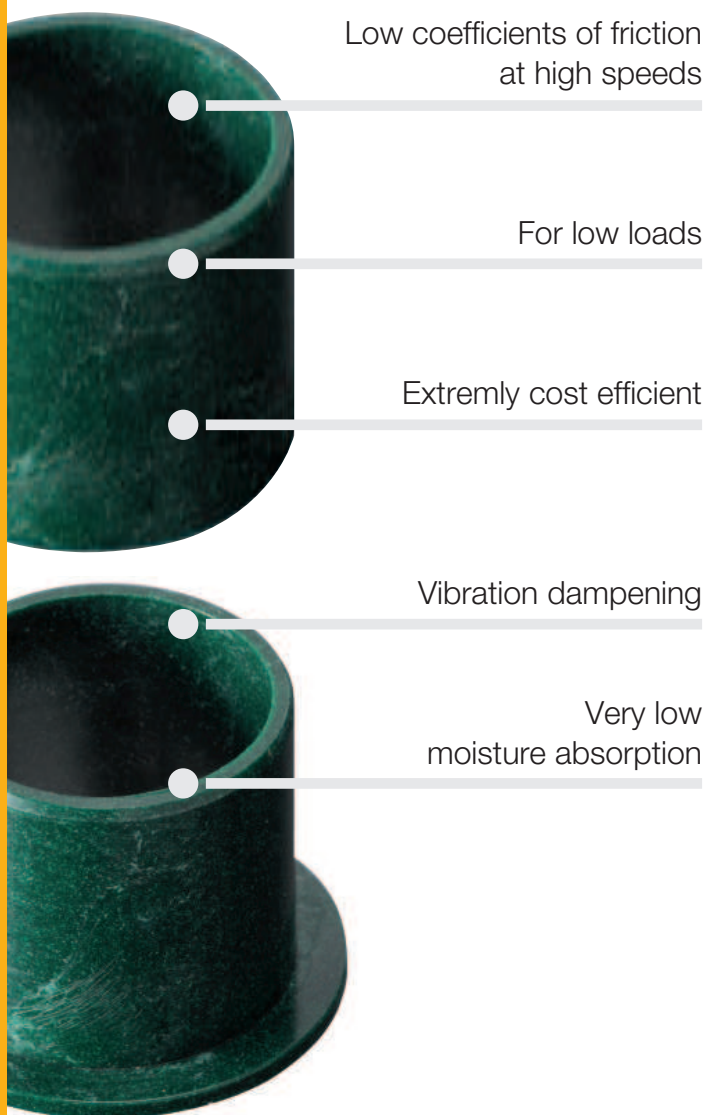


iglidur® D

Low-cost material with silicone. Low-cost-material with low coefficients of friction and good wear resistance at low loads.



When to use it?

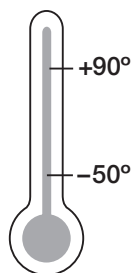
- When very low coefficients of friction are needed
- For high speeds
- For low load
- When a very low-priced bearing is required



When not to use it?

- When high pressure loads occur
 - ▶ iglidur® G, page 61
- When the part should be free of silicon
 - ▶ iglidur® J, page 89
 - ▶ iglidur® R, page 249
- When constant temperatures of more than +90 °C occur
 - ▶ iglidur® G, page 61
 - ▶ iglidur® P, page 185

Temperature



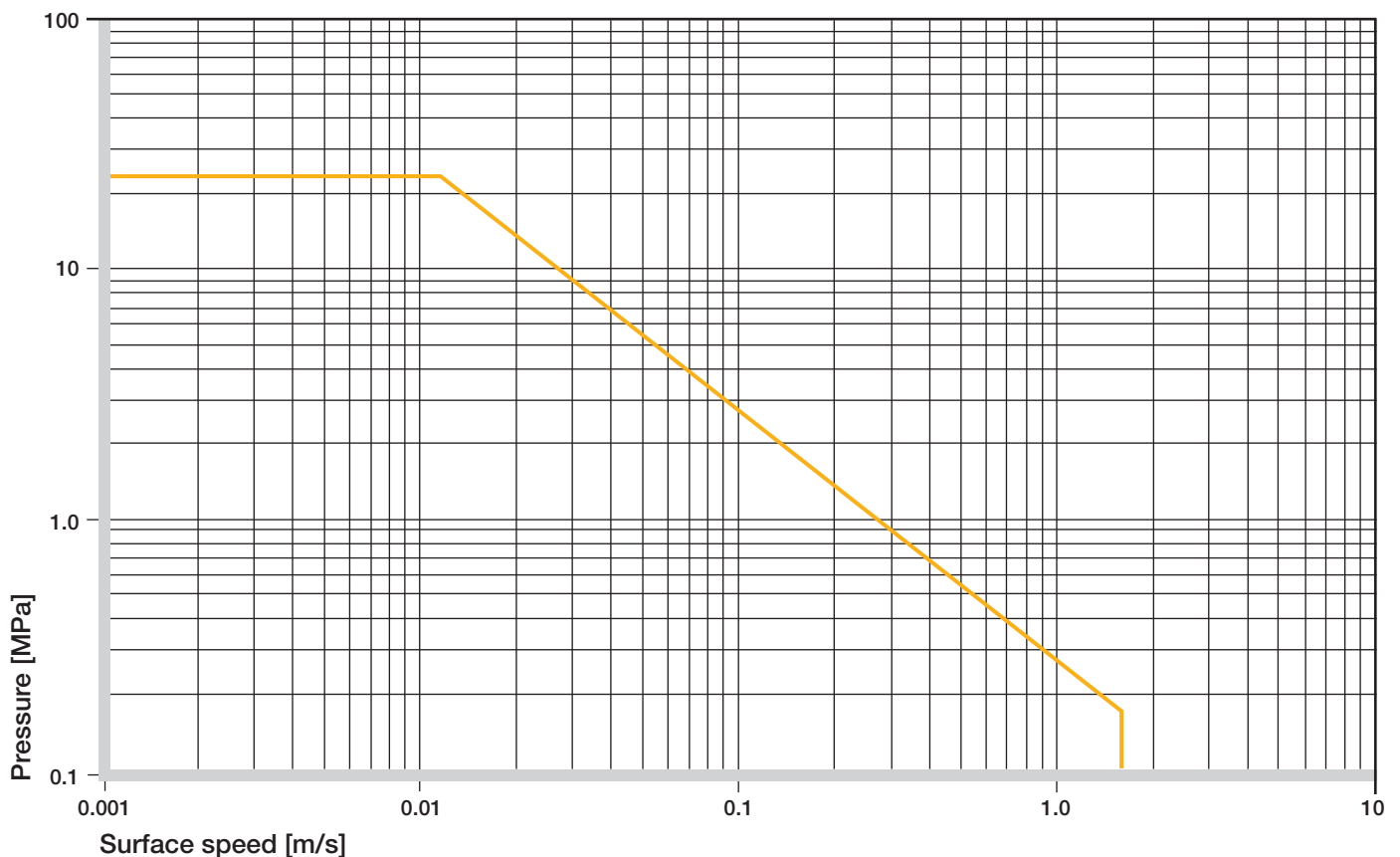
Product range

on request



Material data			
General properties	Unit	iglidur® D	Testing method
Density	g/cm ³	1.40	
Colour		green	
Max. moisture absorption at +23 °C/50 % r.h.	% weight	0.3	DIN 53495
Max. moisture absorption	% weight	1.1	
Coefficient of sliding friction, dynamic against steel	μ	0.08–0.26	
pv value, max. (dry)	MPa · m/s	0.27	
Mechanical properties			
Modulus of elasticity	MPa	2,000	DIN 53457
Tensile strength at +20 °C	MPa	72	DIN 53452
Compressive strength	MPa	70	
Max. recommended surface pressure (+20 °C)	MPa	23	
Shore D hardness		78	DIN 53505
Physical and thermal properties			
Max. long term application temperature	°C	+90	
Max. short term application temperature	°C	+110	
Min. application temperature	°C	-50	
Thermal conductivity	W/m · K	0.25	ASTM C 177
Coefficient of thermal expansion (at +23 °C)	K ⁻¹ · 10 ⁻⁵	11	DIN 53752
Electrical properties			
Specific volume resistance	Ωcm	> 10 ¹⁴	DIN IEC 93
Surface resistance	Ω	> 10 ¹⁴	DIN 53482

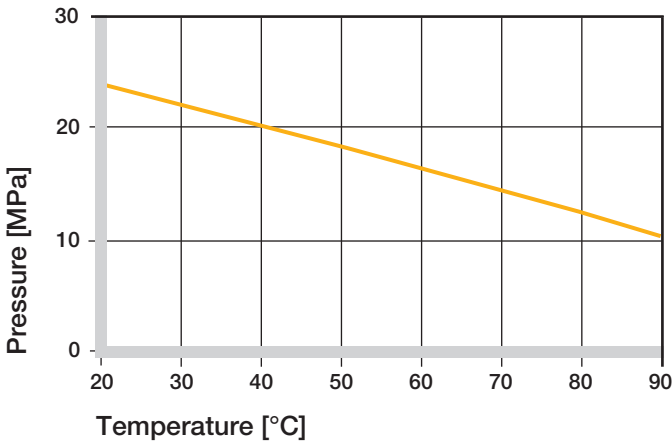
Table 01: Material data



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

Mechanical Properties

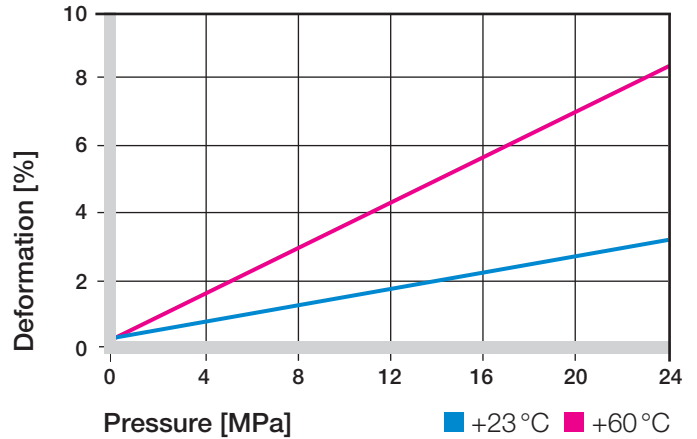
The recommended maximum surface pressure is a mechanical material parameter. No conclusions regarding the tribological properties can be drawn from this. With increasing temperatures, the compressive strength of iglidur® D plain bearings decreases. The Graph 02 shows this inverse relationship. However, at the longterm maximum temperature of +90 °C the permissible surface pressure is almost +100 MPa.



Graph 02: Recommended maximum surface pressure as a function of temperature (23 MPa at +20 °C)

During the development process of iglidur® D as a bearing material, high performance and a very low price were the top requirements. In particular, low coefficients of friction were needed at high speeds in the dry run. Plain bearings made of iglidur® D are supported by a combination of solid lubricants. This material containing silicone achieves excellently low friction values in dry operation and runs with virtually no stick-slip. Graph 03 shows the elastic deformation of iglidur® D during radial loading. At the recommended maximum surface pressure of 23 MPa the deformation is less than 3 %. Plastic deformation is not detectable up to this value. However, it is also dependent on the service time.

► Surface Pressure, page 43



Graph 03: Deformation under pressure and temperature

Permissible Surface Speeds

iglidur® D bearings are suitable for high surface speeds. Speeds of up to 10 m/s are permitted in linear motions! Here too the specified maximum values can be achieved only with minimum pressure loads. The specified values show the speed at which due to friction an increase in temperature up to the long-term permitted value can occur.

► Surface Speed, page 45

m/s	Rotating	Oscillating	Linear
Continuous	1.5	1.1	8
Short term	3	2.1	10

Table 02: Maximum running speed

Temperatures

The short-term permitted maximum temperature is +110 °C, and the long-term application temperature is +90 °C. With increasing temperatures, the compressive strength of iglidur® D bearings decreases. Graph 02 clarifies this relationship.

The ambient application temperature has a direct impact on bearing wear, an increase in temperature results in an increase in wear.

► Application Temperatures, page 46

iglidur® D	Application temperature
Minimum	-50 °C
Max. long term	+90 °C
Max. short term	+110 °C
Add. securing is required from	+50 °C

Table 03: Temperature limits

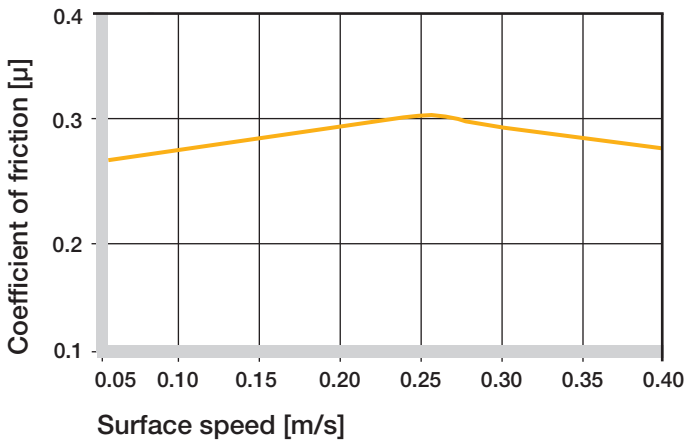
iglidur® D | Technical Data

Friction and Wear

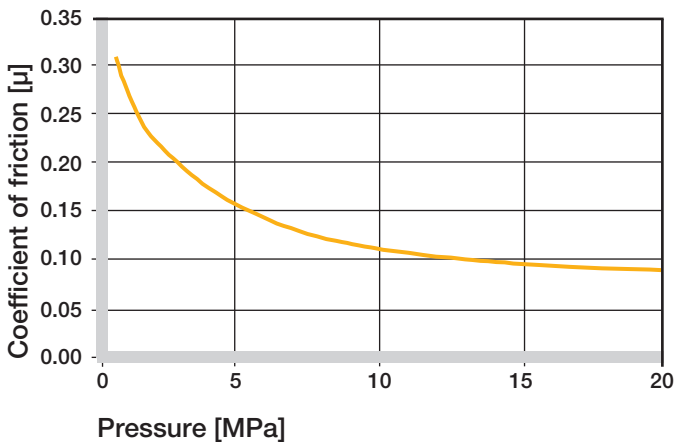
The coefficient of friction decreases like the wear resistance with increasing load. In contrast, a higher surface speed rarely affects the coefficient of friction of an iglidur® D bearing. iglidur® D is suitable for applications in which high pv values are achieved mainly through the high surface speed and not as much through the surface pressure.

The coefficient of friction of the iglidur D bearings is highly dependant on the shaft surface finish. In the Ra range between 0.4 and 0.6 µm, the coefficient of friction attains the optimum value. With values below and above this range, the friction of the bearing system rapidly rises.

- ▶ Coefficients of Friction and Surfaces, **page 48**
- ▶ Wear Resistance, **page 49**



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



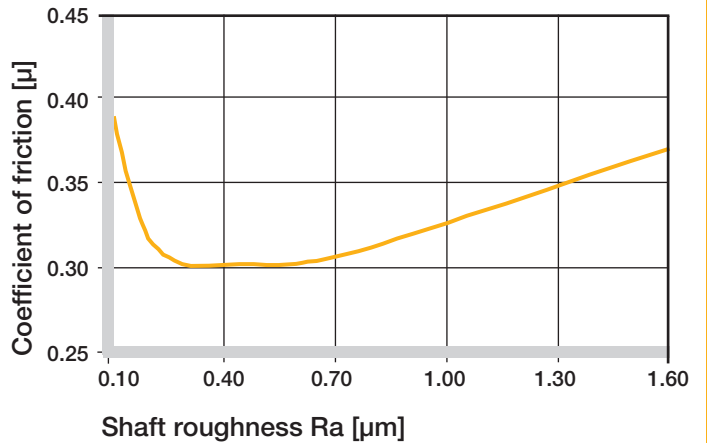
Graph 05: Coefficient of friction as a function of the pressure, v = 0.01 m/s

Shaft Materials

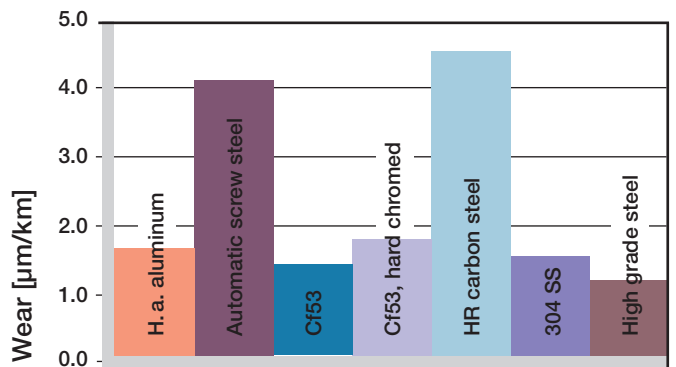
Graph 06 to 09 display a summary of the results of tests with different shaft materials conducted with bearings made of iglidur® D. Whereas in the lower load range the hard-chromed shaft is the most suitable for iglidur® D bearings, the wear is lower with Cf53 and V2A shafts from 2 MPa upward. The Cf53 and V2A shafts are recommended in the low load range in pivoting applications.

Please contact us if you would like to use a shaft material not included in this list.

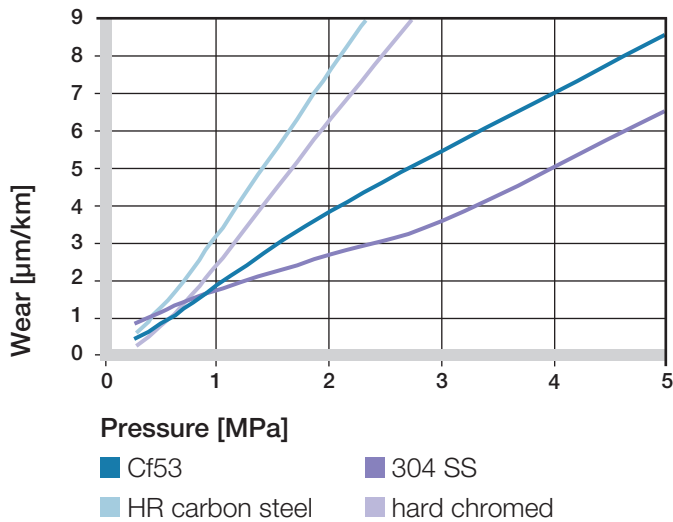
- ▶ Shaft Materials, **page 51**



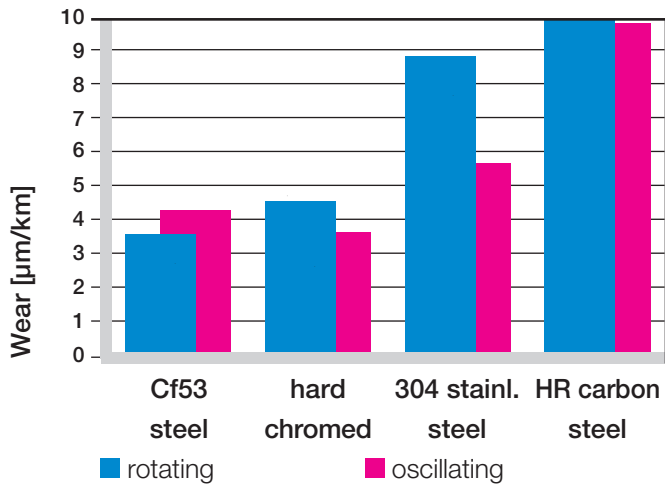
Graph 06: Coefficient of friction as function of the shaft surface (Cf53 hardened and ground steel)



Graph 07: Wear, rotating with different shaft materials, pressure p = 0,75 MPa, v = 0,5 m/s



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



Graph 09: Wear for rotating and oscillating applications with different shaft materials, p = 2 MPa

iglidur® D	Dry	Greases	Oil	Water
C. o. f. μ	0.08–0.26	0.09	0.04	0.04

Table 04: Coefficient of friction against steel (Ra = 1 µm, 50 HRC)

Additional Properties

Chemical Resistance

iglidur® D plain bearings are resistant to very weak acids, diluted alkaline, fuels and all types of lubricants.

► Chemical Table, page 974

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

+ resistant 0 conditionally resistant – not resistant

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

Table 05: Chemical resistance

Radiation Resistance

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

UV Resistance

iglidur® D plain bearings are resistant to UV radiation, but the tribological properties are reduced by permanent exposure.

Vacuum

In a vacuum environment, iglidur® D plain bearings release gases. It is only possible to use in a vacuum to a limited extent.

Electrical Properties

iglidur® D plain bearings are electrically insulating.

Volume resistance	$> 10^{14} \Omega\text{cm}$
Surface resistance	$> 10^{14} \Omega 10$

iglidur® D | Technical Data

Moisture Absorption

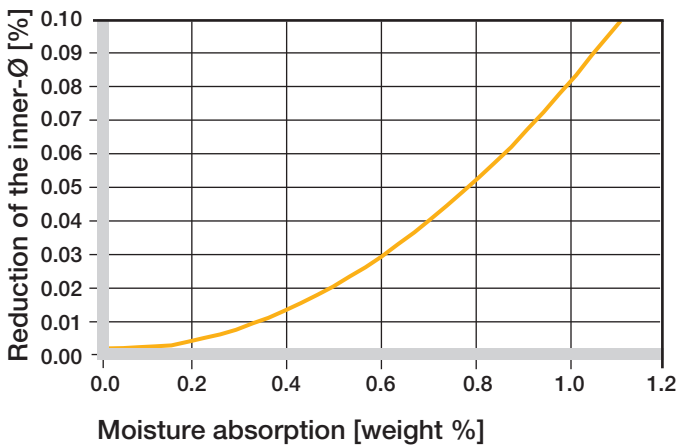
The moisture absorption of iglidur® D plain bearings is approximately 0.2% in standard atmosphere. The saturation limit in water is 1%. This low moisture absorption allows for design in wet environments.

Maximum moisture absorption

At +23 °C/50% r.h. 0.3% weight

Max. moisture absorption 1.1% weight

Table 06: Moisture absorption



Graph 10: Effect of moisture absorption on plain bearings

Installation Tolerances

iglidur® D 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, the inner diameter adjusts to meet the specified tolerances.

► Testing Methods, page 55

Diameter d1 [mm]	Shaft h9 [mm]	iglidur® D E10 [mm]	Housing H7 [mm]
up to 3	0-0.025	+0.014 +0.054	0 +0.010
> 3 to 6	0-0.030	+0.020 +0.068	0 +0.012
> 6 to 10	0-0.036	+0.025 +0.083	0 +0.015
> 10 to 18	0-0.043	+0.032 +0.102	0 +0.018
> 18 to 30	0-0.052	+0.040 +0.124	0 +0.021
> 30 to 50	0-0.062	+0.050 +0.150	0 +0.025
> 50 to 80	0-0.074	+0.060 +0.180	0 +0.030
> 80 to 120	0-0.087	+0.072 +0.212	0 +0.035
> 120 to 180	0-0.100	+0.085 +0.245	0 +0.040

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

Product Range

iglidur® D plain bearings are manufactured to special order.

My Sketches

