



## For the tobacco industry

### FDA-compliant

# igidur® T220



#### When to use it?

- When you need a bearing free from non-permitted materials in the tobacco industry
- When FDA compliance is required



#### When not to use?

- When high surface pressures occur  
*igidur® Z*
- When a cost-effective all-round plain bearing is required  
*igidur® G, iglidur® M250*
- When the highest wear resistance at low pressures is required  
*igidur® J*

# Bearing technology | Plain bearing | iglidur® T220



∅  
-



Also available as:



Bar stock, round bar  
Page 679

## For the tobacco industry FDA-compliant

Plain bearings that constitute only materials "recommended" for the tobacco industry. They are free from carcinogenic additives like, for instance, PTFE.

- Free from banned ingredients as requested by main manufacturers of tobacco products
- FDA-compliant
- Lubrication-free
- Maintenance-free



Bar stock, plate  
Page 683

### Typical application areas

- Tobacco industry



tribo-tape liner  
Page 691



Piston rings  
Page 581



Two hole flange bearings  
Page 603



Moulded special parts  
Page 624



igubal® spherical balls  
Page 841

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

Online product finder  
[www.igus.eu/igidur-finder](http://www.igus.eu/igidur-finder)

Online service life calculation  
[www.igus.eu/igidur-expert](http://www.igus.eu/igidur-expert)

## Technical data

General properties		Testing method	
Density	g/cm <sup>3</sup>	1.28	
Colour		white	
Max. moisture absorption at +23°C and 50% r.h.	% weight	0.3	DIN 53495
Max. moisture absorption	% weight	0.5	
Coefficient of friction, dynamic, against steel	μ	0.20 – 0.32	
pv value, max. (dry)	MPa · m/s	0.28	
Mechanical properties			
Flexural modulus	MPa	1,800	DIN 53457
Flexural strength at +20°C	MPa	65	DIN 53452
Compressive strength	MPa	55	
Max. recommended surface pressure (+20°C)	MPa	40	
Shore D hardness		76	DIN 53505
Physical and thermal properties			
Max. application temperature long-term	°C	+100	
Max. application temperature short-term	°C	+160	
Min. application temperature	°C	-40	
Thermal conductivity	W/m · K	0.24	ASTM C 177
Coefficient of thermal expansion (at +23°C)	K <sup>-1</sup> · 10 <sup>-5</sup>	11	DIN 53752
Electrical properties			
Specific contact resistance	Ωcm	> 10 <sup>10</sup>	DIN IEC 93
Surface resistance	Ω	> 10 <sup>10</sup>	DIN 53482

Table 01: Material properties

iglidur® T220 is a special material for applications in the tobacco processing industry. It fulfils the demands of the tobacco industry (engineering database). The material is free of undesirable or banned ingredients, as requested by reputed manufacturers from 2004 onward.

### Moisture absorption

Under standard climatic conditions, the moisture absorption of iglidur® T220 plain bearings is approximately 0.3% weight. The saturation limit in water is 0.5% weight. These values are so low that consideration of expansion by moisture absorption is only required under extreme circumstances.

### Vacuum

In vacuum, any present moisture is released as vapour. Use in vacuum is only possible with dehumidified iglidur® T220 bearings.

### Radiation resistance

Plain bearings made from iglidur® T220 are resistant up to a radiation intensity of 3 · 10<sup>2</sup>Gy.

### Resistance to weathering

iglidur® T220 plain bearings are resistant to weathering. The material properties are slightly affected. Discoloration occurs.

### Mechanical properties

With increasing temperatures, the compressive strength of iglidur® T220 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® T220 plain bearings can be stressed up to the permitted limit of 40MPa, the elastic deformation is less than 2% at room temperature. The permitted load is limited by higher temperatures (diagram 03).

**Surface pressure, page 41**



-40°C up to +100°C



40MPa



HB



FOOD



RoHS



ISO 5242

## Permissible surface speeds

The maximum speeds of iglidur® T220 plain bearings when rotating continuously is 0.4m/s. The friction and the associated temperature increase limit the permissible speeds. From this it follows that intermittent service or in linear movements, higher speeds can be attained.

**Surface speed, page 44**

## Temperature

The flexibility of the bearings depends on the temperature. Even temperatures as low as +60°C lead to a considerable increase in flexibility. For temperatures over +50°C an additional securing is required.

**Application temperatures, page 49**

**Additional securing, page 49**

## Friction and wear

By the observance of the tobacco processing industry specifications, the coefficient of friction and wear of iglidur® T220 plain bearings remain behind those of the best iglidur® plain bearings. The coefficient of friction decreases with the load and increases only slightly with higher speeds.

**Coefficient of friction and surfaces, page 47**

**Wear resistance, page 50**

## Shaft materials

Diagram 06 shows the test results of iglidur® T220 plain bearings running against various shaft materials. Diagram 07 shows that the bearings react with a heavy increase in wear when the load is increased. Therefore care should be taken to maintain the loads under 5MPa through adequate dimensioning of the bearing.

**Shaft materials, page 52**

## Installation tolerances

iglidur® T220 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 E10 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	0
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 0.4	0.3	1.0
short-term	m/s 1.0	0.7	2.0

Table 03: Maximum surface speeds

	Dry	Greases	Oil	Water
Coefficient of friction $\mu$	0.20 – 0.32	0.09	0.04	0.04

Table 04: Coefficient of friction against steel (Ra = 1  $\mu$ m, 50HRC)

$\varnothing$ d1 [mm]	Housing		Plain bearing		Shaft	
	H7 [mm]	E10 [mm]	E10 [mm]	h9 [mm]	h9 [mm]	h9 [mm]
0 – 3	+0.000	+0.010	+0.014	+0.054	-0.025	+0.000
> 3 – 6	+0.000	+0.012	+0.020	+0.068	-0.030	+0.000
> 6 – 10	+0.000	+0.015	+0.025	+0.083	-0.036	+0.000
> 10 – 18	+0.000	+0.018	+0.032	+0.102	-0.043	+0.000
> 18 – 30	+0.000	+0.021	+0.040	+0.124	-0.052	+0.000
> 30 – 50	+0.000	+0.025	+0.050	+0.150	-0.062	+0.000
> 50 – 80	+0.000	+0.030	+0.060	+0.180	-0.074	+0.000
> 80 – 120	+0.000	+0.035	+0.072	+0.212	-0.087	+0.000
> 120 – 180	+0.000	+0.040	+0.085	+0.245	-0.100	+0.000

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

iglidur® T220 plain bearings are manufactured to special order.

## Technical data

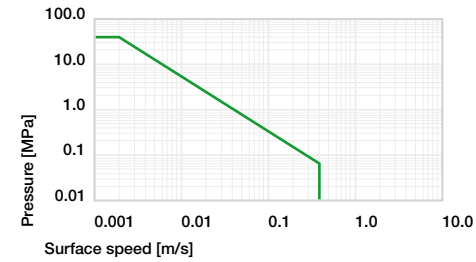


Diagram 01: Permissible pv values for iglidur® T220 plain bearings with a wall thickness of 1mm, dry operation against a steel shaft, at +20°C, mounted in a steel housing

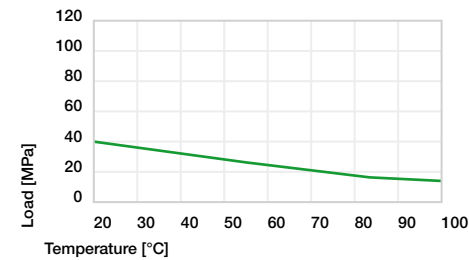


Diagram 02: Maximum recommended surface pressure as a function of temperature (40MPa at +20°C)

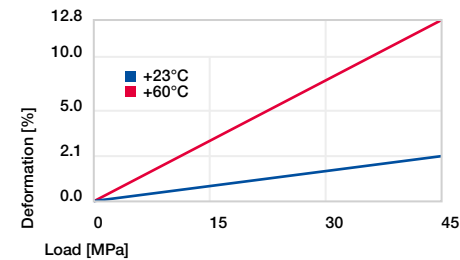


Diagram 03: Deformation under pressure and temperature

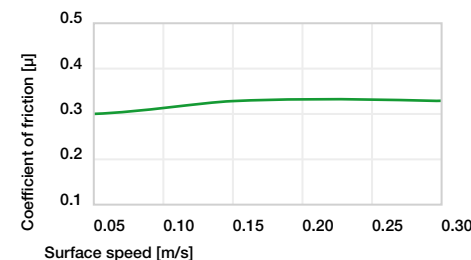


Diagram 04: Coefficient of friction as a function of the surface speed, p = 0.75MPa

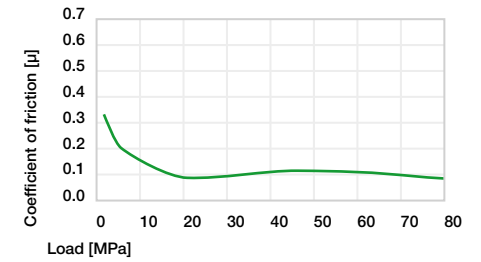


Diagram 05: Coefficient of friction as a function of the load, v = 0.01m/s

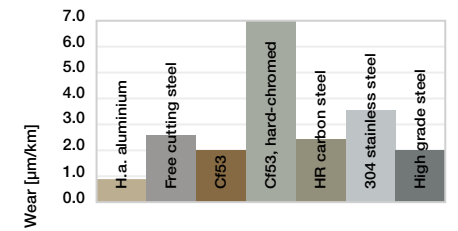


Diagram 06: Wear, rotating with different shaft materials, pressure, p = 1MPa, v = 0.3m/s

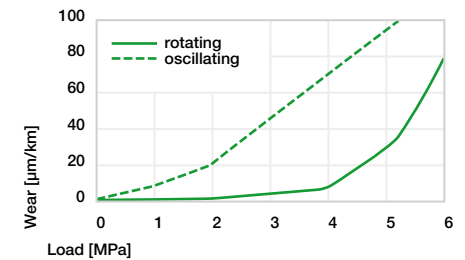


Diagram 07: Wear for oscillating and rotating applications with shaft material Cf53 hardened and ground steel, as a function of the load