



# KS PERMAGLIDE® P1 plain bearings

## Material information P147

### P147 ... maintenance-free and corrosion-resistant

#### Brief description

P147 is an unleaded special sliding material with a high tribological performance. It is designed for maintenance-free, dry-running applications, particularly in areas subject to increased corrosion. It may also be used in systems with liquid lubrication. The use of grease as a lubricant with P147 is only possible to a limited extent, and is not recommended.

#### Material manufacture

The solid lubricant mass is produced in a specially adapted mixing process. In a parallel, continuous sintering operation, bronze powder is sintered onto the steel back as a sliding layer. This produces a sliding layer with a thickness from 0.2 mm to 0.35 mm and a pore volume of approx. 30%. Next, the cavities are filled with solid lubricant by means of impregnating rollers. This process step is controlled in such a way that a running-in layer of solid lubricant up to max. 0.03 mm thick is produced above the sliding layer. In further thermal treatments, the characteristic properties of the material system are adjusted, and the required thickness tolerances of the composite material are produced using controlled roller pairs.

### Plain bearing production

Sliding elements in a great variety of designs are produced from P147 in cutting, stamping and shaping processes. Standard designs are:

- Cylindrical bushes
- Flange bushes
- Thrust washers
- Strips

In a final step, plain bearings manufactured from P147 undergo special anti-corrosion treatment on the bearing back, face reliefs and striking faces.

- Standard version: Tin  
Layer thickness: approx. 0.002 mm
- Increased corrosion protection requirements (on request)  
Version: Zinc, transparent passivated  
Layer thickness: 0.008 mm to 0.012 mm  
Higher layer thickness available on request.

### Properties of P147

- Unleaded
- Compliant with Directive 2011/65/EU (RoHS II)
- Very low stick-slip tendency
- Low wear
- Good chemical resistance
- Low friction value
- No tendency to fuse with metal
- Very low tendency to swell
- Does not absorb water
- Very good corrosion resistance

### Material composition P147

1	Running-in layer	
	PTFE matrix with bulking agent <sup>1)</sup> Layer thickness [mm]:	max. 0.03
2	Sliding layer	
	Tin-bronze Layer thickness [mm]: Pore volume [%]:	0.20–0.35 approx. 30
3	Bearing back	
	Steel Steel thickness [mm]: Steel hardness [HB]:	Variable 100–180

Tab. 1: System composition

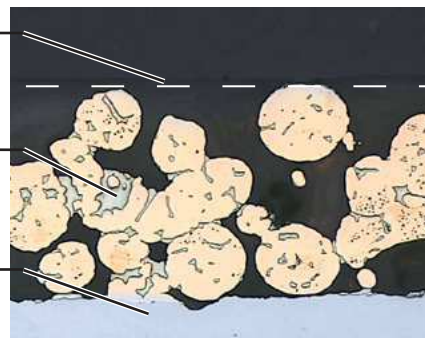


Fig. 2: Layer system

<sup>1)</sup> The pores of the sliding layer are also filled with this lubricant mass.



### Preferred areas of application

- In aggressive media<sup>1)</sup>
- Outside machines and systems<sup>1)</sup>
- Maintenance-free operation in dry-running conditions where unleaded parts are required
- Rotating or oscillating movements up to a speed of 0.8 m/s
- Linear movements
- Temperature range –200 °C to 280 °C

<sup>1)</sup> P147 satisfies the requirements of the salt spray test to DIN 50021

### Hydrodynamic operation

Use in hydrodynamic conditions is possible without problems up to a sliding speed of 3 m/s. In continuous operation above 3 m/s, there is a risk of flow erosion or cavitation.

Motorservice offers the calculation of hydrodynamic operating states as a service



#### Note:

Transparent passivated zinc is an especially effective anti-corrosion agent. An inclined mounting of the bush must be avoided during installation (press-in procedure) of the bearing bushes, as there is a risk of damaging the zinc coating.



#### Note:

The material P147 is available on request.

Running-in layer	
Components	% weight
PTFE	82
BaSO <sub>4</sub>	18
Sliding layer	
Components	% weight
Sn	9 to 11
Cu	Remainder
Material	Material information
Steel	DC04
	DIN EN 10130
	DIN EN 10139

Tab. 2: Chemical composition

Characteristic values, load limit	Designation	Unit	Value
Permissible pv value	p <sub>v perm.</sub>	MPa · m/s	1.4
Permitted specific bearing stress			
• Static	p <sub>perm.</sub>	MPa	250
• Concentrated load, circumferential load at sliding speed ≤ 0.010 m/s	p <sub>perm.</sub>	MPa	140
• Concentrated load, circumferential load at sliding speed ≤ 0.025 m/s	p <sub>perm.</sub>	MPa	56
• Concentrated load, circumferential load, increasing at a sliding speed of ≤ 0.050 m/s	p <sub>perm.</sub>	MPa	28
Permitted sliding speed			
• Dry running at p ≤ 1.75 MPa	v <sub>perm.</sub>	m/s	0.8
Permitted temperature	T <sub>perm.</sub>	°C	–200 to +280
Coefficient of thermal expansion			
• Steel back	α <sub>St</sub>	K <sup>–1</sup>	11 · 10 <sup>–6</sup>
Coefficient of thermal conductivity			
• Steel back	λ <sub>St</sub>	W(mK) <sup>–1</sup>	40

Tab. 3: Material characteristics P147

