PRODUCT INFORMATION

Permaglide P1 plain bearings
P14 material information

P14 ... Maintenance-free and environmentally friendly

Brief description
P14 is a lead-free standard sliding material with a high tribological performance.
It is designed for maintenance-free, dry-running applications, particularly in the food sector. It may also be employed in systems with liquid lubrication, however.
The use of grease as a lubricant with P14 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 of 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 P14 in cutting, stamping and shaping processes.
Standard designs are:
- Cylindrical bushes
- Flange bushes
- Thrust washers
- Strips

In a final step, plain bearings manufactured from P14 undergo anti-corrosion treatment on the bearing back, end faces and striking faces.
Standard version: Tin
Layer thickness: approx. 0.002 mm

Properties of P14
- Lead-free
- Very low stick-slip tendency
- Low wear
- Low friction coefficient
- No tendency to fuse with metal
- Very low tendency to swell

Preferred areas of application
- Maintenance-free operation in dry-running conditions where lead-free parts are required
- Rotating or oscillating movements up to a speed of 1 m/s
- Linear movements
- Temperature range -200 °C to 280 °C

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.
Motor Service offers the calculation of hydrodynamic operating states as a service.

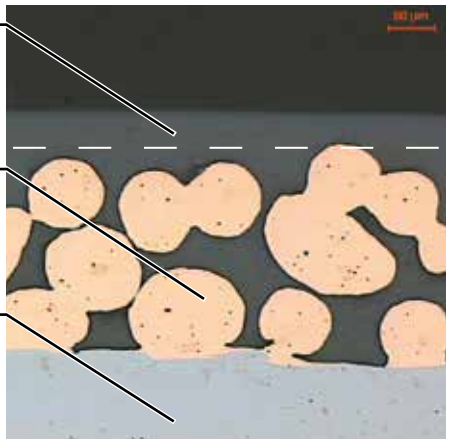
Note:
Tin is used as temporary corrosion protection and an assembly aid.

P14 cannot be used in water (Alternative: P10, P147)

P14 material information

P14 system structure

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



Layer system

Chemical composition

Running-in layer	
Components	**% weight**
PTFE	62
ZnS	38
Sliding layer	
Components	**% weight**
Sn	9 to 11
Cu	Remainder
Bearing back	
Material	**Material information**
Steel	DC04
	DIN EN 10130
	DIN EN 10139

Material characteristics

Characteristic values, load limit	Designation	Unit	Value
Permitted pv value	$pv_{per.}$	MPa·m/s	1.6
Permitted specific bearing load			
• Static	$p_{per.}$	MPa	250
• Concentrated load, circumferential load at sliding speed ≤0.011 m/s	$p_{per.}$	MPa	140
• Concentrated load, circumferential load at sliding speed ≤0.029 m/s	$p_{per.}$	MPa	56
• Concentrated load, circumferential load, increasing at a sliding speed of ≤0.057 m/s	$p_{per.}$	MPa	28
Permitted sliding speed			
• Dry running	$v_{per.}$	m/s	1
• Hydrodynamic operation	$v_{per.}$	m/s	3
Permitted temperature	$T_{per.}$	°C	-200 to +280
Coefficient of thermal expansion			
• Steel back	α_{St}	K^{-1}	$11^{*}10^{-6}$
Coefficient of thermal conductivity			
• Steel back	λ_{St}	$W(mK)^{-1}$	› 40

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