



PI 2051

For technical personnel only!

1/3

PRODUCT INFORMATION

NEW P180 ... HIGHLY RESILIENT AND RESISTANT – THE SUSTAINABLE AND LEAD-FREE P1 MATERIAL OF THE FUTURE

Overview

P180 is a lead-free high-performance material with outstanding tribological performance. It is designed for maintenance-free applications under dry-running conditions. In addition, it can be used in both grease- and liquid-lubricated systems. P180 is a further development of the tried and tested P14 material with improved resilience and wear resistance whether in dry or lubricated applications. The material can also be used in tribological systems that were previously only operated with materials containing lead, such as P10.

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 P180 in cutting, stamping and shaping processes. Standard designs are:

- Cylindrical bushes
- Flange bushes
- Thrust washers
- Strips

In a final step, plain bearings manufactured from P180 undergo corrosion protection treatment on the bearing back, face reliefs and striking faces.

Standard version: Tin

Layer thickness: approx. 0.002 mm



**Properties of P180**

- Lead-free
- Compliant with Directive 2011/65/EU (RoHS II)
- Very low stick-slip tendency
- Extremely resilient, especially with edge wear
- Low and constant friction value
- Very good wear resistance in dry running and wet running
- Universally applicable: suitable for rotary, oscillating and axial applications
- Excellent chemical resistance
- High resistance to erosion
- Largely resistant to swelling
- Compatible with all common dry-running steel shafts

Preferred areas of application

- Operation under dry and lubricated running conditions, where lead-free is required
- Rotating or oscillating movements up to a velocity of 2 m/s
- Linear movements
- Temperature range -200°C to 280°C

Hydrodynamic operation

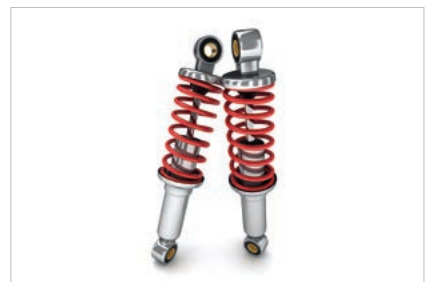
Use in hydrodynamic conditions is possible without problems up to a sliding speed of 10 m/s. The material has a high resistance to erosion and cavitation. Motorservice offers the calculation of hydrodynamic operating states as a service.

**NOTE**

Tin is used as temporary corrosion protection and an assembly device.



The material P180 is suitable as a substitute for materials containing lead and in some cases can exceed their performance limits.

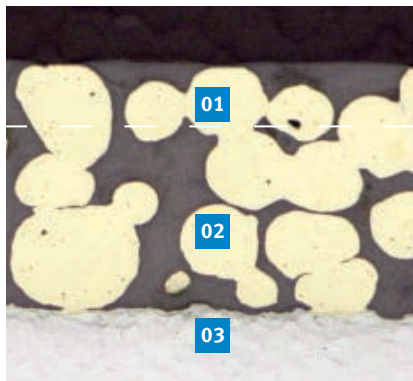
TYPICAL APPLICATIONS**Fluid pumps****Compressors****Shock absorbers****Additional applications:**

- Actuators
- Steering systems
- Solenoid applications
- Seat adjusters
- Hydraulics
- Pneumatics



Material composition P180

01 Running-in layer	
PTFE matrix with bulking agent ¹⁾	
Layer thickness [mm]:	max. 0.03
02 Sliding layer	
Tin bronze	
Layer thickness [mm]:	0.11-0.26
Pore volume [%]:	Approx. 30
03 Bearing back	
Steel	
Steel thickness [mm]:	Variable
Steel hardness [HB]:	100-180



Layer system

Running-in layer	
Components	% weight
PTFE	60
BaSO ₄	16
Other bulking agents	24
Sliding layer	
Components	% weight
Sn	9 to 11
Cu	Remainder
Bearing back	
Material	Material information
Steel	DC04
	DIN EN 10130
	DIN EN 10139

Chemical composition

Characteristic values, load limit	Designation	Unit	Value
Permissible pv value	$p_{v,perm.}$	MPa · m/s	2.2
Permitted specific bearing stress			
• Static	$p_{perm.}$	MPa	250
• Concentrated load, circumferential load at sliding speed ≤ 0.013 m/s	$p_{perm.}$	MPa	160
• Concentrated load, circumferential load at sliding speed ≤ 0.035 m/s	$p_{perm.}$	MPa	56
• Concentrated load, circumferential load, increasing at a sliding speed of ≤ 0.070 m/s	$p_{perm.}$	MPa	28
Permitted sliding speed			
• Dry running at $p \leq 1.10$ MPa	$v_{perm.}$	m/s	2
• Hydrodynamic operation	$v_{perm.}$	m/s	10
Permitted temperature	$T_{perm.}$	°C	-200 to +280
Coefficient of thermal expansion			
• Steel back	α_{St}	K ⁻¹	$11 \cdot 10^{-6}$
Coefficient of thermal conductivity			
• Steel back	λ_{St}	W(mK) ⁻¹	40

Material characteristics P180

SUSTAINABILITY



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