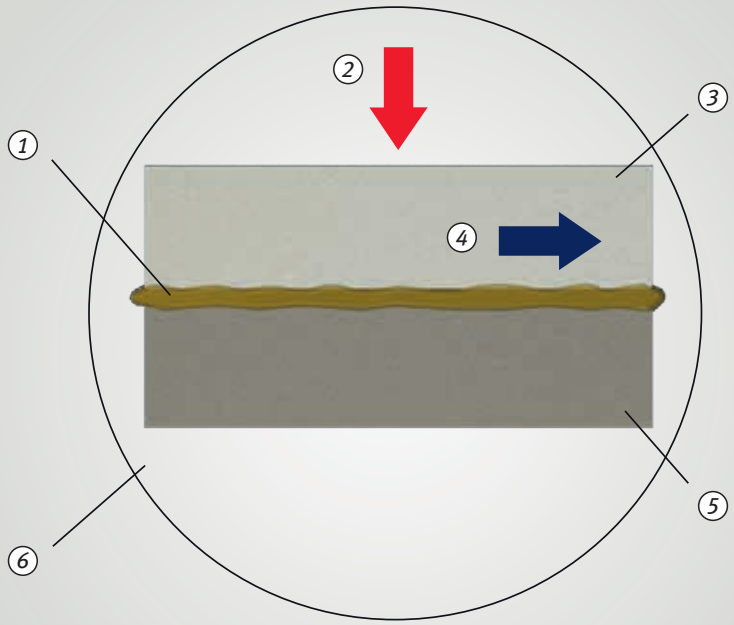
Environmental influences on plain bearings

Plain bearings are used to absorb and convey forces between components that move relative to one another. They determine the position of the moved components in relation to one another and ensure accuracy of the movement.

Plain bearings must satisfy many requirements. They must be capable of tolerating high mechanical loads to the greatest possible extent, while suffering only minimal wear throughout their service life. Likewise, they must withstand high sliding speeds and be insensitive to disturbances from the bearing environment. Illustration 1 shows just how complex a tribological system can be, at the centre of which a plain bearing is working.

Influences in a tribological system



1 Intermediate material
2 Stress
3 Interacting sliding part
4 Relative movement
5 Base body
6 Ambient conditions

Tribological system

Ambient conditions
- Temperature, medium, dirt

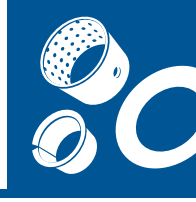
Stress
- Amount and type of load (static, dynamic)
- Load time (constant, with intervals), circumferential load, concentrated load

Interacting sliding part
- Material, hardness, surface roughness, thermal conductivity

Relative movement
- Rotating, oscillating, linear
- Sliding speed, duration of movement

Intermediate material
- Solid lubricant, grease, liquid, viscosity
- Aging resistance

Base body
- Material, hardness, surface roughness, wear resistance, limp-home capability
- Chemical resistance



In terms of the operating mode, we distinguish between three different functional systems:

- Dry-running, maintenance-free plain bearings
- Grease-lubricated, low-maintenance plain bearings
- Hydrodynamically operated plain bearings

Plain bearings that work on the principles of hydrodynamics can satisfy the various requirements comparatively well.
In this way, oil-lubricated plain bearings, in particular, can be designed for optimum, reliable operation with the aid of modern calculation methods.

Low-maintenance plain bearings are generally lubricated with grease. The quantity of grease applied during mounting is normally sufficient for the entire service life. If a grease-lubricated plain bearing is used in difficult conditions, subsequent lubrication is recommended. Correctly timed relubricating intervals can considerably lengthen service life.

Due to the many influencing factors, however, calculating the expected service life of grease-lubricated plain bearings is fraught with uncertainty and can only be used as a guide.
But in many cases, lubrication using oil or grease is not possible or not permitted. In cases like this, maintenance-free, dry-running plain bearings are employed. Here, too, calculating the service life is not sufficiently precise.
The common practice of calculating service life using simple methods and taking into account influencing factors (such as specific load, sliding speed, temperature, etc.) can provide only approximate standard values. It is therefore recommended to verify the design and layout of both maintenance-free, dry-running plain bearings and low-maintenance ones through field-oriented tests.

Information on the special function models of maintenance-free or low-maintenance plain bearings can be found in the KS PERMAGLIDE® catalogue from page 8.