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Plain bearings — Terms, definitions, classification and symbols —

Part 2: Friction and wear

Paliers lisses — Termes, définitions, classification et symboles —

Partie 2: Frottement et usure

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Foreword

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This document was prepared by Technical Committee ISO/TC 123, *Plain bearings*, Subcommittee SC 6, *Terms and common items*.

This fourth edition cancels and replaces the third edition (ISO 4378-2:2017), which has been technically revised.

The main changes are as follows:

— editorial revision of the document: instead of referencing the parts in the figure by subclause number, the part numbers have been used and the names in the key have been shown;

— addition of Bibliography and an alphabetical index.

A list of all parts in the ISO 4378 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

As there is a large number of multiple designations in the domain of plain bearings, there is a considerable risk of error in the interpretation of standards and technical literature.

This document is an attempt to establish a uniform basic system of designations of friction and wear.

In addition, this document is specifically intended for the field of plain bearings the content can be adopted in general to the field of tribology and being adopted to other machinery elements.

Plain bearings — Terms, definitions, classification and symbols —

Part 2: Friction and wear

1 Scope

This document specifies the most commonly used terms relating to friction and wear of plain bearings with their definitions and classification.

For some terms and word combinations, their short forms are given, which can be used where they are unambiguous.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

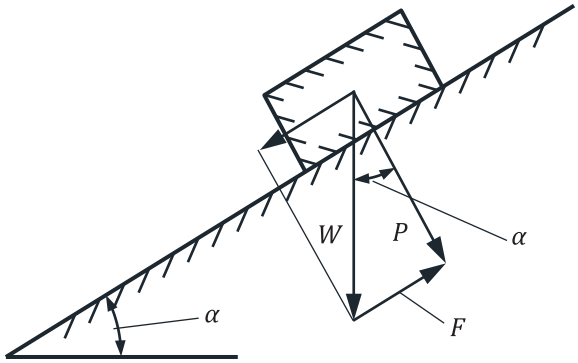
3.1 General terms

3.1.1
external friction
force and its phenomenon of resistance to the relative motion between two bodies, originating at the contact area of their surfaces and directed tangentially to them

3.1.2
internal friction
force and its phenomenon of resistance to the relative motion of particles or mass of a body with respect to other particles or mass in the same body

3.1.3
friction
force and its phenomenon of resistance to the relative motion working tangentially with respect to the common boundary between two bodies when, under the action of an external force, one body moves or is at rest relative to the surface of the other

Note 1 to entry: See Figure 1.



Key

F *friction force* (3.1.4)
P normal force
W weight of material
α *friction angle* (3.1.6)

Figure 1 — Friction

3.1.4
friction force
force that resists relative motion between two bodies

Note 1 to entry: See Figure 1.

3.1.5
coefficient of friction
ratio of the *friction force* (3.1.4) between two bodies to the normal force pressing these bodies together

3.1.6
friction angle
angle, the tangent of which is equal to the ratio of the *friction force* (3.1.4) to the normal force, or *coefficient of friction* (3.1.5)

Note 1 to entry: See Figure 1.

3.1.7
wear
phenomenon of a loss of substance from a solid body surface in frictional conditions

3.1.8
wear process
process of a loss of substance from a solid body surface in frictional conditions, which appears as a gradual decrease of body dimensions and/or change of shape

Note 1 to entry: Rarely, in a broader sense, is there a process of permanent increase of body dimensions on the surface without loss of substance.

3.1.9
wear rate
amount of *wear* (3.1.7) per unit sliding distance or per interval of time

Note 1 to entry: A distinction is made between “momentary” (at a definite moment) and “mean” wear rate (during a definite interval of time).

3.1.10
specific wear rate
wear intensity
value of amount of *wear* (3.1.7) divided by the product of sliding distance (or time) and load; that is, the ratio of *wear rate* (3.1.9) to the load

Note 1 to entry: Wear can be expressed in the units of length, volume, mass, etc.

Note 2 to entry: Wear intensity is distinguished as “momentary” or as “mean” wear intensity.

3.1.11
mild wear
normal wear
type of *adhesive wear* (3.3.1.3) characterizing in generation of smooth surface with a little surface damage and minute *wear* (3.1.7) particles of several microns of less

3.1.12
severe wear
excessive wear
type of *adhesive wear* (3.3.1.3) characterizing that produces significant transfer and large-sized *wear* (3.1.7) debris accompanied by intense *adhesion* (3.4.2) between *friction* (3.1.3) surfaces

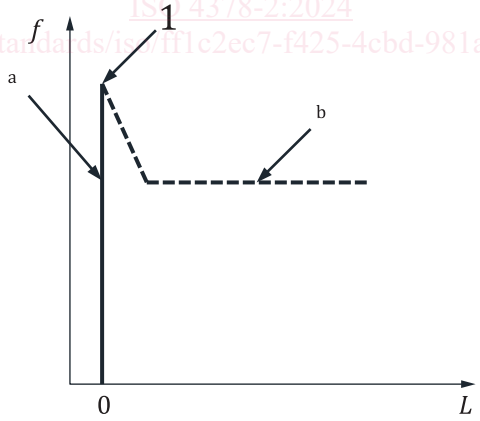
3.2 Terms related to types and characteristics of external friction and classification

3.2.1 Classification according to the presence of relative motion

3.2.1.1
static friction
friction (3.1.3) and its phenomena that occur between two contacting bodies before the start of relative motion under increasing external force

Note 1 to entry: See Figure 2.

Note 2 to entry: Friction that occurs at an extremely low sliding speed is also referred to as static friction.



Key
1 position of the curve corresponding to *maximum static friction* (3.2.1.2)
f *friction* (3.1.3)
L sliding distance
a The solid line represents static friction.
b The dotted line represents *dynamic friction* (3.2.1.3).

Figure 2 — Friction according to relative motion

3.2.1.2
maximum static friction
friction (3.1.3) and its phenomena that occur between two contacting bodies just before the start of relative motion under gradually increasing external force

Note 1 to entry: See Figure 2.

3.2.1.3
dynamic friction
friction (3.1.3) and its phenomena between two bodies in relative motion

Note 1 to entry: See Figure 2.

3.2.2 Classification according to the mode of relative motion

3.2.2.1
sliding motion
relative motion between two bodies in contact when the contact areas of both bodies move with different magnitudes and/or directions of tangential velocity

3.2.2.2
sliding friction
force and its phenomena of resistance to the *sliding motion* (3.2.2.1) between two bodies

Note 1 to entry: See 3.1.3.

3.2.2.3
sliding velocity
difference between tangential velocities of two bodies in contact, at their contact point, during sliding

3.2.2.4
sliding surface
body surface subjected to *sliding motion* (3.2.2.1)

3.2.2.5
rolling motion
relative motion between two bodies in contact when the contact areas of both bodies move with the same magnitude and direction of tangential velocity

3.2.2.6
rolling velocity
tangential velocity at the common contact point between bodies that are rolling relative to each other

3.2.2.7
rolling friction
force and its phenomena of resistance to the *rolling motion* (3.2.2.5) between two bodies

3.2.2.8
combined rolling and sliding friction
dynamic friction (3.2.1.3) that occurs between two contacting bodies when *rolling motion* (3.2.2.5) and *sliding motion* (3.2.2.1) take place simultaneously within the contact area

3.2.2.9
traction
force and its phenomena that occur during the *rolling motion* (3.2.2.5) of a body on another body, accompanied by sliding at the contact area in the tangential direction, and which are utilized for power transmission

3.2.2.10
traction force
force that occurs during the *rolling motion* (3.2.2.5) of a body on another body, accompanied by sliding at the contact area in the tangential direction