



**International  
Standard**

**ISO 4378-1**

**Plain bearings — Terms, definitions,  
classification and symbols —**

Part 1:  
**Design, bearing materials and their  
properties**

*Paliers lisses — Termes, définitions, classification et symboles —  
Partie 1: Conception, matériaux pour paliers et leurs propriétés*

**Fifth edition  
2024-11**

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Published in Switzerland

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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

This fifth edition cancels and replaces the fourth edition (ISO 4378-1:2017), which has been technically revised.

The main changes are as follows:

- addition of several new terms, key references 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](http://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 design, bearing materials and their properties.

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# Plain bearings — Terms, definitions, classification and symbols —

## Part 1: Design, bearing materials and their properties

### 1 Scope

This document specifies the most commonly used terms relating to design, bearing materials and their properties 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 terminological 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 bearing

mechanical component by means of which a part in relative motion is supported and/or guided with respect to other parts of a mechanism

##### 3.1.2

##### plain bearing sliding bearing

*bearing* (3.1.1) in which the type of relative motion is sliding

##### 3.1.3

##### plain bearing unit

mechanical component of a tribological system including a *plain bearing* (3.1.2), its supporting part (e.g. a housing), a shaft and a lubricating system

#### 3.2 Terms related to types of plain bearings and classification

##### 3.2.1 Classification according to the type of load

##### 3.2.1.1

##### statically loaded plain bearing

*plain bearing* (3.1.2) operating under a load constant in magnitude and direction

3.2.1.2

**dynamically loaded plain bearing**

*plain bearing* (3.1.2) operating under a load changing in magnitude and/or direction

3.2.2 Classification according to the direction of the acting load

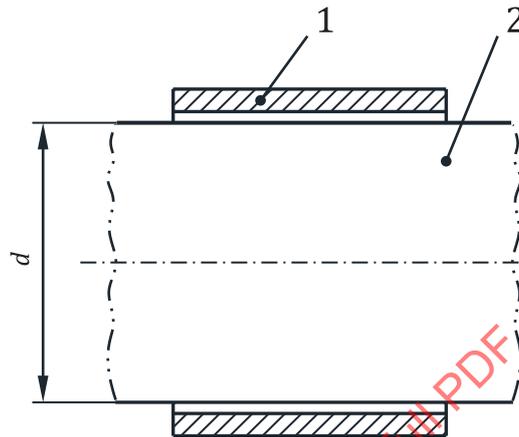
3.2.2.1

**plain journal bearing**

**journal bearing**

*plain bearing* (3.1.2) in which the load acts radially to the axis of the rotating shaft

Note 1 to entry: See [Figures 1](#) and [3](#).



**Key**

1 plain journal bearing

2 journal (3.3.8)

d journal diameter (3.5.32), shaft diameter (3.5.33)

**Figure 1** — Plain journal bearing

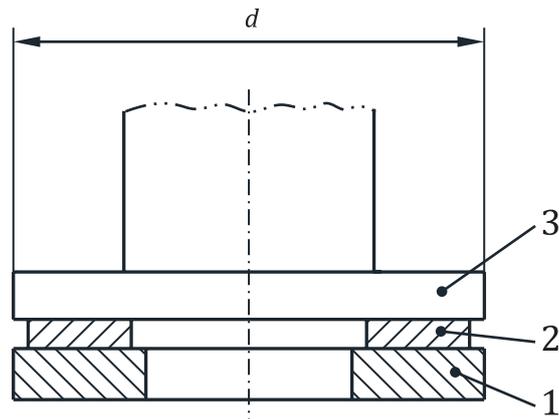
3.2.2.2

**plain thrust bearing**

**thrust bearing**

*plain bearing* (3.1.2) in which the load acts along the axis of the rotating shaft

Note 1 to entry: See [Figure 2](#).



**Key**

- 1 support ring
- 2 thrust pad (3.3.7.2)
- 3 thrust collar (3.3.9)
- d* collar diameter (3.5.34)

**Figure 2 — Plain thrust bearing**

**3.2.2.3**

**journal thrust bearing**  
**flanged bearing**

*plain bearing* (3.1.2) capable of supporting a load in both the axial and radial directions

**3.2.3 Classification according to the type of lubrication**

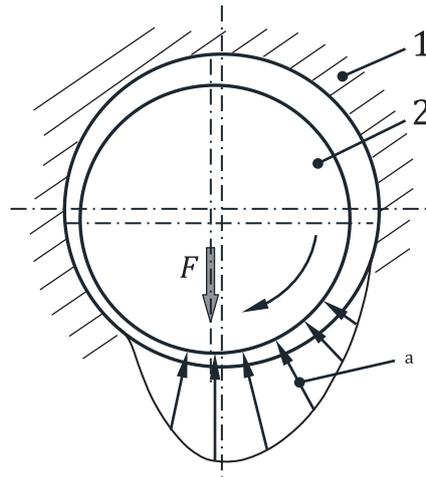
**3.2.3.1**

**hydrodynamic bearing**

*plain bearing* (3.1.2) operating under conditions of hydrodynamic lubrication

Note 1 to entry: See [Figure 3](#).

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**Key**

- 1 plain journal bearing (3.2.2.1)
- 2 journal (3.3.8)
- $F$  load
- a Fluid film pressure distribution.

**Figure 3 — Hydrodynamic bearing**

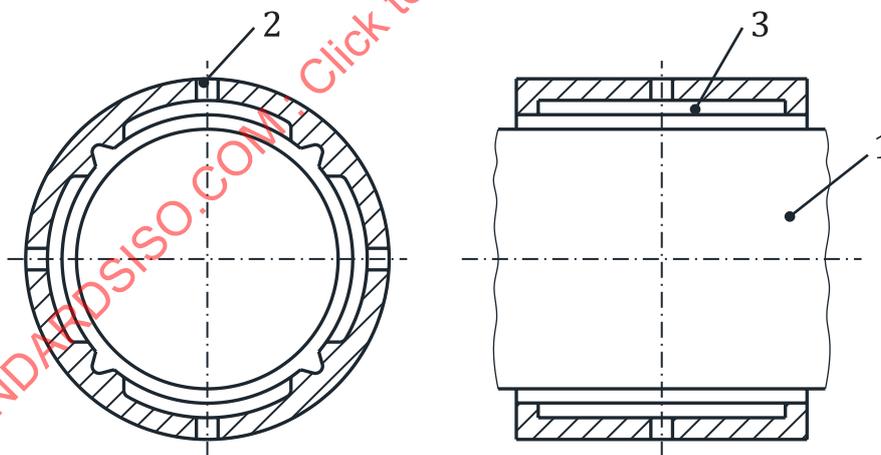
**3.2.3.2**

**hydrostatic bearing**

**externally pressurized bearing**

plain bearing (3.1.2) operating under conditions of hydrostatic lubrication

Note 1 to entry: See [Figure 4](#).



**Key**

- 1 journal (3.3.8)
- 2 oil hole, lubrication hole (3.4.1)
- 3 oil pocket, lubrication indentation (3.4.3)

**Figure 4 — Hydrostatic bearing**

3.2.3.3

**hydrodynamic gas bearing**

**hydrodynamic air bearing**

**aerodynamic bearing**

*plain bearing* (3.1.2) operating under conditions of hydrodynamic gas/air lubrication

3.2.3.4

**hydrostatic gas bearing**

**hydrostatic air bearing**

**aerostatic bearing**

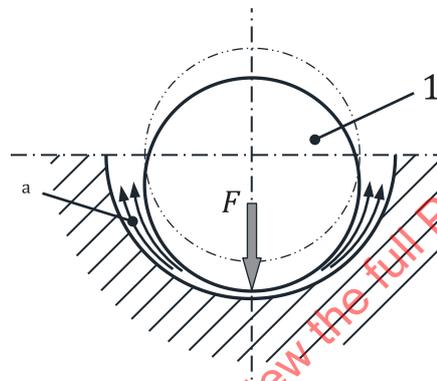
*plain bearing* (3.1.2) operating under conditions of hydrostatic gas/air lubrication

3.2.3.5

**squeeze film bearing**

*plain bearing* (3.1.2) in which complete separation of sliding surfaces is caused by the pressure developed in the lubricant film as a result of their approach in the direction normal to the surface

Note 1 to entry: See [Figure 5](#).



**Key**

- 1 *journal* (3.3.8)
- F* load
- a* Squeezed fluid flow.

**Figure 5 — Squeeze film bearing**

3.2.3.6

**hybrid bearing**

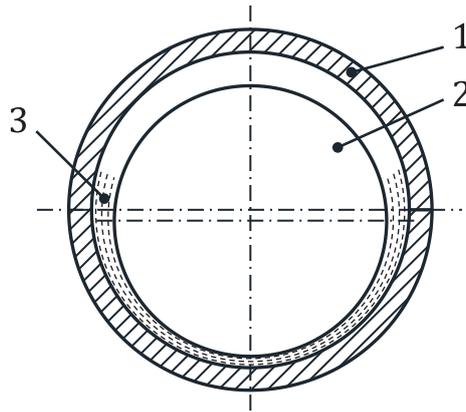
*plain bearing* (3.1.2) operating under conditions of both hydrostatic and hydrodynamic lubrication

3.2.3.7

**solid-film lubricated bearing**

*plain bearing* (3.1.2) operating with a solid lubricant

Note 1 to entry: See [Figure 6](#).



**Key**

- 1 *plain bearing* (3.1.2)
- 2 *journal* (3.3.8)
- 3 *solid lubricant*

**Figure 6 — Solid film lubricated bearing**

**3.2.3.8**

**unlubricated bearing**

*plain bearing* (3.1.2) operating without a lubricant

**3.2.3.9**

**self-lubricating bearing**

*plain bearing* (3.1.2) lubricated by the *bearing material* (3.6.1), by the material components or by solid lubricant overlays

**3.2.3.10**

**porous self-lubricating bearing**

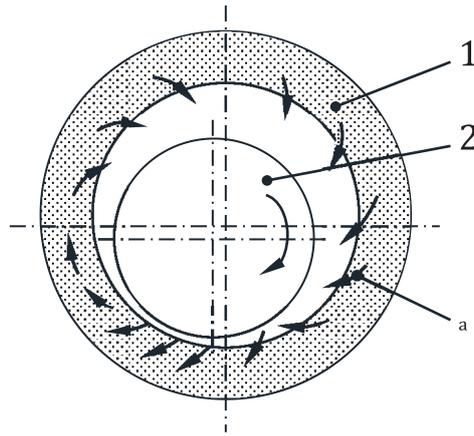
**sintered bearing**

**oil-impregnated sintered bearing**

*plain bearing* (3.1.2), the sliding part of which consists of material having communicating pores filled with lubricant

Note 1 to entry: See [Figure 7](#).

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**Key**

- 1 porous bearing
- 2 journal (3.3.8)
- a Fluid flow.

**Figure 7 — Porous self-lubricating bearing**

**3.2.3.11**

**self-contained plain bearing assembly**

bearing assembly with a lubricant reservoir and means of circulating the lubricant to the bearing surface

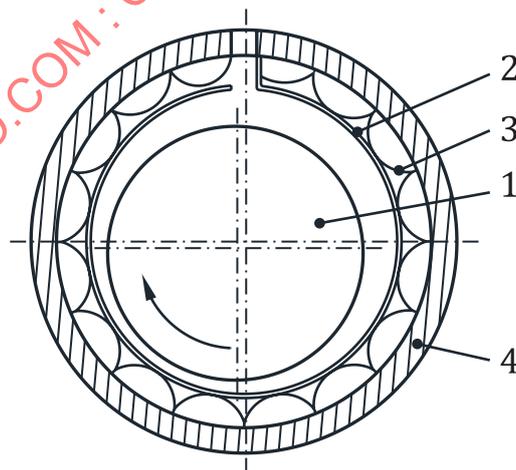
Note 1 to entry: See *plain bearing assembly* (3.2.4.9).

**3.2.3.12**

**foil bearing**

*hydrodynamic bearing* (3.2.3.1) consisting of a thin *solid material* (3.6.2) with low bending stiffness, which supports a load while allowing deflection of the thin solid material

Note 1 to entry: See [Figure 8](#).



**Key**

- 1 journal (3.3.8)
- 2 top foil
- 3 bump foil
- 4 housing (3.3.11)

**Figure 8 — Foil bearing**

3.2.3.13

helical groove bearing

spiral groove bearing

hydrodynamic bearing (3.2.3.1) system with many shallow helical grooves on the surface of the bearing or the shaft

Note 1 to entry: See Figure 9.

Note 2 to entry: The term “spiral groove bearing” is commonly used, although the design in Subfigures a) and b) make use of helical grooves. In case of Subfigure c) the grooves are spiral shaped.

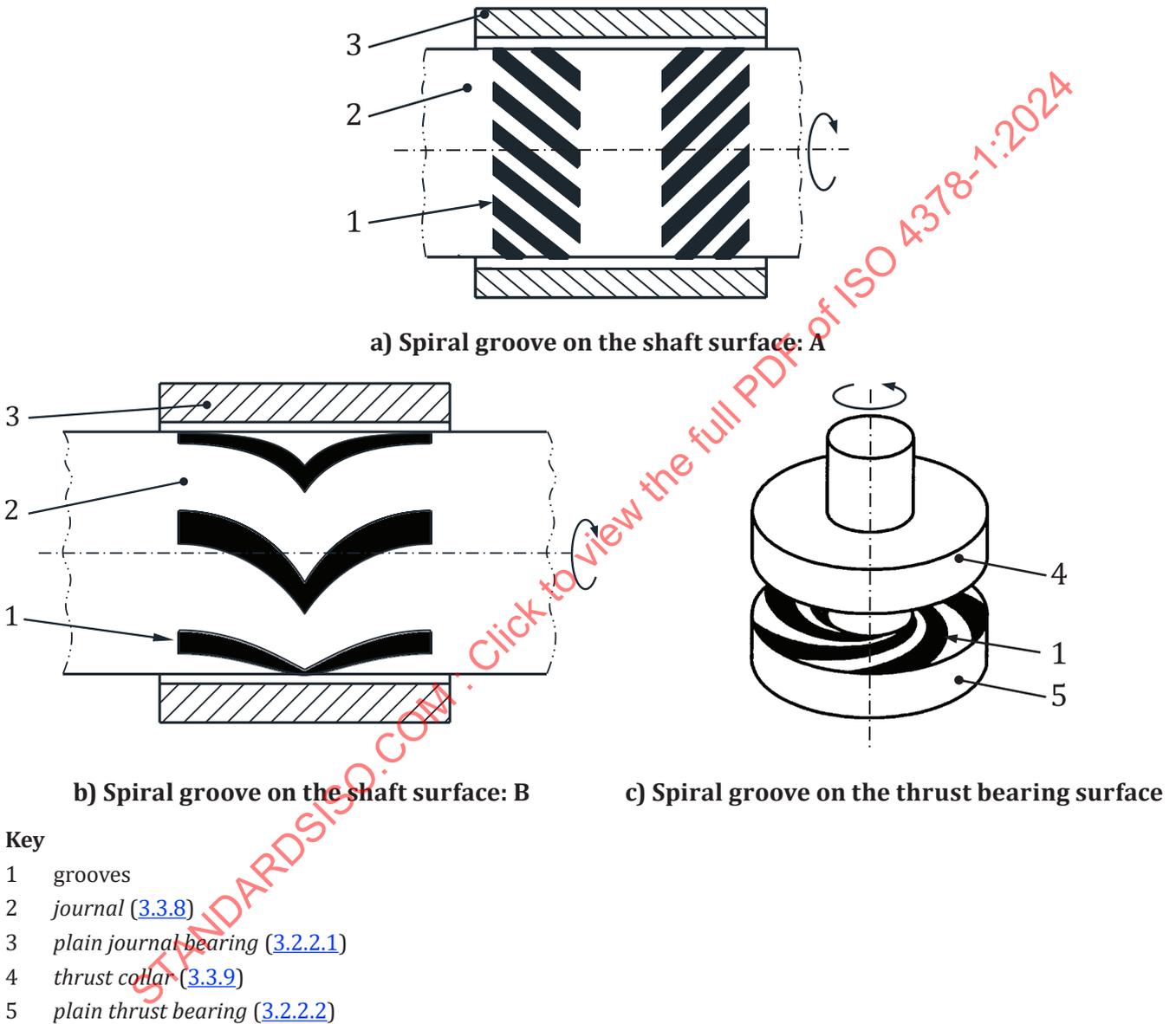


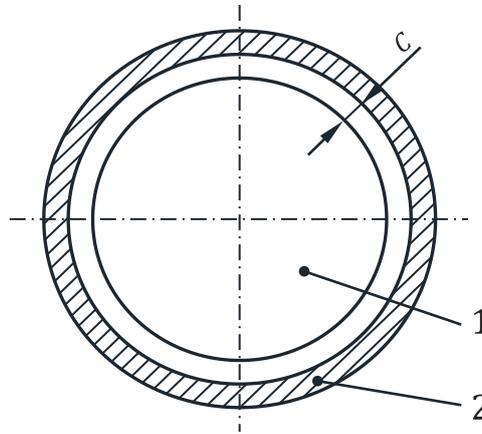
Figure 9 — Spiral groove bearing

3.2.4 Classification according to the design

3.2.4.1 circular cylindrical bearing

plain journal bearing (3.2.2.1), every cross-section of the inside surface of which is a circle of the same diameter

Note 1 to entry: See Figure 10.



Key

- 1 journal (3.3.8)
- 2 plain journal bearing (3.2.2.1)
- C radial clearance of a circular cylindrical bearing (3.5.5)

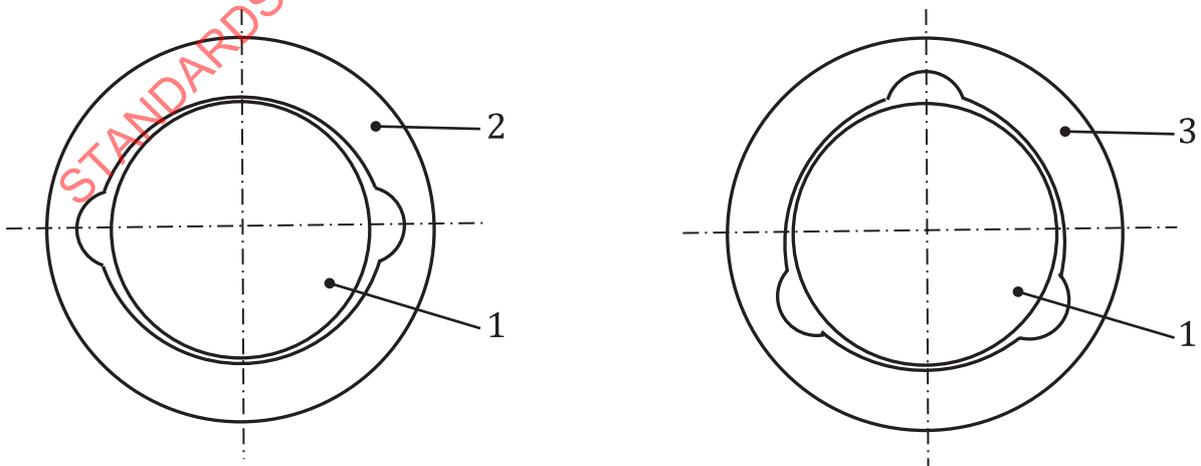
Figure 10 — Circular cylindrical bearing

3.2.4.2 profile bore bearing  
multi-lobed bearing

plain journal bearing (3.2.2.1) in which no cross-section of the inside surface is a circle

Note 1 to entry: See Figure 11.

Note 2 to entry: the bearing usually has more than one cylindrical surface so arranged that two or more lubricant wedges develop around the bearing circumference.



a) Two lobe bearing

b) Three lobe bearing

**Key**

- 1 journal (3.3.8)
- 2 two lobe bearing
- 3 three lobe bearing

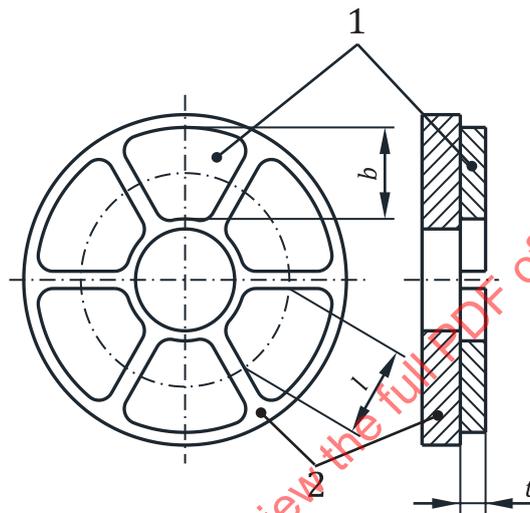
**Figure 11 — Multi lobed bearing**

**3.2.4.3**

**pad thrust bearing**

*plain thrust bearing* (3.2.2.2), the sliding surface of which consists of fixed pads (3.3.7)

Note 1 to entry: See [Figure 12](#)



**Key**

- 1 pad (3.3.7), thrust pad (3.3.7.2)
- 2 support ring
- $l$  pad length of pad thrust bearing (3.5.11)
- $b$  pad width (3.5.13)
- $t$  pad thickness (3.5.14)

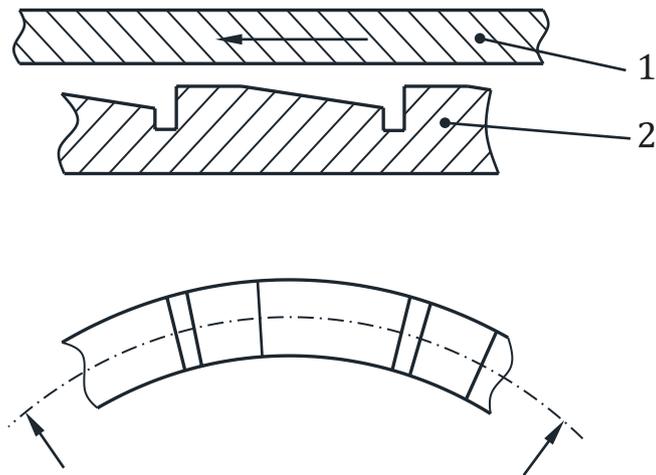
**Figure 12 — Pad thrust bearing**

**3.2.4.4**

**taper-land thrust bearing**

*plain thrust bearing* (3.2.2.2) in which one side of the sliding surfaces is tapered

Note 1 to entry: See [Figure 13](#).



**Key**

- 1 *thrust collar* (3.3.9)
- 2 *taper-land thrust bearing*

NOTE The upper figure shows a developed view of the cross section along the dotted line in the lower figure.

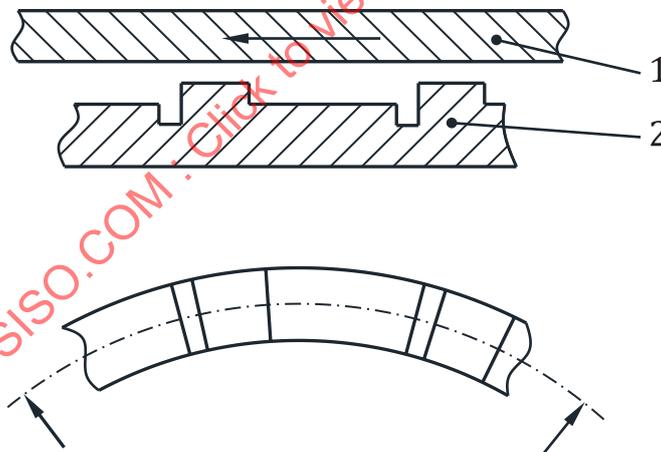
**Figure 13 — Taper-land thrust bearing**

**3.2.4.5**

**step thrust bearing**

*plain thrust bearing* (3.2.2.2) with a step on the surface that is higher in the direction of shaft rotation

Note 1 to entry: See [Figure 14](#).



**Key**

- 1 *thrust collar* (3.3.9)
- 2 *step thrust bearing*

NOTE The upper figure shows a developed view of the cross section along the dotted line in the lower figure.

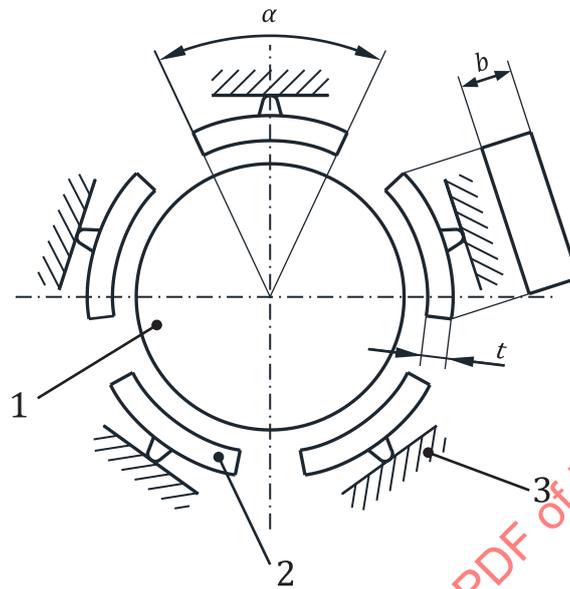
**Figure 14 — Step thrust bearing**

3.2.4.6

**tilting pad journal bearing**

self-tilting *plain journal bearing* (3.2.2.1), the sliding surface of which consists of *pads* (3.3.7) free to align with respect to the *journal* (3.3.8) under the hydrodynamic action of the lubricant film

Note 1 to entry: See [Figure 15](#).



**Key**

- 1 *journal* (3.3.8)
- 2 *pad* (3.3.7), *journal pad* (3.3.7.1)
- 3 *housing* (3.3.11)
- $\alpha$  *pad angle of pad journal bearing* (3.5.12)
- $b$  *pad width* (3.5.13)
- $t$  *pad thickness* (3.5.14)

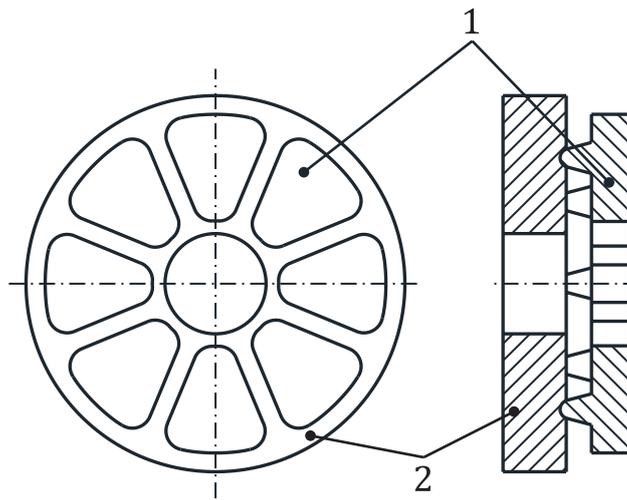
**Figure 15 — Tilting pad journal bearing**

3.2.4.7

**tilting pad thrust bearing**

self-tilting *plain thrust bearing* (3.2.2.2), the sliding surface of which consists of *pads* (3.3.7) free to tilt to make a convergent lubricant film with the thrust collar sliding surface under the hydrodynamic action of the lubricant film

Note 1 to entry: See [Figure 16](#).



**Key**

- 1 pad (3.3.7), thrust pad (3.3.7.2)
- 2 support ring

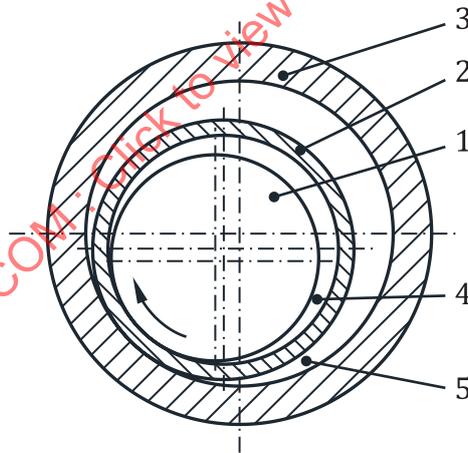
**Figure 16 — Tilting pad thrust bearing**

**3.2.4.8**

**floating bush bearing**

plain bearing (3.1.2) designed as a bush (3.3.2), being able to slide and rotate on the shaft and in the housing bore

Note 1 to entry: See [Figure 17](#).



**Key**

- 1 journal (3.3.8)
- 2 floating bush (3.3.2)
- 3 housing (3.3.11)
- 4 inner fluid film
- 5 outer fluid film

**Figure 17 — Floating bush bearing**

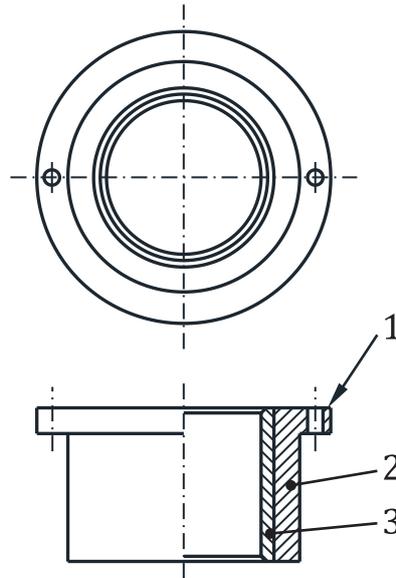
**3.2.4.9**

**plain bearing assembly**

bearing assembly consisting of a plain bearing fitted in a pedestal or flanged housing

Note 1 to entry: See [Figure 18](#).

Note 2 to entry: See *self-contained plain bearing assembly* (3.2.3.11).



**Key**

- 1 *housing flange* (3.3.16)
- 2 *flanged housing*
- 3 *plain journal bearing* (3.2.2.1)

**Figure 18 — Plain bearing assembly**

**3.2.4.9.1**

**pedestal plain bearing assembly  
pillow block bearing assembly**

*plain bearing assembly* (3.2.4.9) secured by fixing elements perpendicular or parallel to the shaft axis

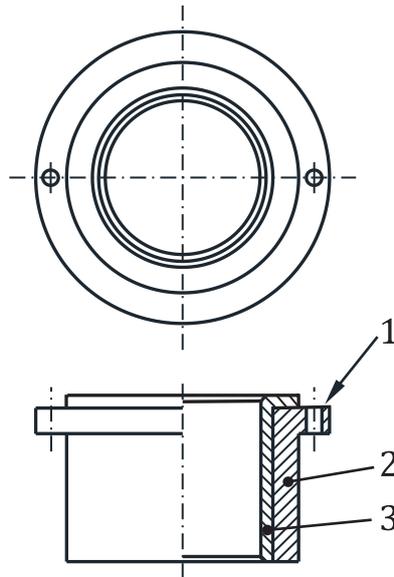
Note 1 to entry: Refer to ISO 11687-1.

**3.2.4.9.2**

**flanged plain bearing assembly**

*plain bearing assembly* (3.2.4.9) secured by fixing elements parallel and/or perpendicular to the shaft axis

Note 1 to entry: See [Figure 19](#).



**Key**

- 1 *housing flange* (3.3.16)
- 2 *flanged housing*
- 3 *flanged bush* (3.3.3)

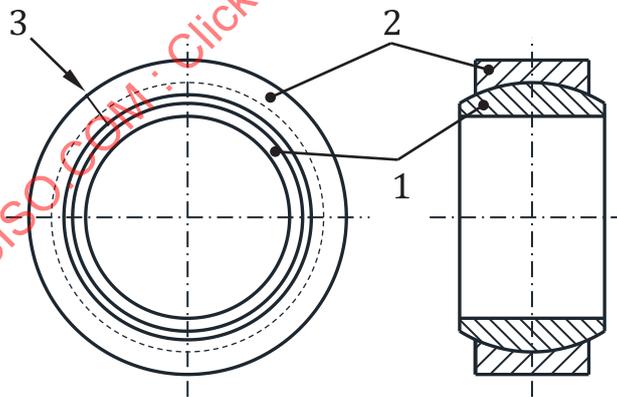
**Figure 19 — Flanged plain bearing assembly**

**3.2.4.10**

**self-aligning bearing**

*plain bearing* (3.1.2) designed with the ability to self-align, with respect to the opposing surface

Note 1 to entry: See [Figure 20](#).



**Key**

- 1 *inner ring*
- 2 *outer ring*
- 3 *joint, split* (3.5.30)

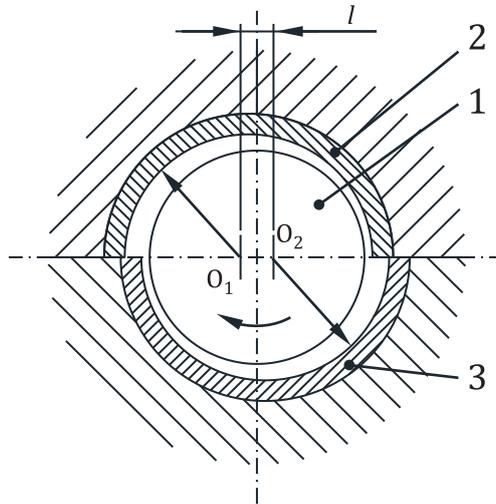
**Figure 20 — Self-aligning bearing**

3.2.4.11

**offset bearing**

pair of *plain bearings* (3.1.2) assembled by shifting radially by a certain distance smaller than the radial clearance

Note 1 to entry: See [Figure 21](#).



**Key**

- 1 *journal* (3.3.8)
- 2 *upper half bearing* (3.3.1)
- 3 *lower half bearing* (3.3.1)
- $O_1$  centre of upper half bearing
- $O_2$  centre of lower half bearing
- $l$  offset

**Figure 21 — Offset bearing**

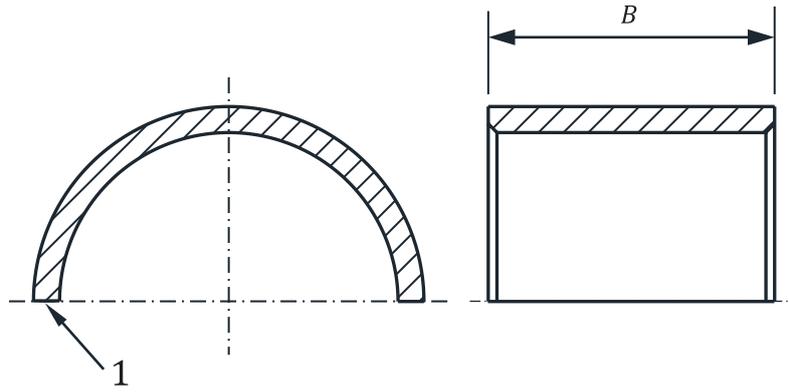
**3.3 Terms related to structural elements of plain bearing assembly**

3.3.1

**half-bearing**

*plain journal bearing* (3.2.2.1) with a sliding surface of 180° of the shaft circumference

Note 1 to entry: See [Figure 22](#).

**Key**

- 1 joint face (3.5.29)  
 B bearing width (3.5.3)

**Figure 22 — Half-bearing****3.3.1.1****thin wall half-bearing**

*half-bearing* (3.3.1) of sufficiently small wall thickness that the bearing geometry will be influenced by housing bore geometrical imperfections

**3.3.1.2****thick wall half-bearing**

*half-bearing* (3.3.1) of sufficiently large wall thickness that the bearing geometry will not be influenced by housing bore geometrical imperfections

**3.3.1.3****bearing back**

surface of *bearing backing* (3.3.1.4) opposite the slide surface

Note 1 to entry: See [Figure 26](#).

**3.3.1.4****bearing backing****half-bearing backing****bush backing****backing**

part of a multilayer bearing/ half-bearing/ bush applied for giving a bearing the required strength and/or stiffness

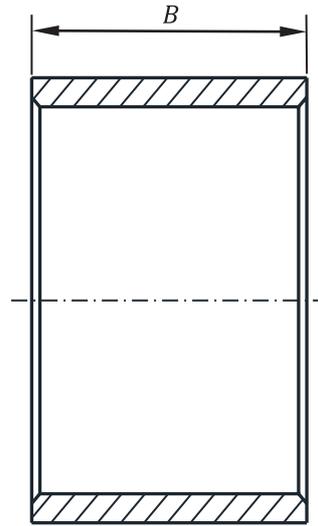
Note 1 to entry: See [Figure 26](#).

Note 2 to entry: Backing is usually made of steel.

**3.3.2****plain bearing bush****bearing bush****bush**

replaceable tubular bearing element, the inner and/or outer surface of which is the sliding surface of a *plain bearing* (3.1.2)

Note 1 to entry: See [Figure 23](#).



**Key**

*B* bearing width (3.5.3)

**Figure 23 — Plain bearing bush**

**3.3.2.1**

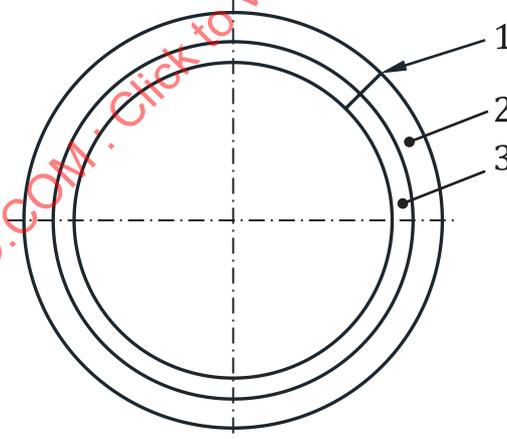
**plain bearing wrapped bush**

**bearing wrapped bush**

**wrapped bush**

*bush* (3.3.2) made from a wrapped strip of a single-layer or multilayer *bearing material* (3.6.1)

Note 1 to entry: See [Figure 24](#).



**Key**

1 *joint, split* (3.5.30)

2 *backing* (3.3.1.4)

3 *bearing material layer* (3.3.5.1)

**Figure 24 — Plain bearing wrapped bush**

**3.3.2.2**

**seamless bush**

*bush* (3.3.2) without *split* (3.5.30)

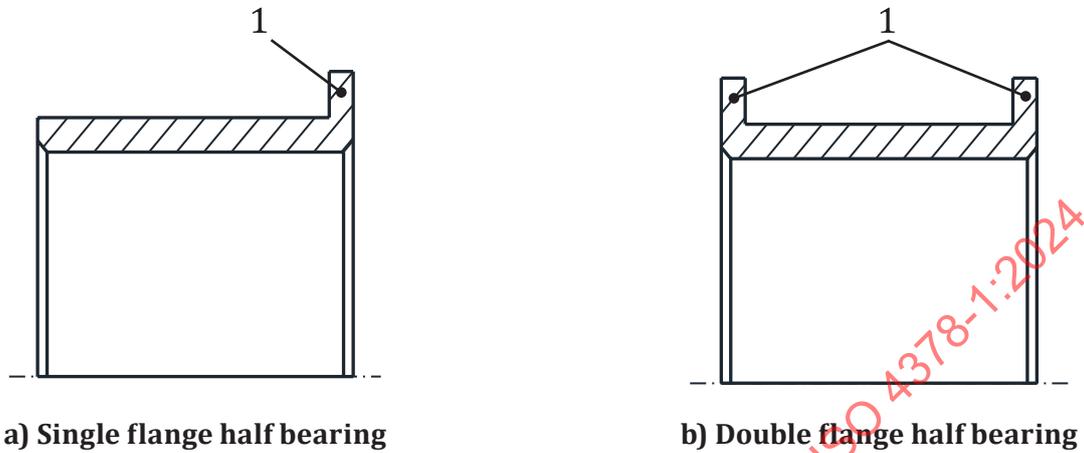
3.3.3

**flanged half-bearing**

**flanged bush**

*half-bearing (3.3.1)/bush (3.3.2)* with a flange at one or both ends

Note 1 to entry: See [Figure 25](#).



**Key**

1 flange

Figure 25 — Flanged half-bearing

3.3.4

**solid half-bearing**

**solid bush**

*half-bearing (3.3.1)/bush (3.3.2)* made of a single material

3.3.5

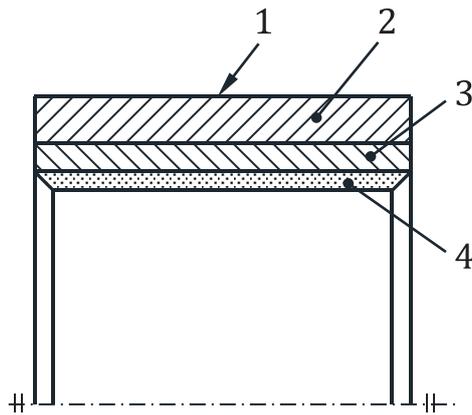
**multilayer half-bearing**

**multilayer bush**

*half-bearing (3.3.1)/bush (3.3.2)* made of layers of different materials

Note 1 to entry: See [Figure 26](#).

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**Key**

- 1 bearing back (3.3.1.3)
- 2 bearing backing, backing (3.3.1.4)
- 3 bearing material layer, bearing layer, lining (3.3.5.1)
- 4 plain bearing running-in layer, running-in layer, over lay (3.3.5.2)

**Figure 26 — Multilayer bush**

**3.3.5.1**

**bearing material layer  
bearing layer  
lining**

layer of a bearing material (3.6.1) as part of a multilayer half-bearing / multilayer bush (3.3.5)

Note 1 to entry: The layer thickness is usually greater than 0,2 mm.

Note 2 to entry: See Figures 24 and 26.

**3.3.5.2**

**plain bearing running-in layer  
running-in layer  
overlay**

additional layer of material applied to the bearing material (3.6.1) to improve running-in ability (3.6.15), conformability (3.6.14), embeddability (3.6.16) and, in some cases, corrosion resistance (3.6.21)

Note 1 to entry: The layer thickness is usually from 0,01 mm to 0,05 mm.

Note 2 to entry: See Figure 26.

**3.3.5.3**

**interlayer  
bonding layer  
nickel dam**

thin layer between the overlay (3.3.5.2) and the lining (3.3.5.1) to strengthen the bond and reduce diffusion

Note 1 to entry: The layer thickness is usually between 0,001 mm and 0,002 mm.

**3.3.5.4**

**protective layer  
flash**

very thin layer on bearing surface or backing to provide corrosion protection in storage

Note 1 to entry: The layer thickness is usually between 0,000 5 mm and 0,001 mm.

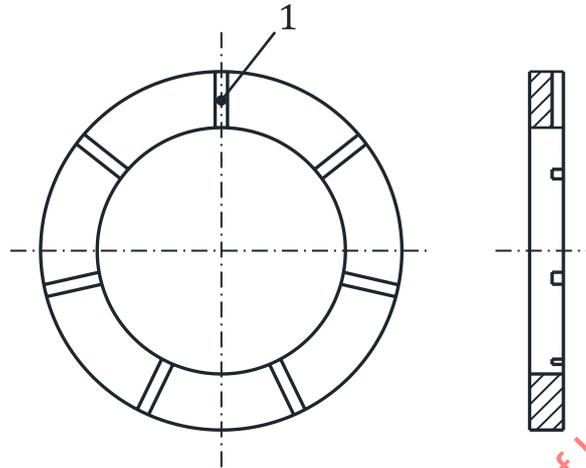
3.3.6

**thrust washer**

annular plate used to support an axial load in conjunction with a *plain journal bearing* (3.2.2.1)

Note 1 to entry: See [Figure 27](#).

Note 2 to entry: For “ring-type thrust washer” see ISO 6525.



**Key**

1 oil groove, lubrication groove (3.4.2)

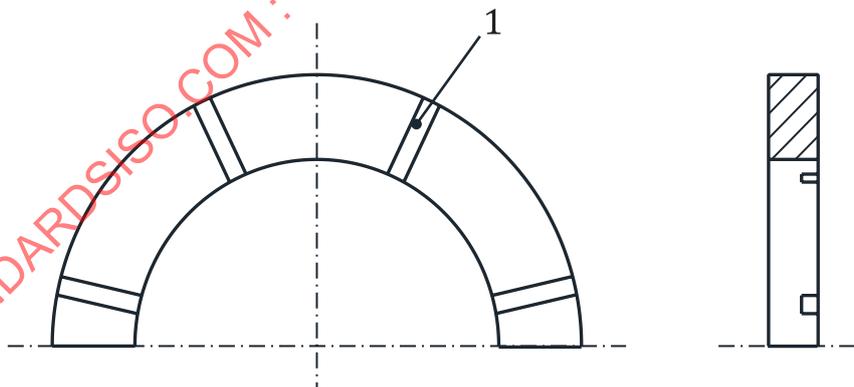
Figure 27 — Thrust washer

3.3.6.1

**thrust half-washer**

part of an annular plate which, on its own, or combined with another similar part, forms a plain *thrust bearing* (3.2.2.2)

Note 1 to entry: See [Figure 28](#).



**Key**

1 oil groove, lubrication groove (3.4.2)

Figure 28 — Thrust half-washer

3.3.7

**pad**

part of a pad bearing that carries the load

Note 1 to entry: See [Figures 12, 15](#) and [16](#).

**3.3.7.1**

**journal pad**

part of a plain journal pad bearing

Note 1 to entry: See [Figure 15](#).

**3.3.7.2**

**thrust pad**

part of a plain thrust pad bearing

Note 1 to entry: See [Figures 2, 12](#) and [16](#).

**3.3.8**

**journal**

part of a shaft or of an axle supported by a *plain journal bearing* ([3.2.2.1](#))

Note 1 to entry: See [Figures 1, 3](#) and [4](#).

**3.3.9**

**thrust collar**

annular part of a shaft supported by a *plain thrust bearing* ([3.2.2.2](#))

Note 1 to entry: See [Figures 2, 9 c\), 13](#) and [14](#).

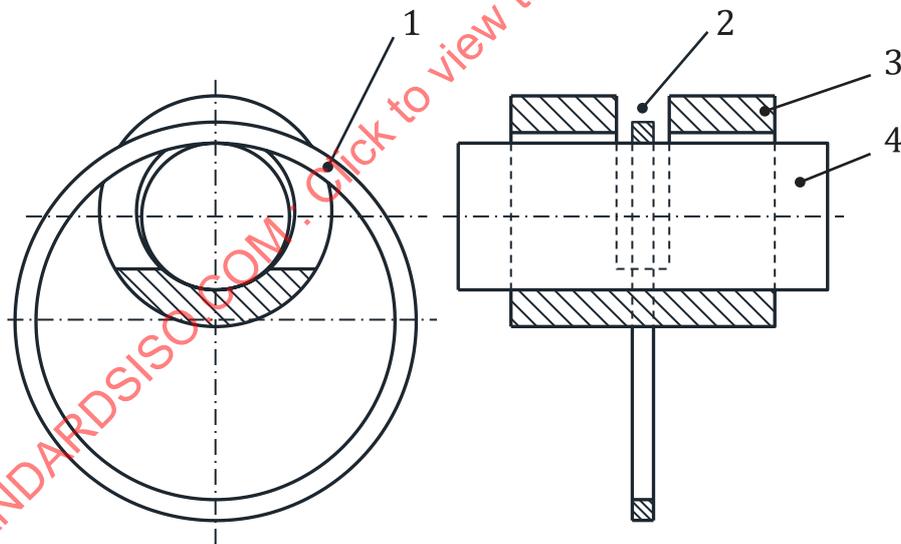
**3.3.10**

**oil ring (loose)**

**oil disc (secured)**

annular element loosely supported by, or secured to, the shaft to transfer lubricant to the *bearing* ([3.1.1](#))

Note 1 to entry: See [Figure 29](#).



**Key**

- 1 oil ring(loose), oil disc(secured)
- 2 oil ring slot ([3.3.19](#))
- 3 bearing ([3.1.1](#))
- 4 journal ([3.3.8](#))

**Figure 29 — Oil ring**

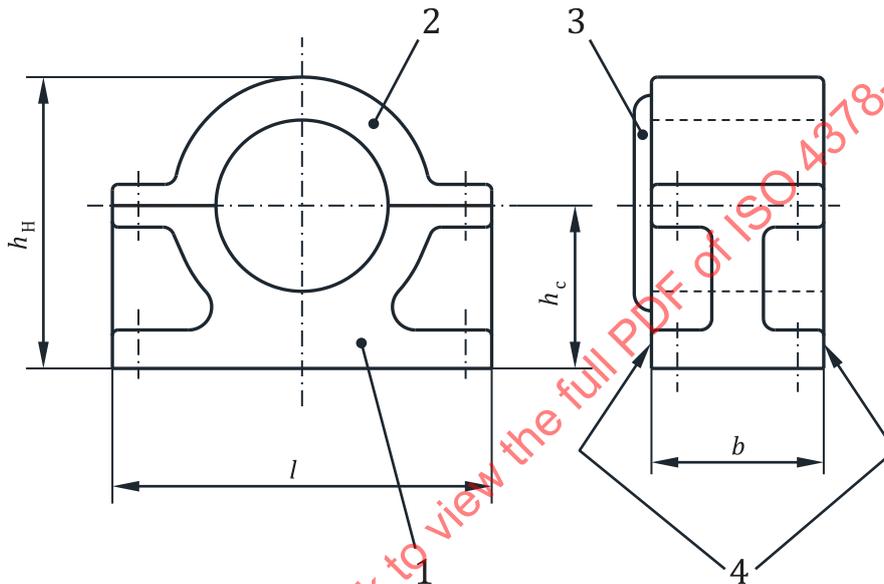
**3.3.11**  
**plain bearing housing**  
**bearing housing**  
**housing**

housing into which a *plain bearing* (3.1.2) is fitted

**3.3.12**  
**plain bearing housing block**  
**bearing block**  
**plummer block**  
**pillow block**

part of the housing that supports the *bearing* (3.1.1)

Note 1 to entry: See [Figure 30](#).



**Key**

- 1 *housing base* (3.3.17)
- 2 *housing cap, bearing cap* (3.3.13)
- 3 *housing cover plate, cover plate* (3.3.14)
- 4 *housing face* (3.5.27)
- $h_H$  *housing height* (3.5.26)
- $l$  *housing length* (3.5.25)
- $b$  *housing width* (3.5.24)
- $h_c$  *centre height of pedestal plain bearing* (3.5.31)

**Figure 30 — Plain bearing housing block**

**3.3.13**  
**plain bearing housing cap**  
**bearing cap**

part of the housing that retains the *bearing* (3.1.1) in the block

Note 1 to entry: See [Figure 30](#).

**3.3.14**

**plain bearing housing cover plate  
cover plate**

plate for closing the *housing face* (3.5.27) in axial direction

Note 1 to entry: See [Figure 30](#).

**3.3.15**

**plain bearing assembly gasket  
bearing gasket**

element used for sealing the *housing* (3.3.11) against lubricant leakage and ingress of dirt

**3.3.16**

**bearing housing flange**

part of the flanged *housing* (3.3.11) for connection to the machine in an axial direction and/or perpendicular to the axis

Note 1 to entry: See [Figures 18](#) and [19](#).

**3.3.17**

**bearing housing base**

part of the pedestal *housing* (3.3.11) for perpendicular or parallel connection to the machine casing or machine foundation

Note 1 to entry: See [Figure 30](#).

**3.3.18**

**bearing insulation**

electrical insulation between *plain bearing* (3.1.2) and housing or between *housing* (3.3.11) and housing support

Note 1 to entry: This is sometimes used to prevent electroerosive wear of the *bearing* (3.1.1).

**3.3.19**

**oil ring slot**

recess in the *plain bearing* (3.1.2) for location of an oil ring

Note 1 to entry: See [Figure 29](#).

**3.3.20**

**oil filler hole  
lubricant filler hole  
lubricant supply hole**

capped hole for charging the *housing* (3.3.11) with lubricant

**3.3.21**

**oil drain hole  
lubricant drain hole**

plugged hole for draining the lubricant charge from the *housing* (3.3.11)

**3.3.22**

**plain bearing housing bore**

cylindrical bore of the *housing* (3.3.11) for fixing the *bush* (3.3.2) or a pair of *half-bearings* (3.3.1), or a spherical bore in the case of the spherical plain bearing

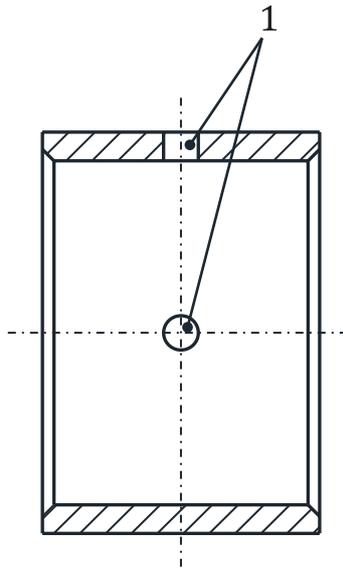
**3.4 Terms related to structural elements of plain bearing**

**3.4.1**

**oil hole  
lubrication hole**

hole through backing and sliding surface of a *plain bearing* (3.1.2) to supply and distribute lubricant

Note 1 to entry: See [Figures 31](#) and [32](#).



**Key**

- 1 oil hole, lubrication hole

**Figure 31 — Oil hole**

**3.4.2**

**oil groove**

**lubrication groove**

groove on the sliding surface to supply and distribute lubricant on the sliding surface

Note 1 to entry: See [Figures 27, 28, 32](#) and [33](#).

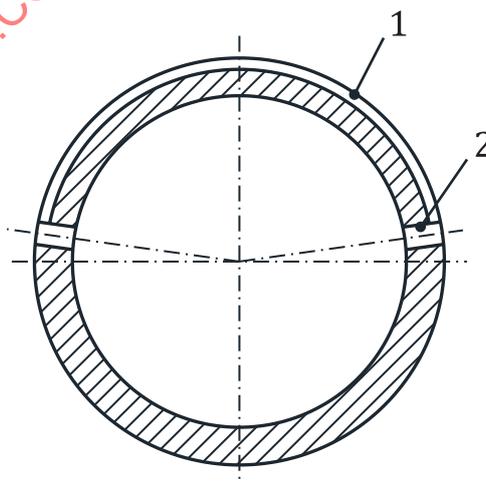
**3.4.2.1**

**outer oil groove**

**outer lubrication groove**

groove on the *bearing back* ([3.3.1.3](#)) to supply lubricant to the *oil hole* ([3.4.1](#))

Note 1 to entry: See [Figure 32](#).



**Key**

- 1 outer oil groove, outer lubrication groove
- 2 oil hole, lubrication hole ([3.4.1](#))

**Figure 32 — Outer oil groove**

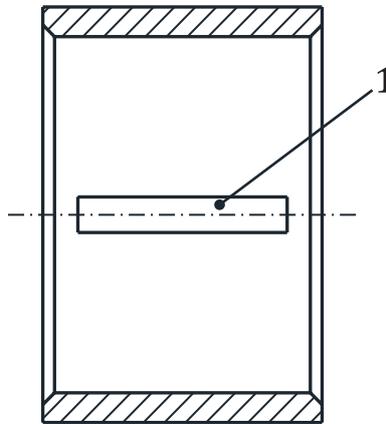
3.4.2.2

**longitudinal groove**

**axial groove**

*lubrication groove* (3.4.2) parallel to the axis in a *plain journal bearing* (3.2.2.1)

Note 1 to entry: See [Figure 33](#).



**Key**

1 longitudinal groove, axial groove

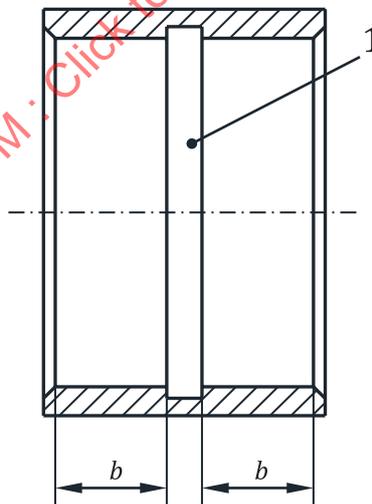
**Figure 33 — Longitudinal groove**

3.4.2.3

**circumferential groove**

*lubrication groove* (3.4.2) in annular or partially annular form

Note 1 to entry: See [Figure 34](#).



**Key**

1 circumferential groove

*b* bearing land width (3.5.3.2)

**Figure 34 — Circumferential groove**

3.4.2.4

**partially circumferential groove**

partially circumferential *lubrication groove* (3.4.2) provided on a part of a *plain journal bearing* (3.2.2.1)

3.4.2.5

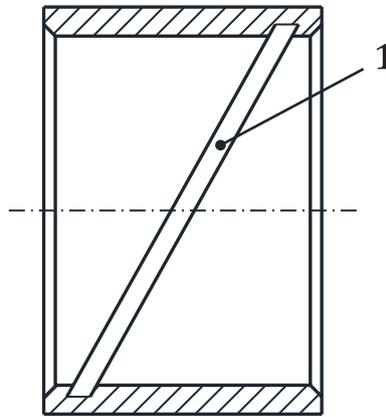
**helical groove**

**spiral groove**

helically cut *lubrication groove* (3.4.2)

Note 1 to entry: See [Figure 35](#).

Note 2 to entry: See Note in [3.2.3.13](#).



**Key**

1 helical groove, spiral groove

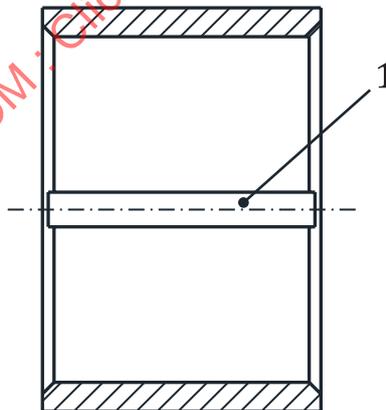
**Figure 35 — Helical groove**

3.4.2.6

**open groove**

axial *lubrication groove* (3.4.2) extending over the full *bearing width* (3.5.3)

Note 1 to entry: See [Figure 36](#).



**Key**

1 open groove

**Figure 36 — Open groove**

3.4.2.7

**stopped-off groove**

*lubrication groove* (3.4.2) that does not reach the bearing end face or faces

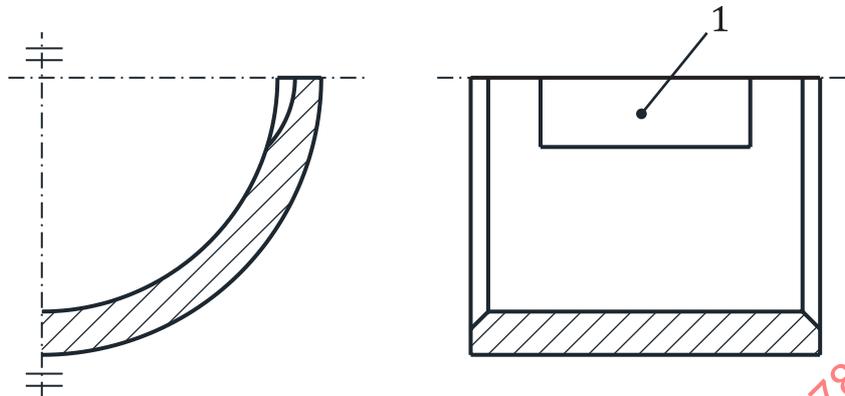
Note 1 to entry: See [Figure 33](#).

3.4.2.8

**gutterway**

axial lubrication groove (3.4.2) adjacent to or spanning an axial joint in a half bearing (3.3.1)

Note 1 to entry: See [Figure 37](#).



**Key**

1 gutterway

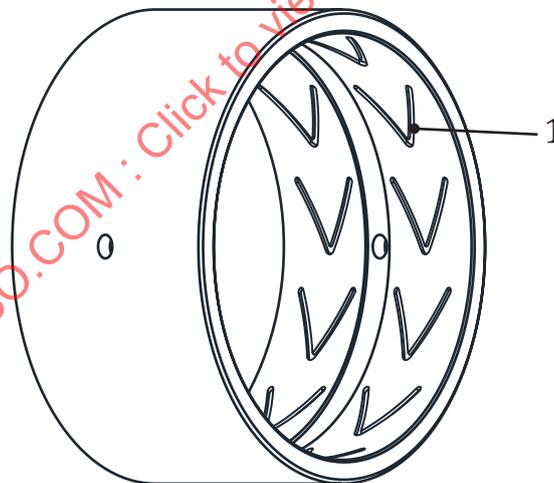
Figure 37 — Gutterway

3.4.2.9

**chevron groove**

lubrication groove (3.4.2) that has a line or pattern in the shape of a V

Note 1 to entry: See [Figure 38](#).



**Key**

1 chevron groove

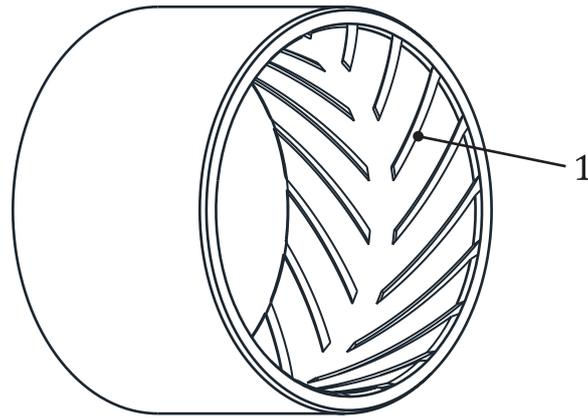
Figure 38 — Chevron groove

3.4.2.10

**herringbone groove**

lubrication grooves (3.4.2) having twist angles in opposite directions from both ends of the bearing surface

Note 1 to entry: See [Figure 39](#).



**Key**

1 herringbone groove

**Figure 39 — Herringbone groove**

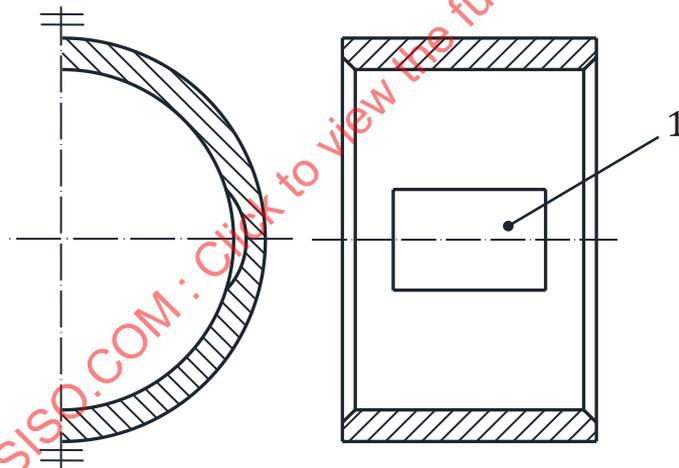
**3.4.3**

**oil pocket**

**lubrication indentation**

recess on the sliding surface to accumulate and to distribute lubricant

Note 1 to entry: See [Figures 4](#) and [40](#).



**Key**

1 oil pocket, lubrication indentation

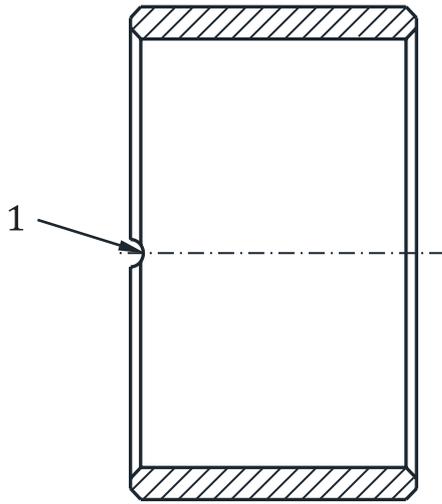
**Figure 40 — Oil pocket**

**3.4.4**

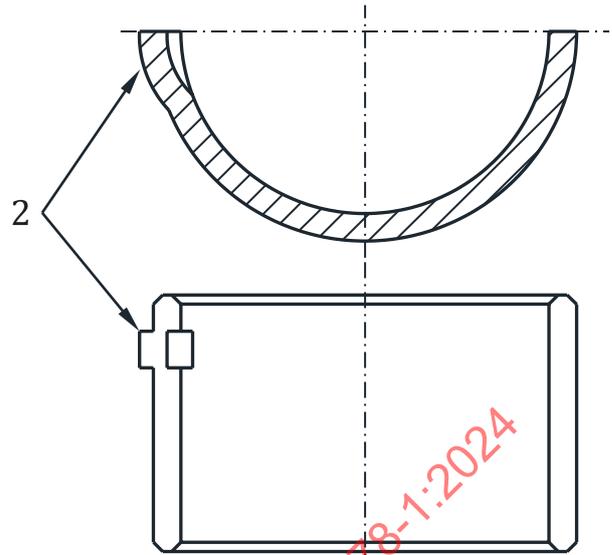
**locating feature**

notch (recess), nick, groove, lug or hole to locate a *bearing* ([3.1.1](#)) in a *housing* ([3.3.11](#))

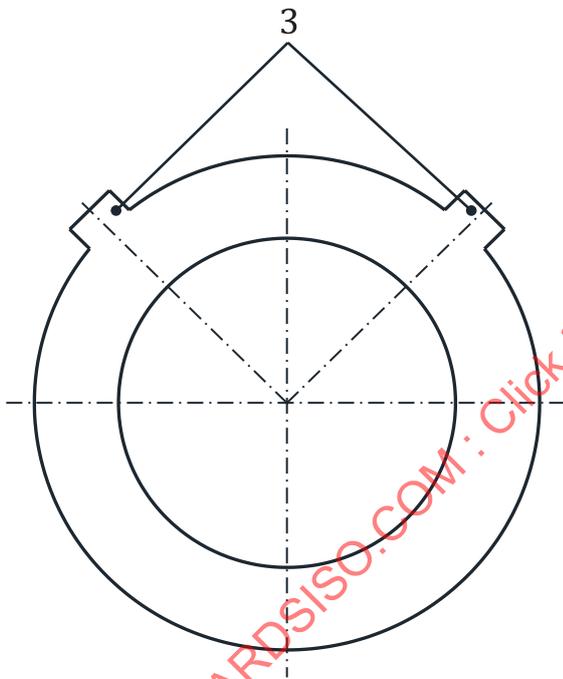
Note 1 to entry: See [Figure 41](#).



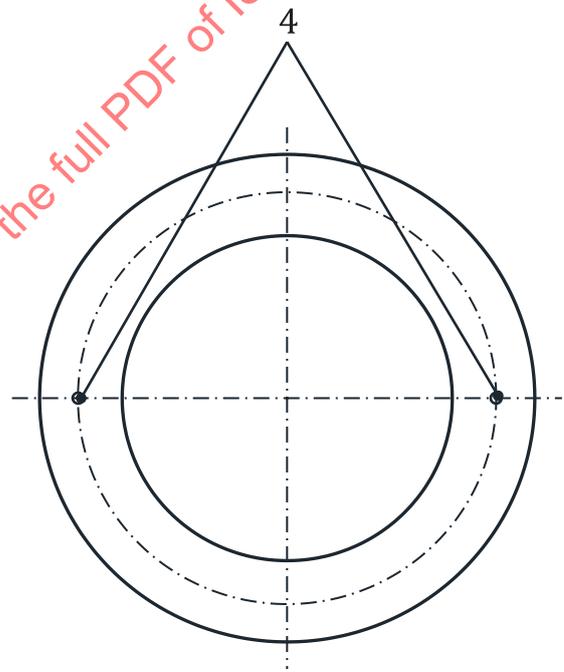
a) Locating feature: notch



b) Locating feature: nick



c) Locating feature: lugs



d) Locating feature: holes

**Key**

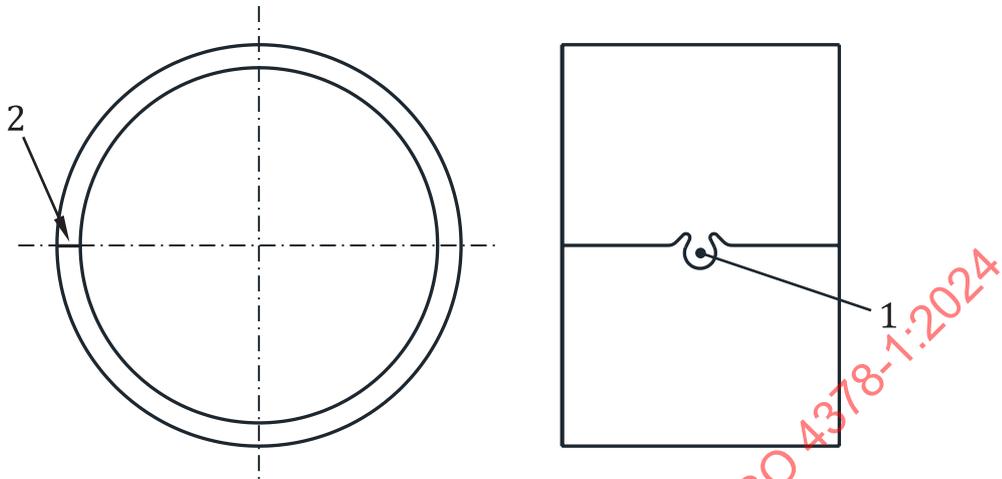
- 1 locating notch
- 2 locating nick
- 3 locating lugs
- 4 locating holes

**Figure 41 — Locating feature**

**3.4.5  
clinch**

shapes of *joint faces* (3.5.29) in order to close the split of *wrapped bush* (3.3.2.1) by engaging mutually

Note 1 to entry: See [Figure 42](#).



**Key**

- 1 clinch
- 2 *joint, split* (3.5.30)

**Figure 42 — Clinch**

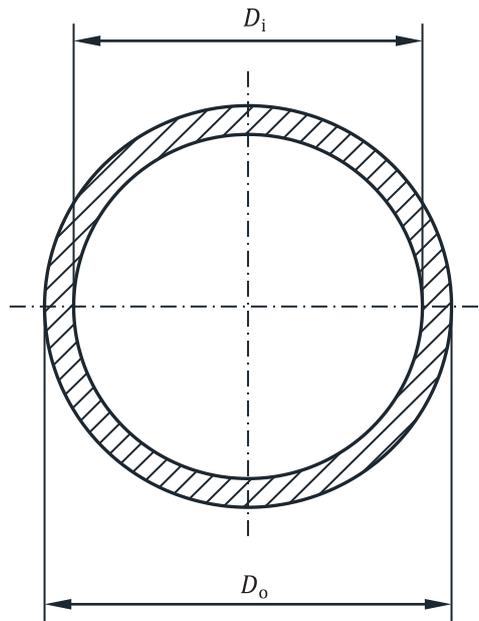
**3.5 Terms related to dimensional characteristics of plain bearing**

**3.5.1  
inside diameter  
bore  
ID**

internal diameter of the section perpendicular to the axis of a circular cylindrical *journal bearing* (3.2.2.1)

Note 1 to entry: See [Figure 43](#).

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**Key**

$D_i$  inside diameter, bore, ID

$D_o$  outside diameter, OD ([3.5.2](#))

**Figure 43 — Journal bearing diameter**

**3.5.2**

**outside diameter**

**OD**

diameter of the back of the *bearing* ([3.1.1](#))

Note 1 to entry: See [Figure 43](#).

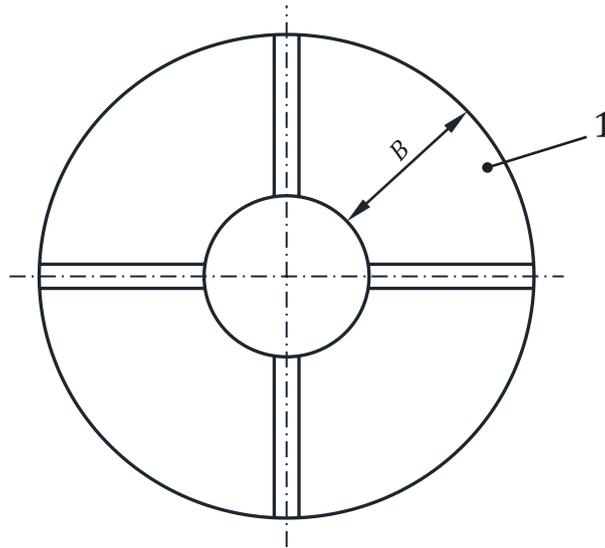
**3.5.3**

**bearing width**

dimension of a *plain bearing* ([3.1.2](#)) measured perpendicular to the direction of the sliding motion

Note 1 to entry: See [Figures 22](#), [23](#) and [44](#).

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**Key**

- 1 *thrust bearing* (3.2.2.2)  
 B bearing width

**Figure 44 — Bearing width****3.5.3.1****effective bearing width**

*half-bearing* (3.3.1) or *bush* (3.3.2) width excluding the central groove and chamfers

**3.5.3.2****bearing land width**

dimension of a circumferentially grooved journal bearing from the edge of the groove to the edge of the *bearing* (3.1.1) in the axial direction, excluding chamfers

Note 1 to entry: See [Figure 34](#).

**3.5.3.3****land**

effective sliding surface in a *plain bearing* (3.1.2)

**3.5.4****diametral clearance of a plain journal bearing****journal bearing clearance****bearing clearance**

difference between the diameter of the bearing bore and the diameter of the *journal* (3.3.8)

**3.5.5****radial clearance of a circular cylindrical bearing**

difference between the radius of the bearing bore and the radius of the *journal* (3.3.8)

Note 1 to entry: See [Figure 10](#).

**3.5.6****minimum radial clearance of a non-circular cylindrical bearing**

minimum distance between the sliding surfaces of the centred shaft and *bearing* (3.1.1)

**3.5.7****relative clearance of a bearing**

ratio of the radial clearance to the radius of *journal* (3.3.8) or the ratio of the diametral clearance to the diameter of *journal* (3.3.8) in a *circular cylindrical bearing* (3.2.4.1)

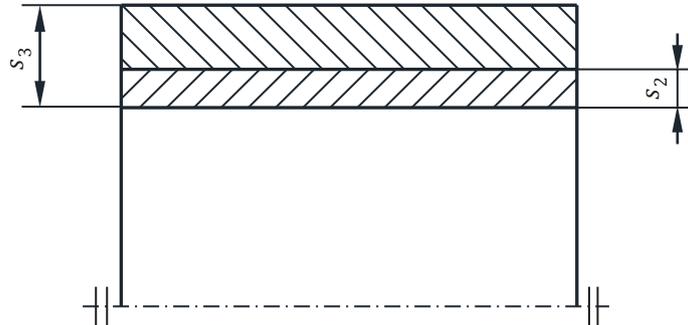
3.5.8

**journal bearing wall thickness**

**bush wall thickness**

distance between the outer surface and the inner sliding surface of a *half-bearing* (3.3.1) or *bush* (3.3.2) in a given radial direction

Note 1 to entry: See [Figure 45](#).



**Key**

$s_2$  bearing material layer thickness, lining thickness (3.5.9)

$s_3$  journal bearing wall thickness, bush wall thickness

**Figure 45 — Journal bearing wall thickness**

3.5.9

**bearing material layer thickness**

**lining thickness**

thickness of *bearing material* (3.6.1) applied to the *backing* (3.3.1.4)

Note 1 to entry: See [Figure 45](#).

3.5.10

**flange thickness**

axial distance between the opposing measuring points at the inside and the outside surface of flange

3.5.11

**pad length of pad thrust bearing**

linear dimension of a *pad* (3.3.7) measured in the direction of sliding along the mean diameter

Note 1 to entry: See [Figure 12](#).

3.5.12

**pad angle of pad journal bearing**

angle to indicate the circumferential dimension of a *pad* (3.3.7) forming part of a pad journal bearing

Note 1 to entry: See [Figure 15](#).

3.5.13

**pad width**

linear dimension of a *pad* (3.3.7) measured perpendicular to the direction of the sliding motion

Note 1 to entry: See [Figures 12](#) and [15](#).

3.5.14

**pad thickness**

linear dimension of a *pad* (3.3.7) measured in the axial direction or in the radial direction

Note 1 to entry: For axial direction (thrust pad), see [Figure 12](#) and for radial direction (journal pad), see [Figure 15](#).

3.5.15

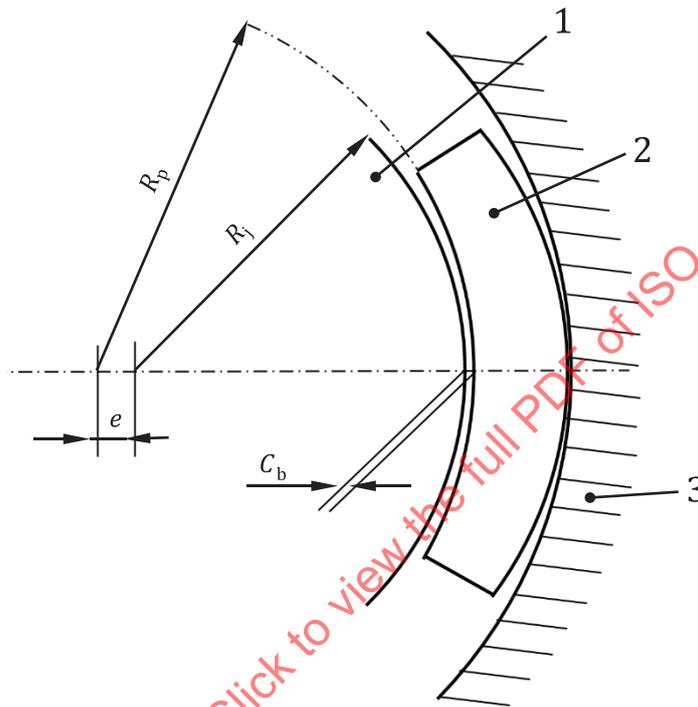
**preload factor**

dimensionless value ( $m$ ) determined by dividing the difference between the manufactured radial clearance ( $C_p$ ) and the assembled radial clearance ( $C_b$ ) by the manufactured radial clearance ( $C_p$ ) in a multi-lobe bearing or a *tilting pad journal bearing* (3.2.4.6)

Note 1 to entry: See [Figure 46](#).

Note 2 to entry: Expressed as  $(C_p - C_b) / C_p$ .

Note 3 to entry: By making the assembled radial clearance ( $C_b$ ) smaller than the manufactured radial clearance ( $C_p$ ), the bearing oil film stiffness and damping property are influenced.



**Key**

- 1 *journal* (3.3.8)
- 2 *journal pad* (3.3.7.1)
- 3 *housing* (3.3.11)

$R_p$  radius of curvature of pad surface

$R_j$  radius of journal

$e$  eccentricity

$C_b$  assembled radial clearance

NOTE 1  $m = e / (e + C_b) = (C_p - C_b) / C_p$

NOTE 2  $C_p = e + C_b = R_p - R_j$

**Figure 46 — Preload factor**

3.5.15.1

**manufactured radial clearance**

$C_p$

difference between the radius of the bearing bore and the radius of the *journal* (3.3.8)

Note 1 to entry: In case of a *circular cylindrical bearing* (3.2.4.1), the *radial clearance of a circular cylindrical bearing* (3.5.5) has to be used and in case of a *non-circular cylindrical bearing*, the *minimum radial clearance* (3.5.6) has to be used.

3.5.15.2

**assembled radial clearance**

$C_b$   
actual minimum distance between the sliding surfaces of journal and bearing (3.1.1) after assembled, which is not same in value with the *manufactured radial clearance* (3.5.15.1) because of the gap between the centres of journal and bearing

3.5.16

**load on pad**

load on a *tilting pad journal bearing* (3.2.4.6) in the direction of the pad pivot

3.5.17

**load between pads**

load on a *tilting pad journal bearing* (3.2.4.6) directed towards the space between two adjacent pads (3.3.7) facing each other

3.5.18

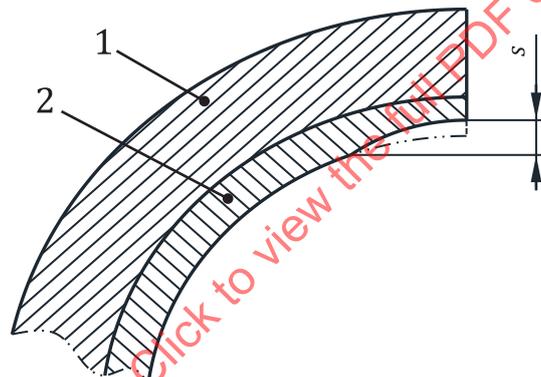
**crush relief**

**oil relief**

**bore relief**

tapering off of *half-bearing* (3.3.1) wall thickness at the *joint face* (3.5.29)

Note 1 to entry: See [Figure 47](#).



**Key**

- 1 backing (3.3.1.4)
- 2 bearing material layer (3.3.5.1)
- s crush relief, oil relief, bore relief

Figure 47 — Crush relief

3.5.19

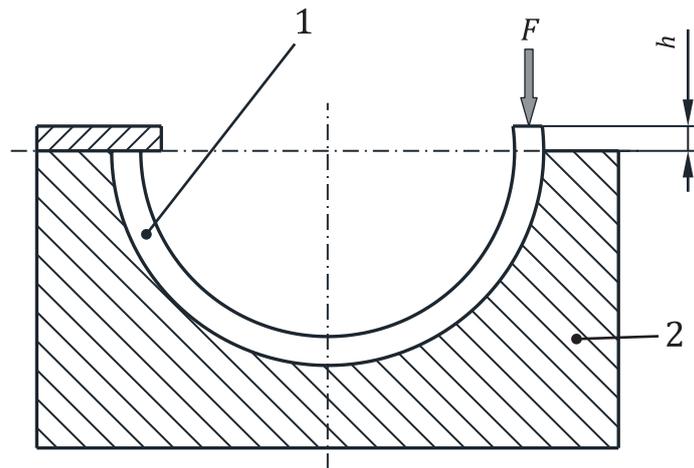
**nip**

**crush**

**crush height**

distance by which a *half-bearing* (3.3.1) fitted under a predetermined test load into a checking block exceeds the defined semi-circular length of the checking block bore

Note 1 to entry: See [Figure 48](#).



**Key**

- 1 thin wall half bearing (3.3.1.1)
- 2 checking block
- $h$  crush
- $F$  load

**Figure 48 — Crush**

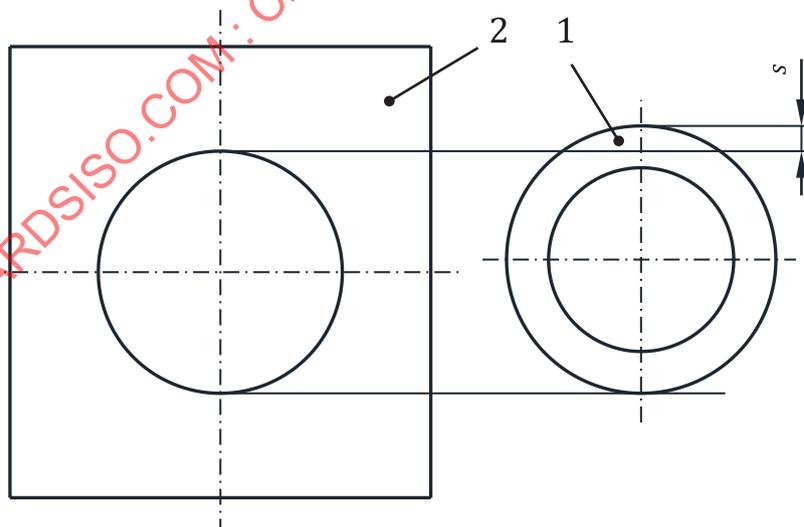
**3.5.20**

**interference bearing fit**

difference between the *journal bearing* (3.2.2.1) outside diameter  $D_o$  (3.5.2) and the *housing diameter* (3.5.23) when the former is larger than the latter

Note 1 to entry: See [Figure 49](#).

Note 2 to entry: Expansion of a housing bore will be caused by the interference fit of the bearings, see ISO 13778:2017, 3.6.



**Key**

- 1 bearing (3.3.1)
- 2 housing (3.3.11)
- $s$  interference

**Figure 49 — Interference**