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Plain bearings — Hydrostatic plain journal bearings without drainage grooves under steady-state conditions —

Part 1: Calculation of oil-lubricated plain journal bearings without drainage grooves

Paliers lisses — Paliers lisses radiaux hydrostatiques sans rainure d'écoulement fonctionnant en régime stationnaire —

Partie 1: Calcul pour la lubrification des paliers lisses radiaux sans rainure d'écoulement

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Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Symbols, terms and units **1**
5 Bases of calculation and boundary conditions **3**
6 Method of calculation **5**
6.1 General 5
6.2 Load-carrying capacity 5
6.3 Lubricant flow rate and pumping power 7
6.4 Frictional power 9
6.5 Optimization 9
6.6 Temperatures and viscosities 11
6.7 Minimum pressure in recesses 11
Annex A (informative) **Description of the approximation method for the calculation of hydrostatic plain journal bearings** **13**
Annex B (informative) **Examples of calculation** **23**
Bibliography **31**

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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 documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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.

This document was prepared by Technical Committee ISO/TC 123, *Plain bearings*, Subcommittee SC 8, *Calculation methods for plain bearings and their applications*.

This second edition cancels and replaces the first edition (ISO 12168-1:2001), of which it constitutes a minor revision.

The changes compared to the previous edition are as follows:

— adjustment to ISO/IEC Directives, Part 2:2018;

— correction of typographical errors.

A list of all parts in the ISO 12168 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.

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Introduction

The functioning of hydrostatic bearings is characterized by the fact that the supporting pressure of the bearing is generated by external lubrication. The special advantages of hydrostatic bearings are lack of wear, quiet running, wide useable speed range as well as high stiffness and damping capacity. These properties are also the reason for the special importance of hydrostatic bearing units in different fields of application such as machine tools.

The bases of calculation described in this document apply to bearings with different numbers of recesses and different width/diameter ratios for identical recess geometry. In this document, only bearings without oil drainage grooves between the recesses are taken into account. As compared to bearings with oil drainage grooves, this type needs less power with the same stiffness behaviour.

The oil is fed to each bearing recess by means of a common pump with constant pump pressure (system p_{en} = constant) and via preceding linear restrictors (e.g. in the form of capillaries).

The calculation procedures listed in this document enable the user to calculate and assess a given bearing design as well as to design a bearing as a function of some optional parameters. Furthermore, this document contains the design of the required lubrication system including the calculation of the restrictor data.

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Plain bearings — Hydrostatic plain journal bearings without drainage grooves under steady-state conditions —

Part 1: Calculation of oil-lubricated plain journal bearings without drainage grooves

1 Scope

This document specifies a calculation method of oil-lubricated plain journal bearings without drainage grooves under steady-state conditions.

It applies to hydrostatic plain journal bearings under steady-state conditions.

In this document, only bearings without oil drainage grooves between the recesses are taken into account.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 12168-2:2019, *Plain bearings — Hydrostatic plain journal bearings without drainage grooves under steady-state conditions — Part 2: Characteristic values for the calculation of oil-lubricated plain journal bearings without drainage grooves*

3 Terms and definitions

No terms and definitions are listed in this document.

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 http://www.electropedia.org/

4 Symbols, terms and units

Symbols, terms and units are shown in Table 1.

Table 1 — Symbols, terms and units

Symbol	Term	Unit
a	Inertia factor	1
A_{lan}	Land area	m^2
A^*_{lan}	Relative land area $\left(A^*_{lan} = \frac{A_{lan}}{\pi \times B \times D} \right)$	1
A_p	Recess area	m^2

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