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Plain bearings — Bearing fatigue —

Part 2: Test with a cylindrical specimen of a metallic bearing material

Paliers lisses — Fatigue des paliers —

Partie 2: Essai d'éprouvettes cylindriques en matériau antifriction métallique

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Foreword

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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).

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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.

This document was prepared by Technical Committee ISO/TC 123, *Plain bearings*, Subcommittee SC 2, *Material and lubricants, their properties, characteristics, test methods and testing conditions*.

This second edition cancels and replaces the first edition (ISO 7905-2:1995), which has been editorially revised.

The main changes compared to the previous edition are as follows:

— references to the withdrawn document ISO 468 have been replaced with references to ISO 4287.

— minor corrective amendments have been made to the test specimen diagram.

A list of all parts in the ISO 7905 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.

Plain bearings — Bearing fatigue —

Part 2: Test with a cylindrical specimen of a metallic bearing material

1 Scope

This document specifies a method for the determination of the endurance limit in fatigue of bearing materials alone (not attached to steel backing).

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 4287, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters*

3 Terms and definitions

No terms and definitions are listed in this document.

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

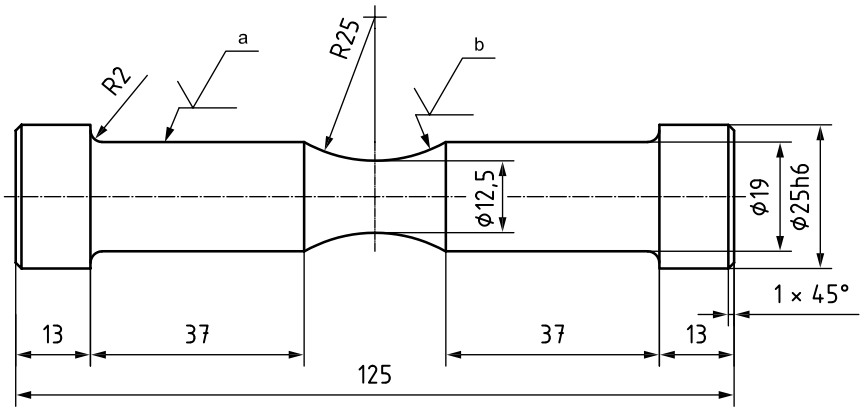
— ISO Online browsing platform: available at https://www.iso.org/obp

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

4 Test specimens

The test specimens shall be cylindrical and in accordance with Figure 1.

Dimensions in millimetres



a Polished.

b Polished in the longitudinal direction.

Figure 1 — Specimen dimensions

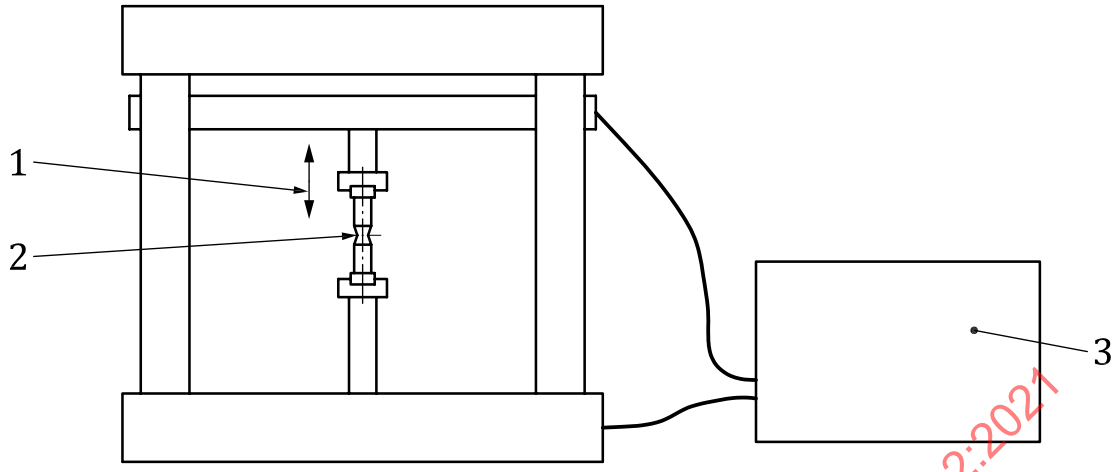
The bearing material and the surface finish of the test specimen shall be as close to representative as possible to the condition caused by the manufacturing sequence used in production of the bearings. Care should be taken before and during testing not to damage the surface mechanically or by corrosion. The surface roughness shall be $R_z < 6$ µm in accordance with ISO 4287. The deficiency of this test method lies in the absence of possible residual stress associated with the bearing manufacturing process and that the metallurgical structure may differ significantly from that of a thin layer applied to the steel backing of a bearing.

5 Test method

In order to define the operating and lubricating conditions, the test rig shall have the following characteristics.

— The test rig should enable mounting of the specimen at each end and be able to apply an oscillating compressive/tensile load in the axial direction. An example test rig configuration is shown in Figure 2.

— The load and displacement should be recorded.



Key

1 tensile/compressive load

2 specimen

3 load control + data logging for load and displacement

Figure 2 — Example test rig configuration

The ultimate number of stress cycles is 5×10^7. The fatigue strength for finite life shall be recorded commencing at 10^7 cycles. The test frequency shall have a range of 50 Hz to 80 Hz. In order to abridge the testing duration and to enhance the statistical estimate of fatigue life, several test rigs may be run simultaneously.

6 Evaluation and presentation of test results

The endurance limit stresses should be presented in the form of stress-number curves (Woehler curves) at predetermined temperature (±2 °C) against a detailed description of the bearing material. Normally stress-number curve testing is terminated for practical considerations at 50×10^6 stress cycles. The endurance limit stress may be quoted at a specified number of cycles, e.g. 3×10^6, 10×10^6, 25×10^6 or 50×10^6. A specimen without failure during fatigue testing to a specified endurance should be identified in the report. Due to the scatter of test results normally experienced and the statistical nature of the fatigue limit, it is recommended that the results be evaluated on the basis of a statistical method.

Another presentation of the endurance limit stress can be affected by means of a Gerber or Goodman-Haigh diagram which plots stress amplitude against mean stress. Metallographic examination will provide detailed evidence of the damage mechanism, corrosive attack and diffusion resulting from thermal effects.

Bibliography

[1] ISO 3548-1, *Plain bearings — Thin-walled half bearings with or without flange — Part 1: Tolerances, design features and methods of test*

[2] ISO 4378-1, *Plain bearings — Terms, definitions, classification and symbols — Part 1: Design, bearing materials and their properties*