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Plain bearings — Compression testing of bearing materials

Paliers lisses — Essai de compression des matériaux paliers

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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 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).

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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, *Materials and lubricants, their properties, characteristics, test methods and testing conditions*.

This second edition cancels and replaces the first edition (ISO 4385:1981), which has been technically revised.

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

— change of scope;

— restructure of the document;

— implementation of Clause 2;

— revision of Clause 3, Terms and definition;

— implementation of Clause 4;

— revision and of Clause 4 and 5, and implementation of Figures 1, 2, 3, 4, 5 and 6;

— revision of Clause 6.

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 — Compression testing of bearing materials

1 Scope

This document specifies a method for compression testing of bearing materials. It is applicable for both bulk materials and coatings.

Compression testing within the meaning of this document serves for the determination of the behaviour of bearing materials under uniaxial compression loading which is uniformly distributed over the cross-section. For this purpose, a cylindrical specimen or a setup of two such specimen, with an original cross-section, A_0, is loaded at constant crosshead speed and the resulting compressive stress and compressive strain are recorded.

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 last edition of the referenced document (including any amendments) applies.

ISO 1101, *Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 9513, *Metallic materials — Calibration of extensometer systems used in uniaxial testing*

ISO 21920-1, *Geometrical product specifications (GPS) — Surface texture: Profile — Part 1: Indication of surface texture*

ISO 21920-2, *Geometrical product specifications (GPS) — Surface texture: Profile — Part 2: Terms, definitions and surface texture parameters*

3 Terms and definitions

No terms and definition 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 Symbols

For the purposes of this document, the symbols and definitions as listed in Table 1 apply.

Table 1 — Symbols description and units

Symbol	Description	Unit
A_0	Original cross-sectional area of a specimen prior to loading. A_0 is calculated using the original diameter as $A_0 = \pi/4 \cdot d_0^2$.	mm^2
A_u	Final cross-sectional area of a specimen after loading. A_u is calculated using the final diameter as $A_u = \pi/4 \cdot d_u^2$.	mm^2
d_0	Original diameter, diameter of a compression specimen prior loading, calculated as the mean of two measurements taken at the specimen centre at right angles to each other. NOTE The original cross-sectional area of the specimen prior to loading, A_0, is calculated using this diameter ($A_0 = \pi/4 \cdot d_0^2$).	mm
d_u	Final diameter, diameter of a compression specimen after loading, calculated as the mean of two measurements taken at the axial specimen centre at right angles to each other. NOTE The final cross-sectional area of the specimen, A_u, is calculated using this diameter ($A_u = \pi/4 \cdot d_u^2$).	mm
d_s	Compression plate diameter	mm
E_b	Elastic modulus of specimen base material	MPa
e_c	Compressive strain; percentage change in gauge length (L_e or L_o) as given in Formulae (1) and (2): $e_c = \frac{\Delta L_e}{L_e} \cdot 100$ (determined directly at the specimen using an extensometer) (1) or $e_c = \frac{\Delta L_0}{L_0} \cdot 100$ (determined via displacement of the compression dies) (2) NOTE The compressive strain e_c is the sum of elastic and plastic strain.	%
e_{ce}	Elastic compressive strain of the original gauge length section; reversible component of compressive strain	%
$e_{c\,eff}$	Calculated change rate of strain	%
e_{cF}	Compressive strain at fracture, percentage change in gauge length (L_e or L_0) at fracture of the specimen, as given in Formulae (3) and (4): $e_{cB} = \frac{\Delta L_{eF}}{L_e} \cdot 100$ (determined directly at the specimen using an extensometer) (3) or $e_{cF} = \frac{\Delta L_{0F}}{L_0} \cdot 100$ (determined via the displacement of the compression dies) (4)	%
e_{cp}	Plastic compressive strain of the original gauge length section, total compressive strain minus the elastic component at any moment of the test	%
$\dot{e}_c$	Change rate of strain along gauge length L_e or L_o	s^{-1}
f_m	Sampling frequency	Hz
F_c	Compressive force at any moment of the test	N
h_0	Height of a specimen prior loading	mm
L	Original gauge length on which strain measurements are based	mm
L_e	Base gauge length for the extensometer used for continuously measuring the change in length of the specimen during the test, as measured directly at the specimen.	mm
L_0	Initial length of the specimen prior loading $L_0 = h_0$, for non coated specimen $L_0 = 2 \cdot h_0$, for coated specimen Is only applicable, if the measurement is carried out without a measurement gauge	mm
ΔL	Change in gauge length due to specimen loading	mm
ΔL_e	Change in extensometer gauge length, change in L_e at any moment during the extensometer test, as measured directly at the specimen	mm