
**Plain bearings — Hardness testing of
bearing metals —**

**Part 1:
Multilayer bearings materials**

*Paliers lisses — Essai de dureté des matériaux antifriction —
Partie 1: Matériaux multicouches pour paliers lisses*



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

This fourth edition cancels and replaces the third edition (ISO 4384-1:2012), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

- “this part of ISO 4384” has been replaced with “this document”;
- a new clause 3 has been included for terms and definitions.

A list of all parts in the ISO 4384 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 — Hardness testing of bearing metals —

Part 1: Multilayer bearings materials

1 Scope

This document specifies parameters for the hardness testing of compound materials for plain bearings made from steel and bearing metal with bearing metals based on copper and aluminium, manufactured by casting, sintering or bonding. It represents a supplement to the existing ISO publications on hardness testing and, therefore, includes only the extensions and restrictions to be observed compared to those publications.

The measuring method applied depends on the bearing metal layer thickness, its hardness and its structure.

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 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method*

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 Specimen

The surface of the specimen in the test area shall be bright metallic and conditioned in such a way that a satisfactory measurement of the test impression is possible. During the preparation of the specimens, it shall be ensured that the material is not heated.

The test surface shall be plane in accordance with ISO 6506-1.

Contrary to ISO 6506-1, the thickness of the test piece shall be at least four times the depth of indentation.

5 Procedure

The test conditions shall be as given in [Table 1](#).

Table 1 — Test conditions

Compound material	Layer thickness of bearing material mm		Test conditions ^a	Test temperature °C
Steel Cu-alloys	≤0,20		Small load hardness testing ^b	18 to 24
	>0,20	≤1,5	HBW 1/10	
	>1,5		HBW 2,5/62,5/30	
Steel Al-alloys	≤0,20		Small load hardness testing ^b	
	>0,20	≤1,5	HBW 1/5/30	
	>1,5		HBW 2,5/31,25/30	
Steel	≤0,5		Small load hardness testing ^b	
	>0,5		HBW 1/30	

^a EXAMPLE: HBW 2,5/62,5/30 = Brinell hardness determined with a ball of 2,5 mm diameter and with a test force of 612,9 N applied for 30 s.

^b Not mandatory determination.

6 Test report

The test report shall include the following information:

- reference to this document, i.e. ISO 4384-1:2019;
- all details necessary for identification of the test sample;
- test conditions and result obtained;
- all operations not specified by this document, or regarded as optional;
- details of any occurrence which might have affected the result.

NOTE 1 There is no general process of accurately converting Brinell hardness into other scales of hardness or into tensile strength. These conversions, therefore, are intended to be avoided, unless a reliable basis for the conversion can be obtained by comparison tests.

NOTE 2 Note that for anisotropic materials, for example those which have been heavily cold-worked, there will be a difference between the lengths of the two diameters of the indentation. The specification for the product can indicate limits for such differences.