
**Metallic materials — Leeb hardness
test —**

**Part 3:
Calibration of reference test blocks**

Matériaux métalliques — Essai de dureté Leeb —

Partie 3: Etalonnage des blocs de référence





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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary Information](#)

The committee responsible for this document is ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 3, *Hardness testing*.

ISO 16859 consists of the following parts, under the general title *Metallic materials — Leeb hardness test*:

- *Part 1: Test method*
- *Part 2: Verification and calibration of the testing devices*
- *Part 3: Calibration of reference test blocks*

Metallic materials — Leeb hardness test —

Part 3: Calibration of reference test blocks

1 Scope

This part of ISO 16859 specifies a method for the calibration of reference test blocks that are used for the indirect verification of Leeb hardness testers according to ISO 16859-2 and for the periodic checking according to ISO 16859-1.

The procedures necessary to ensure metrological traceability of the calibration machine are also specified.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 16859-1, *Metallic materials — Leeb hardness test — Part 1: Test method*

ISO 16859-2, *Metallic materials — Leeb hardness test — Part 2: Verification and calibration of the testing devices*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

3 Manufacture of reference test blocks

3.1 The block shall be specially manufactured for use as a reference test block.

Attention is drawn to the need to use a manufacturing process which will give the necessary homogeneity, stability of texture and uniformity of surface hardness.

3.2 The uniformity of the metallic reference test block shall meet the requirements specified in [7.2](#) and [Table 3](#).

3.3 The impact nature of a Leeb test requires a reference test block with a minimum mass and thickness, as specified in [Table 1](#).

NOTE Examples of common dimensions of reference test blocks are specified in [Annex C](#).

Table 1 — Mass and thickness requirements of reference test block

Type of impact devices	Minimum thickness mm	Minimum diameter mm	Minimum mass kg
D, DL, D+15, S, E, C	33	85	2,7
G	65	115	6,0

3.4 The reference test blocks shall be free of magnetism prior to calibration.

3.5 The maximum deviation from surface flatness of the top and bottom surfaces shall not exceed 0,01 mm. The surfaces of the blocks shall not be convex.

The maximum deviation from parallelism of the top and bottom surfaces shall not exceed 0,02 mm per 50 mm.

3.6 The test surfaces shall be free from damage, such as notches, scratches, oxide layers, etc., which interfere with the mechanics of the indentation process.

The mean surface roughness, R_a , [2] of the test surface(s) shall not exceed 0,1 μm . The sampling length, l , is 0,80 mm (see ISO 4287:1997, 3.1.9).

3.7 To provide evidence that no material is removed from the test surface(s) of the reference test block subsequent to calibration, the thickness at the time of calibration shall be marked on the test surface(s) or printed on the calibration certificate to an accuracy of 0,1 mm. Alternatively, a mark shall be placed on both the top and bottom surfaces, see [8.1 e](#)).

4 Calibration machine

4.1 General

In addition to fulfilling the general conditions specified in ISO 16859-2:2015, Clause 3, the calibration machine shall also meet the requirements given in [4.2](#) to [4.4](#).

4.2 Traceability

4.2.1 Leeb primary hardness standard machines owned by national level institutions are used to calibrate primary reference test blocks in Leeb hardness for accredited Leeb hardness calibration laboratories according to ISO/IEC 17025.

4.2.2 The instruments used for the verification and calibration of the Leeb hardness calibration machine shall be traceable to national standards.

NOTE A four-level structure of the metrological chain is necessary to define and disseminate hardness scales. The metrological chain of hardness values obtained by the Leeb method is defined in ISO 16859-1:2015, Figure C.1.

4.3 Requirements on calibration machines

4.3.1 Requirements on Leeb hardness calibration machines are given in [Annex A](#).

4.3.2 The resolution of Leeb hardness calibration machines shall be equal to or better than 1,0 HL.