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# Metallic materials — Rockwell hardness test

## Part 3: Calibration of reference blocks (ISO 6508-3:2023, IDT)



AS 1815.3:2024

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- University of Technology Sydney
- Weld Australia

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## Preface

This Standard was prepared by the Standards Australia Committee MT-006 Mechanical Testing Of Metals to supersede AS 1815.3:2007, *Metallic materials—Rockwell hardness test, Method 3: Calibration of reference blocks (scales A, B, C, D, E, F, G, H, K, N, T) (ISO 6508-3:2005, MOD)*.

The objective of this document is to specify a method for the calibration of reference blocks to be used for the indirect and daily verification of Rockwell hardness testing machines and indenters, as specified in AS 1815.2. This document also specifies requirements for Rockwell machines and indenters used for calibrating reference blocks and specifies methods for their calibration and verification.

This document is identical with, and has been reproduced from, ISO 6508-3:2023, *Metallic materials — Rockwell hardness test — Part 3: Calibration of reference blocks*.

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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 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](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 3, *Hardness testing*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 459, *ECISS - European Committee for Iron and Steel Standardization*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 6508-3:2015), which has been technically revised.

The main changes are as follows:

- removed all statements of requirements, permissions, and recommendations from the Scope of the document ([Clause 1](#));
- addition of [Clause 3](#), Terms and definitions;
- modification of the requirements for the calibration and verification of the machine and indenter ([Clause 5](#));
- added a performance verification for the calibration machine and indenter ([Clause 5](#));
- added a requirement to conduct a control verification prior to the calibration of reference blocks ([Clause 6](#));
- added a normative [Annex D](#) for the control verification of the calibration machine ([Annex D](#)).

A list of all parts in the ISO 6508 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](http://www.iso.org/members.html)

# Australian Standard®

## Metallic materials — Rockwell hardness test

### Part 3: Calibration of reference blocks (ISO 6508-3:2023, IDT)

#### 1 Scope

This document specifies a method for the calibration of reference blocks to be used for the indirect and daily verification of Rockwell hardness testing machines and indenters, as specified in ISO 6508-2. This document also specifies requirements for Rockwell machines and indenters used for calibrating reference blocks and specifies methods for their calibration and verification.

Attention is drawn to the fact that the use of hard metal for ball indenters is considered to be the standard type of Rockwell indenter ball.

#### 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 376, *Metallic materials — Calibration of force-proving instruments used for the verification of uniaxial testing machines*

ISO 6508-1:2023, *Metallic materials — Rockwell hardness test — Part 1: Test method*

ISO 6508-2:2023, *Metallic materials — Rockwell hardness test — Part 2: Verification and calibration of testing machines and indenters*

#### 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 Manufacture of reference blocks

**4.1** The block shall be specially manufactured for use as a hardness-reference block.

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

**4.2** Each hardness reference block shall be of a thickness not less than 6 mm. To minimize the effect of hardness change with increasing number of indents, thicker blocks should be used.

**4.3** The reference blocks shall be free of magnetism. It is recommended that the manufacturer ensures that the blocks, if made of steel, have been demagnetized at the end of the manufacturing process (before calibration).

**4.4** The deviation from surface flatness of the top and bottom surfaces shall be  $\leq 0,01$  mm. The bottom of the blocks shall not be convex. The deviation from parallelism of the top and bottom surfaces shall be  $\leq 0,02$  mm per 50 mm.

**4.5** The test surface and bottom surface shall be free from damage, such as notches, scratches, oxide layers, etc., which can interfere with the measurement of the indentations. The surface roughness,  $R_a$ , shall not exceed 0,3  $\mu\text{m}$  for the test surface and 0,8  $\mu\text{m}$  for the bottom surface. Sampling length is  $l = 0,8 \text{ mm}$  (see ISO 4287:1997, 3.1.9).

**4.6** To verify that no material is subsequently removed from the reference block, the thickness at the time of calibration shall be marked on it, to the nearest 0,1 mm, or an identifying mark shall be made on the test surface [see [9.1 e](#)].

## 5 Calibration machine and calibration indenter

### 5.1 General

**5.1.1** Calibrations and verifications of Rockwell calibration machines and calibration indenters shall be carried out at a temperature of  $(23 \pm 5) ^\circ\text{C}$ .

**5.1.2** The instruments used for calibration and verification shall be traceable to national standards.

### 5.2 Direct verification of the calibration machine

**5.2.1** In addition to fulfilling the conditions in ISO 6508-2:2023, Clause 4, the calibration machine shall also meet the requirements given in [5.2.2](#), [5.2.3](#), [5.2.4](#), [5.2.5](#), [5.2.6](#) and [5.2.7](#) determined by the procedures specified in ISO 6508-2:2023, Clause 5.

**5.2.2** The machine shall be directly verified annually, not to exceed 13 months. Direct verification involves calibration and verification of the following:

- a) test force;
- b) measuring system;
- c) testing cycle; if this is not possible, at least the force versus time behaviour.
- d) machine hysteresis test.

**5.2.3** The test force shall be measured by means of an elastic proving device (according to ISO 376) class 0,5 or better and calibrated for reversibility, or by another method having the same or better accuracy.

Evidence should be available to demonstrate that the output of the force-proving device does not vary by more than 0,1 % in a period of 1 s to 30 s, following a stepped change in force.

**5.2.4** Each test force shall be measured and shall agree with the nominal preliminary test force,  $F_0$ , to within  $\pm 0,2 \%$  and the nominal total test force,  $F$ , to within  $\pm 0,1 \%$ .

**5.2.5** The measuring system shall have a resolution of  $\pm 0,0001 \text{ mm}$  and a maximum expanded uncertainty of 0,0002 mm, when calculated with a confidence level of 95 % over its working range.

**5.2.6** The testing cycle shall be timed with an uncertainty less than  $\pm 0,5 \text{ s}$  and shall conform to the testing cycle of [Clause 6](#).

**5.2.7** The average of the last three tests when evaluating the hysteresis of the calibration machine shall indicate a hardness number of  $(130 \pm 0,5)$  Rockwell units when the regular Rockwell ball scales B, E, F, G, H, and K are used, or within  $(100 \pm 0,5)$  Rockwell units when any other Rockwell scale is used.