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Kovinski materiali - Preskus trdote po Rockwellu - 1. del: Preskusna metoda (ISO 6508-1:2016)

Metallic materials - Rockwell hardness test - Part 1: Test method (ISO 6508-1:2016)

Metallische Werkstoffe - Härteprüfung nach Rockwell - Teil 1: Prüfverfahren (ISO 6508-1:2016)

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Matériaux métalliques - Essai de dureté Rockwell - Partie 1: Méthode d'essai (ISO 6508-1:2016)

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English Version

**Metallic materials - Rockwell hardness test - Part 1: Test
method (ISO 6508-1:2016)**

Matériaux métalliques - Essai de dureté Rockwell -
Partie 1: Méthode d'essai (ISO 6508-1:2016)

Metallische Werkstoffe - Härteprüfung nach Rockwell -
Teil 1: Prüfverfahren (ISO 6508-1:2016)

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European foreword

This document (EN ISO 6508-1:2016) has been prepared by Technical Committee ISO/TC 164 “Mechanical testing of metals” in collaboration with Technical Committee ECISS/TC 101 “Test methods for steel (other than chemical analysis)” the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2017, and conflicting national standards shall be withdrawn at the latest by February 2017.

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STANDARD

ISO
6508-1

Fourth edition
2016-08-15

**Metallic materials — Rockwell
hardness test —**

**Part 1:
Test method**

Matériaux métalliques — Essai de dureté Rockwell —

Partie 1: Méthode d'essai

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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 on 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 the following URL: www.iso.org/iso/foreword.html.

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

This fourth edition cancels and replaces the third edition (ISO 6508-1:2015), of which it constitutes a minor revision in order to clarify the scope of this part of ISO 6508.

ISO 6508 consists of the following parts, under the general title *Metallic materials — Rockwell hardness test*:

- *Part 1: Test method*
- *Part 2: Verification and calibration of testing machines and indenters*
- *Part 3: Calibration of reference blocks*

Metallic materials — Rockwell hardness test —

Part 1: Test method

1 Scope

This part of ISO 6508 specifies the method for Rockwell regular and Rockwell superficial hardness tests for scales A, B, C, D, E, F, G, H, K, 15N, 30N, 45N, 15T, 30T, and 45T for metallic materials and is applicable to stationary and portable hardness testing machines.

For specific materials and/or products, other specific International Standards apply (for instance, ISO 3738-1 and ISO 4498).

NOTE Attention is drawn to the fact that the use of tungsten carbide composite for ball indenters is considered to be the standard type of Rockwell indenter ball. Steel indenter balls are allowed to continue to be used only when complying with [Annex A](#).

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 6508-2:2015, *Metallic materials — Rockwell hardness test — Part 2: Verification and calibration of testing machines and indenters* [2dac9ea31c74/sist-en-iso-6508-1-2016](#)

ISO 6508-3:2015, *Metallic materials — Rockwell hardness test — Part 3: Calibration of reference blocks*

3 Principle

An indenter of specified size, shape, and material is forced into the surface of a test specimen under two force levels using the specific conditions defined in [Clause 7](#). The specified preliminary force is applied and the initial indentation depth is measured, followed by the application and removal of a specified additional force, returning to the preliminary force. The final indentation depth is then measured and the Rockwell hardness value is derived from the difference, h , in the final and initial indentation depths and the two constants N and S (see [Figure 1](#), [Table 1](#), and [Table 2](#)) as shown in [Formula \(1\)](#):

$$\text{Rockwell hardness} = N - \frac{h}{S} \quad (1)$$

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4 Symbols, abbreviated terms and designations

4.1 See [Table 1](#), [Table 2](#), [Table 3](#), and [Figure 1](#).

Table 1 — Rockwell Regular scales

| Rockwell Regular hardness scale | Hardness symbol Unit | Type of indenter | Preliminary force F_0 | Total force F | Scaling Constant S | Full Range Constant N | Applicable range of application (Rockwell Regular hardness scales) |
|---------------------------------|-------------------------|------------------|----------------------------|--------------------|-------------------------|----------------------------|--|
| A | HRA | Diamond cone | 98,07 N | 588,4 N | 0,002 mm | 100 | 20 HRA to 95 HRA |
| B | HRBW | Ball 1,587 5 mm | 98,07 N | 980,7 N | 0,002 mm | 130 | 10 HRBW to 100 HRBW |
| C | HRC | Diamond cone | 98,07 N | 1,471 kN | 0,002 mm | 100 | 20 HRC ^a to 70 HRC |
| D | HRD | Diamond cone | 98,07 N | 980,7 N | 0,002 mm | 100 | 40 HRD to 77 HRD |
| E | HREW | Ball 3,175 mm | 98,07 N | 980,7 N | 0,002 mm | 130 | 70 HREW to 100 HREW |
| F | HRFW | Ball 1,587 5 mm | 98,07 N | 588,4 N | 0,002 mm | 130 | 60 HRFW to 100 HRFW |
| G | HRGW | Ball 1,587 5 mm | 98,07 N | 1,471 kN | 0,002 mm | 130 | 30 HRGW to 94 HRGW |
| H | HRHW | Ball 3,175 mm | 98,07 N | 588,4 N | 0,002 mm | 130 | 80 HRHW to 100 HRHW |
| K | HRKW | Ball 3,175 mm | 98,07 N | 1,471 kN | 0,002 mm | 130 | 40 HRKW to 100 HRKW |

^a The applicable range of application can be extended to 10 HRC if the surfaces of the diamond cone and spherical tip are polished for a penetration depth of at least 0,4 mm.

Table 2 — Rockwell Superficial scales

| Rockwell Superficial hardness scale | Hardness symbol Unit | Type of indenter | Preliminary force F_0 | Total force F | Scaling Constant S | Full Range Constant N | Applicable range of application (Rockwell Superficial hardness scales) |
|-------------------------------------|-------------------------|------------------|----------------------------|--------------------|-------------------------|----------------------------|--|
| 15N | HR15N | Diamond cone | 29,42 N | 147,1 N | 0,001 mm | 100 | 70 HR15N to 94 HR15N |
| 30N | HR30N | Diamond cone | 29,42 N | 294,2 N | 0,001 mm | 100 | 42 HR30N to 86 HR30N |
| 45N | HR45N | Diamond cone | 29,42 N | 441,3 N | 0,001 mm | 100 | 20 HR45N to 77 HR45N |
| 15T | HR15TW | Ball 1,587 5 mm | 29,42 N | 147,1 N | 0,001 mm | 100 | 67 HR15TW to 93 HR15TW |
| 30T | HR30TW | Ball 1,587 5 mm | 29,42 N | 294,2 N | 0,001 mm | 100 | 29 HR30TW to 82 HR30TW |
| 45T | HR45TW | Ball 1,587 5 mm | 29,42 N | 441,3 N | 0,001 mm | 100 | 10 HR45TW to 72 HR45TW |

Scales using indenter balls with diameter 6,350 mm and 12,70 mm may also be used, if specified in the product specification or by special agreement. See ASTM E18 [11] for additional scales using these ball sizes.

NOTE 1 For certain materials, the applicable range of application might be narrower than those indicated.

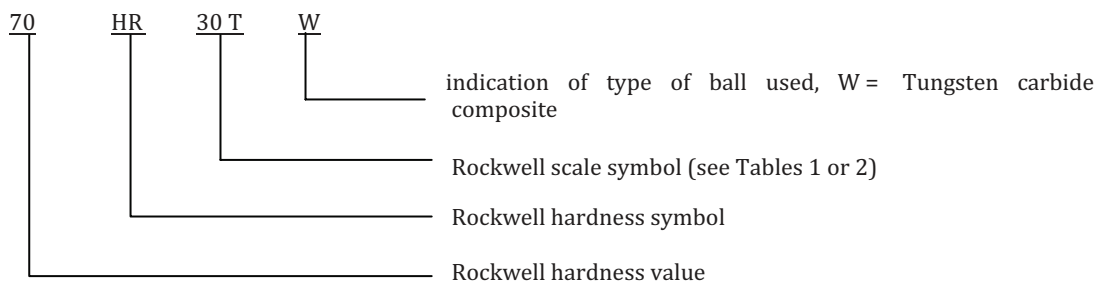
NOTE 2 The numbers representing the test forces were originally based on units of kgf. For example, the total test force of 30 kgf has been converted to 294,2 N.

Table 3 — Symbols and abbreviated terms

| Symbol/ Abbreviated term | Definition | Unit |
|--|--|------|
| F_0 | Preliminary test force | N |
| F_1 | Additional test force (total force minus preliminary force) | N |
| F | Total test force | N |
| S | Scaling constant, specific to the scale | mm |
| N | Full range constant, specific to the scale | - |
| h | Permanent depth of indentation under preliminary test force after removal of additional test force (permanent indentation depth) | mm |
| HRA HRC HRD | Rockwell Regular hardness = $100 - \frac{h}{0,002}$ | |
| HRBW HREW HRFW HRGW HRHW HRKW | Rockwell Regular hardness = $130 - \frac{h}{0,002}$ | |
| HRN HRTW | Rockwell Superficial hardness = $100 - \frac{h}{0,001}$ | |

4.2 The following is an example of the designation of Rockwell hardness.

EXAMPLE



NOTE 1 Previous versions of this part of ISO 6508 allowed the use of steel indenter balls, which required the suffix S.

NOTE 2 For the HR30Tsm and HR15Tsm scales defined in [Annex A](#), a capital S and a lower-case m is used indicating the use of steel indenter balls and a diamond spot specimen holder.