INTERNATIONAL STANDARD

ISO
674

First edition
1988-12-01

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Metallic materials — Hardness test — Calibration of standardized blocks to be used for Rockwell hardness testing machines (scales A — B — C — D — E — F — G — H — K)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Matériaux métalliques — Essai de dureté — Étalonnage des blocs de référence à utiliser pour les machines d'essai de dureté Rockwell (échelles A — B — C — D — E — F — G — H — K)

ISO 674:1988
https://standards.iteh.ai/catalog/standards/sist/2632ed3e-1f5d-4ef1-95b0-071263ebac71/iso-674-1988

Reference number
ISO 674 : 1988 (E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

International Standard ISO 674 was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals.*

ISO 674:1988
https://standards.iteh.ai/catalog/standards/sist/2632ed3e-1f5d-4ef1-95b0-071205ebdc71/iso-674-1988

It cancels and replaces ISO Recommendation R 674 : 1968, of which it constitutes a technical revision.

© International Organization for Standardization, 1988 •

Printed in Switzerland

Metallic materials — Hardness test — Calibration of standardized blocks to be used for Rockwell hardness testing machines (scales A — B — C — D — E — F — G — H — K)

1 Scope

This International Standard specifies a method for the calibration of standardized blocks to be used in Rockwell hardness testing machines (scales A — B — C — D — E — F — G — H — K) for the indirect verification of these machines, as described in ISO 716.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

2 Normative references

ISO 674:1988
https://standards.iteh.ai/catalog/standards/sist/2632ed3e-1f5d-4ef1-95b0-07b262abaa31/iso-674-1988

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 468 : 1982, *Surface roughness — Parameters, their values and general rules for specifying requirements.*

ISO 716 : 1986, *Metallic materials — Hardness test — Verification of Rockwell hardness testing machines (scales A — B — C — D — E — F — G — H — K).*

ISO 6507-1 : 1982, *Metallic materials — Hardness test — Vickers test — Part 1:* HV 5 *to* HV 100.

ISO 6508 : 1986, *Metallic materials — Hardness test — Rockwell test (scales A — B — C — D — E — F — G — H — K).*

3 Manufacture

3.1 The block shall be specially prepared and the attention of the manufacturer is drawn to the need to use a manufacturing process which will give the necessary homogeneity, stability of structure and uniformity of hardness.

3.2 Each metal block to be standardized shall be of a thickness not less than 6 mm.

3.3 The standardized blocks shall be free of magnetism. It is recommended that the manufacturer shall ensure that the blocks, if of steel, have been demagnetized at the end of the manufacturing process (before calibration).

3.4 The maximum deviation in flatness of the surfaces shall not exceed 0,010 mm. The bottoms of the blocks shall not be convex.

The maximum error in parallelism shall not exceed 0,020 mm/50 mm.

3.5 The test surface shall be free from scratches which interfere with the measurement of the indentations. The surface roughness R_a shall not exceed 0,3 µm for the test surface and 0,8 µm for the bottom surface; sampling length l = 0,80 mm (see ISO 468).

3.6 To permit checking that no material is subsequently removed from the standardized block, its thickness at the time of standardization shall be marked on it to the nearest 0,1 mm, or an identifying mark shall be made on the test surface (see clause 8).

4 Standardizing machine

4.1 In addition to fulfilling the general requirements specified in ISO 716 : 1986, clause 3, the standardizing machine shall also meet the requirements given in 4.2.

4.2 The machine shall be verified directly. Direct verification involves

- verification of the test force (see 4.2.1);
- verification of the indenter (see 4.2.2 and 4.2.3);
- verification of the measuring device (see 4.2.4).

4.2.1 The preliminary force F_0, shall be 98,07 N ± 0,2 % at the initial application and after the additional force F_1 has been removed.

The total test force, F, shall be correct to within ± 0,1 % of the nominal test force (see table 1).

Table 1

Rockwell hardness scale	Preliminary test force, F_0 (Nominal value) N	Total test force, F (Nominal value) N
A F H	98,07	588,4
B D E	98,07	980,7
C G K	98,07	1 471

4.2.2 The diamond cone indenter shall meet the following requirements:

a) The diamond cone shall have a mean included angle of 120° ± 0,10°. In each measured section the included angle shall be 120° ± 0,17°.

The number of measured sections are as follows:

— at least eight sections at random when the roundness of the cone is not measured.

or

— two sections when the error in roundness of the cone, adjacent to the blend, measured in a section normal to the indenter axis, does not exceed 0,004 mm. These sections shall be situated at the positions of maximum and minimum error in roundness.

The error of roundness is defined as the greatest radial distance between any point on the conical surface and the circumscribing circle.

Deviations from straightness of the generator of the diamond cone, adjacent to the blend, shall not exceed 0,000 5 mm over a minimum length of 0,40 mm.

b) The spherical tip of the diamond cone shall have a mean radius of 0,200 mm ± 0,005 mm. In each measured section as defined in a), the radius shall be 0,200 mm ± 0,007 mm and local deviations from it shall not exceed 0,002 mm.

The surfaces of the cone and the spherical tip shall blend in a truly tangential manner.

c) The inclination of the axis of the diamond cone to the axis of the indenter holder (normal to the seating surface) shall be within 0,3°.

d) Tests shall be made in accordance with the procedure described in clause 5, on a minimum of four blocks: one at a hardness level near the lower limit and one near the upper limit of the field of application specified in table 1 of ISO 6508: 1986 for the HRC-scale.

For each block the mean hardness value of three indentations made using the indenter to be verified, shall not differ from the mean hardness value of the three indentations obtained with the standardizing indenter by more than ± 0,4 HRC units. The indentations with the indenter to be verified and with the standardizing indenter shall be carried out in such a way that the indentations of both indenters are in each case adjacent.

When the indenter is intended for use in HRA and HRD scales, additional HRA tests shall be made on one block in the range 80 HRA to 88 HRA. The error shall be not more than 0,4 HRA.

NOTE — The standardizing indenter is the indenter or the indenters being recognized as the reference indenter(s) at national level.

4.2.3 The steel ball indenter shall meet the requirements of ISO 716.

The diameter of the steel ball indenter (scales B, E, F, G, H, K), when measured at not less than three positions, shall not differ from the nominal diameter by more than

± 0,002 mm for the ball of diameter 1,587 5 mm;

± 0,003 mm for the ball of diameter 3,175 mm.

The hardness of the steel ball shall be not less than 850 HV 10, when determined in accordance with ISO 6507-1, and applying the appropriate correction for curvature.

4.2.4 The measuring device shall be capable of measuring vertical displacements within ± 0,1 of a scale unit.

5 Standardizing procedure

The standardized blocks shall be calibrated in a standardizing machine as described in clause 4, at a temperature of 23 °C ± 5 °C, using the general procedure described in ISO 6508.

5.1 The mechanism which controls the application of the test force shall either

a) employ a device, e.g. a spring, to reduce the velocity of penetration of the indenter during the period of penetration

or

b) employ a device to maintain a constant velocity of the indenter during the period of increasing force.

5.2 Standard machine type a) [see 5.1 a)]

The initial velocity (i.e. the velocity of the indenter prior to penetration of the test block) shall be not greater than 1 mm/s.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 674:1988
https://standards.iteh.ai/catalog/standards/sist/2632ed3e-1f5d-4ef1-95b0-071263ebac71/iso-674-1988

Bring the indenter into contact with the test surface and apply the preliminary test force (F_0 = 98,07 N) without shock or vibration. The duration of the preliminary test force, F_0, shall be not less than 1 s and not greater than 10 s.

Set the measuring device to its datum position and, without shock or vibration, increase the force from F_0 to F in not less than 2 s and not greater than 8 s.

The duration of the additional test force F_1 shall be not less than 3 s and not greater than 5 s.

The final reading shall be made immediately after the additional test force has been removed.

5.3 Standard machine type b) [see 5.1 b)]

The constant velocity of the indenter shall be not less than 0,005 mm/s and not greater than 0,020 mm/s.

Bring the indenter into contact with the test surface and apply the preliminary test force (F_0 = 98,07 N) without shock or vibration. The duration of the preliminary test force F_0 shall be not less than 1 s and not greater than 10 s.

Set the measuring device to its datum position and, without shock or vibration, increase the force from F_0 to F.

The duration of the additional test force F_1 shall be not less than 3 s and not greater than 5 s.

The final reading shall be made immediately after the additional test force has been removed.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 674:1988
https://standards.iteh.ai/catalog/standards/sist/2632ed3e-11bd-4ef1-95b0-071263ebac71/iso-674-1988

6 Number of indentations

On each standardized block five indentations shall be made uniformly distributed over the entire test surface.

7 Uniformity of hardness

7.1 Let e_1, e_2, ..., e_5 be the values in scale units of the measured increase in depth of indentation, arranged in increasing order of magnitude.

The non-uniformity of the block under the particular conditions of standardization is characterized by:

$$e_5 - e_1$$

and expressed in percent of $\overline{e}$,

where

$$\overline{e} = \frac{e_1 + e_2 + \ldots + e_5}{5}$$

7.2 The block is not sufficiently uniform in hardness for standardization purposes unless the uniformity satisfies the conditions given in table 2.

Table 2

Rockwell hardness scale	Maximum permissible non-uniformity $e_5 - e_1$
A	1,5 % $\overline{e}$ or 0,4 HRA [1]
B	3 % $\overline{e}$
C	1,5 % $\overline{e}$
D	1,5 % $\overline{e}$
E	3 % $\overline{e}$
F	3 % $\overline{e}$
G	3 % $\overline{e}$
H	3 % $\overline{e}$
K	3 % $\overline{e}$

1) The greater of the two values shall apply.

8 Marking

8.1 Each standardized block shall be marked with the following:

a) arithmetic mean of the hardness values found in the standardizing test, for example: 66,3 HRC;

b) name or mark of the supplier;

c) serial number;

d) name or mark of the standardizing authority;

e) thickness of the block or an identifying mark on the test surface;

f) year of calibration.

8.2 Any mark put on the side of the block shall be upright when the test surface is the upper face.

This page intentionally left blank

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 674:1988
https://standards.iteh.ai/catalog/standards/sist/2632ed3e-1f5d-4ef1-95b0-071263ebac71/iso-674-1988

This page intentionally left blank

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 674:1988
https://standards.iteh.ai/catalog/standards/sist/2632ed3e-1f5d-4ef1-95b0-071263ebac71/iso-674-1988

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 674:1988
https://standards.iteh.ai/catalog/standards/sist/2632ed3e-1f5d-4ef1-95b0-071263ebac71/iso-674-1988

UDC 669 : 620.178.152.42 : 53.089.6

Descriptors : metals, tests, hardness tests, Rockwell hardness, test equipment, blocks, reference sample, calibration, marking.

Price based on 3 pages