
**Rubber, vulcanized or thermoplastic —
Determination of indentation hardness —**

**Part 2:
IRHD pocket meter method**

*Caoutchouc vulcanisé ou thermoplastique — Détermination de la
dureté par pénétration —
Partie 2: Méthode au duromètre de poche IRHD*

ISO 7619-2:2004

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 7619-2 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analyses*.

This first edition of ISO 7619-2, together with ISO 7619-1, cancels and replaces ISO 7619:1997, which has been technically revised as follows in respect of the IRHD pocket meter now covered exclusively by Part 2:

- a test time of 3 s replaces the formerly specified “within 1 s”, giving a more accurate value, as the hardness value drops significantly during the first few seconds;
- a test time of 15 s has been introduced for TPE materials, as the hardness value continues to decrease over a longer period of time than for vulcanized rubber, this test time being the same as that specified for plastic in ISO 868^[1];

ISO 7619 consists of the following parts, under the general title *Rubber, vulcanized or thermoplastic — Determination of indentation hardness*:

- *Part 1: Durometer method (Shore hardness)*
- *Part 2: IRHD pocket meter method*

Introduction

The hardness of rubber, as measured by the IRHD pocket meter or the durometer, is a complex response to an applied indentation. The measurement will depend upon

- a) the elastic modulus of the rubber,
- b) the viscoelastic properties of the rubber,
- c) the thickness of the test piece,
- d) the geometry of the indenter,
- e) the pressure exerted,
- f) the rate of increase of pressure, and
- g) the interval at which the hardness is recorded.

Because of these factors, it is inadvisable to relate results using an IRHD pocket meter directly to durometer hardness values, although correlations have been established for some individual rubbers or compounds.

NOTE Further information on the relation between the durometer values and IRHD values is given in the literature [4], [5], [6].

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Rubber, vulcanized or thermoplastic — Determination of indentation hardness —

Part 2: IRHD pocket meter method

1 Scope

This part of ISO 7619 specifies a method for determining the indentation hardness of vulcanized or thermoplastic rubber by means of a pocket hardness meter calibrated in IRHD. The use of such meters is primarily intended for control, not specification, purposes (for specification, see ISO 48). It is possible to increase precision by fixing the pocket hardness meter on a support.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references only the edition cited apply. For undated references, the latest edition of the referenced document

ISO 48:1994, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)* <https://standards.iteh.ai/catalog/standards/sist/3e9369df-577c-454d-b02f-44919afbcca7/iso-7619-2-2004>

ISO 23529, *Physical test methods — Preparation and conditioning of test pieces and preferred test conditions*¹⁾

3 Principle

The measured property is the penetration of a specified indenter forced into the material under specified conditions.

4 Apparatus

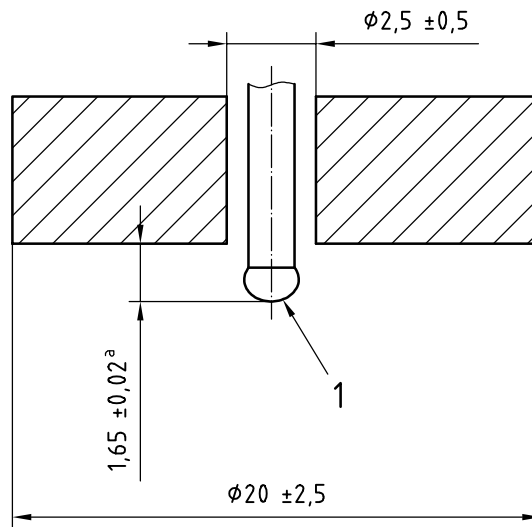
4.1 IRHD pocket hardness meter

The hardness meter calibrated in IRHD consists of the components specified in 4.1.1 to 4.1.4.

4.1.1 Pressure foot

The pressure foot shall be square with sides $20 \text{ mm} \pm 2,5 \text{ mm}$ and having a centre hole of diameter $2,5 \text{ mm} \pm 0,5 \text{ mm}$ (see Figure 1).

¹⁾ To be published. (Revision of ISO 471:1995)

**Key**

1 hemispherical (diameter $1,575 \text{ mm} \pm 0,025 \text{ mm}$)

^a Valid at 30 IRHD.

Figure 1 — Indenter for IRHD pocket meter
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4.1.2 Indentor

The indentor end shall be hemispherical, with a diameter of $1,575 \text{ mm} \pm 0,025 \text{ mm}$ (see Figure 1).

4.1.3 Indicating device

This device allows the extent of protrusion of the indenter beyond the face of the pressure foot to be read. It shall be calibrated directly in terms of IRHD from the value 30 for maximum protrusion of 1,65 mm to the value 100 for zero protrusion obtained by placing the pressure foot and indenter in firm contact with a flat piece of glass.

4.1.4 Calibrated spring

This shall be used to apply a substantially constant force to the indenter of $2,65 \pm 0,15 \text{ N}$ over the 30 IRHD to 100 IRHD range.

5 Test piece**5.1 Thickness**

For the determination of hardness by pocket hardness meters, the thickness of the test piece shall be at least 6 mm.

For sheets thinner than 6 mm, a test piece may be composed of not more than three layers, none of which shall be thinner than 2 mm, in order to obtain the necessary thickness. However, determinations made on such test pieces may not agree with those made on single-thickness pieces.

For comparison purposes, the test pieces shall be similar.

5.2 Surface

The other dimensions of the test piece shall be sufficient to permit measurements at least 12 mm away from any edge. The surface of the test piece shall be flat over the area in contact with the pressure foot.

Satisfactory hardness determinations cannot be made on rounded, uneven or rough surfaces using pocket meters. However, their use in certain specialized applications is recognized, e.g. ISO 7267-1^[2] for determination of hardness of rubber-covered rolls. In such applications, the limitations of their use shall be clearly identified.

6 Conditioning

Where practical, test pieces shall be conditioned immediately before testing for a minimum period of 1 h at the standard laboratory temperature in accordance with ISO 471. The same temperature shall be used throughout any single test or series of tests intended to be comparable.

7 Procedure

7.1 General procedure

Place the test piece on a flat, hard, rigid surface. Hold the hardness meter in position with the centre of the indenter at least 12 mm from the edges of the test piece. Apply the pressure foot to the test piece as rapidly as possible, without shock, keeping the foot parallel to the surface of the test piece and ensuring that the indenter is normal to the rubber surface.

7.2 Test time

Apply a force sufficient only to obtain firm contact between the pressure foot and the test piece and take the reading at the specified time after the pressure foot is in firm contact with the test piece. The standard test time shall be 3 s for vulcanized rubber and 15 s for thermoplastic rubber. Other test times may be used, provided they are stated in the test report. Rubbers of unknown type should be treated as vulcanized.

7.3 Number of measurements

Make five measurements of hardness at different positions on the test piece at least 6 mm apart and determine the median value.

8 Calibration and checking

8.1 Calibration

The instrument shall be adjusted and calibrated regularly using suitable instruments for measuring force and dimensions.

NOTE An International Standard for calibration of hardness meters and durometers, ISO 18898, is under preparation^[3].