
**Rubber-covered rollers — Determination
of apparent hardness —**

Part 1:
IRHD method

*Cylindres revêtus de caoutchouc — Détermination de la dureté
apparente*

Partie 1: Méthode DIDC

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ISO 7267-1:1997

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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.

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.

International Standard ISO 7267-1 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Physical and degradation tests*.

This second edition cancels and replaces the first edition (ISO 7267-1:1986). Clause 2 has been updated and a method for rollers with a radius less than 4 mm has been added.

ISO 7267 consists of the following parts, under the general title *Rubber-covered rollers — Determination of apparent hardness*:

— Part 1: IRHD method

— Part 2: Shore-type durometer method

— Part 3: Pusey and Jones method

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Introduction

The hardness of a roller covering has traditionally been determined on the finished roller, since it is this hardness that is critical to the correct functioning of the roller in its end application. Values of hardness determined by whichever method is chosen are therefore dependent not only on the method employed and on the rubber, but also on the diameter of the roller and the thickness of the covering and in the case of thin coverings on the nature of the roller core. For this reason the term "apparent hardness" is used to distinguish between the values obtained by methods described in the various parts of this International Standard and those that would be obtained for the rubber if it was possible to use the standard test methods for standard test pieces forming the subjects of other International Standards.

Since rollers vary considerably in size, construction and end use, and in view of the fact that hardness determinations are made for such different purposes as specification and factory process control, it has not been possible to standardize on one test method. Consequently three methods are described, each capable of standing alone (see foreword).

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Rubber-covered rollers — Determination of apparent hardness —

Part 1: IRHD method

1 Scope

This part of ISO 7267 specifies a method for the determination of the apparent hardness of vulcanized or thermoplastic rubber roller covers, expressed in International Rubber Hardness Degrees (IRHD). The method is similar in principle to the methods used for the determination of the hardness of rubber in ISO 48, in that it consists essentially of measuring the depth of penetration of a spherical indenter operating under a specified force. The apparatus used is similar to that described in ISO 48, having a base specifically designed for application to roller covers and similar curved surfaces.

2. Normative references

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 are 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 indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 48:1994, *Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 471:1995, *Rubber - Temperatures, humidities and times for conditioning and testing*

3 Time interval between forming and finished grinding, and testing

Tests shall not be carried out less than 16 h after forming and/or finished grinding and for arbitration purposes, not less than 72 h after forming (see ISO 471).

4 Conditioning and temperature of test

Whenever possible, the test shall be carried out at the standard laboratory temperature in accordance with ISO 471. The product under test shall be maintained under the test condition for sufficient time to reach temperature equilibrium with test environment. Where this is impracticable, the period of time and the conditions shall be given in the product specification (see Note 1).

The same temperature shall be used throughout any one test or series of tests intended to be comparable.

Note 1 - For large rollers having heavy metal cores, ambient conditions may not allow equilibrium temperatures to be obtained.

5 Apparatus

5.1 Rollers having a radius greater than 50 mm

The apparatus used shall be that described in ISO 48, methods CN, CH or CL, as appropriate to the nominal apparent hardness of the roller cover to be tested.

The base of the instrument shall have a hole below the plunger allowing free passage of the annular foot such that measurement may be made above or below the base.

The lower surface of the base shall be in the form of two cylinders parallel to each other and the plane of the base. The diameter of the cylinders and their distance apart shall be such as to locate and support the instrument on the curved surface to be tested (see Figure 1). Alternatively, the base may be fitted with feet movable in universal joints so that they adapt themselves to the curved surface.

5.2 Rollers having a radius of 4 mm to 50 mm

The apparatus used shall be that described in ISO 48, methods CN, CH or CL, as appropriate to the nominal apparent hardness of the roller cover to be tested.

On surfaces too small to support the instrument, jigs or V blocks shall be provided to support the journals or shafts of the rollers so that the indenter is vertically above the axis of the roller under test (see Figure 2).

Note 2 - Wax may be used to support the smaller rollers.

5.3 Small rollers having a radius less than 4 mm

The apparatus used shall be that described in ISO 48, method CM.

Jigs or blocks shall be provided to support the roller so that the indenter is vertically above the axis of the roller under test. Alternatively the roller shall be secured by wax to the instrument table. No test shall be made if the radius is less than 0,8 mm.

6 Procedure

Firmly locate the roller to be tested, with its major axis horizontal and with the area in which the hardness is to be measured uppermost. Place the measuring equipment with the plunger vertical on the roller over the position where the hardness is to be measured and lower the foot into contact with the roller surface. Bring the plunger and the indenting ball into contact with the rubber under the contact force. After 5 s, if the gauge is graduated in International Rubber Hardness Degrees (IRHD), adjust the gauge to read 100 and apply the additional major indenting force. Maintain this force for 30 s and then take the gauge reading as the hardness in IRHD.

If the gauge is graduated in metric units, the differential indentation **D** (in hundredths of a millimetre) of the plunger caused by the additional indenting force, applied for 30 s, shall be noted. This shall be converted into International Rubber Hardness Degrees as described in ISO 48.

During the loading periods, gently vibrate the apparatus unless it is completely free of friction.

Make three measurements at different points at least 6 mm apart within the test area at which the hardness is to be determined.

Note 3 - Several test areas along the length and around the circumference of the roller may be required to determine the average hardness of the covering and the hardness variation over a single roller (see ISO 6123-1).

7 Expression of results

Express the apparent hardness as the median of the three measurements for each test area reported to the nearest whole number in IRHD.

8 Test report

The test report shall include the following information:

- a reference to this International Standard;
- a complete identification of the roller under test;
- conditioning and temperature of test;
- the apparent hardness, expressed in IRHD;
- the date of test.

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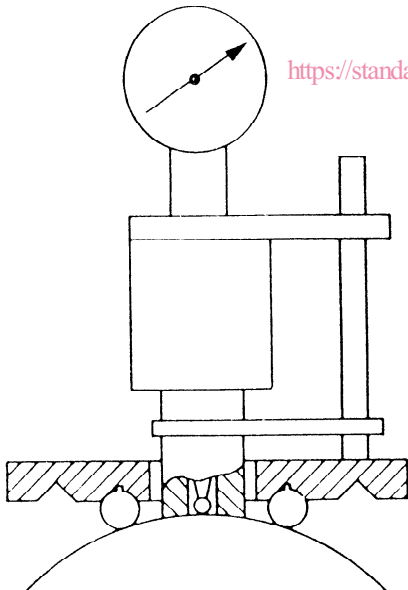


Figure 1
Testing surfaces of large radius
($R > 50$ mm)

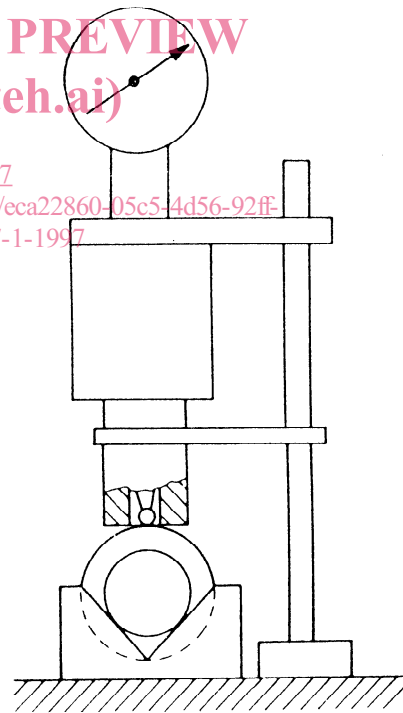


Figure 2
Test jig for surfaces of small radius
($4 \text{ mm} \leq R \leq 50 \text{ mm}$)

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