

# Rubber-covered rollers — Determination of apparent hardness

## Part 1: IRHD method

ICS 83.140.99

## National foreword

This British Standard is the UK implementation of ISO 7267-1:2008. It supersedes BS 7442-3.1:1998 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/22, Physical testing of rubber.

A list of organizations represented on this committee can be obtained on request to its secretary.

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# INTERNATIONAL STANDARD

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

### Part 1: IRHD method

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

*Partie 1: Méthode DIDC*



Reference number  
ISO 7267-1:2008(E)

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## Foreword

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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 7267-1 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

This third edition cancels and replaces the second edition (ISO 7267-1:1997), which has been revised primarily to update the normative references.

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*

## 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, 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 (see Foreword), each capable of standing alone.

# Rubber-covered rollers — Determination of apparent hardness —

## Part 1: IRHD method

**WARNING** — Persons using this part of ISO 7267 should be familiar with normal laboratory practice. This part of ISO 7267 does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

**CAUTION** — Certain procedures specified in this part of ISO 7267 may involve the use or generation of substances, or the generation of waste, that could constitute a local environmental hazard. Reference should be made to appropriate documentation on safe handling and disposal after use.

### 1 Scope

This part of ISO 7267 specifies a method for the determination of the apparent hardness, expressed in International Rubber Hardness Degrees (IRHD), of vulcanized- or thermoplastic-rubber roller covers. 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.

**NOTE** With some rollers, there may be significant variation in the thickness of the rubber over the surface of the roller, which could affect the measured apparent hardness.

### 2 Normative references

The following referenced documents are indispensable for the application 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 48:2007, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

### 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.

## 4 Conditioning and temperature of test

Whenever possible, the test shall be carried out at a standard laboratory temperature in accordance with ISO 23529. The product under test shall, if possible, be maintained under the test conditions for sufficient time to reach temperature equilibrium with the test environment. Where this is impracticable, the period of time and the conditions shall be as given in the product specification (see Note).

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

NOTE 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 48:2007, method 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 48:2007, method 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).

Wax may be used to support smaller rollers.

### 5.3 Small rollers having a radius less than 4 mm

The apparatus used shall be that described in ISO 48:2007, 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.

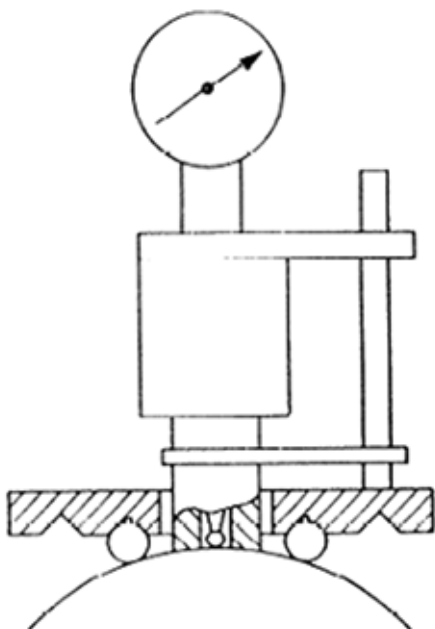
## 6 Procedure

**6.1** 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.

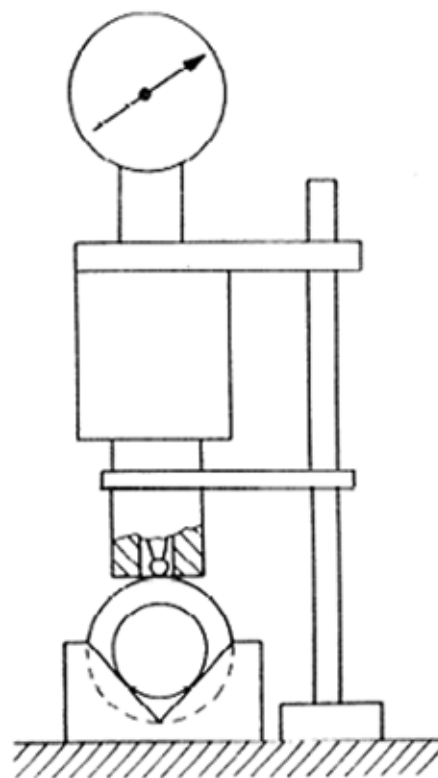


If the gauge is graduated in metric units, note the differential indentation  $D$  (in hundredths of a millimetre) of the plunger caused by the additional indenting force, applied for 30 s. Convert this into International Rubber Hardness Degrees as described in ISO 48.

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



**Figure 1 — Testing surfaces of large radius**  
 $(R > 50 \text{ mm})$



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

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

**NOTE** 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, *Rubber or plastics covered rollers — Specifications — Part 1: Requirements for hardness*).

## 7 Expression of results

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

## 8 Test report

The test report shall include the following information:

- a) a full description of the roller and its origin;
- b) a full reference to the test method used, i.e. the number of this part of ISO 7267;
- c) test details:
  - 1) the time and temperature of conditioning prior to testing,
  - 2) the temperature of test, and the relative humidity, if necessary,
  - 3) details of any procedures not specified in this part of ISO 7267;
- d) test results:
  - 1) the number of areas or rollers tested,
  - 2) the individual test results,
  - 3) the apparent hardness, expressed in IRHD (see Clause 7);
- e) the date of the test.



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