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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

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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 voluntary nature of standards, 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.

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

This fourth edition cancels and replaces the third edition (ISO 7267-1:2008), of which it constitutes a minor revision to update the normative references in Clause 2.

A list of all parts in the ISO 7267 series can be found on the ISO website.

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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, 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 document 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 in the ISO 7267 series, each capable of standing alone.

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Rubber-covered rollers — Determination of apparent hardness —

Part 1: IRHD method

WARNING 1 — Persons using this document should be familiar with normal laboratory practice. This document 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 determine the applicability of any other restrictions.

WARNING 2 — Certain procedures specified in this document might 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.

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1 Scope

This document 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 indentor 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 can 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 documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 48:2010, *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 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 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.

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5 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 might not allow equilibrium temperatures to be obtained.

6 Apparatus

6.1 Rollers having a radius greater than 50 mm

The apparatus used shall be that described in ISO 48:2010, 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.

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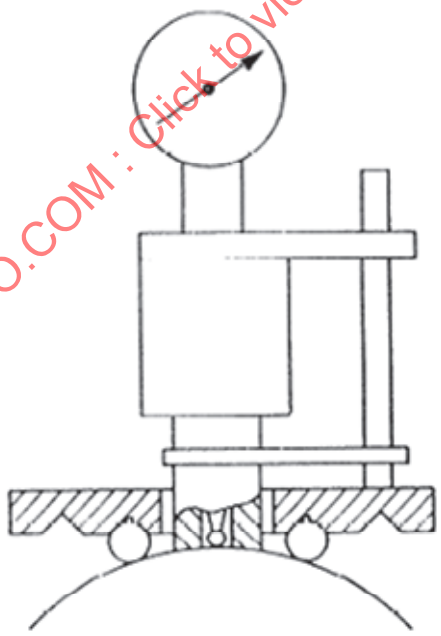

Figure 1 — Testing surfaces of large radius ($R > 50$ mm)

6.2 Rollers having a radius of 4 mm to 50 mm

The apparatus used shall be that described in ISO 48:2010, method CN, CH or CL, as appropriate to the nominal apparent hardness of the roller cover to be tested.

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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 indentor is vertically above the axis of the roller under test (see Figure 2).

Wax may be used to support smaller rollers.

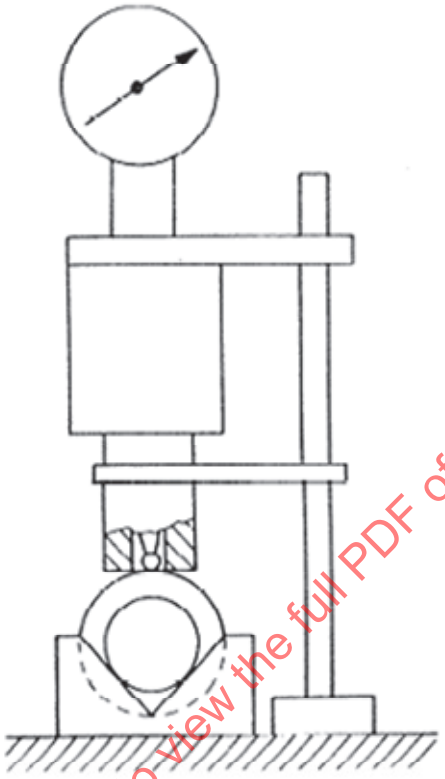

Figure 2 — Test jig for surfaces of small radius (4 mm ≤ R ≤ 50 mm)

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6.3 Small rollers having a radius less than 4 mm

The apparatus used shall be that described in ISO 48:2010, method CM.

Jigs or blocks shall be provided to support the roller so that the indentor 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.

7 Procedure

7.1 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.

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