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

**Part 2:
Hardness between 10 IRHD and 100
IRHD**

*Caoutchouc vulcanisé ou thermoplastique — Détermination de la
dureté —*

Partie 2: Dureté comprise entre 10 DIDC et 100 DIDC



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Contents

| | Page |
|---|-----------|
| Foreword..... | iv |
| Introduction..... | v |
| 1 Scope..... | 1 |
| 2 Normative references..... | 2 |
| 3 Terms and definitions..... | 2 |
| 4 Principle..... | 3 |
| 5 Apparatus..... | 3 |
| 5.1 General..... | 3 |
| 5.2 Methods N, H, L and M..... | 3 |
| 5.3 Methods CN, CH, CL and CM..... | 5 |
| 5.3.1 Cylindrical surfaces of radius greater than 50 mm..... | 5 |
| 5.3.2 Surfaces with double curvature of large radius greater than 50 mm..... | 5 |
| 5.3.3 Cylindrical surfaces of radius 4 mm to 50 mm or small test pieces with double curvature..... | 5 |
| 5.3.4 Small O-rings and articles of radius of curvature less than 4 mm..... | 5 |
| 6 Test pieces..... | 5 |
| 6.1 General..... | 5 |
| 6.2 Methods N, H, L and M..... | 5 |
| 6.2.1 General..... | 5 |
| 6.2.2 Thickness..... | 5 |
| 6.2.3 Lateral dimensions..... | 6 |
| 6.3 Methods CN, CH, CL and CM..... | 6 |
| 7 Time interval between forming and testing..... | 7 |
| 8 Conditioning of test pieces..... | 7 |
| 9 Temperature of test..... | 7 |
| 10 Procedure..... | 7 |
| 11 Number of readings..... | 7 |
| 12 Expression of results..... | 8 |
| 13 Precision..... | 8 |
| 14 Test report..... | 10 |
| Annex A (informative) Empirical relationship between indentation and hardness..... | 12 |
| Annex B (informative) Precision results from interlaboratory test programmes..... | 15 |
| Bibliography..... | 23 |

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 of 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 first edition of ISO 48-2 cancels and replaces ISO 48:2010, of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

- a new standard number has been given.
- in the Introduction, an explanation of the purpose of the grouping work has been added.
- in [Clause 12](#), an alternative way of expressing results has been added.

A list of all parts in the ISO 48 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

ISO/TC 45/SC 2 established a principle that it would be helpful for users if standards on the same subject but covering different aspects or methods were grouped together, preferably with an introductory guidance standard, rather than being scattered throughout the numbering system. This has been achieved for some subjects, for example curemeters (ISO 6502) and dynamic properties (ISO 4664).

In 2017, it was decided to group standards for hardness and, subsequently, it was agreed that they would be grouped under the ISO 48 number. The new standards together with the previously numbered standards are listed below.

- ISO 48-1: former ISO 18517
- ISO 48-2: former ISO 48
- ISO 48-3: former ISO 27588
- ISO 48-4: former ISO 7619-1
- ISO 48-5: former ISO 7619-2
- ISO 48-6: former ISO 7267-1
- ISO 48-7: former ISO 7267-2
- ISO 48-8: former ISO 7267-3
- ISO 48-9: former ISO 18898

The hardness test specified in this document is intended to provide a rapid measurement of rubber stiffness, unlike hardness tests on other materials which measure resistance to permanent deformation.

Hardness is measured from the depth of indentation of a spherical indenter, under a specified force, into a rubber test piece. An empirical relationship between depth of indentation and Young's modulus for a perfectly elastic isotropic material has been used to derive a hardness scale which can conveniently be used for most rubbers.

When it is required to determine the value of Young's modulus itself, it is expected that an appropriate test method be used, for example that described in ISO 7743.

The guide to hardness testing, ISO 48-1, can also be a useful reference.

Rubber, vulcanized or thermoplastic — Determination of hardness —

Part 2:

Hardness between 10 IRHD and 100 IRHD

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.

1 Scope

This document specifies four methods for the determination of the hardness of vulcanized or thermoplastic rubbers on flat surfaces (standard-hardness methods) and four methods for the determination of the apparent hardness of curved surfaces (apparent-hardness methods). The hardness is expressed in international rubber hardness degrees (IRHD). The methods cover the hardness range from 10 IRHD to 100 IRHD.

These methods differ primarily in the diameter of the indenting ball and the magnitude of the indenting force, these being chosen to suit the particular application. The range of applicability of each method is indicated in [Figure 1](#).

This document does not specify a method for the determination of hardness by a pocket hardness meter, which is described in ISO 48-5.

This document specifies the following four methods for the determination of standard hardness.

- Method N (normal test) is appropriate for rubbers with a hardness in the range 35 IRHD to 85 IRHD, but can also be used for hardnesses in the range 30 IRHD to 95 IRHD.
- Method H (high-hardness test) is appropriate for rubbers with a hardness in the range 85 IRHD to 100 IRHD.
- Method L (low-hardness test) is appropriate for rubbers with a hardness in the range 10 IRHD to 35 IRHD.
- Method M (microtest) is essentially a scaled-down version of the normal test method N, permitting the testing of thinner and smaller test pieces. It is appropriate for rubbers with a hardness in the range 35 IRHD to 85 IRHD, but can also be used for hardnesses in the range 30 IRHD to 95 IRHD.

NOTE 1 The value of the hardness obtained by method N within the ranges 85 IRHD to 95 IRHD and 30 IRHD to 35 IRHD might not agree precisely with that obtained using method H or method L, respectively. The difference is not normally significant for technical purposes.

NOTE 2 Because of various surface effects in the rubber and the possibility of slight surface roughness (produced, for example, by buffing), the microtest might not always give results agreeing with those obtained by the normal test.

This document also specifies four methods, CN, CH, CL and CM, for the determination of the apparent hardness of curved surfaces. These methods are modifications of methods N, H, L and M, respectively, and are used when the rubber surface tested is curved, in which case there are two possibilities:

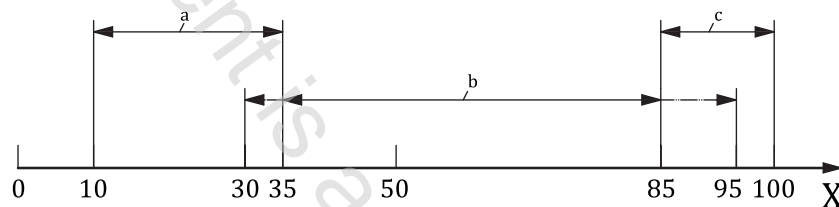
- a) the test piece or product tested is large enough for the hardness instrument to rest upon it;
- b) the test piece or product tested is small enough for both the test piece and the instrument to rest upon a common support.

A variant of b) would be where the test piece rests upon the support surface of the instrument.

Apparent hardness can also be measured on non-standard flat test pieces using methods N, H, L and M.

The procedures described cannot provide for all possible shapes and dimensions of test piece, but cover some of the commonest types, such as O-rings.

This document does not specify the determination of the apparent hardness of rubber-covered rollers, which is specified in ISO 48-6, ISO 48-7 and ISO 48-8.



Key

- X hardness (IRHD)
- a Method L and method CL.
- b Methods N and M and methods CN and CM.
- c Method H and method CH.

Figure 1 — Range of applicability

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 48-9, *Rubber, vulcanized or thermoplastic — Determination of hardness — Part 9: Calibration and verification of hardness testers*

ISO 1382, *Rubber — Vocabulary*

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

3 Terms and definitions

For the purposes of this document, terms and definitions in ISO 1382 and the following terms and definitions apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>