INTERNATIONAL STANDARD

ISO 48-9

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Rubber, vulcanized or thermoplastic — Determination of hardness —

Part 9: Calibration and verification of hardness testers

Caoutchouc vulcanisé ou thermoplastique — Détermination de la dureté —

Partie 9: Étalonnage et vérification des duromètres

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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 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 48-9 cancels and replaces ISO 18898:2016, 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.

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

Rubber, vulcanized or thermoplastic — Determination of hardness —

Part 9: Calibration and verification of hardness testers

1 Scope

This document specifies procedures for the calibration and verification of durometers of types A, D, AO and AM (see ISO 48-4), IRHD pocket meters (see ISO 48-5), IRHD dead-load instruments (see ISO 48-2) and dead-load instruments using the very low rubber hardness scale (see ISO 48-3).

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 48-2, *Rubber, vulcanized or thermoplastic — Determination of hardness — Part 2: Hardness between 10 IRHD and 100 IRHD*

ISO 48-3, *Rubber, vulcanized or thermoplastic — Determination of hardness — Part 3: Dead-load hardness using the very low rubber hardness (VLRH) scale*

ISO 48-4, *Rubber, vulcanized or thermoplastic — Determination of hardness — Part 4: Indentation hardness by durometer method (Shore hardness)*

ISO 48-5, *Rubber, vulcanized or thermoplastic — Determination of hardness — Part 5: Indentation hardness by IRHD pocket meter method*

ISO 18899, *Rubber — Guide to the calibration of test equipment*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 48-2 and ISO 18899 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/

4 Measurands and metrological requirements for calibration and verification

4.1 Environmental conditions

The ambient temperature of the measurement room in which the calibration or verification is carried out shall be 18 °C to 25 °C.

4.2 Metrological requirements

The measurands, as specified in ISO 48-2, ISO 48-3, ISO 48-4, and ISO 48-5, of indentor and pressure foot for the instrument to be calibrated are depicted in Figures 1 to 7 and requirements are specified in Tables 1 to 10.

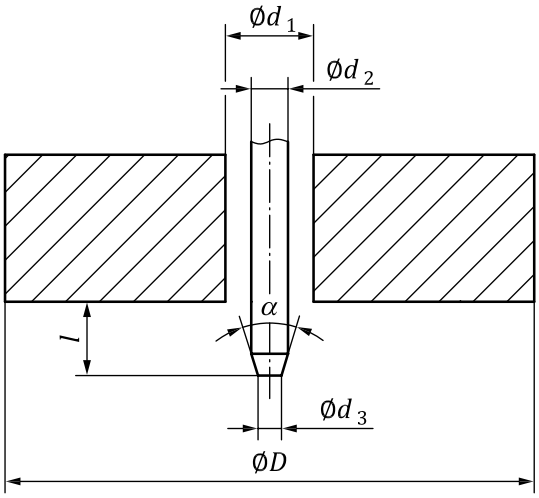

Figure 1 — Indentor and pressure foot for type A durometer

Table 1 — Type A durometer

Measurand		Unit	Metrological requirement	Calibration and verification instructions
Shaft diameter of indentor	d_2	mm	1,25 ± 0,15	5.2.1.2
Cone frustum top diameter	d_3	mm	0,79 ± 0,01	5.2.1.2
Cone angle of indentor	α	°	35,00 ± 0,25	5.2.1.2
Centrality of pressure foot			Central	
Diameter of pressure foot	D	mm	18,0 ± 0,5	5.2.2.1
Hole diameter of pressure foot	d_1	mm	3,0 ± 0,1	5.2.2.2
Mass on pressure foot	m	kg	$1{,}0^{+0{,}1}_{0{,}0}$	5.2.4.1
Depth of indentation	l	mm	0,00 to 2,50; Δl = ±0,02	5.2.3.1
Spring force on indentor	F	mN	F = 550,0 + 75,0H_A; ΔF = ±37,5 where H_A = hardness reading on type A durometer	5.2.5.1
Duration of force application	t	s	3 or 15	5.2.7

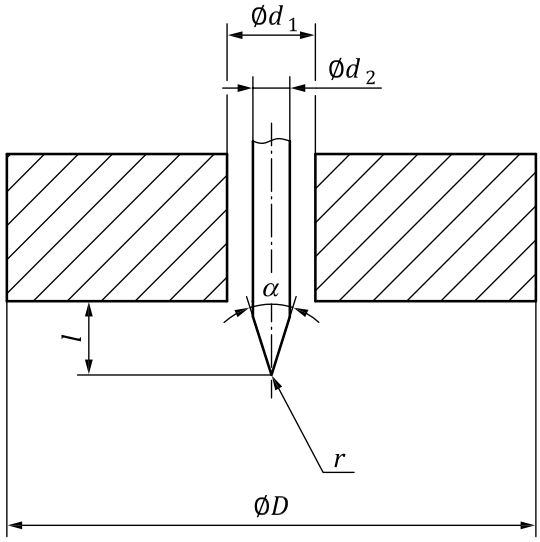

Figure 2 — Indentor and pressure foot for type D durometer

Table 2 — Type D durometer

Measurand		Unit	Metrological requirement	Calibration and verification instructions
Shaft diameter of indentor	d_2	mm	1,25 ± 0,15	5.2.1.3
Radius of indentor	r	mm	0,10 ± 0,01	5.2.1.3
Cone angle of indentor	α	°	30,00 ± 0,25	5.2.1.3
Centrality of pressure foot			Central	
Diameter of pressure foot	D	mm	18,0 ± 0,5	5.2.2.1
Hole diameter of pressure foot	d_1	mm	3,0 ± 0,1	5.2.2.2
Mass on pressure foot	m	kg	$5{,}0^{+0{,}5}_{0{,}0}$	5.2.4.1
Depth of indentation	l	mm	0,00 to 2,50; Δl = ±0,02	5.2.3.2
Spring force on indentor	F	mN	$F = 445{,}0H_D$; ΔF = ±222,5 where H_D = hardness reading on type D durometer	5.2.5.2
Duration of force application	t	s	3 or 15	5.2.7

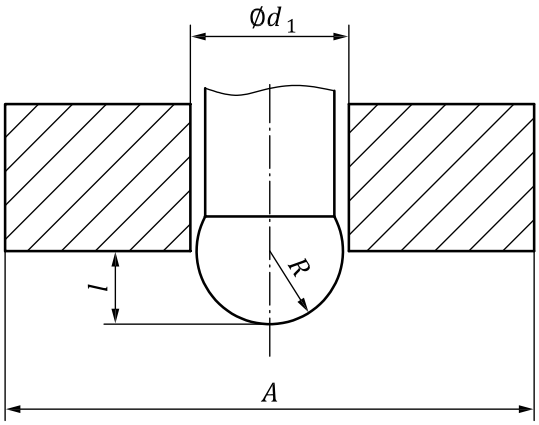

Figure 3 — Indentor and pressure foot for type AO durometer

Table 3 — Type AO durometer

Measurand		Unit	Metrological requirement	Calibration and verification instructions
Radius of indentor	R	mm	2,50 ± 0,02	5.2.1.4
Centrality of pressure foot			Central	
Area of pressure foot	A	mm^2	500 minimum	5.2.2.1
Hole diameter of pressure foot	d_1	mm	5,4 ± 0,2	5.2.2.2
Mass on pressure foot	m	kg	$1{,}0^{+0{,}1}_{0{,}0}$	5.2.4.1
Depth of indentation	l	mm	0,00 to 2,50; Δl = ±0,02	5.2.3.3
Spring force on indentor	F	mN	$F = 550{,}0 + 75{,}0H_{AO}$; ΔF = ±37,5 where H_{AO} = hardness reading on type AO durometer	5.2.5.3
Duration of force application	t	s	3 or 15	5.2.7

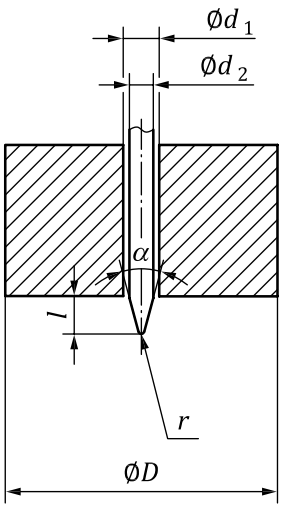

Figure 4 — Indentor and pressure foot for type AM durometer

Table 4 — Type AM durometer

Measurand		Unit	Metrological requirement	Calibration and verification instructions
Shaft diameter of indentor	d_2	mm	0,790 ± 0,025	5.2.1.5
Radius of indentor	r	mm	0,10 ± 0,01	5.2.1.5
Cone angle of indentor	α	°	30,00 ± 0,25	5.2.1.5
Centrality of pressure foot			Central	
Diameter of pressure foot	D	mm	9,0 ± 0,3	5.2.2.1
Hole diameter of pressure foot	d_1	mm	1,19 ± 0,03	5.2.2.2
Mass on pressure foot	m	kg	$0{,}25^{+0{,}05}_{0{,}00}$	5.2.4.1
Depth of indentation	l	mm	0,00 to 1,25; Δl = ±0,01	5.2.3.4
Spring force on indentor	F	mN	F = 324,0 + 4,4H_{AM}; ΔF = ±8,8 where H_{AM} = hardness reading on type AM durometer	5.2.5.4
Duration of force application	t	s	3 or 15	5.2.7