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ISO 18898

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Rubber — Calibration and verification of hardness testers

Caoutchouc — Étalonnage et vérification des duromètres

Reference number
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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 meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

This third edition cancels and replaces the second edition (ISO 18898:2012), which has been technically revised with the following change:

— calibration and verification for determination of dead-load hardness using the very low rubber hardness scale (VLRH) has been incorporated.

Rubber — Calibration and verification of hardness testers

1 Scope

This International Standard specifies procedures for the calibration and verification of durometers of types A, D, AO and AM (see ISO 7619-1), IRHD pocket meters (see ISO 7619-2), IRHD dead-load instruments (see ISO 48) and dead-load instruments using the very low rubber hardness scale (see ISO 27588).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 7619-1, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 1: Durometer method (Shore hardness)*

ISO 7619-2, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 2: IRHD pocket meter method*

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

ISO 27588, *Rubber, vulcanized or thermoplastic — Determination of dead-load hardness using the very low rubber hardness (VLRH) scale*

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 and ISO 18899 apply.

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 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.

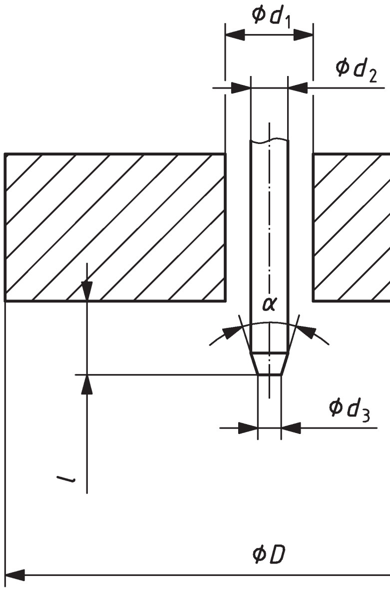

Figure 1 — Indentor and pressure foot for type A durometer

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[a] 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

[a] For hand-held durometers, the tolerance may be doubled.

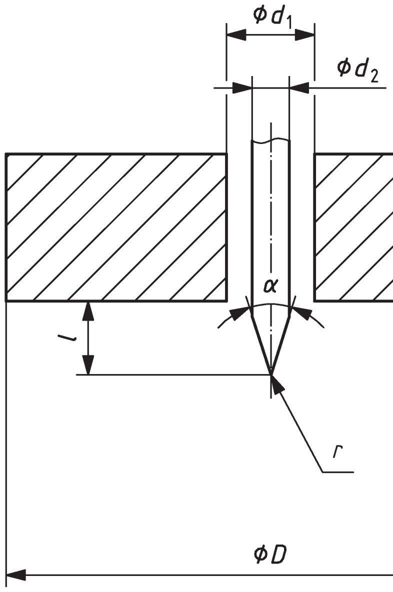

Figure 2 — Indentor and pressure foot for type D durometer

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[a] 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

[a] For hand-held durometers, the tolerance may be doubled.

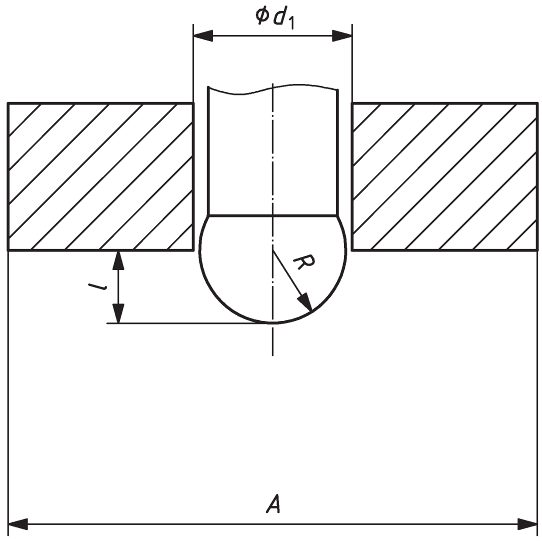

Figure 3 — Indentor and pressure foot for type AO durometer

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[a] 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

[a] For hand-held durometers, the tolerance may be doubled.

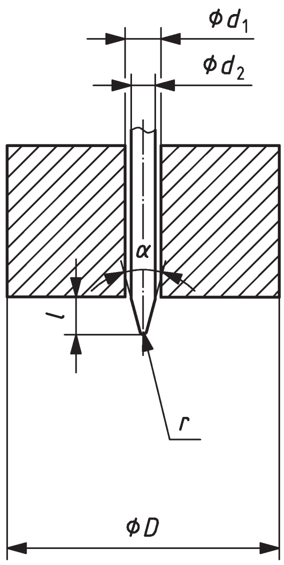

Figure 4 — Indentor and pressure foot for type AM durometer

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

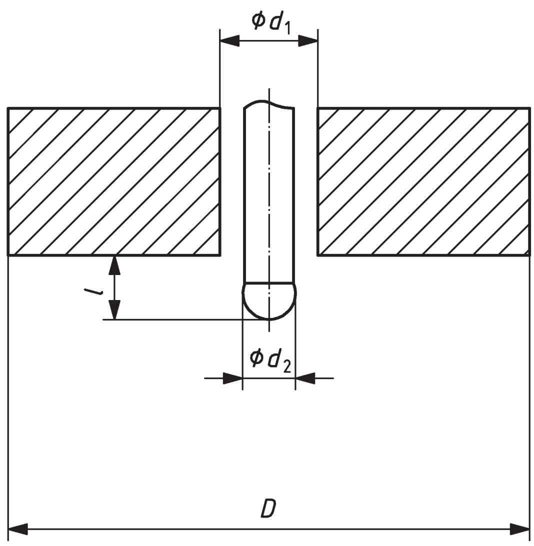

Figure 5 — Indentor and pressure foot for IRHD dead-load tester

Table 5 — IRHD dead-load method N

Measurand		Unit	Metrological requirement	Calibration and verification instructions
Ball diameter of indentor	d_2	mm	2,50 ± 0,01	5.2.1.6
Centrality of pressure foot			Central	
Diameter of pressure foot	D	mm	20 ± 1	5.2.2.1
Hole diameter of pressure foot	d_1	mm	6 ± 1	5.2.2.2
Force on pressure foot	F_f	N	8,3 ± 1,5	5.2.4.2
Incremental indentation depth	l	mm	$l = f$(IRHD) (see Table 15) Δl = ± 0,01	5.2.3.5
Contact force on indentor	F_c	N	0,30 ± 0,02	5.2.6.1
Total force on indentor	F_t	N	5,70 ± 0,03	5.2.6.1
Duration of application of total force, t_t, and contact force, t_c		s	t_t = 30; t_c = 5	5.2.7

Table 6 — IRHD dead-load method H

Measurand		Unit	Metrological requirement	Calibration and verification instructions
Ball diameter of indentor	d_2	mm	1,00 ± 0,01	5.2.1.6
Centrality of pressure foot			Central	
Diameter of pressure foot	D	mm	20 ± 1	5.2.2.1
Hole diameter of pressure foot	d_1	mm	6 ± 1	5.2.2.2
Force on pressure foot	F_f	N	8,3 ± 1,5	5.2.4.2
Incremental indentation depth	l	mm	$l = f$(IRHD) (see Table 16) Δl = ± 0,01	5.2.3.6
Contact force on indentor	F_c	N	0,30 ± 0,02	5.2.6.1
Total force on indentor	F_t	N	5,70 ± 0,03	5.2.6.1
Duration of application of total force, t_t, and contact force, t_c		s	t_t = 30; t_c = 5	5.2.7

Table 7 — IRHD dead-load method L

Measurand		Unit	Metrological requirement	Calibration and verification instructions
Ball diameter of indentor	d_2	mm	5,00 ± 0,01	5.2.1.6
Centrality of pressure foot			Central	
Diameter of pressure foot	D	mm	22 ± 1	5.2.2.1
Hole diameter of pressure foot	d_1	mm	10 ± 1	5.2.2.2
Force on pressure foot	F_f	N	8,3 ± 1,5	5.2.4.2
Incremental indentation depth	l	mm	$l = f$(IRHD) (see Table 17) Δl = ± 0,01	5.2.3.7
Contact force on indentor	F_c	N	0,30 ± 0,02	5.2.6.1
Total force on indentor	F_t	N	5,70 ± 0,03	5.2.6.1
Duration of application of total force, t_t, and contact force, t_c		s	t_t = 30; t_c = 5	5.2.7