INTERNATIONAL STANDARD

ISO 18898

Second edition
2012-07-01

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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 18898 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

This second edition cancels and replaces the first edition (ISO 18898:2006), which has been technically revised as follows:

— for hand-held durometers of types A, D and AO, an increased spring force tolerance is now allowed (see footnotes to Tables 1, 2 and 3 and Tables 19, 20 and 21);

— for type A, D and AO durometers, the number of spring force measuring points may be less than ten, as long as linearity of measurement is ensured, but not less than three (see 5.2.5.1, 5.2.5.2 and 5.2.5.3);

— the size of the pressure foot in Table 9 has been redefined to include circular pressure feet.

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) and IRHD dead-load instruments (see ISO 48).

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

ISO 18899:2004, *Rubber — Guide to the calibration of test equipment*

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 6 and requirements are specified in Tables 1 to 9.

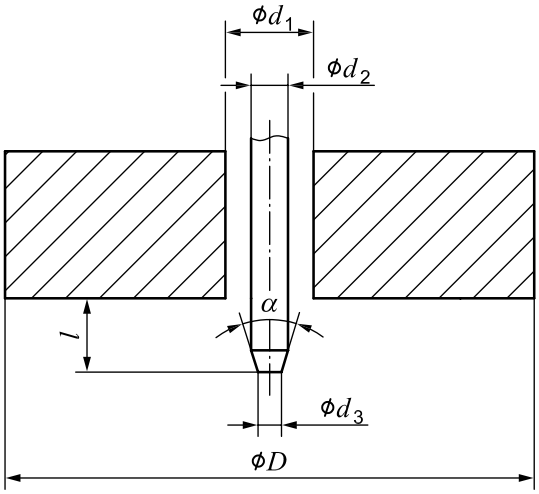

Figure 1 — Indentor and pressure foot for type A durometer

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; $\Delta l = \pm 0{,}02$	5.2.3.1
Spring force on indentor	F	mN	$F = 550{,}0 + 75{,}0H_A$; $\Delta F = \pm 37{,}5$ [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.

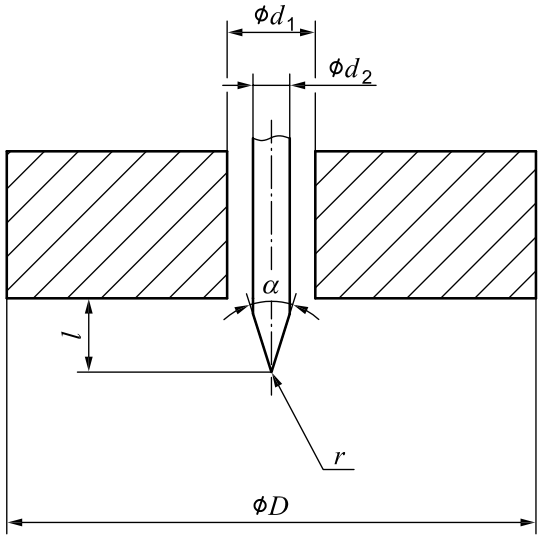

Figure 2 — Indentor and pressure foot for type D durometer

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; $\Delta l = \pm 0{,}02$	5.2.3.2
Spring force on indentor	F	mN	$F = 445{,}0H_D$; $\Delta F = \pm 222{,}5$ [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.

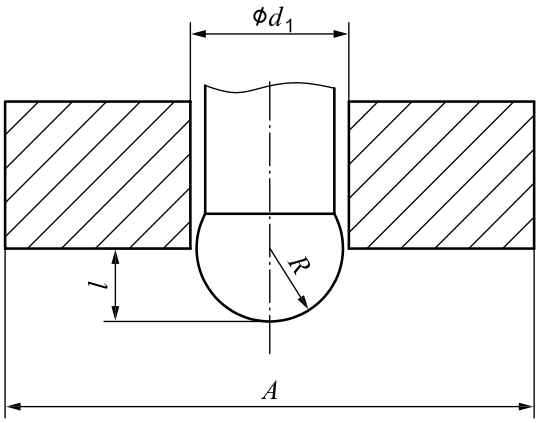

Figure 3 — Indentor and pressure foot for type AO durometer

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; $\Delta l = \pm 0{,}02$	5.2.3.3
Spring force on indentor	F	mN	$F = 550{,}0 + 75{,}0H_{AO}$; $\Delta F = \pm 37{,}5$ [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.

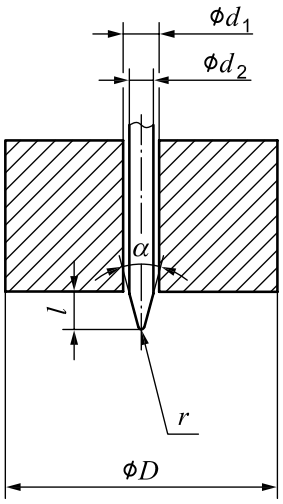

Figure 4 — Indentor and pressure foot for type AM durometer

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; $\Delta l = \pm 0{,}01$	5.2.3.4
Spring force on indentor	F	mN	$F = 324{,}0 + 4{,}4H_{AM}$; $\Delta F = \pm 8{,}8$ 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

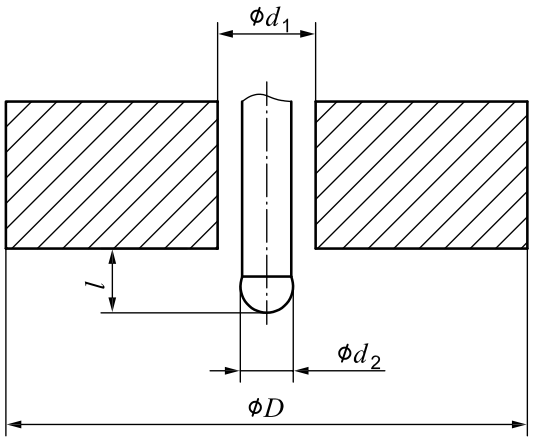

Figure 5 — Indentor and pressure foot for IRHD dead-load tester

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 14) $\Delta l = \pm 0{,}01$	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 15) $\Delta l = \pm 0{,}01$	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 16) $\Delta l = \pm 0{,}01$	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

Table 8 — IRHD dead-load method M

Measurand		Unit	Metrological requirement	Calibration and verification instructions
Ball diameter of indentor	d_2	mm	0,395 ± 0,005	5.2.1.6
Centrality of pressure foot			Central	
Diameter of pressure foot	D	mm	3,35 ± 0,15	5.2.2.1
Hole diameter of pressure foot	d_1	mm	1,00 ± 0,15	5.2.2.2
Force on pressure foot	F_f	mN	235 ± 30	5.2.4.3
Incremental indentation depth	l	mm	$l = f$(IRHD) (see Table 17) $\Delta l = \pm 0{,}002$	5.2.3.8
Contact force on indentor	F_c	mN	8,3 ± 0,5	5.2.6.2
Total force on indentor	F_t	mN	153,3 ± 1,0	5.2.6.2
Duration of application of total force t_t and contact force t_c		s	$t_t = 30$; $t_c = 5$	5.2.7