

---

---

**Rubber — Calibration and verification  
of hardness testers**

*Caoutchouc — Étalonnage et vérification des duromètres*

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 18898:2006](https://standards.iteh.ai/catalog/standards/sist/07eddad2-5aea-4d82-ac94-3ebd1676eb15/iso-18898-2006)

<https://standards.iteh.ai/catalog/standards/sist/07eddad2-5aea-4d82-ac94-3ebd1676eb15/iso-18898-2006>



**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

ISO 18898:2006

<https://standards.iteh.ai/catalog/standards/sist/07eddad2-5aea-4d82-ae94-3ebd1676eb15/iso-18898-2006>

© ISO 2006

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

## Contents

Page

Foreword.....	iv
<b>1</b> <b>Scope</b> .....	<b>1</b>
<b>2</b> <b>Normative references</b> .....	<b>1</b>
<b>3</b> <b>Terms and definitions</b> .....	<b>1</b>
<b>4</b> <b>Measurands and metrological requirements for calibration and verification</b> .....	<b>1</b>
<b>4.1</b> <b>Environmental conditions</b> .....	<b>1</b>
<b>4.2</b> <b>Metrological requirements</b> .....	<b>1</b>
<b>5</b> <b>Calibration and verification methods</b> .....	<b>8</b>
<b>5.1</b> <b>Requirements to be met by the measuring instruments used for the calibration and verification methods</b> .....	<b>8</b>
<b>5.2</b> <b>Outline of the calibration and verification methods to be used</b> .....	<b>9</b>
<b>5.2.1</b> <b>Indentors</b> .....	<b>9</b>
<b>5.2.2</b> <b>Geometry of the pressure foot</b> .....	<b>9</b>
<b>5.2.3</b> <b>Depth of indentation</b> .....	<b>9</b>
<b>5.2.4</b> <b>Contact force of the pressure foot</b> .....	<b>14</b>
<b>5.2.5</b> <b>Spring force</b> .....	<b>14</b>
<b>5.2.6</b> <b>Contact and total force of IRHD dead-load instruments</b> .....	<b>17</b>
<b>5.2.7</b> <b>Duration of force application</b> .....	<b>18</b>
<b>6</b> <b>Calibration and verification certificate</b> .....	<b>18</b>

[ISO 18898:2006](https://standards.iteh.ai/catalog/standards/sist/07eddad2-5aea-4d82-ac94-3ebd1676eb15/iso-18898-2006)

<https://standards.iteh.ai/catalog/standards/sist/07eddad2-5aea-4d82-ac94-3ebd1676eb15/iso-18898-2006>

## 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*.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 18898:2006](https://standards.iteh.ai/catalog/standards/sist/07eddad2-5aea-4d82-ae94-3ebd1676eb15/iso-18898-2006)

<https://standards.iteh.ai/catalog/standards/sist/07eddad2-5aea-4d82-ae94-3ebd1676eb15/iso-18898-2006>

# 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, *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 indenter 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.

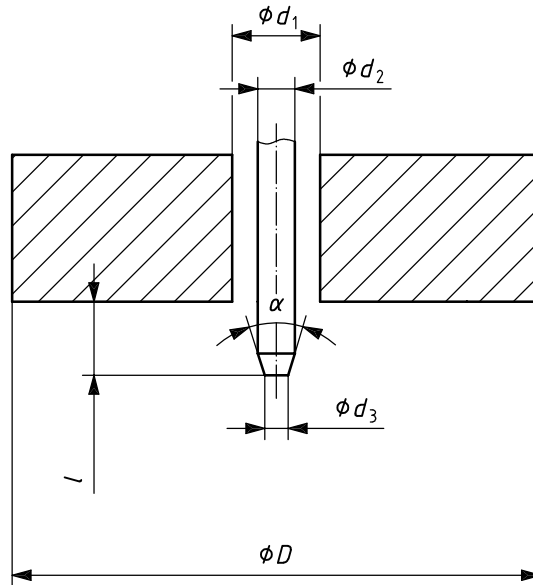


Figure 1 — Indentor and pressure foot for type A durometer

iTeh STANDARD PREVIEW

Table 1 — Type A durometer

Measurand	Unit	Metrological requirement ISO 18898:2006	Calibration and verification instructions
Shaft diameter of indentor	$d_2$ mm	$1,25 \pm 0,15$	5.2.1.2
Cone frustum top diameter	$d_3$ mm	$0,79 \pm 0,01$	5.2.1.2
Cone angle of indentor	$\alpha$ °	$35 \pm 0,25$	5.2.1.2
Centrality of pressure foot		Central	
Diameter of pressure foot	$D$ mm	$18 \pm 0,5$	5.2.2.1
Hole diameter of pressure foot	$d_1$ mm	$3 \pm 0,1$	5.2.2.2
Mass on pressure foot	$m$ kg	$1^{+0,1}_0$	5.2.4.1
Depth of indentation	$l$ mm	0,0 to 2,50; $\Delta l = \pm 0,02$	5.2.3.1
Spring force on indentor	$F$ mN	$F = 550 + 75H_A$ ; $\Delta F = \pm 37,5$ 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

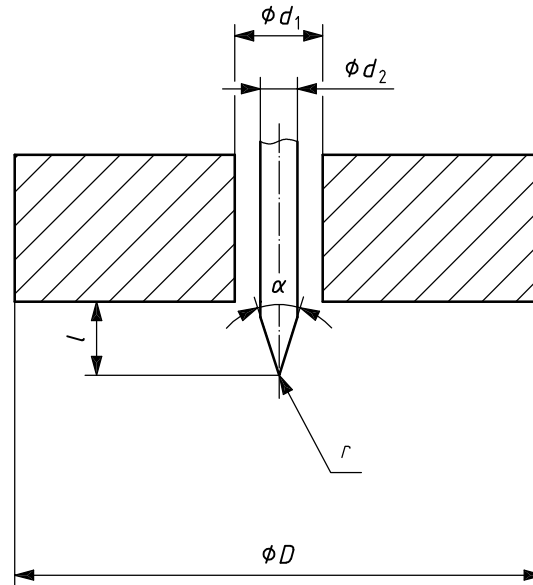


Figure 2 — Indentor and pressure foot for type D durometer

## iTeh STANDARD PREVIEW

Table 2 — Type D durometer

Measurand	Unit	Metrological requirement	Calibration and verification instructions
Shaft diameter of indenter	$d_2$	1,25 ± 0,15	5.2.1.3
Radius of indenter	$r$	0,10 ± 0,01	5.2.1.3
Cone angle of indenter	$\alpha$	30 ± 0,25	5.2.1.3
Centrality of pressure foot		Central	
Diameter of pressure foot	$D$	18 ± 0,5	5.2.2.1
Hole diameter of pressure foot	$d_1$	3 ± 0,1	5.2.2.2
Mass on pressure foot	$m$	5 <sup>+0,5</sup> <sub>0</sub>	5.2.4.1
Depth of indentation	$l$	0,0 to 2,50; $\Delta l = \pm 0,02$	5.2.3.2
Spring force on indenter	$F$	$F = 445H_D$ ; $\Delta F = \pm 222,5$ where $H_D$ = hardness reading on type D durometer	5.2.5.2
Duration of force application	$t$	3 or 15	5.2.7

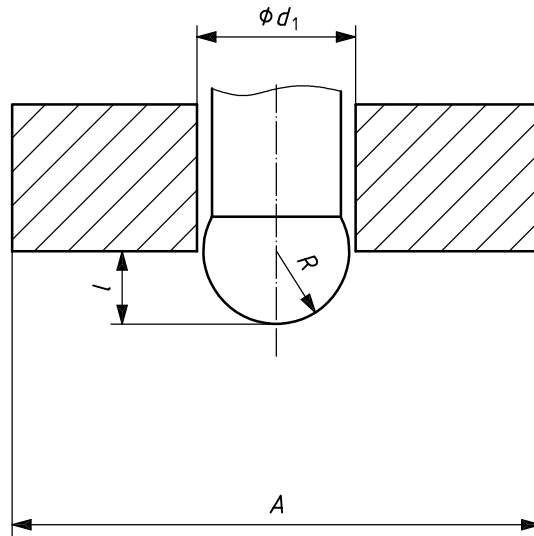


Figure 3 — Indenter and pressure foot for type AO durometer

Table 3 — Type AO durometer

Measurand	Unit	Metrological requirement	Calibration and verification instructions
Radius of indenter	$R$	mm $2,5 \pm 0,02$	5.2.1.4
Centrality of pressure foot		Central	
Area of pressure foot	$A$	mm <sup>2</sup> 500 minimum	5.2.2.1
Hole diameter of pressure foot	$d_1$	mm $5,4 \pm 0,2$	5.2.2.2
Mass on pressure foot	$m$	kg $1^{+0,1}_0$	5.2.4.1
Depth of indentation	$l$	mm 0,0 to 2,50; $\Delta l = \pm 0,02$	5.2.3.3
Spring force on indenter	$F$	mN $F = 550 + 75H_{AO}$ ; $\Delta F = \pm 37,5$ 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



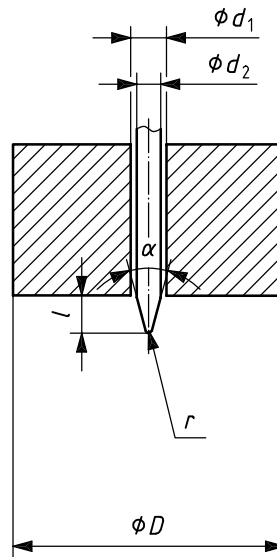


Figure 4 — Indentor and pressure foot for type AM durometer

Table 4 — Type AM durometer

Measurand	Unit	Metrological requirement	Calibration and verification instructions
Shaft diameter of indenter	$d_2$	$0,79 \pm 0,025$	5.2.1.5
Radius of indenter	$r$	$0,1 \pm 0,01$	5.2.1.5
Cone angle of indenter	$\alpha$	$30 \pm 0,25$	5.2.1.5
Centrality of pressure foot		Central	
Diameter of pressure foot	$D$	$9 \pm 0,3$	5.2.2.1
Hole diameter of pressure foot	$d_1$	$1,19 \pm 0,03$	5.2.2.2
Mass on pressure foot	$m$	$0,25^{+0,05}_0$	5.2.4.1
Depth of indentation	$l$	$0,0$ to $1,25$ ; $\Delta l = \pm 0,01$	5.2.3.4
Spring force on indenter	$F$	$F = 324 + 4,4H_{AM}$ ; $\Delta F = \pm 8,8$ where $H_{AM}$ = hardness reading on type AM durometer	5.2.5.4
Duration of force application	$t$	3 or 15	5.2.7

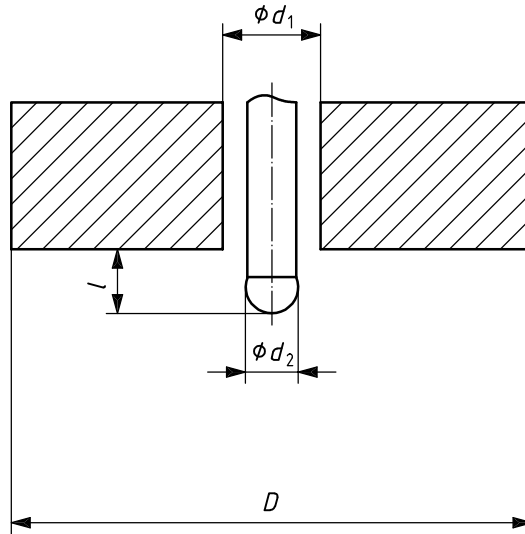


Figure 5 — Indentor and pressure foot for IRHD dead-load tester

Table 5 — IRHD dead-load method N

Measurand	Unit	Metrological requirement	Calibration and verification instructions	
Ball diameter of indentor	$d_2$	mm	$2,50 \pm 0,01$	5.2.1.6
Centrality of pressure foot		Central		
Diameter of pressure foot	$D$	mm	$20 \pm 1$	5.2.2.1
Hole diameter of pressure foot	$d_1$	mm	$6 \pm 1$	5.2.2.2
Force on pressure foot	$F_f$	N	$8,3 \pm 1,5$	5.2.4.2
Incremental indentation depth	$l$	mm	$l = f(\text{IRHD})$ (see Table 14) $\Delta l = \pm 0,01$ mm	5.2.3.5
Contact force on indentor	$F_c$	N	$0,30 \pm 0,02$	5.2.6.1
Total force on indentor	$F_t$	N	$5,70 \pm 0,03$	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 indenter $d_2$	mm	$1,00 \pm 0,01$	5.2.1.6
Centrality of pressure foot		Central	
Diameter of pressure foot $D$	mm	$20 \pm 1$	5.2.2.1
Hole diameter of pressure foot $d_1$	mm	$6 \pm 1$	5.2.2.2
Force on pressure foot $F_f$	N	$8,3 \pm 1,5$	5.2.4.2
Incremental indentation depth $l$	mm	$l = f(\text{IRHD})$ (see Table 15) $\Delta l = \pm 0,01$	5.2.3.6
Contact force on indenter $F_c$	N	$0,30 \pm 0,02$	5.2.6.1
Total force on indenter $F_t$	N	$5,70 \pm 0,03$	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 indenter $d_2$	mm	$5,00 \pm 0,01$	5.2.1.6
Centrality of pressure foot		Central	
Diameter of pressure foot $D$	mm	$22 \pm 1$	5.2.2.1
Hole diameter of pressure foot $d_1$	mm	$10 \pm 1$	5.2.2.2
Force on pressure foot $F_f$	N	$8,3 \pm 1,5$	5.2.4.2
Incremental indentation depth $l$	mm	$l = f(\text{IRHD})$ (see Table 16) $\Delta l = \pm 0,01$	5.2.3.7
Contact force on indenter $F_c$	N	$0,30 \pm 0,02$	5.2.6.1
Total force on indenter $F_t$	N	$5,70 \pm 0,03$	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 indenter $d_2$	mm	$0,395 \pm 0,005$	5.2.1.6
Centrality of pressure foot		Central	
Diameter of pressure foot $D$	mm	$3,35 \pm 0,15$	5.2.2.1
Hole diameter of pressure foot $d_1$	mm	$1,00 \pm 0,15$	5.2.2.2
Force on pressure foot $F_f$	mN	$235 \pm 30$	5.2.4.3
Incremental indentation depth $l$	mm	$l = f(\text{IRHD})$ (see Table 17) $\Delta l = \pm 0,002$	5.2.3.8
Contact force on indenter $F_c$	mN	$8,3 \pm 0,5$	5.2.6.2
Total force on indenter $F_t$	mN	$153,3 \pm 1,0$	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