
**Rubber — Measurement of
vulcanization characteristics using
curemeters —**

**Part 2:
Oscillating disc curemeter**

iTeh STANDARD PREVIEW
*Caoutchouc — Mesure des caractéristiques de vulcanisation à l'aide
de rhéomètres —
(standards.iteh.ai)
Partie 2: Rhéomètre à disque oscillant*

[ISO 6502-2:2018](https://standards.iteh.ai/catalog/standards/sist/489c4ea6-413d-4f83-a8ee-e3b35d2cb89/iso-6502-2-2018)

[https://standards.iteh.ai/catalog/standards/sist/489c4ea6-413d-4f83-a8ee-
e3b35d2cb89/iso-6502-2-2018](https://standards.iteh.ai/catalog/standards/sist/489c4ea6-413d-4f83-a8ee-e3b35d2cb89/iso-6502-2-2018)



iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 6502-2:2018

<https://standards.iteh.ai/catalog/standards/sist/489c4ea6-413d-4f83-a8ee-e3b35d2cb89/iso-6502-2-2018>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2018

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	1
5 Apparatus	2
5.1 General	2
5.2 Dies	3
5.3 Die closure	5
5.4 Disc	5
5.5 Disc oscillation	7
5.6 Torque-measuring system	7
5.6.1 Measurement	7
5.6.2 Recording	7
5.7 Heating and temperature control	8
6 Calibration	8
7 Test piece	8
8 Vulcanization	8
9 Conditioning	9
10 Procedure	9
10.1 Preparation for test	9
10.2 Loading the curemeter	9
11 Expression of results	9
11.1 General	9
11.2 Torque values	9
11.3 Times to different percentages of full cure	10
11.4 Scorch time	10
11.5 Cure rate index	10
12 Test report	10
Annex A (normative) Calibration schedule	11
Bibliography	13

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 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. (standards.iteh.ai)

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*. ISO 6502-2:2018

This first edition of ISO 6502-2 cancels and replaces the third edition of ISO 3417:2008, which has been technically revised. The main changes compared to the previous edition are as follows:

- changes to keep consistency within the ISO 6502 series have been made;
- only the experimental procedure specified in ISO 3417:2008 has been moved to this document;
- other general matters specified in ISO 3417:2008 have been moved to ISO 6502-1.

A list of all parts in the ISO 6502 series can be found on the ISO website.

Rubber — Measurement of vulcanization characteristics using curemeters —

Part 2: Oscillating disc curemeter

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 a method for determining selected vulcanization characteristics of a rubber compound by means of an oscillating disc curemeter. The introduction to the use of curemeters is described in ISO 6502-1.

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 6502-1:2018, *Rubber — Measurement of vulcanization characteristics using curemeters — Part 1: Introduction*

ISO 18899:2013, *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 6502-1 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 <http://www.electropedia.org/>

4 Principle

4.1 A test piece of rubber is contained in a sealed test cavity under an initial positive pressure and maintained at an elevated temperature. A biconical disc is embedded in the test piece and is oscillated through a small rotary amplitude. This action exerts a shear strain on the test piece, and the torque required to oscillate the disc depends on the stiffness (shear modulus) of the rubber. The torque is recorded autographically as a function of time.

4.2 The stiffness of the rubber test piece increases as vulcanization proceeds. The curve is complete when the recorded torque rises either to an equilibrium value or to a maximum value (see ISO 6502-1). If the torque continues to increase, vulcanization is considered to be complete after a given time. The time required to obtain a vulcanization curve is a function of the test temperature and the characteristics of the rubber compound.

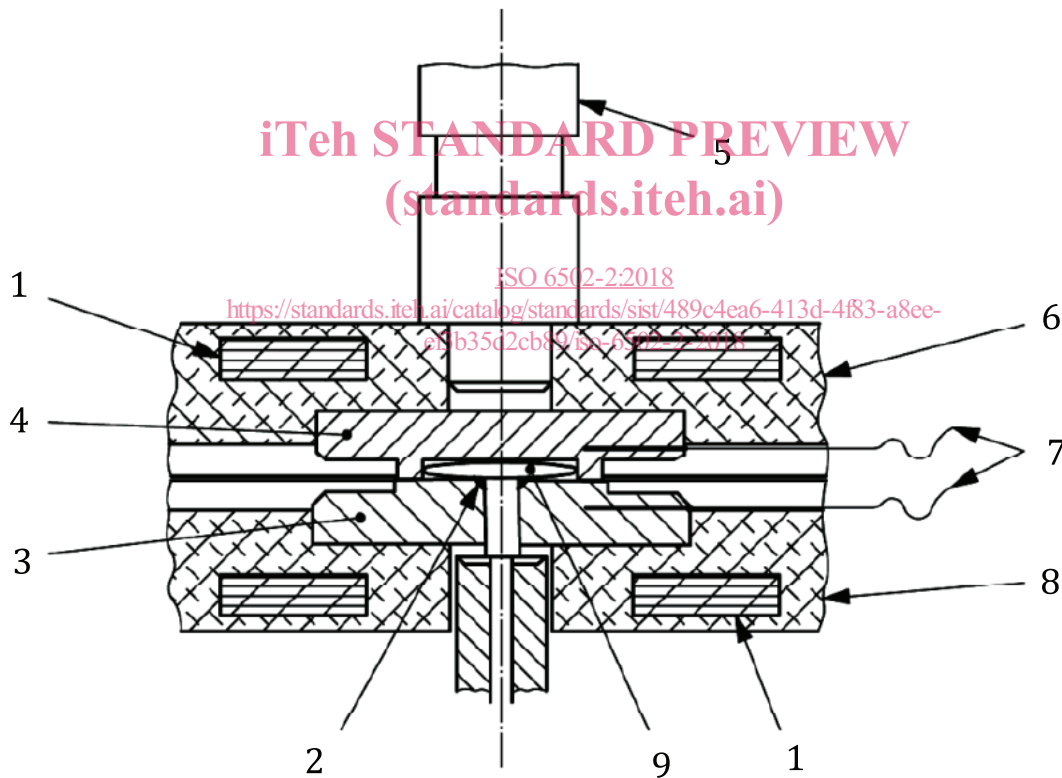
4.3 The parameters that can be measured from the recorded curve of torque as a function of time, i.e. $M = f(t)$, are presented in ISO 6502-1:2018, Clause 4.

5 Apparatus

5.1 General

The curemeter consists of a biconical disc in a temperature-controlled die cavity. The shaft of the disc is secured in a drive shaft and oscillated through a small rotary amplitude (see [Figure 1](#)).

The torque applied to the disc represents the resistance of the rubber test piece to deformation and is recorded autographically to yield a curve of torque versus time.



Key

- | | | | |
|---|--------------|---|--------------------------------|
| 1 | heater | 6 | upper platen |
| 2 | seal | 7 | calibrated temperature sensors |
| 3 | lower die | 8 | lower platen |
| 4 | upper die | 9 | biconical disc |
| 5 | cylinder rod | | |

Figure 1 — Curemeter assembly

5.2 Dies

The dies shall be manufactured from a non-deforming tool steel having a minimum Rockwell hardness of 50 HRC or equivalent.

The geometry of the dies is shown in [Figures 2](#) and [3](#). Suitable means shall be employed by the design of the dies or otherwise to apply pressure on the test piece throughout the test in order to minimize slippage between the disc and the rubber. Holes shall be drilled in both the upper and lower dies at the locations shown in [Figures 2](#) and [3](#) to enable temperature sensors to be inserted. The surfaces of the die cavity shall contain rectangular-shaped grooves located at 20° intervals to minimize slippage. The lower die dimensions shall be as given in [Figure 2](#). The upper die shall contain identically shaped grooves. The dimensions of the upper die shall be as given in [Figure 3](#).

The form of the die cavity can be checked by measuring the dimensions of the vulcanized test piece after cutting.

The lower die shall have a hole in the centre to allow the insertion of disc stem. A suitable low constant friction seal shall be fitted in this hole to prevent material from leaking from the die cavity.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 6502-2:2018](#)

<https://standards.iteh.ai/catalog/standards/sist/489c4ea6-413d-4f83-a8ee-e3b35d2cb89/iso-6502-2-2018>

Dimensions in millimetres

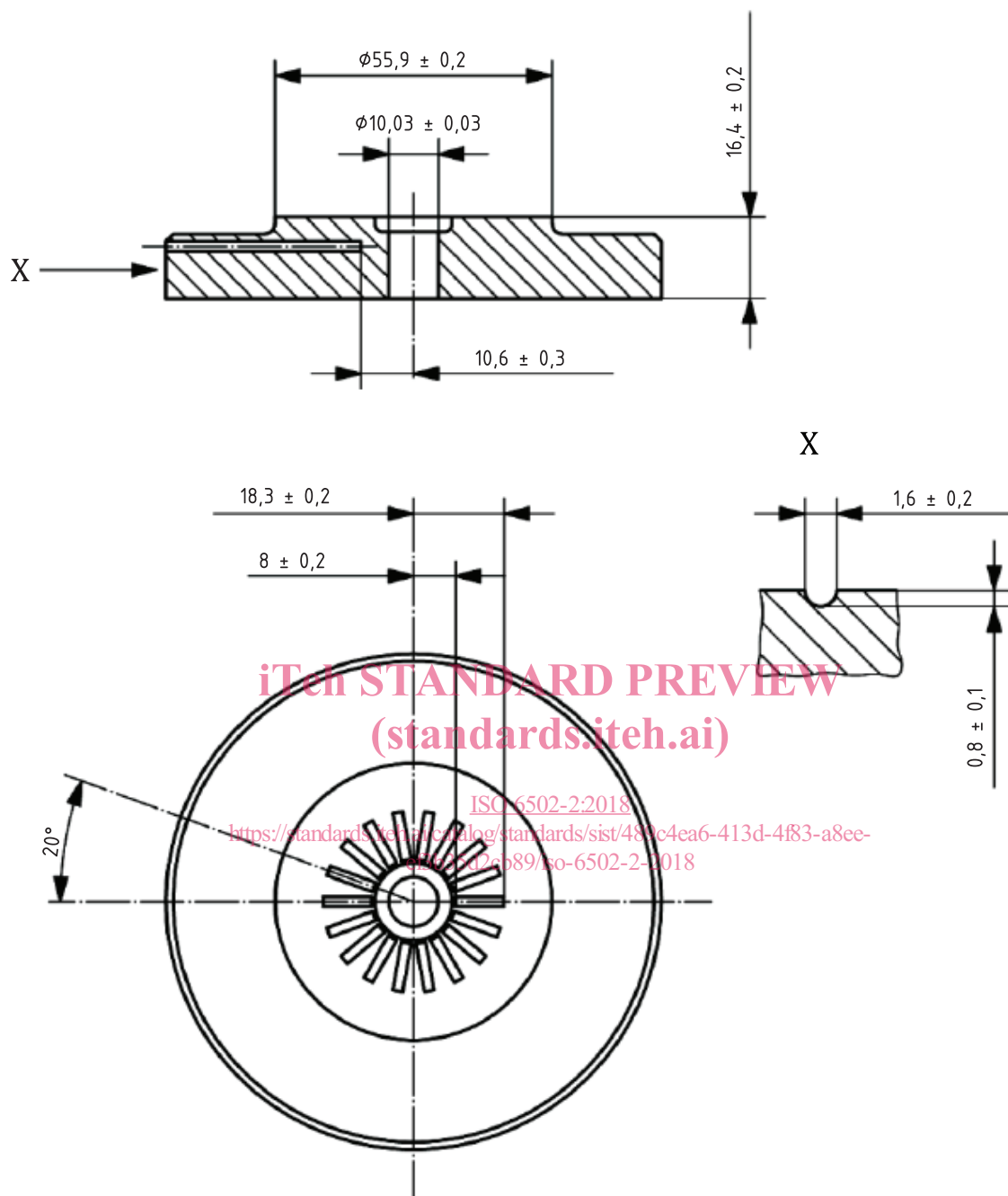


Figure 2 — Lower die

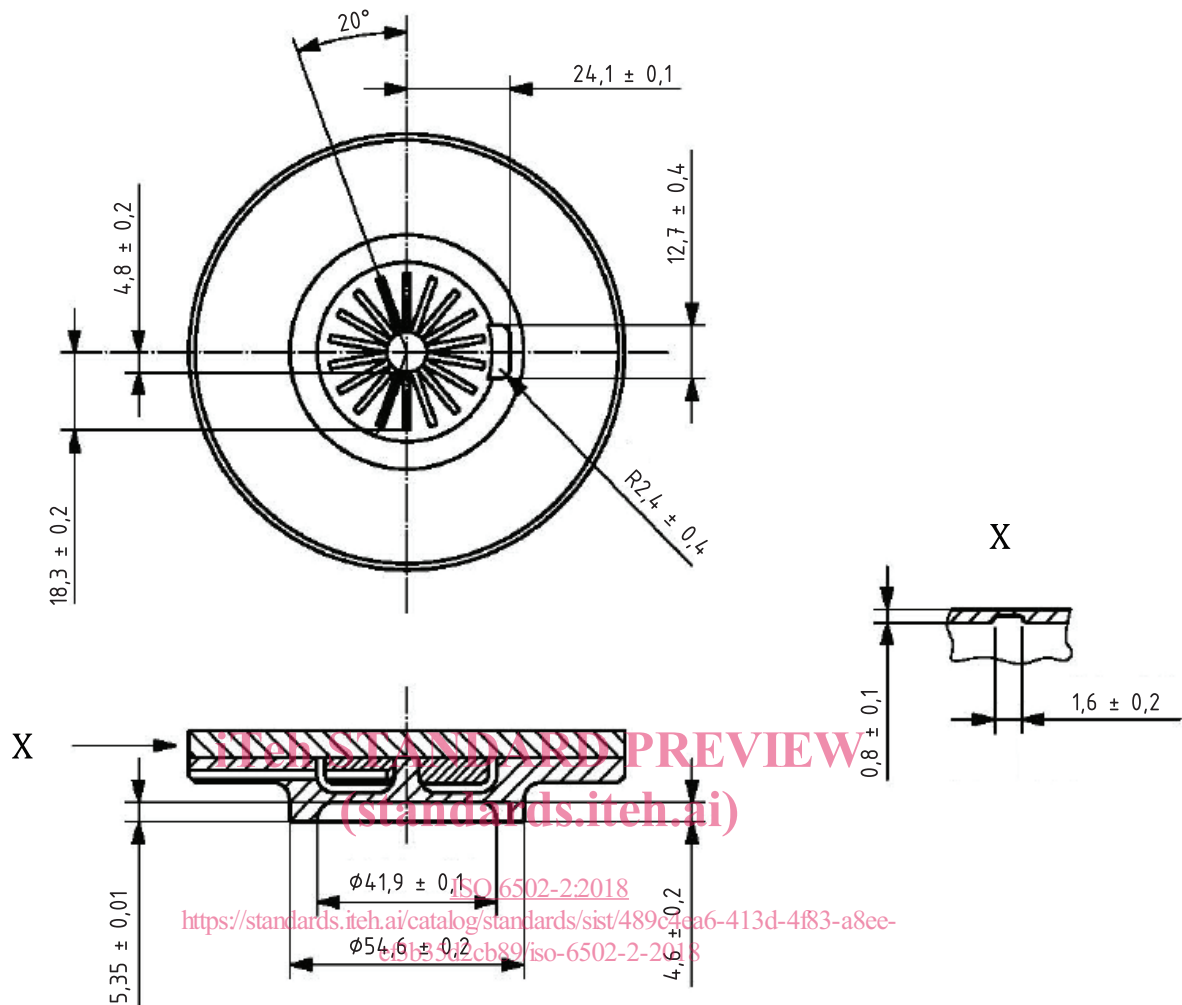


Figure 3 — Upper die

5.3 Die closure

The dies shall be closed, and held closed during the test, by a pneumatic cylinder exerting a force of $11,0 \text{ kN} \pm 0,5 \text{ kN}$.

5.4 Disc

The biconical disc shall be fabricated from a non-deforming tool steel having a minimum Rockwell hardness of 50 HRC or equivalent. The disc is shown in [Figure 4](#), and the critical dimensions are given in [Table 1](#).