ISO/FDIS 6502-2:~~2024(en)~~

ISO/TC 45/SC 2

Secretariat: JISC

Date: ~~2024-12-16~~2025-03-27

Rubber — Measurement of vulcanization characteristics using curemeters —

Part 2:
Oscillating disc curemeter

Caoutchouc — Mesure des caractéristiques de vulcanisation à l'aide de rhéomètres —

Partie 2: Rhéomètre à disque oscillant

FDIS stage

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Published in Switzerland

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Foreword

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This document 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 6502-2:2018), which has been technically revised.

The main changes are as follows:

— an Introduction was added;

— the view direction was changed in Figure 3~~Figure 3.~~;

— the volume of the test piece was changed from 8 cm³ to 9 cm³ in Clause 7~~Clause 7.~~;

— the temperature accuracy was corrected to the temperature resolution in Table A.1~~Table A.1.~~

A list of all parts in the ISO 6502 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.

Field Code Changed

Introduction

An International Standard specifying requirements for the use of oscillating disc curemeters was established in 1977 as ISO 3417~~[1]~~[1]. Later, when various rotorless curemeters were developed and became popular, an International Standard for these instruments was produced as ISO 6502~~[2]~~[2]. However, owing to the differences in geometry and construction of the various available instruments, ISO 6502 was not able to specify such requirements in detail. In 1999, it became clear that a number of different rotorless curemeters were available and that significant developments had taken place and were continuing to do so. Hence, it was concluded that, rather than specify individual rotorless instruments, possibly restricting future developments, a more general document was required. Accordingly, it was decided to provide general guidance and assistance in the design and use of curemeters. ~~ISO 6502 was divided into ISO 6502-1 and ISO 6502-3. ISO 3417 was incorporated into ISO 6502-2.~~

The previous edition of this document (ISO 6502-1:2018) replaced ISO 6502, which was split into subsequent parts, covering oscillating disc curemeters (ISO 6502-2) and rotorless curemeters (ISO 6502-3). ISO 6502-1 covers the general principle required for the measurement of vulcanization characteristics using curemeters.

~~[1] Withdrawn.~~
[1] Withdrawn.
~~[2] Withdrawn.~~
[2] Withdrawn.

Rubber — Measurement of vulcanization characteristics using curemeters —

Part 2: Oscillating disc curemeter

WARNING — 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.

Certain procedures specified in this document can involve the use or generation of substances, or the generation of waste, that can 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.

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 6502-1:2025, *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 terminology 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 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 ~~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.

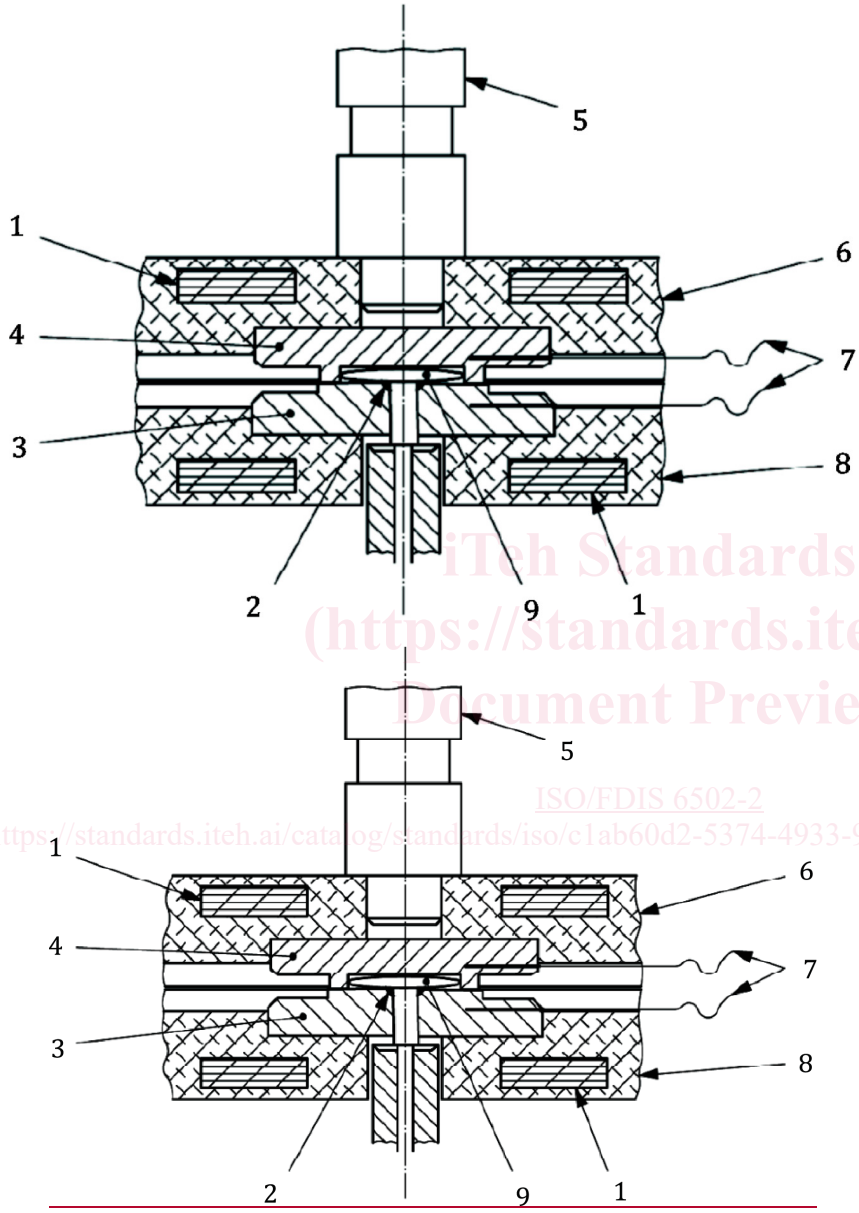
4.3 ~~4.3~~ The parameters that can be measured from the recorded curve of torque as a function of time, i.e. $M = f(t)$, are presented in ISO 6502~~-~~1:2025, Table~~-~~1.

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~~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~~Figures 2~~ and 3~~3.~~ Suitable means, which take into consideration the design of the dies, shall be used 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~~Figures 2~~ and 3~~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~~Figure 2.~~ The upper die shall contain identically shaped grooves. The dimensions of the upper die shall be as given in Figure 3~~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.