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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 9869.3-2025

Replacing GB/T 16584-1996

**Rubber - Measurement of vulcanization characteristics using
curemeters - Part 3: Rotorless curemeter
(English Translation)**

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 3 of GB/T 9869, "Determination of vulcanization properties of rubber using a vulcanizing apparatus". GB/T 9869 has published the following...

part.

---Part 1: Introduction;

---Part 2: Circular Oscillating Vulcanizer;

---Part 3: Rotorless Vulcanizer.

This document supersedes GB/T 16584-1996 "Determination of Vulcanization Properties of Rubber Using a Rotorless Vulcanizing Apparatus", and is consistent with GB/T 16584-1996.

Aside from structural adjustments and editorial changes, the main technical changes are as follows.

- a) Typical dimensions for three types of rotorless vulcanizer structures have been added (see 5.1);
- b) Increased technical requirements for the phantom (see 5.2);
- c) The requirements for the phantom closure force have been changed (see 5.3, 3.2 of GB/T 16584-1996);
- d) Increased technical requirements for the protective film (see 5.6);
- e) Instrument calibration has been added (see Chapter 6);
- f) Increased requirements for sample volume (see Chapter 7);
- g) Sample conditioning has been added (see Chapter 9);
- h) A calibration specification has been added (see Appendix A).

This document is equivalent to ISO 6502-3:2023 "Determination of vulcanization properties of rubber by vulcanizers - Part 3: Rotorless vulcanizers".

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Petroleum and Chemical Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Standardization of Rubber and Rubber Products (SAC/TC35).

Introduction

There are many types of vulcanizing instruments available, with varying shapes and structures. As vulcanization testing technology continues to improve, current standards have become increasingly important.

It cannot meet current usage requirements. Furthermore, to maintain consistency with the ISO 6502 series of standards, the current standard needs to be revised and the technical content updated.

This standard, GB/T 9869 "Determination of Vulcanization Properties of Rubber Using Vulcanizing Apparatus", aims to provide better guidance for the selection and use of vulcanizing apparatuses.

The experimental method for determining the vulcanization characteristics of rubber using a

vertical vulcanizer consists of three parts.

---Part 1: Introduction. The purpose is to provide a general introduction and guidance for the design and use of vulcanizers.

---Part 2: Disc Oscillating Vulcanizer. The purpose is to clarify the technical requirements that the disc oscillating vulcanizer must meet and to specify the use of a disc.

A method for determining the vulcanization characteristics of rubber compounds using an oscillating vulcanizing apparatus.

---Part 3: Rotorless Vulcanizer. The purpose is to clarify the technical requirements that a rotorless vulcanizer must meet and to specify the use of rotorless vulcanizers.

A method for determining the vulcanization characteristics of rubber compounds using a vulcanization analyzer.

The correspondence between this series of documents and previous versions is as follows.

---GB/T 9869.1.GB/T 25268-2010;

---GB/T 9869.2.GB/T 9869-2014;

---GB/T 9869.3.GB/T 16584-1996.

Determination of vulcanization properties of rubber using a vulcanizing apparatus Part 3: Rotorless Vulcanizer Warning 1. Personnel using this document should have practical experience working in a formal laboratory. This document does not cover all possible safety hazards.

Problem. Users are responsible for taking appropriate safety and health measures and ensuring compliance with relevant national regulations.

Warning 2---Some steps outlined in this document may involve the use or generation of certain wastes, which may pose a hazard to the local environment.

The relevant documents should include appropriate provisions for safe operation and disposal of waste after use.

1 Scope

This document describes a test method for determining the vulcanization properties of rubber compounds using a rotorless vulcanizer. ISO 6502-1 provides the vulcanization...

Instructions for using the instrument.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to this document, only the version corresponding to that date applies. For undated references, the latest version (including all amendments) applies.

This document.

Note: GB/T 9869.1-2025 Determination of vulcanization properties of rubber using a vulcanizing apparatus - Part 1: Introduction (ISO 6502-1:2018, IDT) Note. GB/T 25269-2010 Guide to Calibration of Rubber Testing Equipment (ISO 18899:2004, IDT)

3 Terms and Definitions

The terms and definitions defined in ISO 6502-1 apply to this document.

4 Principles

The rubber sample was placed in a heated cavity formed by two molds, one of which oscillated at a given frequency and amplitude.

Shear strain and shear torque are applied to the rubber sample, and the magnitude of the shear torque depends on the stiffness (shear modulus) of the rubber compound. As vulcanization progresses...

As the torque increases, it is measured by a torque sensor installed in another phantom. The torque is recorded in real time as a function of time.

As vulcanization proceeds, the stiffness of the rubber specimen increases. When the recorded torque rises to a stable or maximum value (see ISO 6502-1), the vulcanization...

The vulcanization curve is complete. If the torque continues to increase, vulcanization is considered incomplete within the given time. The time value required to obtain the vulcanization curve is taken as...

It depends on the test temperature and the properties of the rubber compound.

According to ISO 6502-1, vulcanization characteristic parameters are obtained from the recorded torque versus time function curve.