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Rubber — Determination of viscosity and stress relaxation using a rotorless sealed shear rheometer

Caoutchouc — Détermination de la viscosité et de la relaxation de contrainte au moyen d'un rhéomètre à cisaillement sans rotor étanche

Reference number
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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 13145:2012), of which it constitutes a minor revision. The changes are as follows:

— the reference ISO 18899 has been updated with the latest edition.

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Introduction

The rheological properties of rubbers are related to their structural characteristics and will influence the behaviour of the rubber during processing and the performance of the final product.

For these reasons, the industrial environment requires instruments that can quickly and easily evaluate the rheological properties.

As a consequence, this standard test method was formulated using a rotorless sealed shear rheometer for rheological evaluation under defined conditions.

This test can be an alternative to the Mooney viscometer, still used as standard in many parts of the rubber industry to measure Mooney viscosity (according to ISO 289-1). The defined conditions have been selected to provide a shear rate range similar to that used for Mooney viscosity and a good repeatability level.

This test procedure is performed over a short time and preferably in the automatic mode to optimize test efficiency.

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Rubber — Determination of viscosity and stress relaxation using a rotorless sealed shear rheometer

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 ensure compliance with any national regulatory conditions.

1 Scope

This document describes a method for the determination of the viscosity and stress relaxation of raw or compounded rubber under specified conditions.

The viscosity determination consists of a constant strain, temperature and frequency test in which the elastic and the loss components of the complex shear modulus can be determined.

The determination of stress relaxation consists of a constant static strain and temperature test in which the torque decrease can be determined.

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 1382, *Rubber — Vocabulary*

ISO 18899:2013, *Rubber — Guide to the calibration of test equipment*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 1382 and the following 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/

3.1
rotorless sealed shear rheometer
device consisting of two dies forming a temperature-controlled cavity, one of which is moved relative to the other to apply a stress or strain to the test piece

3.2
sinusoidal strain
$\gamma(t)$
strain produced by the oscillation of the die constituting the test cavity

Note 1 to entry: It is given by the expression $\gamma(t) = \gamma_0 \sin(\omega t)$, where γ_0 is the maximum amplitude of the applied strain.

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