This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: D6049 – 03 (Reapproved 2017)

Standard Test Method for Rubber Property—Measurement of the Viscous and Elastic Behavior of Unvulcanized Raw Rubbers and Rubber Compounds by Compression Between Parallel Plates[1]

This standard is issued under the fixed designation D6049; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method is an adaptation of the German Standard DIN 53514, a further development of the former "Defo Test" (see Appendix X1).

1.2 This test method is capable of measuring and characterizing the rheological behavior (viscosity and elasticity) of unvulcanized raw rubbers and rubber compounds, relating to the macro structure of rubber polymers (average molecular weight, molecular weight distribution, long chain branching, and micro- and macro-gel).

1.3 The viscosity and elasticity of unvulcanized rubbers and rubber compounds are determined by subjecting cylindrical test pieces to a compression/recovery cycle. The dependency on shear rate at constant shear stress is evaluated and the material fatigue behavior is determined in repeat cycle testing.

1.4 The non-Newtonian viscous and elastic behavior of rubbers and rubber compounds can also be evaluated.

1.5 Statistical evaluation of the test data provides an indication of data variation, which may be employed as an estimate of the homogeneity of the material tested.

1.6 The values stated in SI units are to be regarded as the standard. The values in parentheses are for information only.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D297 Test Methods for Rubber Products—Chemical Analysis

D926 Test Method for Rubber Property—Plasticity and Recovery (Parallel Plate Method)

D4483 Practice for Evaluating Precision for Test Method Standards in the Rubber and Carbon Black Manufacturing Industries

D6048 Practice for Stress Relaxation Testing of Raw Rubber, Unvulcanized Rubber Compounds, and Thermoplastic Elastomers

2.2 *DIN Standards:*[3]

DIN 53514 Testing of Rubber—Determination of Viscosity and Elasticity Related Numbers of Raw Rubber and Rubber Mixes in a Compression Test between Parallel Plates

DIN 53523, Part 1 Testing of Rubber and Elastomers—Testing with the Mooney Shearing Disk Viscometer; Preparation of Test Pieces

2.3 *ISO Standards:*[4]

ISO 5725 Precision of Test Methods—Determination of Repeatability and Reproducibility for a Standard Test Method by Interlaboratory Tests

ISO 7323 Rubber—Raw and Unvulcanized Compounded—Determination of Plasticity Number and Recovery Number; Parallel Plate Method

3. Terminology

3.1 *Definitions*—The following terms appear in logical order for the sake of clarity.

3.1.1 *Multiple Compression Force Test*—refer to Section 10 for more details.

[1] This test method is under the jurisdiction of Committee D11 on Rubber and Rubber-like Materials and is the direct responsibility of Subcommittee D11.12 on Processability Tests.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from Deutsches Institut für Normung, Burggrafenstr 6, D10787 Berlin 30, Germany.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

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