INTERNATIONAL STANDARD



First edition 2008-05-01

Rubber — Acquisition and presentation of comparable single-point data

Caoutchouc — Acquisition et présentation de données simples comparables

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<u>ISO 24453:2008</u> https://standards.iteh.ai/catalog/standards/sist/dc674648-7198-48ff-8b71-5b197813ed1a/iso-24453-2008



Reference number ISO 24453:2008(E)

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 24453 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

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Rubber — Acquisition and presentation of comparable single-point data

1 Scope

This International Standard identifies specific test procedures for the acquisition and presentation of comparable single-point data for properties of rubber compounds. In general, each property is specified by a single test method and a single experimental value although, in certain cases, properties may be represented by more than one value obtained under different test conditions. The properties presented are those used to characterize processing properties, those most often quoted by manufacturers and in material specifications, and those relevant to more specific applications. An important application of this International Standard consists in helping different suppliers produce material specification sheets in which the same set of properties is measured using the same conditions.

2 Normative references

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The following referenced documents are indispensable for the application 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 34-1, Rubber, vulcanized or thermoplastic — Determination of tear strength — Part 1: Trouser, angle and crescent test pieces 5b197813ed1a/iso-24453-2008

ISO 36, Rubber, vulcanized or thermoplastic — Determination of adhesion to textile fabric

ISO 37, Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties

ISO 48, Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)

ISO 188, Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests

ISO 289-1, Rubber, unvulcanized — Determinations using a shearing-disc viscometer — Part 1: Determination of Mooney viscosity

ISO 289-2, Rubber, unvulcanized — Determinations using a shearing-disc viscometer — Part 2: Determination of pre-vulcanization characteristics

ISO 812, Rubber, vulcanized or thermoplastic— Determination of low-temperature brittleness

ISO 813, Rubber, vulcanized or thermoplastic — Determination of adhesion to a rigid substrate — 90° peel method

ISO 815-1, Rubber, vulcanized or thermoplastic — Determination of compression set at ambient, elevated or low temperatures — Part 1: At ambient or elevated temperatures

ISO 815-2, Rubber, vulcanized or thermoplastic — Determination of compression set at ambient, elevated or low temperatures — Part 2: At low temperatures

ISO 1431-1, Rubber, vulcanized or thermoplastic — Resistance to ozone cracking — Part 1: Static and dynamic strain testing

ISO 1432, Rubber, vulcanized or thermoplastic — Determination of low temperature stiffening (Gehman test)

ISO 1817, Rubber, vulcanized — Determination of the effects of liquids

ISO 1827, Rubber, vulcanized or thermoplastic — Determination shear modulus adhesion to rigid plates — Quadruple-shear method

ISO 1853, Conducting and dissipative rubbers, vulcanized or thermoplastic — Measurement of resistivity

ISO 2007, Rubber, unvulcanized — Determination of plasticity — Rapid-plastimeter method

ISO 2285, Rubber, vulcanized or thermoplastic — Determination of tension set under constant elongation, and of tension set, elongation and creep under constant tensile load

ISO 2393, Rubber test mixes — Preparation, mixing and vulcanization — Equipment and procedures

ISO 2781, Rubber, vulcanized and thermoplastic — Determination of density

ISO 2782, Rubber, vulcanized or thermoplastic — Determination of permeability to gases

ISO 2921, Rubber, vulcanized — Determination of low-temperature characteristics — Temperature-retraction procedure (TR test)

ISO 3384, Rubber, vulcanized or thermoplastic — Determination of stress relaxation in compression at ambient and elevated temperatures (standards.iteh.ai)

ISO 3387, Rubber — Determination of crystallization effects by hardness measurements

https://standards.iteh.ai/catalog/standards/sist/dc674648-7198-48ff-8b71-ISO 3865, Rubber, vulcanized or thermoplastic Ty Methods of test for staining in contact with organic material

ISO 4649, Rubber, vulcanized or thermoplastic — Determination of abrasion resistance using a rotating cylindrical drum device

ISO 4662, Rubber — Determination of rebound resilience of vulcanizates

ISO 4666-3, Rubber, vulcanized — Determination of temperature rise and resistance to fatigue in flexometer testing — Part 3: Compression flexometer

ISO 6179, Rubber, vulcanized or thermoplastic — Rubber sheets and rubber-coated fabrics — Determination of transmission rate of volatile liquids (gravimetric technique)

ISO 6502, Rubber — Guide to the use of curemeters

ISO 7743, Rubber, vulcanized or thermoplastic – Determination of compression stress-strain properties

ISO 8013, Rubber, vulcanized — Determination of creep in compression or shear

ISO 9026, Raw rubber or unvulcanized compounds — Determination of green strength

ISO 11345, Rubber — Assessment of carbon black and carbon black/silica dispersion — Rapid comparative methods

ISO 15113, Rubber — Determination of frictional properties

ISO 23529, Rubber — General procedures for preparing and conditioning test pieces for physical test methods

IEC 60093, Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials

BS 903:A18, Physical testing of rubber — Part A18: Determination of equilibrium water vapour absorption

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

single-point data

data characterizing a rubber material by means of those property tests in which important aspects of performance can be described with single-value results

4 Test piece preparation

Where relevant, materials for test shall be prepared, mixed and moulded following the general principles given in ISO 2393.

The detailed conditions used shall be as recommended by the manufacturer of the rubber compound and shall, for each of the processing steps, be the same for each test piece except that different cure times may be used for different sized test pieces.

The equipment, mixing cycle and conditions used for moulding shall be given in the test report.

The final preparation of test pieces (for example stamping from sheet) shall be in accordance with the relevant test method standard.

The properties of a rubber compound can vary depending on the processing procedures used and this should be taken into account when comparing materials. 5b197813ed1a/iso-24453-2008

To maximize the usefulness of results, processing conditions should be representative of those used in production.

5 Conditioning

The time between mixing and moulding shall be between 24 h and one week.

The time between moulding and conditioning shall be between 16 h and four weeks. Recommendations for the storage of vulcanized rubber products are given in ISO 2230.

Test pieces shall be conditioned in accordance with the relevant test method standard. Where this refers to standard laboratory conditions of temperature and/or humidity, these are taken to mean (23 ± 2) °C and 50 % RH.

NOTE If tests are carried out at the alternative standard laboratory temperature of (27 ± 2) °C, the results will not be strictly comparable unless adjusted by the known relationship of the property with temperature.

For tests at temperatures other than (23 ± 2) °C, where specific instructions are not included in the test method standard, condition the test pieces at the temperature at which the test is to be conducted for a period sufficient to enable test pieces to attain substantial equilibrium in accordance with ISO 23529.

Details of the conditioning used shall be given in the test report.

6 **Processability properties**

If processability data are required (for example if unvulcanized material is being supplied), the test methods, test conditions and units shall be selected from those specified in Table 1.

The test temperature(s) shall be as considered appropriate for the material in question.

NOTE The measurement of viscoelastic flow and cure properties of rubber compounds is essential for the processor in order to form the material efficiently and effectively into the required product. However, these properties are generally of little consequence for the end user of the product and it is for this reason that processability properties are considered separately to other properties in this International Standard.

Property		Symbol	International Standard	Unit	Test conditions
1.1	Mooney viscosity	See ISO 289-1	ISO 289-1	Mooney units	Large rotor
1.2	Mooney scorch time	t _x	ISO 289-2	min	Rise of 5 MU
2.1	Rapid plasticity number		ISO 2007	0,01 mm	
3.1	Time to 90 % cure (The cure curve is normally presented.)	ť _c (90)	ISO 6502	min	
3.2	Time to 50 % cure	eh (50)AN	DISO 6502	PRE min IE	Preference is given to an
3.3	Scorch time	(stan	dasociate	h.ai)	The temperature is selected according to the compound and expected processing conditions.
3.4	Minimum torque	ML	ISO 6502	Nm	
3.5	Plateau torque https://sta (Maximum torque or torque after a specified time, if appropriate)	indards, iteh. ai/cata $M_{\rm HF}^{\rm HF}5b197$ ($M_{\rm HR}$ or $M_{\rm H}$)	log/standards/sist/dc 813e <mark>f\$6/6502</mark> 1453	:674648-7198-48f - ²⁰⁰⁸ Nm	
4.1	Green strength (yield or maximum stress)		ISO 9026	MPa	Use beaded type 1 test piece.
4.2	Carbon black dispersion		ISO 11345	Dimensionless	Method A or B

Table 1 — Test methods for processability data

7 Test requirements

The test methods, test conditions and units specified in Table 2 shall be used when determining data according to this International Standard.

A property may be omitted if it is not relevant to the material in question (for example fluid resistance, if a compound is not for use in oil or fuel).

It is not essential to measure both compression and tension set, the choice being dependent on the material and the intended application.

If required, additional properties may be presented using the test methods, test conditions and units specified in Table 3. It is recommended that all properties relevant to the intended end use of the material be presented.

Unless otherwise specified in the tables or the test method standard, properties shall be measured at standard laboratory temperature and, where appropriate, humidity, in an air atmosphere in accordance with ISO 23529.

NOTE 1 The properties listed in Table 2 are those usually included in data sheets whilst those listed in Table 3 will generally only be relevant when specific applications are being considered.

NOTE 2 Symbols for properties are given in Tables 1 to 3 where these are designated in the test method standard.

8 Presentation of results

Processability data, when required, shall be presented in accordance with the requirements of the test method standards used.

The data for the properties listed in Tables 2 and 3 shall be presented as shown by these tables. Test the minimum number of test pieces that is specified for each property in the associated test method standard. Record the test result in the "value" column (this is usually the mean or median value). For properties where the temperature of test and/or the liquid used has(have) to be selected, report the temperature(s) and fluid(s). Precede the data with information that identifies the material together with the information required by Clauses 4 and 5.

In order that the value recorded for each property be as representative as possible of the material tested, the measurements are preferably made on test pieces obtained from a number of batches of material blended together. Alternatively, the average of results from several sets of test pieces produced from different batches may be presented.

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