



Designation: D 3403 – 97

Standard Test Methods for Rubber—Evaluation of IR (Isoprene Rubber)¹

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1. Scope

1.1 These test methods specify the standard materials, test formula, mixing procedures, and test methods for the evaluation and production control of isoprene rubber (IR).

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

1.3 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension²
- D 1646 Test Methods for Rubber—Viscosity, Stress Relaxation, and Pre-Vulcanization Characteristics (Mooney Viscometer)²
- D 2084 Test Method for Rubber Property—Vulcanization Using Oscillating Disk Cure Meter²
- D 3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets²
- D 3896 Practice for Rubber from Synthetic Sources—Sampling²
- D 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries²
- E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method³

3. Significance and Use

3.1 These tests are mainly intended for referee purposes but may be used for quality control of rubber production. They may also be used in research and development work and for comparison of different rubber samples in a standard formula.

3.2 These tests may also be used to obtain values for customer acceptance of rubber.

4. Standard Test Formula

4.1 Standard Formula:

Material	Standard Testing Materials	NIST SRM No.	Quantity, Parts by Mass
Isoprene rubber (IR)	...	...	100.00
Zinc oxide ^A	...	370	5.00
Sulfur ^B	SRM371	371	2.25
Stearic acid ^B	SRM372	372	2.00
Oil furnace black ^C	IRB	378	35.00
TBBS ^{B,D}	RM8384	384	0.70
Total			144.95
Batch factor for mill mix ^E			3.00
Batch factor for internal mixer ^E			10.00
Batch factor for MIM mix ^F (Cam Head)			0.50
Batch factor for MIM mix ^F (Banbury Head)			0.43

^A An IRM is being prepared and will be included in these test methods at the December 1993 meeting.

^B Available from NIST.

^C The current Industry Reference Black (IRB) shall be used.

^D *N-tert-butyl-2-benzothiazolesulfenamide*.

^E For mill and internal mixer batches, weigh the rubber, carbon black and oil to the nearest 1.0 g, the sulfur and accelerator to the nearest 0.02 g, and the other compounding materials to the nearest 0.1 g.

^F For MIM batches, weigh the rubber and carbon black to the nearest 0.1 g, the compounding material blend to the nearest 0.01 g, and the individual compounding materials, if used, to the nearest 0.001 g.

For the MIM procedure, it is recommended that a blend of compounding materials, excluding carbon black, be prepared to improve accuracy in the weighing of these materials. The compounding material blend is prepared by blending a proportional mass of each material in a bioconical or vee blender. A mortar and pestle may be used for blending small quantities.

5. Sample Preparation

5.1 Obtain and prepare the test samples in accordance with Practice D 3896.

6. Mixing Procedures

6.1 The compound may be prepared in an internal mixer, on a mill, or in a miniature internal mixer. It is not implied that comparable results will be obtained. The following mixing procedures are provided:

6.1.1 *Method A—Internal Mixer for Initial and Final Mix—(6.2),*

6.1.2 *Method B—Initial Internal Mix with Final Mill Mix—(6.3),*

¹ These test methods are under the jurisdiction of ASTM Committee D11 on Rubber and are the direct responsibility of Subcommittee D11.23 on Synthetic Rubber.

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² *Annual Book of ASTM Standards*, Vol. 09.01.

³ *Annual Book of ASTM Standards*, Vol. 14.02.