



# Standard Practice for Rubber—Directions for Achieving Subnormal Test Temperatures<sup>1</sup>

This standard is issued under the fixed designation D 3847; 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 practice covers the general requirements for achieving and maintaining temperatures below 21°C for thermal conditioning and physical testing of rubber.

1.2 This practice describes the acceptable types and construction of low-temperature cabinets for conditioning and testing of rubber, the composition and circulation of heat-transfer media, and the required uniformity and precision of temperature control.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *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:<sup>2</sup>

- D 746 Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
- D 832 Practice for Rubber Conditioning For Low Temperature Testing
- D 945 Test Methods for Rubber Properties in Compression or Shear (Mechanical Oscillograph)
- D 1053 Test Methods for Rubber Property—Stiffening at Low Temperatures: Flexible Polymers and Coated Fabrics
- D 1229 Test Method for Rubber Property—Compression Set at Low Temperatures
- D 1329 Test Method for Evaluating Rubber Property—Retraction at Lower Temperatures (TR Test)

D 1415 Test Method for Rubber Property—International Hardness

D 2136 Test Method for Coated Fabrics—Low-Temperature Bend Test

D 2137 Test Methods for Rubber Property—Brittleness Point of Flexible Polymers and Coated Fabrics

D 2240 Test Method for Rubber Property—Durometer Hardness

D 2632 Test Method for Rubber Property—Resilience by Vertical Rebound

E 197 Specification for Enclosures and Servicing Units for Tests Above and Below Room Temperature<sup>3</sup>

## 3. Significance and Use

3.1 Low temperatures are often needed for conditioning of rubber prior to testing, as well as during the test. Conditioning is required to attain a specific temperature that is uniform throughout the specimen or for producing time-dependent effects. Specimens may be conditioned and tested in the same or different chambers.

3.2 This practice is intended to apply particularly, but not exclusively, to the following ASTM Standards: Test Methods D 746, D 945, D 1053, D 1229, D 1329, D 1415, D 2136, D 2137, D 2240, D 2632, Practice D 832, and Specification E 197.

## 4. General Equipment Requirements<sup>4</sup>

4.1 The low-temperature cabinet may be refrigerated mechanically, or by dry ice or liquid nitrogen, either directly or indirectly.

4.1.1 The heat-transfer medium in the test chamber should be air or air mixed with carbon dioxide or nitrogen, unless a liquid medium is specified. Although liquids cool the specimens faster than gases, they are more likely to cause property changes in addition to those caused by temperature change. Water, ethyl alcohol, and ethylene glycol are usually acceptable for immersion times that are kept to the minimum for the required tests.

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D11 on Rubber and is the direct responsibility of Subcommittee D11.14 on Time and Temperature-Dependent Physical Properties.

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<sup>2</sup> 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.

<sup>3</sup> Withdrawn.

<sup>4</sup> For more detailed information, see Specification E 197.