



## Standard Test Methods for Rubber Products—Chemical Analysis<sup>1</sup>

This standard is issued under the fixed designation D 297; 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 (€) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

€<sup>1</sup> NOTE—Sections 31.4.5, 38.4.2, 45.1.3, 53.2.3.5, 54.4.2, 56.5.3, 57.7.3, and X2.4.1.6 were editorially updated in January 2003.

### 1. Scope

1.1 These test methods cover the qualitative and quantitative analysis of the composition of rubber products of the “R” family (see 3.1). Many of these test methods may be applied to the analysis of natural and synthetic crude rubbers.

1.1.1 *Part A* consists of general test methods for use in the determination of some or all of the major constituents of a rubber product.

1.1.2 *Part B* covers the determination of specific polymers present in a rubber product.

1.1.3 The test methods appear in the following order:

| Part A. General Test Methods:                    | Sections  |
|--------------------------------------------------|-----------|
| Rubber Polymer Content by the Indirect Method    | 11-13     |
| Determinations and Report for the General Method | 14 and 15 |
| Density                                          | 16        |
| Extract Analysis                                 | 17-26     |
| Sulfur Analysis                                  | 27-33     |
| Fillers Analysis                                 | 34-40     |
| Ash Analysis                                     | 41-51     |
| Part B. Determination of Rubber Polymers         | 52-58     |

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

1.3 *This standard does not purport to address all of the safety problems, 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.* Specific precautionary statements are given in 31.4.5, 31.6, 37.4.2, 38.4.2, 45.1.3, 53.2.3.5, 54.4.2, and 56.5.3; and X1.3.3 and X2.4.1.6.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

D 982 Test Method for Organic Nitrogen in Paper and Paperboard<sup>2</sup>

D 1416 Test Methods for Rubber from Synthetic Sources—Chemical Analysis<sup>3</sup>

D 1418 Practice for Rubber and Rubber Lattices—Nomenclature<sup>3</sup>

D 1646 Test Methods for Rubber—Viscosity, Stress Relaxation, and Pre-Vulcanization Characteristics (Mooney Viscometer)<sup>3</sup>

D 3156 Practice for Rubber—Chromatographic Analysis of Antidegradants Antioxidants, Antiozonants, and Stabilizers<sup>3</sup>

D 3452 Practice for Rubber—Identification by Pyrolysis-Gas Chromatography<sup>3</sup>

D 3677 Test Methods for Rubber—Identification by Infrared Spectrophotometry<sup>3</sup>

D 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries<sup>3</sup>

E 11 Specification for Wire-Cloth Sieves for Testing Purposes<sup>4</sup>

E 131 Terminology Relating to Molecular Spectroscopy<sup>5</sup>

E 200 Practice for Preparation, Standardization, and Storage of Standard and Reagent Solutions for Chemical Analysis<sup>6</sup>

E 422 Test Method for Measuring Heat Flux Using a Water-Cooled Calorimeter<sup>7</sup>

E 443 Test Method for Sulfur in Organic Compounds by Oxygen Flask Combustion<sup>6</sup>

### 3. Terminology

3.1 *Definitions*—The nomenclature and abbreviations used for natural and synthetic rubbers are in accordance with Practice D 1418.

### 4. Reagents

4.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that

<sup>1</sup> These test methods are under the jurisdiction of ASTM Committee D11 on Rubber and are the direct responsibility of Subcommittee D11.11 on Chemical Analysis.

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<sup>2</sup> Discontinued; see 1982 *Annual Book of ASTM Standards*, Part 20.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 09.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 14.02.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 03.06.

<sup>6</sup> *Annual Book of ASTM Standards*, Vol 15.05.

<sup>7</sup> *Annual Book of ASTM Standards*, Vol 15.03.