



Standard Test Method for Rubber Property—Effect of Liquids¹

This standard is issued under the fixed designation D 471; 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.

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

^{ε1} NOTE—Table 3 was editorially updated in September 1999.

1. Scope

1.1 This test method covers the required procedures to evaluate the comparative ability of rubber and rubber-like compositions to withstand the effect of liquids. It is designed for testing: (1) specimens of vulcanized rubber cut from standard sheets (see Practice D 3182), (2) specimens cut from fabric coated with vulcanized rubber (see Test Method D 751), or (3) finished articles of commerce (see Practice D 3183). This test method is not applicable to the testing of cellular rubbers, porous compositions, and compressed sheet packing, except as described in 11.2.2.

1.2 ASTM Oils No. 2 and No. 3, formerly used in this test method as standard test liquids, are no longer commercially available and in 1993 were replaced with IRM 902 and IRM 903, respectively (see Appendix X1 for details).

1.3 This test method includes the following:

Change in Mass (after immersion)	Section 10
Change in Volume (after immersion)	Section 11
Dimensional-Change Method for Water-Insoluble Liquids and Mixed Liquids	Section 12
Change in Mass with Liquid on One Surface Only	Section 13
Determining Mass of Soluble Matter Extracted by the Liquid	Section 14
Change in Tensile Strength, Elongation and Hardness (after immersion)	Section 15
Change in Breaking Resistance, Burst Strength, Tear Strength and Adhesion for Coated Fabrics	Section 16
Calculation (of test results)	Section 17

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

1.5 *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 92 Test Method for Flash and Fire Points by Cleveland Open Cup²
D 97 Test Method for Pour Point of Petroleum Products²
D 287 Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method)²
D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension³
D 445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)²
D 611 Test Methods for Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents²
D 751 Test Methods for Coated Fabrics⁴
D 975 Specification for Diesel Fuel Oils²
D 1217 Test Method for Density and Relative Density (Specific Gravity) of Liquids by Bingham Pycnometer²
D 1415 Test Method for Rubber Property—International Hardness³
D 1500 Test Method for ASTM Color of Petroleum Products (ASTM Color Scale)²
D 1747 Test Method for Refractive Index of Viscous Materials²
D 2008 Test Method for Ultraviolet Absorbance and Absorptivity of Petroleum Products²
D 2140 Test Method for Carbon-Type Composition of Insulating Oils of Petroleum Origin⁵
D 2240 Test Method for Rubber Property—Durometer Hardness³
D 2699 Test Method for Research Octane Number of Spark-Ignition Engine Fuel⁶
D 3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets³
D 3183 Practice for Rubber—Preparation of Pieces for Test Purposes from Products³
D 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries³

¹ This test method is under the jurisdiction of ASTM Committee D-11 on Rubber and is the direct responsibility of Subcommittee D11.15 on Degradation Tests.

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² *Annual Book of ASTM Standards*, Vol 05.01.

³ *Annual Book of ASTM Standards*, Vol 09.01.

⁴ *Annual Book of ASTM Standards*, Vol 09.02.

⁵ *Annual Book of ASTM Standards*, Vol 10.03.

⁶ *Annual Book of ASTM Standards*, Vol 05.05.