



Designation: D 1460 – 86 (Reapproved 1997)<sup>€1</sup>

## Standard Test Method for Rubber Property—Change in Length During Liquid Immersion<sup>1</sup>

This standard is issued under the fixed designation D 1460; 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.

€<sup>1</sup> NOTE—Section 8 was corrected editorially in February 1997.

### 1. Scope

1.1 This test method covers a technique to measure the effect of immersion liquids on rubber vulcanizates or rubbery materials. Change in specimen geometry and dimensions are observed through the transparent walls of the tube containing the specimen immersed in the liquid. Although it may be employed with any liquid, it is especially applicable to liquids that are so volatile that they must be maintained under pressure during the period of immersion.

1.2 This test method differs from Test Method D 471 in that volume changes are approximated from observed dimensional changes rather than being calculated directly.

1.3 The values stated in SI units are to be regarded as the 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:

D 471 Test Method for Rubber Property—Effect of Liquids<sup>2</sup>

D 1349 Practice for Rubber—Standard Temperatures for Testing<sup>2</sup>

D 3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets<sup>2</sup>

D 3183 Practice for Rubber—Preparation of Pieces for Test Purposes from Products<sup>2</sup>

### 3. Significance and Use

3.1 This test method gives the rubber technologist two means to evaluate the effect of liquids on rubber vulcanizates or rubbery materials. Volatile, nonvolatile, and other liquids that require pressure to maintain a liquid state may be used.

Data obtained on rubbery materials exposed to liquids by this method may be used to predict their behavior in applications involving similar exposure. These changes in length have been found to be useful for specifications but do not necessarily indicate changes for design purposes.

### 4. Test Fluid

4.1 The test liquid may be any one of the standard liquids described in Test Method D 471, or any other liquids to which the vulcanizate may be exposed in service. Mixtures of volatile liquid and oil may be employed in Apparatus B, in which case the oil shall be introduced with the specimen, and the volatile liquid introduced later by way of the lower valve.

### 5. Apparatus

5.1 Two types of apparatus may be used, as follows:

5.1.1 *Apparatus A* consists of a plain glass tube 10 mm in outside diameter and 250 mm long, sealed at one end. A glass rod 7.5 mm in diameter and approximately 20 mm in length is placed in the bottom of each tube to support the test specimen. The opposite end of the tube is closed by a small vented rubber stopper after the fluid and specimen have been introduced, or, in the case of a volatile liquid, this end may be heat-sealed.

5.1.2 *Apparatus B* consists of a 300-mm (12-in.) length of extra-heavy glass pipe with flanged ends, approximately 20 mm (¾ in.) in inside diameter, one end being closed originally by a blind flange with suitable gasket, and the other by a similar blind flange applied after the specimen has been introduced. Both flanges are drilled, tapped, and connected to metal valves by short lengths of threaded tubing. The lower valve is for admitting the fluid after the pipe has been closed; the upper valve is for discharging the vapors of the liquid at the conclusion of the test.

5.2 Apparatus B is preferred to Apparatus A when employing a liquid that requires pressure (not exceeding 1.1 MPa (160 psi)) to maintain it in the liquid state during the period of immersion. This category includes most refrigerants, liquid petroleum gases, anhydrous ammonia, etc. By the use of Apparatus B, the difficult and possibly hazardous operation of heat-sealing the tube is avoided. For pressures above 1.1 MPa (160 psi) it is still necessary to employ Apparatus A, using tubing of sufficient wall thickness to support the pressure. For

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-11 on Rubber and is the direct responsibility of Subcommittee D11.10 on Physical Testing.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 09.01.