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Standard Test Method for Rubber Property—International Hardness[1]

This standard is issued under the fixed designation D1415; 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 U.S. Department of Defense.

1. Scope

1.1 This test method covers a procedure for measuring the hardness of vulcanized or thermoplastic rubber. The hardness is obtained by the difference in penetration depth of a specified dimension ball under two conditions of contact with the rubber: (*1*) with a small initial force and (*2*) with a much larger final force. The differential penetration is taken at a specified time and converted to a hardness scale value.

1.2 This test method is technically similar to ISO 48.

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:*[2]

D1349 Practice for Rubber—Standard Conditions for Testing

D2240 Test Method for Rubber Property—Durometer Hardness

D4483 Practice for Evaluating Precision for Test Method Standards in the Rubber and Carbon Black Manufacturing Industries

2.2 *International Standard:*[3]

ISO 48 Rubber, Vulcanized or Thermoplastic—Determination of Hardness (Hardness between 10 and 100 IRHD)

3. Summary of Test Methods

3.1 Four procedures are given to accommodate specimens of different dimensions hardness of vulcanized or thermoplastic rubbers on flat surfaces:

Type S1 and S2, Standard hardness tests;
Type M, Micro-hardness tests;
Type L, Low hardness test;
Type H, High hardness test.

3.1.1 *Types S1 and S2 (refer to* Table 1*)*—The standard test for hardness is the appropriate method for specimens having a thickness described in Section 6, and is appropriate for those having a hardness of 35 IRHD to 85 IRHD. It may be used for those in the range of 30 IRHD to 95 IRHD.

NOTE 1—The hardness values obtained by Types S and S1, within the ranges of 85 IRHD to 95 IRHD and 30 IRHD to 35 IRHD may not agree with those obtained using Types H or L. The differences are not generally considered significant.

3.1.2 *Type M (refer to* Table 1*)*—The micro-hardness test is a scaled-down version of Type S1 and S2, which permit testing of thinner and smaller specimens. It is applicable for specimens having a thickness described in Section 6, and a hardness of 35 IRHD to 85 IRHD. It may be used for those in the range of 30 IRHD to 95 IRHD.

NOTE 2—The hardness values obtained by Type M may not agree with those obtained using Types S1 or S2 due to the effects of surface variations or specimen configuration.

3.1.3 *Type L*—The appropriate method for specimens having a thickness described in Section 6, and a hardness of 10 IRHD to 35 IRHD.

3.1.4 *Type H*—The appropriate method for specimens having a thickness described in Section 6, and a hardness of 85 IRHD to 100 IRHD.

3.2 In all procedures, the hardness in International Rubber Hardness Degrees (IRHD) is derived from the difference in penetrations and a table or graph constructed from the table. In the micro-tester procedure, the difference in penetration must first be multiplied by scale factor 6. Alternatively, the penetration measuring instrument may be calibrated directly in IRHD.

[1] This test method is under the jurisdiction of ASTM Committee D11 on Rubber and is the direct responsibility of Subcommittee D11.10 on Physical Testing.

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[2] 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.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

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