This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: D1709 – 24

Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method[1]

This standard is issued under the fixed designation D1709; 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 These test methods cover the determination of the energy that causes plastic film to fail under specified conditions of impact of a free-falling dart. This energy is expressed in terms of the weight (mass) of the missile falling from a specified height which would result in 50 % failure of specimens tested.

1.2 Two test methods are described:

1.2.1 *Test Method A* employs a dart with a 38.10 ± 0.13-mm (1.500 ± 0.005-in.) diameter hemispherical head dropped from a height of 0.66 ± 0.01 m (26.0 ± 0.4 in.). This test method can be used for films whose impact resistances require masses of about 50 g to about 6 kg to fracture them.

1.2.2 *Test Method B* employs a dart with a 50.80 ± 0.13-mm (2.000 ± 0.005-in.) diameter hemispherical head dropped from a height of 1.52 ± 0.03 m (60.0 + 0.25, −1.70 in.). Its range of applicability is from about 0.3 kg to about 6 kg.

1.3 Two testing techniques are described:

1.3.1 The standard technique is the staircase method. By this technique, the missile weight employed during the test is decreased or increased by uniform increments after the testing of each specimen, depending upon the result (fail or not fail) observed for the specimen.

1.3.2 The alternative technique provides for testing specimens in successive groups of ten. One missile weight is employed for each group and the missile weight is varied in uniform increments from group to group.

1.3.3 The staircase technique and the alternative technique give equivalent results both as to the values of impact failure weight which are obtained and as to the precisions with which they are determined.

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

NOTE 1—Tests on materials that do not break, for any reason, are not considered to be valid. It has been noted that certain materials may stretch so far as to bottom out at the base of certain test instruments without actually rupturing. Subcommittee D20.19 is currently considering methods for testing these materials. Anyone interested in participating in a Task Group should contact the Chairman of Subcommittee D20.19 through ASTM International Headquarters.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

NOTE 2—Film has been arbitrarily defined as sheeting having nominal thickness not greater than 0.25 mm (0.010 in.).

NOTE 3—This test method is technically equivalent to ISO 7765-1:1988, with the exception of a larger tolerance on the drop height in Test Method B, smaller tolerances on the dart diameters for Test Methods A and B, and the requirement for a vented dart well in 5.1.1. Also, the ISO method does not allow the alternative testing technique described in Section 11 of this test method.

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D618 Practice for Conditioning Plastics for Testing

D883 Terminology Relating to Plastics

D1248 Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable

D3420 Test Method for Pendulum Impact Resistance of Plastic Film

[1] These test methods are under the jurisdiction of ASTM Committee D20 on Plastics and are the direct responsibility of Subcommittee D20.19 on Film, Sheeting, and Molded Products.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard**

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