



Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact¹

This standard is issued under the fixed designation D 746; 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.

1. Scope*

1.1 This test method covers the determination of the temperature at which plastics and elastomers exhibit brittle failure under specified impact conditions. Two routine inspection and acceptance procedures are also provided.

NOTE 1—When testing rubbers for impact brittleness use Test Methods D 2137.

1.2 The values stated in SI units are to be regarded as the standard.

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.*

NOTE 2—This test method and ISO 974–2000 (E) are technically equivalent when using the Type B fixture and the Type III specimen, however, the minimum number of specimens that are required to be tested is significantly different when using this test method. The ISO method requires that a minimum of 100 specimens be tested.

2. Referenced Documents

2.1 ASTM Standards:²

- D 618 Practice for Conditioning Plastics for Testing
- D 832 Practice for Rubber Conditioning for Low-Temperature Testing
- D 883 Terminology Relating to Plastics
- D 2137 Test Methods for Rubber Property—Brittleness Point of Flexible Polymers and Coated Fabrics
- E 77 Test Method for the Inspection and Verification of Thermometers
- E 220 Test Method for Calibration of Thermocouples by Comparison Techniques
- E 644 Test Methods for Testing Industrial Resistance Thermometers

¹ This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.30 on Thermal Properties (Section D20.30.07).

Current edition approved May 1, 2004. Published May 2004. Originally approved in 1943. Last previous edition approved in 1998 as D 746 – 98.

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.

E 1137 Specification for Industrial Platinum Resistance Thermometers

2.2 ISO Standard:

ISO 974-1980 (E) Plastics—Determination of the Brittleness Temperature by Impact³

3. Terminology

3.1 *General*—The definitions of plastics used in this test method are in accordance with Test Method D 883 unless otherwise specified.

3.2 *brittleness temperature*—that temperature, estimated statistically, at which 50 % of the specimens would probably fail.

4. Summary of Test Method

4.1 To determine the brittleness temperature, specimens are secured to a specimen holder with a torque wrench. The specimen holder is immersed in a bath containing a heat-transfer medium that is cooled. The specimens are struck at a specified linear speed and then examined. The brittleness temperature is defined as the temperature at which 50 % of the specimens fail.

5. Significance and Use

5.1 This test method establishes the temperature at which 50 % of the specimens tested fail when subjected to the conditions specified herein. The test provides for the evaluation of long-time effects such as crystallization, or those effects that are introduced by low-temperature incompatibility of plasticizers in the material under test. Plastics and elastomers are used in many applications requiring low-temperature flexing with or without impact. Use data obtained by this method to predict the behavior of plastic and elastomeric materials at low temperatures only in applications in which the conditions of deformation are similar to those specified in this test method. This test method has been found useful for specification purposes, but does not necessarily measure the lowest temperature at which the material is suitable for use.

NOTE 3—Suitable apparatus is commercially available from several

³ *ISO Standards Handbook 21*, Vol 1. ISO Standards are available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

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