Designation: D 4812 – 99

Standard Test Method for Unnotched Cantilever Beam Impact Resistance of Plastics[1]

This standard is issued under the fixed designation D 4812; 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 resistance of plastics to breakage by flexural shock, as indicated by the energy extracted from standardized pendulum-type hammers, mounted in standardized machines, in breaking standard specimens with one pendulum swing. The result of this test method is reported as energy absorbed per unit of specimen width.

NOTE 1—The pendulum-type test instruments have been standardized in that they must comply with certain requirements, including a fixed height of hammer fall that results in a substantially fixed velocity of the hammer at the moment of impact. Pendulums of different initial energies (produced by varying their effective weights) are recommended for use with specimens of different impact strengths. Moreover, manufacturers of the equipment are permitted to use different lengths and constructions of pendulums (with resulting possible differences in pendulum rigidities (see Section 5), and other differences in machine design).

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

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 standard and ISO 180, Method 1U, are similar in content but are not technically equivalent.

2. Referenced Documents

2.1 *ASTM Standards:*

D 256 Test Methods for Impact Resistance of Plastics and Electrical Insulating Materials[2]

D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing[2]

D 883 Terminology Relating to Plastics[2]

D 5947 Test Methods for Physical Dimensions of Solid Plastic Specimens[3]

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method[4]

3. Terminology

3.1 *Definitions*—Definitions used in this test method are in accordance with Terminology D 883.

4. Summary of Test Method

4.1 This test method differs from others of similar character in that unnotched test specimens are used (see Test Methods D 256 for procedures using notched test specimens). The lack of a notch makes this test method especially useful for reinforced materials where a notch may mask the effects of orientation. It may also be used with other filled or unreinforced materials where a stress-concentrating notch is not desired. It is not valid for materials that twist when subjected to this test.

5. Significance and Use

5.1 The excess-energy pendulum-impact test indicates the energy to break standard test specimens of specified size under stipulated conditions of specimen mounting and pendulum velocity at impact.

5.2 The energy lost by the pendulum during the breakage of the specimen is the sum of the energies required to produce the following results:

5.2.1 To initiate fracture of the specimen,

5.2.2 To propagate the fracture across the specimen,

5.2.3 To throw the free end (or pieces) of the broken specimen (toss correction),

5.2.4 To bend the specimen,

5.2.5 To produce vibration in the pendulum arm,

5.2.6 To produce vibration or horizontal movement of the machine frame or base,

5.2.7 To overcome friction in the pendulum bearing and in the excess-energy-indicating mechanism, and to overcome windage (pendulum air drag),

5.2.8 To indent or deform plastically the specimen at the line of impact, and

[1] This test method is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.10 on Mechanical Properties.

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[2] *Annual Book of ASTM Standards,* Vol 08.01.

[3] *Annual Book of ASTM Standards,* Vol 08.03.

[4] *Annual Book of ASTM Standards,* Vol 14.02.

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