Designation: D 6110 – 04

# Standard Test Method for Determining the Charpy Impact Resistance of Notched Specimens of Plastics[1]

This standard is issued under the fixed designation D 6110; 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 is used to determine the resistance of plastics to breakage by flexural shock as indicated by the energy extracted from standardized (see Note 1) pendulum-type hammers, mounted in standardized machines, in breaking standard specimens with one pendulum swing. This test method requires specimens to be made with a milled notch (see Note 2). The notch produces a stress concentration which promotes a brittle, rather than a ductile, fracture. The results of this test method are reported in terms of energy absorbed per unit of specimen width (see Note 3).

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

NOTE 2—The specimens are standardized in that they have a fixed length and fixed depth, however, the width of the specimens is permitted to vary between limits. One design of milled notch is allowed. The notch in the specimen serves to concentrate the stress, minimize plastic deformation, and direct the fracture to the part of the specimen behind the notch. Scatter in energy-to-break is thus reduced. Because of differences in the elastic and viscoelastic properties of plastics, however, response to a given notch varies among materials.

NOTE 3—Caution must be exercised in interpreting the results of this test method. The following testing parameters have been shown to affect test results significantly: method of specimen fabrication, including but not limited to processing technology, molding conditions, mold design, and thermal treatment; method of notching; speed of notching tool; design of notching apparatus; quality of the notch; time between notching and test; test specimen thickness; test specimen width under notch; and environmental conditioning.

1.2 *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 4—This standard resembles ISO 179 in title only. The content is significantly different.

## 2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 618 Practice for Conditioning Plastics for Testing

D 647 Practice for Design of Molds for Test Specimens of Plastic Molding Materials[3]

D 883 Terminology Relating to Plastics

D 4000 Classification System for Specifying Plastic Materials

D 4066 Classification System for Nylon Injection and Extrusion Materials

D 5942 Test Method for Determination of Charpy Impact Strength

D 5947 Test Methods for Physical Dimensions of Solid Plastics Specimens

E 691 Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods

## 3. Terminology

3.1 *Definitions*—For definitions related to plastics, see Terminology D 883.

## 4. Summary of Test Method

4.1 A notched specimen is supported as a horizontal simple beam and is broken by a single swing of the pendulum with the impact line midway between the supports and directly opposite the notch.

## 5. Significance and Use

5.1 Before proceeding with this test method, refer to the material specification for the material being tested. Any test specimen preparation, conditioning, dimensions and testing parameters required by the materials specification shall take

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

Current edition approved March 1, 2004. Published April 2004. Originally approved in 1997. Last previous edition approved in 2002 as D 6110 - 02.

[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] *Discontinued 1994; Replaced by D 1896, D 3419, D 3641, D 4703, D 5227.*

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

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