



Designation: D256 – 10 (Reapproved 2018)

Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics¹

This standard is issued under the fixed designation D256; 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 resistance of plastics to “standardized” (see [Note 1](#)) pendulum-type hammers, mounted in “standardized” machines, in breaking standard specimens with one pendulum swing (see [Note 2](#)). The standard tests for these test methods require specimens made with a milled notch (see [Note 3](#)). In Test Methods A, C, and D, the notch produces a stress concentration that increases the probability of a brittle, rather than a ductile, fracture. In Test Method E, the impact resistance is obtained by reversing the notched specimen 180° in the clamping vise. The results of all test methods are reported in terms of energy absorbed per unit of specimen width or per unit of cross-sectional area under the notch. (See [Note 4](#).)

NOTE 1—The machines with their pendulum-type hammers 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. However, hammers of different initial energies (produced by varying their effective weights) 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 may exist. The specimens are “standardized” in that they are required to have one fixed length, one fixed depth, and one particular design of milled notch. The width of the specimens is permitted to vary between limits.

NOTE 2—Results generated using pendulums that utilize a load cell to record the impact force and thus impact energy, may not be equivalent to results that are generated using manually or digitally encoded testers that measure the energy remaining in the pendulum after impact.

NOTE 3—The notch in the Izod 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. However, because of differences in the elastic and viscoelastic properties of plastics, response to a given notch varies among materials. A measure of a plastic’s “notch sensitivity” may be obtained with Test Method D by comparing the energies to break specimens having different radii at the base of the notch.

¹ These test methods are under the jurisdiction of ASTM Committee D20 on Plastics and are the direct responsibility of Subcommittee D20.10 on Mechanical Properties.

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NOTE 4—Caution must be exercised in interpreting the results of these standard test methods. The following testing parameters may affect test results significantly:

- Method of fabrication, including but not limited to processing technology, molding conditions, mold design, and thermal treatments;
- 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 The values stated in SI units are to be regarded as 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

NOTE 5—These test methods resemble ISO 180:1993 in regard to title only. The contents are significantly different.

1.4 *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
- D3641 Practice for Injection Molding Test Specimens of Thermoplastic Molding and Extrusion Materials
- D4066 Classification System for Nylon Injection and Extrusion Materials (PA)

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.

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