



## Standard Test Method for Impact Resistance of Poly(Vinyl Chloride) (PVC) Rigid Profiles by Means of a Falling Weight<sup>1</sup>

This standard is issued under the fixed designation D 4495; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope \*

1.1 This test method covers the determination of the energy required to crack or break rigid poly(vinyl chloride) (PVC) profile under specified conditions of impact by means of a falling weight.

1.2 This test method is able to be used by itself or in conjunction with other methods of measuring PVC product toughness.

1.3 Because of the wide variety of profile sizes and shapes and the wide variety of manufacturing procedures and field abuse, this test method does not correlate universally with all types of abuse. Therefore, correlations must be established as needed.

1.4 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of this standard.

1.5 The values stated in inch-pound units are to be regarded as the standard.

NOTE 1—There is no equivalent or similar ISO standard.

1.6 *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.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing<sup>2</sup>
- D 883 Terminology Relating to Plastics<sup>2</sup>
- E 178 Practice for Dealing with Outlying Observations<sup>3</sup>

### 3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminology D 883, unless otherwise indicated.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.24 on Plastic Building Products. Current edition approved July 10, 2000. Published September 2000. Originally published as D 4495 – 85. Last previous edition D 4495 – 98.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 08.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 10.03.

### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *failure*—the presence of a brittle failure readily visible by the naked eye, including a sharp crack, split, or shatter in any part of the profile as a result of the impact of the falling weight. Failure does not include ductile tears (where the surfaces at the tip of the crack have a greater than 0° angle), or ductile breaks (hinged breaks where the cracked part remains joined to the unbroken part throughout the length of the cracked part or section), (Fig. 1).

3.2.2 *mean failure height*—the height from which the falling weight will cause 50 % of the specimens to fail.

3.2.3 *mean failure energy*—energy required to produce 50 % failures. The product of the weight and mean failure height.

3.2.4 *outlier*—an observation that appears to deviate markedly from other members of the sample in which it occurs.

### 4. Summary of Test Method

4.1 The profile is cut into lengths of at least 6 in. The test method establishes the height from which a standard falling weight will cause 50 % of the specimens to fail.

### 5. Significance and Use

5.1 The impact strength of PVC profiles relates to suitability for service and to quality of processing. Impact tests are used for quality-control purposes and as an indication that products can withstand handling during assembling, installation, or in service.

5.2 Results obtained by use of this test method can be used in two ways:

5.2.1 As the basis for establishing impact-test requirements in product standards, and

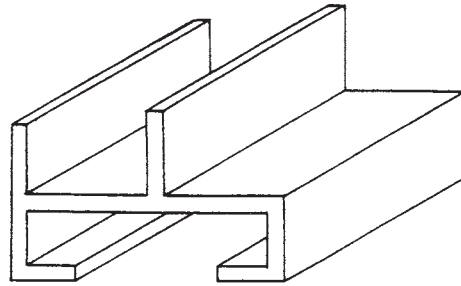
5.2.2 To measure the effect of changes in materials or processing.

### 6. Apparatus

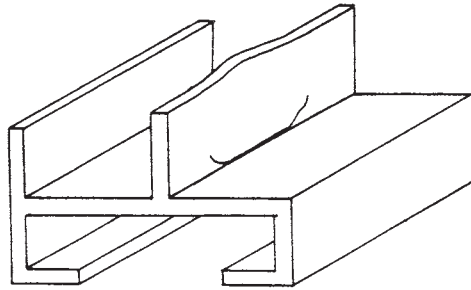
6.1 *General*—One type of impact tester is illustrated in Fig. 2.

6.2 *Falling Weight*, shall be cylindrical and 2 ½ in. in diameter, with a flat-bottom surface that strikes the test specimen.

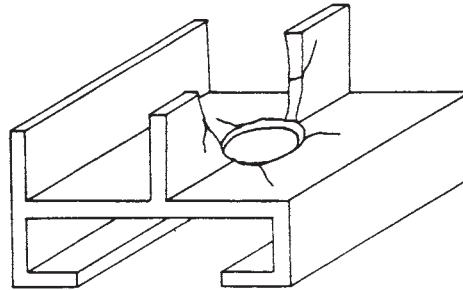
\*A Summary of Changes section appears at the end of this standard.



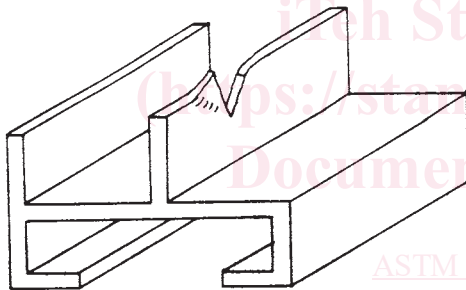
Original profile



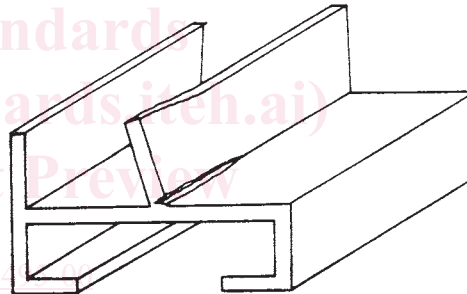
Sharp crack - brittle - zero degree angle at the tip  
FAILURE



Split or shatter - brittle - parts separated  
FAILURE



Tear - ductile - crack not sharp - tip of crack has greater than zero degree angle  
NON-FAILURE



Hinged break - ductile - crack not all the way through the sample  
NON-FAILURE

FIG. 1 Types of Breaks

NOTE 2—It is suggested that the striking portion of the weight be made of scratch-resistant steel to reduce damage to the striking surface. Badly scarred surfaces may affect test results.

6.2.1 The mass of the falling weight shall be  $10 \pm 0.5$  lb.

6.3 *Drop Tube*, shall be of sufficient length (approximately 12 ft (4 m)) to provide for a fall of at least 10 ft (3 m) and shall be mounted so that the lengthwise direction is vertical, as measured with a plumb bob or a spirit level at least 2 ft (600 mm) in length.

6.3.1 Care must be taken to ensure that the weight falls freely; it must not “chatter” down the tube.

NOTE 3—No particular material for the drop tube is specified. However, a cold-drawn seamless steel tubing with an inside diameter of  $2 \frac{5}{8}$  to  $2 \frac{3}{4}$  in. (67 to 70 mm) has been found to be satisfactory. It may also be necessary to provide a protective barrier around the specimen, particularly for larger sizes of profile, to protect the operator from flying broken pieces.

NOTE 4—The dropped weight may not fall freely if the clearance between the weight and tube is too large or too small, or if it is restrained

by a partial vacuum above the weight, such as can be caused by the hold and release device.

6.3.2 Means shall be provided to hold the weight to be dropped at steps of 2 in. (50 mm) for a distance of 2 to 10 ft (600 mm to 3 m) above the flat-plate holder, to release the weight in a reproducible manner, and to allow the weight to fall freely.

6.4 *Specimen Holder*—The flat plate shall be used as a specimen holder.

6.4.1 The rigid steel flat-plate holder shall consist of a plate approximately 8 by 12 by 1 in. (200 by 300 by 25 mm). The specimen holder shall be fastened to a concrete slab (floor). Means shall be provided to center the specimens under the drop tube.

## 7. Test Specimens

7.1 The profile shall be not less than 6 in. (150 mm) in length.