



Standard Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)¹

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This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This test method covers the determination of the impact resistance of thermoplastic pipe and fittings under specified conditions of impact by means of a tup (falling weight). Three interchangeable striking noses are used on the tup, differing in geometrical configuration. Two specimen holders are described.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered 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.*

2. Referenced Documents

2.1 ASTM Standards:²

D618 Practice for Conditioning Plastics for Testing

D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

3. Significance and Use

3.1 The impact resistance of thermoplastic pipe and fittings relates to suitability for service and to quality of processing. Impact resistance may also provide a relative measure of a material's resistance to breakage during handling and installation and, for non-buried applications, to in-service breakage. See Appendix X4 for guidelines for selecting testing combinations.

¹ This test method is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.40 on Test Methods.

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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.

3.2 Results obtained by use of this test method can be used in three ways:

3.2.1 As the basis for establishing impact test requirements in product standards,

3.2.2 To measure the effect of changes in materials or processing, and

3.2.3 To measure the effect of the environment.

4. Apparatus

4.1 *General*—One type of impact tester is illustrated in Fig. 1.

4.2 Tup:

4.2.1 The tup nose shall be as shown in Fig. 2. When used with the 0.50-in. (12.7-mm) radius nose, it is designated as Tup A. When used with the 2.00-in. (51-mm) radius nose, it is designated as Tup B. When used with the 0.25-in. (6.3-mm) radius nose, it is designated as Tup C.

NOTE 1—It is suggested that tups be made of scratch-resistant steel to reduce damage to the nose. Badly scarred noses may affect test results.

4.2.2 The mass of the tup shall be 6, 12, 20, or 30 lb (2.7, 5.4, 9.1, or 13.6 kg).

4.3 Drop Tube:

4.3.1 The drop tube shall be of sufficient length (approximately 12 ft (3.7 m)) to provide for a fall of at least 10 ft (3.0 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 (610 mm) in length.

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

NOTE 2—No material for the drop tube is specified. However, a colddrawn seamless steel tubing with an inside diameter of 2.563 ± 0.003 in. (65.10 ± 0.08 mm), or acrylonitrile-butadiene-styrene (ABS) or poly(vinyl chloride) (PVC) plastic pipe, 2½ in. nominal pipe size, with a standard dimension ratio (SDR) of 21, have been found to be satisfactory.

NOTE 3—Provided equivalent results are obtained, the tup may be dropped without a drop tube or guided by other means. The drop tube is used to reduce the hazard to operators and property that may occur when the tup rebounds. It also helps guide and center the tup so that it will be more likely to strike the top of the test specimen. It may also be necessary to provide a protective barrier around the specimen, particularly for larger sizes of pipe and fittings, to protect the operator from flying broken pieces.

NOTE 4—The tup may not fall freely if the clearance between the tup