



Standard Test Method for Brittleness Temperature of Plastic Sheeting by Impact¹

This standard is issued under the fixed designation D 1790; 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 that temperature at which plastic sheeting 1.00 mm (0.040 in.) or less in thickness exhibits a brittle failure under specified impact conditions.

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

NOTE 1—This test method was developed jointly with the Society of the Plastics Industry, primarily for use with plasticized vinyl sheetings. Its applicability to other plastic sheetings must be verified by the user.

1.3 *This standard does not purport to address 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.* Specific precautionary statements are given in Note 4.

NOTE 2—This test method is similar to ISO 8570-1991 in title only. The technical content is significantly different.

2. Referenced Documents

2.1 ASTM Standards:

D 618 Practice for Conditioning Plastics for Testing²

D 883 Terminology Relating to Plastics²

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method³

2.2 ISO Standard:

ISO 8570-1991 Plastics—Film and Sheeting—Determination of Cold-Crack Temperature⁴

3. Terminology

3.1 Definitions:

3.1.1 *brittleness temperature*, T_b —that temperature, derived statistically, where 80 % of the specimens would prob-

ably pass 95 % of the time when a stated minimum number are tested by this test method. The 80 %-passing value may be determined by plotting the data on probability graph paper, as described in 9.1.

3.1.2 *General*—Definitions of terms applying to this test method appear in Terminology D 883.

4. Significance and Use

4.1 Data obtained by this test method may be used to predict the behavior of plastic sheeting at low temperatures only if the conditions of deformation are similar to those specified in this test method. This test method is useful for specification testing and for comparative purposes, but does not necessarily measure the lowest temperature at which the plastic sheeting may be used.

4.2 It has been demonstrated that on calendered sheeting the brittleness temperature is sensitive to the direction of fold. It has also been demonstrated that the brittleness temperature is sensitive to the direction of sampling. Therefore, it is imperative that the procedure for taking specimens and folding be followed explicitly.

5. Apparatus

5.1 *Cold Conditioning Chamber*, at least 450 by 450 by 450 mm (18 by 18 by 18 in.). Means (automatic or manual) shall be provided for controlling the temperature of the chamber to within $\pm 2^\circ\text{C}$ of the desired value.

5.2 *Impact Tester*⁵ shown in Fig. 1 shall be constructed of cold-rolled steel except for the bolts, screws, and rubber stopper. All structural parts (that is, base, anvil, arm, arm supports, and shaft) may be chromium plated. The arm, including the rubber stopper and bolt, shall weigh $3.09\text{ kg} \pm 28\text{ g}$ ($6\text{ lb } 13 \pm 1\text{ oz}$).

5.3 *Die*, $50.8 \pm 0.4\text{ mm}$ by $146.1 \pm 0.4\text{ mm}$ ($2 \pm \frac{1}{64}\text{ in.}$ by $5\frac{3}{4} \pm \frac{1}{64}\text{ in.}$) to cut the test specimens from the sample.

5.4 *Stapler*, desk-type, with a stop mounted on the base exactly 12.7 mm ($\frac{1}{2}\text{ in.}$) back of the center of the groover that turns the staple.

5.5 *Index Card Stock*, 50 by 127 mm (2 by 5 in.).

¹ This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.30 on Thermal Properties (Section D20.30.07).

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

³ *Annual Book of ASTM Standards*, Vol 14.02.

⁴ Available from American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁵ A suitable tester is available from the United States Testing Co., 1415 Park Ave., Hoboken, NJ.

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

