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Standard Test Method for Bond or Cohesive Strength of Sheet Plastics and Electrical Insulating Materials¹

This standard is issued under the fixed designation D952; 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 the bond strength or ply adhesion strength of sheet plastic and electrical insulating materials. It is applicable to both laminated and nonlaminated thermoplastic and thermosetting materials.

1.2 Test data obtained by this test method is relevant and appropriate for use in engineering design.

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

1.4 *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 1—There is no known ISO equivalent to this standard.

2. Referenced Documents

2.1 *ASTM Standards:*²

D618 Practice for Conditioning Plastics for Testing

D883 Terminology Relating to Plastics

D4000 Classification System for Specifying Plastic Materials

~~D4066 Classification System for Nylon Injection and Extrusion Materials (PA)~~

D4805 Terminology for Plastics Standards

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

2.2 *ANSI Standard:*

B1.1 Standard for Unified Screw Threads³

3. Terminology

3.1 *Definitions*—For definitions of technical terms pertaining to plastics used in this test method, see Terminology D883 or Terminology D4805.

4. Significance and Use

4.1 This test, when applied to laminated plastics, is a measure of the interlaminar or intralaminar strength, whichever is smaller, in a direction normal to the plane of the laminate. When applied to nonlaminated plastics, the test is a measure of the cohesive strength of the material. The property determined is fundamental and has not yet been correlated with the results of any other method for bond strength.

4.2 The test may be found to be useful as (1) a research test when studying the effects of changes in independent variables, (2) a specification test, or (3) a referee test.

4.3 Before proceeding with this test method, reference should be made to the specification of the material being tested. Any test specimen preparation, conditioning, dimensions or testing parameters or combination thereof covered in the relevant ASTM materials specification shall take precedence over those in this test method. If there are no relevant ASTM material specifications then the default conditions apply. Table 1 of Classification System D4000 lists the ASTM materials standards that currently exist.

¹ This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.10 on Mechanical Properties. Current edition approved April 10, 2002. Published June 2002. Originally published as D952-48T. Last previous edition D952-95. DOI: 10.1520/D0952-02. Current edition approved May 1, 2010. Published June 2010. Originally approved in 1948. Last previous edition approved in 2002 as D952-02. DOI: 10.1520/D0952-10.

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 Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

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

TABLE 1 Precision Data

Materials	Average Strength, MPa (psi)	Coefficient of Variation	
		v_r Within ^A Laboratories	v_R Between ^B Laboratories
BMC	12.7 (1840)	7.1	7.1
SMC	14.0 (2030)	5.4	8.8

^A v_r is the within-laboratories standard deviation of the mean, expressed as a percentage of the listed average.

^B v_R is the between-laboratories standard deviation of the mean, expressed as a percentage of the listed average.

5. Apparatus and Materials

5.1 *Testing Machine*—Any suitable tensile testing machine capable of crosshead movement at a constant rate of 1.3 mm/min. (0.05 in./min.) and of sufficient capacity to exceed the failure load of the material being tested.

5.2 *Loading Fixtures*—The loading fixtures shall be self-aligning and shall not apply eccentric loads.

5.3 *Metal Blocks*—A pair of 51-mm (2-in.) square metal blocks each having a maximum height of 51 mm (2 in.). Each block shall be configured to permit attachment to the testing machine’s loading fixture (see Fig. 1).

NOTE 2—Blocks constructed from heat-treated aluminum alloy, each having a hole in one end tapped $\frac{7}{8}$ in. in accordance with ANSI B1.1, to accommodate threaded $\frac{7}{8}$ -in. studs of convenient length, have been used successfully.

5.4 *Adhesive*—Any adhesive that is found to perform satisfactorily under this test may be used provided that it will not influence the specimen behavior by physical or chemical effects.

NOTE 3—Redux⁴ has been found satisfactory for use with certain thermoset materials. Cyanoacrylate cement and room-temperature-curing epoxy have been used successfully for both thermoplastic and thermoset materials.

6. Test Specimen

6.1 The test specimen shall consist of sheet material 51 mm (2 in.) square, prepared in such a manner as to produce smooth edges. The thickness of the specimen shall be the thickness of the material. Opposite surfaces should be as parallel as possible to prevent eccentric loading of the material.

6.2 At least five specimens shall be tested for each sample.

6.3 For testing the material specified, this test method is so designed that failure between the adhesive and the metal should not occur. If failure does occur between the adhesive and the metal blocks, or between the adhesive and the specimen, discard the result and test another specimen.

7. Conditioning

7.1 *Conditioning*—Condition the test specimens at $23 \pm 2^\circ\text{C}$ ($73.4 \pm 3.6^\circ\text{F}$) and $50 \pm 5\%$ relative humidity for not less than 40 h prior to test in accordance with Procedure A of Practice Condition the test specimens in accordance with Procedure A of

⁴ Redux is available from the Shur-Lok Bonded Structures, Ltd., 1300 E. Normandy Place, Santa Ana, CA.

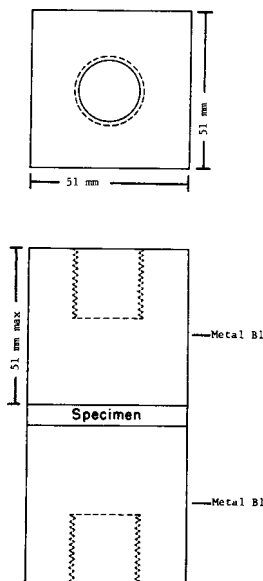


FIG. 1 Test Assembly for Bond Strength Test