



Standard Test Method for In-Plane Shear Strength of Reinforced Plastics¹

This standard is issued under the fixed designation D3846; 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 This test method covers the determination of the in-plane shear strength of reinforced thermosetting plastics in flat sheet form in thicknesses ranging from 2.54 to 6.60 mm (0.100 to 0.260 in.). This protocol is not for reinforced pultruded thermoset products, which may use Test Method [D2344/D2344M](#).

1.2 The values stated in SI units are to be regarded as the 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 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](#)
- [D695 Test Method for Compressive Properties of Rigid Plastics](#)
- [D2344/D2344M Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates](#)
- [E4 Practices for Force Verification of Testing Machines](#)
- [E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)

3. Terminology

3.1 *Definitions:*

3.1.1 *in-plane shear strength*—the shear strength at rupture in which the plane of fracture is located along the longitudinal

axis of the specimen between two centrally located notches machined halfway through its thickness on opposing faces.

4. Summary of Test Method

4.1 In-plane shear strength, as determined by this test method, is measured by applying a compressive load to a notched specimen of uniform width. The specimen is loaded edgewise in a supporting jig of the same description as that referenced in Test Method [D695](#) for testing thin specimens. A schematic of the specimen used for this test and the supporting jig is shown in [Fig. 1](#). Failure of the specimen occurs in *shear* between two centrally located notches machined halfway through its thickness and spaced a fixed distance apart on opposing faces.

5. Significance and Use

5.1 Shear tests of various kinds are widely used in the reinforced plastics industry to assess the strength of the reinforcement-to-resin bond in polyester-, vinyl ester-, and epoxy-resin composites. In addition to their importance for the generation of data for research and development, quality control, and specification purposes, such tests are of fundamental value to the fibrous reinforcement industry, since they can be used to assess the potential of new sizing systems for the surface treatment of glass fibers.

5.2 This test method is useful for establishing the shear strength of laminates or other reinforced plastics having randomly dispersed fiber reinforcement. While the test also lends itself to parallel-fiber reinforced plastics, it has been designed to accommodate nonparallel-fiber reinforced materials that cannot be tested satisfactorily by the short-beam procedure described in Test Method [D2344/D2344M](#).

6. Apparatus

6.1 *Testing Machine*—Any suitable testing machine capable of control of constant-rate-of-crosshead movement and comprising essentially the following:

6.1.1 *Drive Mechanism*—A drive mechanism for imparting to the movable member a uniform, controlled velocity with respect to the stationary member, as required in [10.3](#).

6.1.2 *Load Indicator*—A load-indicating mechanism capable of showing the total compressive load carried by the test

¹ This test method is under the jurisdiction of ASTM Committee [D20](#) on Plastics and is the direct responsibility of Subcommittee [D20.18](#) on Reinforced Thermosetting Plastics.

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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.