Designation: D 3846 – 02

# Standard Test Method for In-Plane Shear Strength of Reinforced Plastics[1]

This standard is issued under the fixed designation D 3846; 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 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.).

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—This standard has no known ISO equivalent.

## 2. Referenced Documents

2.1 *ASTM Standards:*

D 618 Practice for Conditioning Plastics for Testing[2]

D 695 Test Method for Compressive Properties of Rigid Plastics[2]

D 2344 Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates[3]

E 4 Practices for Force Verification of Testing Machines[4]

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method[5]

## 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 D 695 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 D 2344.

## 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 specimen. The mechanism shall be essentially free of inertial lag at the specified rate of testing and shall indicate the load

[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.

Current edition approved March 10, 2002. Published May 2002. Originally published as D 3846 – 79. Last previous edition D 3846 – 94.

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

[3] *Annual Book of ASTM Standards*, Vol 15.03.

[4] *Annual Book of ASTM Standards*, Vol 03.01.

[5] *Annual Book of ASTM Standards*, Vol 14.02.

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