

Standard Test Method for Measuring the Curved Beam Strength of a Fiber-Reinforced Polymer-Matrix Composite¹

This standard is issued under the fixed designation D 6415; 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.

^{ε1} NOTE—Equation 5 was editorially corrected in December 2000.

1. Scope

1.1 This test method determines the curved beam strength of a continuous fiber-reinforced composite material using a 90° curved beam specimen (Fig. 1). The curved beam consists of two straight legs connected by a 90° bend with a 6.4-mm inner radius. An out-of-plane (through-the-thickness) tensile stress is produced in the curved region of the specimen when load is applied. This test method is limited to use with composites consisting of layers of fabric or layers of unidirectional fibers.

1.2 This test method may also be used to measure the interlaminar tensile strength if a unidirectional specimen is used where the fibers run continuously along the legs and around the bend.

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.*

1.4 The values stated in SI units are to be regarded as standard. The values given in parentheses are provided for information purposes only.

2. Referenced Documents

2.1 ASTM Standards:

- D 883 Terminology Relating to Plastics²
- D 2734 Test Methods for Void Content of Reinforced Plastics³
- D 3171 Test Method for Fiber Content of Resin Matrix Composites by Matrix Digestion⁴
- D 3878 Terminology of High-Modulus Reinforcing Fibers and Their Composites⁴
- D 5229/D 5229M Test Method for Moisture Absorption Properties and Equilibrium Conditioning of Polymer Matrix Composite Materials⁴

¹ This test method is under the jurisdiction of ASTM Committee D30 on Composite Materials and is the direct responsibility of D30.06 on Interlaminar Properties.

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² Annual Book of ASTM Standards, Vol 08.01.

³ Annual Book of ASTM Standards, Vol 08.02.

⁴ Annual Book of ASTM Standards, Vol 15.03.

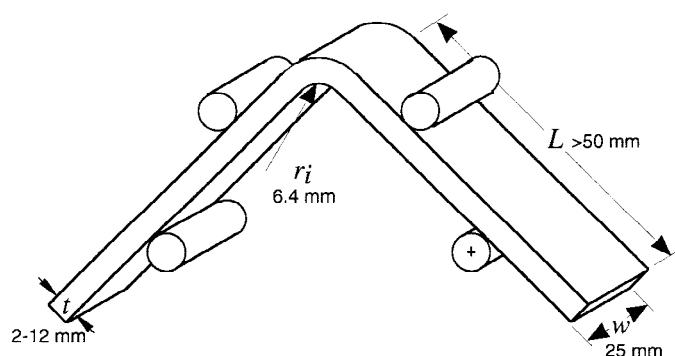


FIG. 1 Test Specimen Geometry

D 5687/D 5687M Guide for Preparation of Flat Composite Panels with Processing Guidelines for Specimen Preparation⁴

E 4 Practices for Force Verification of Testing Machines⁵

E 6 Terminology Relating to Methods of Mechanical Testing⁵

E 122 Practice for Choice of Sample Size to Estimate a Measure of Quality for a Lot or Process⁶

3. Terminology

3.1 **Definitions**—Terminology D 3878 defines terms relating to high-modulus fibers and their composites. Terminology D 883 defines terms relating to plastics. Terminology E 6 defines terms relating to mechanical testing. In the event of a conflict between terms, Terminology D 3878 shall have precedence over the other standards.

3.2 Definitions of Terms Specific to This Standard:

NOTE 1—If the term represents a physical quantity, its analytical dimensions are stated immediately following the term (or letter symbol) in fundamental dimension form, using the following ASTM standard symbology for fundamental dimensions, shown within square brackets: [M] for mass, [L] for length, [T] for time, [θ] for thermodynamic temperature, and [nd] for nondimensional quantities. Use of these symbols is restricted to analytical dimensions when used with square brackets, as the symbols may have other definitions when used without the brackets.

⁵ Annual Book of ASTM Standards, Vol 03.01.

⁶ Annual Book of ASTM Standards, Vol 14.02.