Designation: D 5450/D 5450M – 93 (Reapproved 2000)

Standard Test Method for Transverse Tensile Properties of Hoop Wound Polymer Matrix Composite Cylinders[1]

This standard is issued under the fixed designation D 5450/D 5450M; 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 determines the transverse tensile properties of wound polymer matrix composites reinforced by high-modulus continuous fibers. It describes testing of hoop wound (90°) cylinders in axial tension for determination of transverse tensile properties.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. Within the text, the inch-pound units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement[2]

D 883 Terminology Relating to Plastics[2]

D 2584 Test Method for Ignition Loss of Cured Reinforced Resins[3]

D 2734 Test Method for Void Content of Reinforced Plastics[3]

D 3171 Test Method for Constituent Content of Composite Materials[4]

D 3878 Terminology of Composite Materials[4]

D 5229/D 5229M Test Methods for Moisture Absorption Properties and Equilibrium Conditioning of Polymer Matrix Composite Materials[4]

D 5448/D 5448M Test Method for Inplane Shear Properties of Hoop Wound Polymer Matrix Composite Cylinders[4]

D 5449/D 5449M Test Method for Transverse Compressive Properties of Hoop Wound Polymer Matrix Composite Cylinders[4]

E 4 Practices for Force Verification of Testing Machines[5]

E 6 Terminology Relating to Methods of Mechanical Testing[5]

E 111 Test Method for Young's Modulus, Tangent Modulus, and Chord Modulus[5]

E 122 Practice for Calculating Sample Size to Estimate with a Specified Tolerable Error, the Average for a Characteristic of a Lot or Process[6]

E 132 Test Method for Poisson's Ratio at Room Temperature[5]

E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods[6]

E 251 Test Methods for Performance Characteristics of Metallic Bonded Resistance Strain Gages[5]

E 456 Terminology Relating to Quality and Statistics[6]

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method[6]

E 1012 Practice for Verification of Specimen Alignment Under Tensile Loading[5]

E 1237 Guide for Installing Bonded Resistance Strain Gages[5]

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. Terminology E 456 and Practice E 177 define terms relating to statistics. In the event of a conflict between terms, Terminology D 3878 shall have precedence over other standards.

3.2 *Descriptions of Terms:*[7]

[1] This test method is under the jurisdiction of ASTM Committee D30 on High Modulus Fibers and Their Composites and is the direct responsibility of Subcommittee D30.04 on Lamina and Laminate Test Methods.

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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.

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

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

[7] 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 non-dimensional 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.

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