



Standard Practice for Filled-Hole Tension and Compression Testing of Polymer Matrix Composite Laminates¹

This standard is issued under the fixed designation D 6742/D 6742M; 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 practice provides instructions for modifying open-hole tension and compression test methods to determine filled-hole tensile and compressive strengths. The composite material forms are limited to continuous-fiber reinforced polymer matrix composites in which the laminate is both symmetric and balanced with respect to the test direction. The range of acceptable test laminates and thicknesses are described in 8.2.1.

1.2 This practice supplements Test Methods D 5766/D 5766M (for tension testing) and D 6484/D 6484M (for compression testing) with provisions for testing specimens that contain a close-tolerance fastener or pin installed in the hole. Several important test specimen parameters (for example, fastener selection, fastener installation method, and fastener hole tolerance) are not mandated by this practice; however, repeatable results require that these parameters be specified and reported.

1.3 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.

1.4 *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.*

2. Referenced Documents

2.1 ASTM Standards:

- D 792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement²
- D 883 Terminology Relating to Plastics²

- D 3171 Test Methods for Constituent Content of Composite Materials³
- D 3878 Terminology for Composite Materials³
- D 5229/D 5229M Test Method for Moisture Absorption Properties and Equilibrium Conditioning of Polymer Matrix Composite Materials³
- D 5766/D 5766M Test Method for Open-Hole Tensile Strength of Polymer Matrix Composite Laminates³
- D 6484/D 6484M Test Method for Open-Hole Compressive Strength of Polymer Matrix Composite Laminates³
- D 6507 Practice for the Fiber Reinforcement Orientation Codes for Composite Materials³
- E 6 Terminology Relating to Methods of Mechanical Testing⁴
- E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods⁵
- E 456 Terminology Relating to Quality and Statistics⁵
- E 1309 Guide for Identification of Fiber-Reinforced Polymer-Matrix Composite Materials in Databases³
- E 1434 Guide for Recording Mechanical Test Data of Fiber-Reinforced Composite Materials in Databases³

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 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 International 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.

3.2.1 nominal value, *n*—a value, existing in name only,

¹ This practice is under the jurisdiction of ASTM Committee D30 on Composite Materials, and is the direct responsibility of Subcommittee D30.05 on Structural Test Methods.

Current edition approved Oct. 10, 2002. Published November 2002. Originally published as D 6742/D 6742M – 01. Last previous edition D 6742/D 6742M – 01.

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.