



Standard Test Method for Bearing Response of Polymer Matrix Composite Laminates¹

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^{€1} NOTE—Equation 5 was editorially corrected in February 2003.

1. Scope

1.1 This test method determines the bearing response of multi-directional polymer matrix composite laminates reinforced by high-modulus fibers by either double-shear (Procedure A) or single-shear (Procedure B) tensile loading of a specimen. Standard specimen configurations using fixed values of test parameters are described for each procedure. However, when fully documented in the test report, a number of test parameters may be optionally varied. The composite material forms are limited to continuous-fiber or discontinuous-fiber (tape or fabric, or both) reinforced composites for which the laminate is balanced and symmetric with respect to the test direction. The range of acceptable test laminates and thicknesses are described in 8.2.1.

1.2 This test method is consistent with the recommendations of MIL-HDBK-17, which describes the desirable attributes of a bearing response test method.

1.3 The multi-fastener test configurations described in this test method are similar to those used by industry to investigate the bypass portion of the bearing bypass interaction response for bolted joints, where the specimen may produce either a bearing failure mode or a bypass failure mode. While this test method may be referenced as guidance in bearing bypass test programs, the scope of this test method is limited to bearing failure modes.

1.4 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.

1.5 *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 953 Test Method for Bearing Strength of Plastics²
- D 2584 Test Method for Ignition Loss of Cured Reinforced Resins³
- D 2734 Test Method for Void Content of Reinforced Plastics³
- D 3171 Test Method for Constituent Content of Composite Materials⁴
- D 3878 Terminology for Composite Materials⁴
- D 5229/D 5229M Test Method for Moisture Absorption Properties and Equilibrium Conditioning of Polymer Matrix Composite Materials⁴
- 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 83 Practice for Verification and Classification of Extensometers⁵
- E 122 Practice for Calculating Sample Size to Estimate, With a Specified Tolerable Error, the Average for a Characteristic of a Lot or Process⁶
- E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods⁶
- E 238 Test Method for Pin-Type Bearing Test of Metallic Materials⁵
- E 456 Terminology Relating to Quality and Statistics⁶
- E 1309 Guide for Identification of Fiber-Reinforced Polymer-Matrix Composite Materials in Databases⁴
- E 1434 Guide for Recording Mechanical Test Data of Fiber-Reinforced Composite Materials in Databases⁴

¹ This test method is under the jurisdiction of ASTM Committee D30 on Composite Materials and is the direct responsibility of Subcommittee D30.05 on Structural 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.