



Designation: D 6416/D 6416M – 99

Standard Test Method for Two-Dimensional Flexural Properties of Simply Supported Sandwich Composite Plates Subjected to a Distributed Load¹

This standard is issued under the fixed designation D 6416/D 6416M; 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 two-dimensional flexural properties of sandwich composite plates subjected to a distributed load. The test fixture uses a relatively large square panel sample which is simply supported all around and has the distributed load provided by a water-filled bladder. This type of loading differs from the procedure of Test Method C 393, where concentrated loads induce one-dimensional, simple bending in beam specimens.

1.2 This test method is applicable to composite structures of the sandwich type which involve a relatively thick layer of core material bonded on both faces with an adhesive to thin-face sheets composed of a denser, higher-modulus material, typically, a polymer matrix reinforced with high-modulus fibers.

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 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.

2. Referenced Documents

2.1 ASTM Standards:

- C 274 Terminology of Structural Sandwich Constructions²
- C 365 Test Methods for Flatwise Compressive Strength of Sandwich Cores²
- C 393 Test Method for Flexural Properties of Flat Sandwich Constructions²
- D 792 Test Method for Density and Specific Gravity (Relative Density) and Density of Plastics by Displacement³

¹ This test method is under the jurisdiction of ASTM Committee D-30 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 15.03.

³ Annual Book of ASTM Standards, Vol 08.01.

D 2584 Test Method for Ignition Loss of Cured Reinforced Resins⁴

D 2734 Test Method for Void Content of Reinforced Plastics⁴

D 3171 Test Method for Fiber Content of Resin-Matrix Composites by Matrix Digestion²

D 3878 Terminology of High-Modulus Reinforcing Fibers and Their Composites²

E 4 Practices for Force Verification of Testing Machines⁵

E 6 Terminology Relating to Methods of Mechanical Testing⁵

E 251 Test Methods for Performance Characteristics of Metallic Bonded Resistance Strain Gages⁵

E 1237 Guide for Installing Bonded Resistance Strain Gages⁵

3. Terminology

3.1 Terminology D 3878 defines terms relating to high-modulus fibers and their composites. Terminology C 274 defines terms relating to structural sandwich constructions. 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 terminology standards.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *bending stiffness, n*—the sandwich property which resists bending deflections.

3.2.2 *core, n*—a centrally located layer of a sandwich construction, usually low density, which separates and stabilizes the facings and transmits shear between the facings and provides most of the shear rigidity of the construction.

3.2.3 *face sheet, n*—the outermost layer or composite component of a sandwich construction, generally thin and of high density, which resists most of the edgewise loads and flatwise bending moments: synonymous with face, skin, and facing.

3.2.4 *footprint, n*—the enclosed area of the face sheet surface of a sandwich panel in contact with the pressure bladder during loading.

3.2.5 *hydromat, n*—a pressure bladder with a square perimeter fabricated from two square pieces of industrial belting

⁴ Annual Book of ASTM Standards, Vol 08.02.

⁵ Annual Book of ASTM Standards, Vol 03.01.