Designation: D 6416/D 6416M – 01

Standard Test Method for Two-Dimensional Flexural Properties of Simply Supported Sandwich Composite Plates Subjected to a Distributed Load[1]

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 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:*

C 274 Terminology of Structural Sandwich Constructions[2]

C 365 Test Methods for Flatwise Compressive Strength of Sandwich Cores[2]

C 393 Test Method for Flexural Properties of Flat Sandwich Constructions[2]

D 792 Test Methods for Density and Specific Gravity (Relative Density) and Density of Plastics by Displacement[3]

D 2584 Test Method for Ignition Loss of Cured Reinforced Resins[4]

D 2734 Test Method for Void Content of Reinforced Plastics[4]

D 3171 Test Method for Constituent Content of Composite Materials[2]

D 3878 Terminology for High-Modulus Reinforcing Fibers and Their Composites[2]

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

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

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

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

2.2 *ASTM Adjunct:*

Sandwich Plate Test Fixture and Hydromat Pressure Bladder, ASTM D 6416/D 6416M[6]

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.

[1] This test method is under the jurisdiction of ASTM Committee D30 on Composite Materials and is the direct responsibility of Subcommittee D30.09 on Sandwich Construction.

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[2] *Annual Book of ASTM Standards*, Vol 15.03.

[3] *Annual Book of ASTM Standards*, Vol 08.01.

[4] *Annual Book of ASTM Standards*, Vol 08.02.

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

[6] Detailed drawings for the fabrication of the 500–mm test fixture and pressure bladder shown in Fig. 3 and Fig. 4 are available from ASTM Headquarters. Order Adjunct No. ADJD6416.

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