



Standard Practice for Determining Sandwich Beam Flexural and Shear Stiffness¹

This standard is issued under the fixed designation D7250/D7250M; 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 covers determination of the flexural and transverse shear stiffness properties of flat sandwich constructions subjected to flexure in such a manner that the applied moments produce curvature of the sandwich facing planes. Permissible core material forms include those with continuous bonding surfaces (such as balsa wood and foams) as well as those with discontinuous bonding surfaces (such as honeycomb). The calculation methods in this practice are limited to sandwich beams exhibiting linear force-deflection response. This practice uses test results obtained from Test Methods [C393/C393M](#) and/or [D7249/D7249M](#).

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

1.2.1 Within the text the inch-pound units are shown in brackets.

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:*²

- [C273 Test Method for Shear Properties of Sandwich Core Materials](#)
- [C393/C393M Test Method for Core Shear Properties of Sandwich Constructions by Beam Flexure](#)
- [D883 Terminology Relating to Plastics](#)

[D3878 Terminology for Composite Materials](#)

[D7249/D7249M Test Method for Facing Properties of Sandwich Constructions by Long Beam Flexure](#)

[E6 Terminology Relating to Methods of Mechanical Testing](#)

[E122 Practice for Calculating Sample Size to Estimate, With Specified Precision, the Average for a Characteristic of a Lot or Process](#)

[E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods](#)

[E456 Terminology Relating to Quality and Statistics](#)

3. Terminology

3.1 *Definitions*—Terminology [D3878](#) defines terms relating to high-modulus fibers and their composites, as well as terms relating to sandwich constructions. Terminology [D883](#) defines terms relating to plastics. Terminology [E6](#) defines terms relating to mechanical testing. Terminology [E456](#) and Practice [E177](#) define terms relating to statistics. In the event of a conflict between terms, Terminology [D3878](#) shall have precedence over the other terminologies.

3.2 *Symbols:* b = sandwich width, mm [in.]

c = core thickness, mm [in.]

d = sandwich thickness, mm [in.]

D = flexural stiffness, N-mm² [lb-in.²]

Δ = beam mid-span deflection, mm [in.]

G = core shear modulus, MPa [psi]

S = support span length, mm [in.]

L = load span length, mm [in.] ($L = 0.0$ for 3-point mid-span loading configuration)

n = number of specimens

P = total applied force, N [lb]

t = facing thickness, mm [in.]

U = transverse shear rigidity, N [lb]

4. Summary of Practice

4.1 This practice consists of calculating the flexural stiffness, transverse (through-thickness) shear rigidity and core shear modulus of a sandwich beam using deflection and/or strain data from two or more flexure tests of different loading configurations conducted under Test Methods [C393/C393M](#) and/or [D7249/D7249M](#). This practice also includes equations for calculating the shear rigidity and core shear modulus of a

¹ This practice 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 For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.