



Standard Test Method for Transthickness Tensile Strength of Continuous Fiber- Reinforced Advanced Ceramics at Ambient Temperature¹

This standard is issued under the fixed designation C1468; 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 covers the determination of transthickness tensile strength (S_T^t) under monotonic uniaxial forcing of continuous fiber-reinforced ceramics (CFCC) at ambient temperature. This test method addresses, but is not restricted to, various suggested test specimen geometries, test fixtures, data collection and reporting procedure. In general, round or square test specimens are tensile tested in the direction normal to the thickness by bonding appropriate hardware to the samples and performing the test. For a Cartesian coordinate system, the x -axis and the y -axis are in the plane of the test specimen. The transthickness direction is normal to the plane and is labeled the z -axis for this test method. For CFCCs, the plane of the test specimen normally contains the larger of the three dimensions and is parallel to the fiber layers for uni-directional, bi-directional, and woven composites. Note that transthickness tensile strength as used in this test method refers to the tensile strength obtained under monotonic uniaxial forcing where monotonic refers to a continuous nonstop test rate with no reversals from test initiation to final fracture.

1.2 This test method is intended primarily for use with all advanced ceramic matrix composites with continuous fiber reinforcement: unidirectional (1-D), bidirectional (2-D), woven, and tridirectional (3-D). In addition, this test method also may be used with glass (amorphous) matrix composites with 1-D, 2-D, and 3-D continuous fiber reinforcement. This test method does not address directly discontinuous fiber-reinforced, whisker-reinforced or particulate-reinforced ceramics, although the test methods detailed here may be equally applicable to these composites. It should be noted that 3-D architectures with a high volume fraction of fibers in the “ z ” direction may be difficult to test successfully.

1.3 Values are in accordance with the International System of Units (SI) and [IEEE/ASTM SI 10](#).

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. Additional recommendations are provided in [6.7](#) and Section [7](#).

2. Referenced Documents

2.1 ASTM Standards:²

- [C1145 Terminology of Advanced Ceramics](#)
- [C1239 Practice for Reporting Uniaxial Strength Data and Estimating Weibull Distribution Parameters for Advanced Ceramics](#)
- [C1275 Test Method for Monotonic Tensile Behavior of Continuous Fiber-Reinforced Advanced Ceramics with Solid Rectangular Cross-Section Test Specimens at Ambient Temperature](#)
- [C1468 Test Method for Transthickness Tensile Strength of Continuous Fiber-Reinforced Advanced Ceramics at Ambient Temperature](#)
- [D3878 Terminology for Composite Materials](#)
- [E4 Practices for Force Verification of Testing Machines](#)
- [E6 Terminology Relating to Methods of Mechanical Testing](#)
- [E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods](#)
- [E337 Test Method for Measuring Humidity with a Psychrometer \(the Measurement of Wet- and Dry-Bulb Temperatures\)](#)
- [E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)
- [IEEE/ASTM SI 10 American National Standard for Use of the International System of Units \(SI\): The Modern Metric System.](#)
- [E1012 Practice for Verification of Testing Frame and Specimen Alignment Under Tensile and Compressive Axial Force Application](#)

3. Terminology

3.1 Definitions:

¹ This test method is under the jurisdiction of ASTM Committee [C28](#) on Advanced Ceramics and is the direct responsibility of Subcommittee [C28.07](#) on Ceramic Matrix Composites.

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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.