



Standard Practice for Constant-Amplitude, Axial, Tension-Tension Cyclic Fatigue of Continuous Fiber-Reinforced Advanced Ceramics at Ambient Temperatures¹

This standard is issued under the fixed designation C1360; 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 the determination of constant-amplitude, axial tension-tension cyclic fatigue behavior and performance of continuous fiber-reinforced advanced ceramic composites (CFCCs) at ambient temperatures. This practice builds on experience and existing standards in tensile testing CFCCs at ambient temperatures and addresses various suggested test specimen geometries, specimen fabrication methods, testing modes (force, displacement, or strain control), testing rates and frequencies, allowable bending, and procedures for data collection and reporting. This practice does not apply to axial cyclic fatigue tests of components or parts (that is, machine elements with nonuniform or multiaxial stress states).

1.2 This practice applies primarily to advanced ceramic matrix composites with continuous fiber reinforcement: uni-directional (1-D), bi-directional (2-D), and tri-directional (3-D) or other multi-directional reinforcements. In addition, this practice may also be used with glass (amorphous) matrix composites with 1-D, 2-D, 3-D, and other multi-directional continuous fiber reinforcements. This practice does not directly address discontinuous fiber-reinforced, whisker-reinforced or particulate-reinforced ceramics, although the methods detailed here may be equally applicable to these composites.

1.3 The values stated in SI units are to be regarded as the standard and are in accordance with [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. Refer to Section 7 for specific precautions.*

¹ This practice 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. Referenced Documents

2.1 ASTM Standards:²

- [C1145 Terminology of 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](#)
- [D3479/D3479M Test Method for Tension-Tension Fatigue of Polymer Matrix Composite Materials](#)
- [D3878 Terminology for Composite Materials](#)
- [E4 Practices for Force Verification of Testing Machines](#)
- [E6 Terminology Relating to Methods of Mechanical Testing](#)
- [E83 Practice for Verification and Classification of Extensometer Systems](#)
- [E337 Test Method for Measuring Humidity with a Psychrometer \(the Measurement of Wet- and Dry-Bulb Temperatures\)](#)
- [E467 Practice for Verification of Constant Amplitude Dynamic Forces in an Axial Fatigue Testing System](#)
- [E468 Practice for Presentation of Constant Amplitude Fatigue Test Results for Metallic Materials](#)
- [E739 Practice for Statistical Analysis of Linear or Linearized Stress-Life \(\$S-N\$ \) and Strain-Life \(\$\epsilon-N\$ \) Fatigue Data](#)
- [E1012 Practice for Verification of Testing Frame and Specimen Alignment Under Tensile and Compressive Axial Force Application](#)
- [E1150 Definitions of Terms Relating to Fatigue \(Withdrawn 1996\)³](#)
- [E1823 Terminology Relating to Fatigue and Fracture Testing](#)
- [IEEE/ASTM SI 10 Standard for Use of the International System of Units \(SI\) \(The Modern Metric System\)](#)

3. Terminology

3.1 Definitions:

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.

³ The last approved version of this historical standard is referenced on www.astm.org.

*A Summary of Changes section appears at the end of this standard