



Standard Test Method for Monotonic Equibiaxial Flexural Strength of Advanced Ceramics at Ambient Temperature¹

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1. Scope

1.1 This test method covers the determination of the equibiaxial strength of advanced ceramics at ambient temperature via concentric ring configurations under monotonic uniaxial loading. In addition, test specimen fabrication methods, testing modes, testing rates, allowable deflection, and data collection and reporting procedures are addressed. Two types of test specimens are considered: machined test specimens and as-fired test specimens exhibiting a limited degree of warpage. Strength as used in this test method refers to the maximum strength obtained under monotonic application of load. Monotonic loading refers to a test conducted at a constant rate in a continuous fashion, with no reversals from test initiation to final fracture.

1.2 This test method is intended primarily for use with advanced ceramics that macroscopically exhibit isotropic, homogeneous, continuous behavior. While this test method is intended for use on monolithic advanced ceramics, certain whisker- or particle-reinforced composite ceramics as well as certain discontinuous fiber-reinforced composite ceramics may also meet these macroscopic behavior assumptions. Generally, continuous fiber ceramic composites do not macroscopically exhibit isotropic, homogeneous, continuous behavior, and the application of this test method to these materials is not recommended.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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.*

¹ This test method is under the jurisdiction of ASTM Committee C28 on Advanced Ceramics and is the direct responsibility of Subcommittee C28.01 on Mechanical Properties and Performance.

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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

C1259 Test Method for Dynamic Young's Modulus, Shear Modulus, and Poisson's Ratio for Advanced Ceramics by Impulse Excitation of Vibration

C1322 Practice for Fractography and Characterization of Fracture Origins in Advanced Ceramics

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)

F394 Test Method for Biaxial Flexure Strength (Modulus of Rupture) of Ceramic Substrates (Discontinued 2001) (Withdrawn 2001)³

IEEE/ASTM SI 10 Standard for Use of the International System of Units (SI): The Modern Metric System

3. Terminology

3.1 Definitions:

3.1.1 The definitions of terms relating to biaxial testing appearing in Terminology E6 and Terminology C1145 may apply to the terms used in this test method. Pertinent definitions are listed below with the appropriate source given in parentheses. Additional terms used in conjunction with this test method are defined in the following section.

3.1.2 *advanced ceramic, n*—highly engineered, high performance predominately non-metallic, inorganic, ceramic material having specific functional attributes. **C1145**

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.