



Standard Test Method for Effect of Surface Grinding on Flexure Strength of Advanced Ceramics¹

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1. Scope

1.1 This test method covers the determination of the effect of surface grinding on the flexure strength of advanced ceramics. Surface grinding of an advanced ceramic material can introduce microcracks and other changes in the near surface layer, generally referred to as damage (see Fig. 1 and Ref. (1)).² Such damage can result in a change—most often a decrease—in flexure strength of the material. The degree of change in flexure strength is determined by both the grinding process and the response characteristics of the specific ceramic material. This method compares the flexure strength of an advanced ceramic material after application of a user-specified surface grinding process with the baseline flexure strength of the same material. The baseline flexure strength is obtained after application of a surface grinding process specified in this standard. The baseline flexure strength is expected to approximate closely the inherent strength of the material. The flexure strength is measured by means of ASTM flexure test methods.

1.2 Flexure test methods used to determine the effect of surface grinding are C1161 Test Method for Flexure Strength of Advanced Ceramics at Ambient Temperatures and C1211 Test Method for Flexure Strength of Advanced Ceramics at Elevated Temperatures.

1.3 Materials covered in this standard are those advanced ceramics that meet criteria specified in flexure testing standards C1161 and C1211.

1.4 The flexure test methods supporting this standard (C1161 and C1211) require test specimens that have a rectangular cross section, flat surfaces, and that are fabricated with specific dimensions and tolerances. Only grinding processes that are capable of generating the specified flat surfaces, that is, planar grinding modes, are suitable for evaluation by this method. Among the applicable machine types are horizontal

and vertical spindle reciprocating surface grinders, horizontal and vertical spindle rotary surface grinders, double disk grinders, and tool-and-cutter grinders. Incremental cross-feed, plunge, and creep-feed grinding methods may be used.

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

1.6 *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:³

- C1145 Terminology of Advanced Ceramics
- C1161 Test Method for Flexural Strength of Advanced Ceramics at Ambient Temperature
- C1211 Test Method for Flexural Strength of Advanced Ceramics at Elevated Temperatures
- C1239 Practice for Reporting Uniaxial Strength Data and Estimating Weibull Distribution Parameters for Advanced Ceramics
- C1322 Practice for Fractography and Characterization of Fracture Origins in Advanced Ceramics
- C1341 Test Method for Flexural Properties of Continuous Fiber-Reinforced Advanced Ceramic Composites

3. Terminology

3.1 Materials Related:

3.1.1 *advanced ceramic, n*—a highly engineered, high-performance, predominately nonmetallic, inorganic, ceramic material having specific functional attributes. **C1145**

3.1.2 *baseline flexure strength, n*—in the context of this standard, refers to the flexure strength value obtained after application of a grinding procedure specified in this standard.

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 The boldface numbers in parentheses refer to a list of references at the end of this standard.

³ 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.