



Standard Guide for Measurements on Small Graphite Specimens¹

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1. Scope*

1.1 This guide covers best practice for properties measurements on small (nonstandard) graphite specimens and requirements for representing properties of the bulk material. This guide is aimed specifically at measurements required on nuclear graphites, where there may be constraints on the geometry or volume of the test specimen, or both. The objective of this guide is to provide advice on how the application of selected standards under noncompliant conditions can be tested for suitability.

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

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

- C559 Test Method for Bulk Density by Physical Measurements of Manufactured Carbon and Graphite Articles
- C565 Test Methods for Tension Testing of Carbon and Graphite Mechanical Materials
- C611 Test Method for Electrical Resistivity of Manufactured Carbon and Graphite Articles at Room Temperature
- C651 Test Method for Flexural Strength of Manufactured Carbon and Graphite Articles Using Four-Point Loading at Room Temperature
- C695 Test Method for Compressive Strength of Carbon and Graphite
- C714 Test Method for Thermal Diffusivity of Carbon and Graphite by Thermal Pulse Method

- C747 Test Method for Moduli of Elasticity and Fundamental Frequencies of Carbon and Graphite Materials by Sonic Resonance
- C748 Test Method for Rockwell Hardness of Graphite Materials
- C749 Test Method for Tensile Stress-Strain of Carbon and Graphite
- C769 Test Method for Sonic Velocity in Manufactured Carbon and Graphite Materials for Use in Obtaining an Approximate Value of Young's Modulus
- C781 Practice for Testing Graphite and Boronated Graphite Materials for High-Temperature Gas-Cooled Nuclear Reactor Components
- C886 Test Method for Scleroscope Hardness Testing of Carbon and Graphite Materials
- C1161 Test Method for Flexural Strength of Advanced Ceramics at Ambient Temperature
- C1259 Test Method for Dynamic Young's Modulus, Shear Modulus, and Poisson's Ratio for Advanced Ceramics by Impulse Excitation of Vibration
- D7972 Test Method for Flexural Strength of Manufactured Carbon and Graphite Articles Using Three-Point Loading at Room Temperature
- E228 Test Method for Linear Thermal Expansion of Solid Materials With a Push-Rod Dilatometer
- E1461 Test Method for Thermal Diffusivity by the Flash Method

3. Summary of Guide

3.1 There is currently a suite of ASTM standards (see 2.1) that can be applied to graphite covering a range of physical, mechanical, electrical and thermal property measurements. Each of these standards has been developed with the objective of optimizing the method of measurement in the absence of any constraints on test specimen production. Without exception, these standards specify limits on the ratio between test specimen dimensions and coke and filler grain sizes or prescribe test specimen geometries or size ranges, or both. The default position for any user should be to follow these standards exactly as described. However, in some applications, available test material or experiment design constraints on test specimen sizes may result in noncompliance. The objective of this guide is to provide advice on how the application of selected standards under noncompliant conditions can be tested for

¹ This guide is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.F0 on Manufactured Carbon and Graphite Products.

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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.