



Standard Practice for Testing Graphite and Boronated Graphite Materials for High-Temperature Gas-Cooled Nuclear Reactor Components¹

This standard is issued under the fixed designation C781; 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 test methods for measuring the properties of graphite and boronated graphite materials. These properties may be used for the design and evaluation of high-temperature gas-cooled reactor components.

1.2 The test methods referenced herein are applicable to materials used for replaceable and permanent components as defined in Section 7 and Section 9, and includes fuel elements; removable reflector elements and blocks; permanent side reflector elements and blocks; core support pedestals and elements; control rod, reserve shutdown, and burnable poison compacts; and neutron shield material.

1.3 This practice includes test methods that have been selected from existing ASTM standards, ASTM standards that have been modified, and new ASTM standards that are specific to the testing of materials listed in 1.2. Comments on individual test methods for graphite and boronated graphite components are given in Sections 8 and 10, respectively. The test methods are summarized in Tables 1 and 2.

1.4 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

1.5 *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 Measure-

ments of Manufactured Carbon and Graphite Articles

C561 Test Method for Ash in a Graphite Sample

C577 Test Method for Permeability of Refractories

C611 Test Method for Electrical Resistivity of Manufactured Carbon and Graphite Articles at Room Temperature

C625 Practice for Reporting Irradiation Results on Graphite

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

C709 Terminology Relating to Manufactured Carbon and Graphite

C747 Test Method for Moduli of Elasticity and Fundamental Frequencies of Carbon and Graphite Materials by Sonic Resonance

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 Young's Modulus

C816 Test Method for Sulfur in Graphite by Combustion-Iodometric Titration Method

C838 Test Method for Bulk Density of As-Manufactured Carbon and Graphite Shapes

C1039 Test Methods for Apparent Porosity, Apparent Specific Gravity, and Bulk Density of Graphite Electrodes

C1179 Test Method for Oxidation Mass Loss of Manufactured Carbon and Graphite Materials in Air

C1233 Practice for Determining Equivalent Boron Contents of Nuclear Materials

C1274 Test Method for Advanced Ceramic Specific Surface Area by Physical Adsorption

D346 Practice for Collection and Preparation of Coke Samples for Laboratory Analysis

D1193 Specification for Reagent Water

D2854 Test Method for Apparent Density of Activated Carbon

D2862 Test Method for Particle Size Distribution of Granular Activated Carbon

D3104 Test Method for Softening Point of Pitches (Mettler Softening Point Method)

¹ This practice 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.