



Designation: C751 – 07

## Standard Specification for Nuclear-Grade Boron Carbide Pellets<sup>1</sup>

This standard is issued under the fixed designation C751; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This specification applies to boron carbide pellets for use as a control material in nuclear reactors.

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

### 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

**C559** Test Method for Bulk Density by Physical Measurements of Manufactured Carbon and Graphite Articles

**C750** Specification for Nuclear-Grade Boron Carbide Powder

**C791** Test Methods for Chemical, Mass Spectrometric, and Spectrochemical Analysis of Nuclear-Grade Boron Carbide

**C859** Terminology Relating to Nuclear Materials

**E105** Practice for Probability Sampling Of Materials

2.2 *ANSI Standard*:

**ANSI/ASME NQA-1** Quality Assurance Program Requirements for Nuclear Facilities<sup>3</sup>

2.3 *U.S. Government Document*:

**Title 10**, CFR, Energy Part 50 (10 CFR 50) Licensing of Domestic Production and Utilization Facilities<sup>4</sup>

### 3. Terminology

3.1 Terms shall be defined in accordance with Terminology **C859**, except for the following:

3.2 *buyer*—the organization issuing the purchase order.

3.3 *pellet lot*—that quantity of pellets produced from one boron carbide powder lot using one set of process parameters. The pellet lot size shall be agreed upon between seller and buyer.

3.4 *powder lot*—a fixed quantity of boron carbide powder blended together such that samples taken in accordance with Section 7 on Sampling can be considered as representative of the entire fixed quantity.

3.5 *seller*—the boron carbide pellet supplier.

### 4. Chemical Composition

4.1 The starting boron carbide powder used to produce these pellets shall be in accordance with Specification **C750**.

4.2 Analytical chemistry methods used to test pellets for conformance with this specification shall be those of Method **C791** or demonstrated equivalent methods agreed upon between buyer and seller.

4.3 The <sup>10</sup>B concentration (gram <sup>10</sup>B per unit volume or grams <sup>10</sup>B per unit length) may be specified by the buyer. The buyer should consider the following in specifying the allowable range in <sup>10</sup>B concentration:

4.3.1 Variations in chemical composition,

4.3.2 Bulk pellet density,

4.3.3 Boron isotopic composition, and

4.3.4 Pellet dimensions.

4.4 The finished boron carbide pellets shall conform to the chemical analysis in **Table 1**.

### 5. Physical Requirements Physical Requirements

5.1 *Physical Dimensions*:

5.1.1 Dimensional requirements shall be in accordance with applicable drawings and purchase order documents.

5.1.2 Pellet dimensions shall be measured to ensure compliance with the buyer's requirements.

5.2 *Density*:

5.2.1 Pellet density limits shall be specified by the buyer.

5.2.2 The method of density measurement shall be Test Method **C559** or an alternative method approved by the buyer. Sampling plans to meet the acceptance criteria shall be agreed upon between the buyer and the seller. The method of density measurement and the method of compliance with **5.2.1** shall be approved by the buyer.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee **C26** on Nuclear Fuel Cycle and is the direct responsibility of Subcommittee **C26.03** on Neutron Absorber Materials Specifications.

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<sup>2</sup> 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.

<sup>3</sup> Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

<sup>4</sup> Available from U.S. Government Printing Office, Washington, DC 20402.