



Standard Specification for Nuclear-Grade Boron Carbide Powder¹

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1. Scope

1.1 This specification defines the chemical and physical requirements for boron carbide powder intended for a variety of nuclear applications. Because each application has a different need for impurity and boron requirements, three different chemical compositions of powder are specified. In using this specification, it is necessary to dictate which type of powder is intended to be used. In general, the intended applications for the various powder types are as follows:

1.1.1 *Type 1*—For use as particulate material in nuclear reactor core applications.

1.1.2 *Type 2*—Powder that will be further processed into a fabricated shape for use in a nuclear reactor core or used in non-core applications when the powder directly or indirectly may cause adverse effects on structural components, such as halide stress corrosion of stainless steel.

1.1.3 *Type 3*—Powder that will be used for non-core applications or special in-core applications.

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

2. Referenced Documents

2.1 *ASTM Standards*:²

B527 Test Method for Determination of Tap Density of Metallic Powders and Compounds

B822 Test Method for Particle Size Distribution of Metal Powders and Related Compounds by Light Scattering

B923 Test Method for Metal Powder Skeletal Density by Helium or Nitrogen Pycnometry

C371 Test Method for Wire-Cloth Sieve Analysis of Non-plastic Ceramic Powders

C791 Test Methods for Chemical, Mass Spectrometric, and

¹ 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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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.

[Spectrochemical Analysis of Nuclear-Grade Boron Carbide](#)

[E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves](#)

[E105 Practice for Probability Sampling of Materials](#)

[2.2 ANSI Standard](#):³

[ANSI/ASME NQA-1 Quality Assurance Program Requirements for Nuclear Facilities](#)

[2.3 U.S. Government Document](#):⁴

[Title 10, Code of Federal Regulations, Energy Part 50 \(10CFR 50\), Domestic Licensing of Production and Utilization Facilities](#)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard*:

3.1.1 *buyer*—organization issuing the purchase order.

3.1.2 *powder lot*—that quantity of boron carbide powder blended together such that samples taken in accordance with the procedures of 8.1 can be considered as representative of the entire powder lot.

3.1.3 *seller*—boron carbide powder supplier.

4. Ordering Information

4.1 The buyer may specify the following information on the order:

4.1.1 Quantity (weight of delivered product).

4.1.2 Nominal particle size, particle size range, and applicable tolerance.

4.1.3 Density and method of measurement.

4.1.4 Angular or spherical shape.

4.1.5 Shape factor.

4.1.6 Lot size.

4.1.7 Sampling requirements.

4.1.8 Powder type (1, 2, or 3).

4.1.9 Isotopic content (¹⁰B).

5. Chemical Composition

NOTE 1—B₄C powder is hygroscopic and certain applications require low-moisture content.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, <http://www.access.gpo.gov>.