



Designation: C 750 – 03

Standard Specification for Nuclear-Grade Boron Carbide Powder¹

This standard is issued under the fixed designation C 750; 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 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.

2. Referenced Documents

2.1 ASTM Standards:

B 329 Test Method for Apparent Density of Powders of Refractory Metals and Compounds by the Scott Volumeter²

C 117 Test Method for Material Finer than 75- μm (No. 200) Sieve in Mineral Aggregates by Washing³

C 371 Test Method for Wire-Cloth Sieve Analysis of Non-plastic Ceramic Powders⁴

C 493 Test Method for Bulk Density and Porosity of Granular Refractory Materials by Mercury Displacement⁵

C 791 Test Methods for Chemical, Mass Spectrometric, and Spectrochemical Analysis of Nuclear-Grade Boron Carbide⁶

C 859 Terminology Relating to Nuclear Materials⁶

E 11 Specification for Wire-Cloth Sieves for Testing Purposes⁷

E 105 Practice for Probability Sampling of Materials⁷

2.2 ANSI Standard:

ANSI/ASME NQA-1 Quality Assurance Program Requirements for Nuclear Facilities⁸

2.3 U.S. Government Document:

Title 10, Code of Federal Regulations, Energy Part 50 (10CFR 50), Domestic Licensing of Production and Utilization Facilities⁹

3. Terminology

3.1 *Descriptions of Terms Specific to This Standard*—Terms shall be defined in accordance with Terminology C 859 except for the following:

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.

¹ Annual Book of ASTM Standards, Vol 14.02.

² Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

³ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

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 Annual Book of ASTM Standards, Vol 02.05.

³ Annual Book of ASTM Standards, Vol 04.02.

⁴ Annual Book of ASTM Standards, Vol 15.02.

⁵ Annual Book of ASTM Standards, Vol 15.01.

⁶ Annual Book of ASTM Standards, Vol 12.01.