



Designation: C 992 – 89 (Reapproved 1997)

Standard Specification for Boron-Based Neutron Absorbing Material Systems for Use in Nuclear Spent Fuel Storage Racks¹

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1. Scope

1.1 This specification defines criteria for boron-based neutron absorbing material systems used in racks for storage of nuclear light water reactor (LWR) spent-fuel assemblies or disassembled components in a pool environment, or both.

1.2 The materials systems described herein shall be functional for their service life in the operating environment of a nuclear reactor spent-fuel pool.

1.3 A number of acceptable boron-based absorbing materials combinations are currently available while others are being developed for use in the future. This specification defines criteria essential and applicable to all materials combinations and identifies parameters a buyer should specify to satisfy a unique or particular requirement.

1.4 Compliance with this specification does not relieve the seller or the buyer from obligation to conform to applicable federal regulations governing the storage of nuclear fuel.

2. Referenced Documents

2.1 ASTM Standards:

A 240 Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels²

B 209 Specification for Aluminum and Aluminum Alloy Sheet and Plate³

C 750 Specification for Nuclear-Grade Boron Carbide Powder⁴

C 859 Terminology Relating to Nuclear Materials⁴

E 105 Practice for Probability Sampling of Materials⁵

2.2 ANSI Standards:⁶

ANSI 45.2.2 Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants

ANSI-ASME NQA-1 Quality Assurance Program Requirements for Nuclear Facilities

2.3 U. S. Government Documents:⁷

Title 10, CFR, Energy Part 50 (10CFR50) Licensing of Production and Utilization Facilities

Title 10, CFR, Energy Part 72 (10CFR72) Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation (ISFSI)

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 Terms shall be defined in accordance with Terminology C 859 except as defined as follows:

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

3.1.3 *individual piece*—a discrete section of neutron absorber material whose individual dimensions conform to those in the purchase specification.

3.1.4 *irradiation*—the neutron, beta and gamma fluxes, from spent-fuel assemblies in a water-filled spent fuel pool.

3.1.5 *production batch*—a group of neutron-absorbing material pieces produced in a continuous production period, all of which can be shown to have the same chemical composition, physical, and nuclear properties within specification limits.

3.1.6 *seller*—the neutron absorbing system manufacturer.

3.1.7 *service life*—the period of time for which properties of the neutron-absorbing material system are expected to remain in compliance with the contract requirements which relate to chemical and physical integrity.

3.1.8 *supplier*—any outside source of raw materials and services used by the seller.

4. Ordering Information

4.1 The buyer should specify the following environmental conditions to which the neutron absorbing material system shall be exposed:

4.1.1 Total service life of the neutron absorbing material system (considered forty years unless otherwise specified),

4.1.2 Dose rate and maximum integrated irradiation over the total service life of the neutron absorbing material system, and

¹ This specification is under the jurisdiction of ASTM Committee C-26 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 01.03.

³ *Annual Book of ASTM Standards*, Vol 02.02.

⁴ *Annual Book of ASTM Standards*, Vol 12.01.

⁵ *Annual Book of ASTM Standards*, Vol 14.02.

⁶ Available from the American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁷ Available from Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.