



Standard Guide for Establishing Surveillance Test Program for Boron-Based Neutron Absorbing Material Systems for Use in Nuclear Spent Fuel Storage Racks¹

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1. Scope

1.1 This guide provides advice for establishing a surveillance test program to monitor the performance of boron-based neutron absorbing material systems (absorbers) in nuclear spent fuel storage racks. The recommended practices presented in this guide, when implemented, will provide a comprehensive surveillance test program to verify the presence of sufficient neutron absorbing material within the storage racks. The performance of a surveillance test program provides added assurance of the safe and effective operation of a high-density storage facility for nuclear spent fuel.

1.2 *This standard does not purport to address all of the safety problems, 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:

- C 859 Terminology Relating to Nuclear Materials²
- C 992 Specification for Boron-Based Neutron Absorbing Material Systems for Use in Nuclear Spent Fuel Storage Racks²
- C 1068 Guide for Qualification of Measurement Methods by a Laboratory Within the Nuclear Industry²
- D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension³
- D 430 Test Methods for Rubber Deterioration—Dynamic Fatigue³
- D 518 Test Method for Rubber Deterioration—Surface Cracking³
- D 813 Test Method for Rubber Deterioration—Crack Growth³
- D 1415 Test Method for Rubber Property—International Hardness³
- D 2240 Test Method for Rubber Property—Durometer Hardness³

D 3183 Practice for Rubber—Preparation of Pieces for Test Purposes from Products³

D 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries³

E 6 Terminology Relating to Methods of Mechanical Testing⁴

E 8 Test Methods for Tension Testing of Metallic Materials⁴

E 23 Test Methods for Notched Bar Impact Testing of Metallic Materials⁴

E 74 Practice for Calibration of Force Measuring Instruments for Verifying the Force Indication of Testing Machines⁴

E 290 Test Method for Semi-Guided Bend Test for Ductility of Metallic Materials⁴

E 1027 Practice for Exposure of Polymeric Materials to Ionizing Radiation⁵

G 1 Practice for Preparing, Cleaning, and Evaluating Corrosion Test Specimens⁶

G 4 Method for Conducting Corrosion Coupon Tests in Plant Equipment⁶

G 15 Terminology Relating to Corrosion and Corrosion Testing⁶

G 16 Guide for Applying Statistics to Analysis of Corrosion Data⁶

G 46 Practice for Examination and Evaluation of Pitting Corrosion⁶

G 69 Practice for Measurement of Corrosion Potentials of Aluminum Alloys⁶

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

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

3.1.1.1 *absorber*—a boron-based neutron-absorbing material system.

3.1.1.2 *high-density storage*—the close-packing of spent fuel to the extent that absorbers are required for neutron flux reduction.

3.1.1.3 *irradiation*—the neutron, beta and gamma fluxes,

¹ This guide 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 12.01.

³ Annual Book of ASTM Standards, Vol 09.01.

⁴ Annual Book of ASTM Standards, Vol 03.01.

⁵ Annual Book of ASTM Standards, Vol 12.02

⁶ Annual Book of ASTM Standards, Vol 03.02.