Designation: E1035 – 18 (Reapproved 2023)

Standard Practice for Determining Neutron Exposures for Nuclear Reactor Vessel Support Structures[1]

This standard is issued under the fixed designation E1035; 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 practice covers procedures for monitoring the neutron radiation exposures experienced by ferritic materials in nuclear reactor vessel support structures located in the vicinity of the active core. This practice includes guidelines for:

1.1.1 Selecting appropriate dosimetric sensor sets and their proper installation in reactor cavities.

1.1.2 Making appropriate neutronics calculations to predict neutron radiation exposures.

1.2 The values stated in SI units are to be regarded as standard; units that are not SI can be found in Terminology E170 and are to be regarded as standard. Any values in parentheses are for information only.

1.3 This practice is applicable to all pressurized water reactors whose vessel supports will experience a lifetime neutron fluence (E > 1 MeV) that exceeds 1×10^{17} neutrons/cm^2 or exceeds 3.0×10^{-4} dpa (**1**).[2] (See Terminology E170.)

1.4 Exposure of vessel support structures by gamma radiation is not included in the scope of this practice, but see the brief discussion of this issue in 3.2.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* (For example, (**2**).)

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

E170 Terminology Relating to Radiation Measurements and Dosimetry

E482 Guide for Application of Neutron Transport Methods for Reactor Vessel Surveillance

E693 Practice for Characterizing Neutron Exposures in Iron and Low Alloy Steels in Terms of Displacements Per Atom (DPA)

E844 Guide for Sensor Set Design and Irradiation for Reactor Surveillance

E854 Test Method for Application and Analysis of Solid State Track Recorder (SSTR) Monitors for Reactor Surveillance

E910 Test Method for Application and Analysis of Helium Accumulation Fluence Monitors for Reactor Vessel Surveillance

E944 Guide for Application of Neutron Spectrum Adjustment Methods in Reactor Surveillance

E1005 Test Method for Application and Analysis of Radiometric Monitors for Reactor Vessel Surveillance

E1018 Guide for Application of ASTM Evaluated Cross Section Data File

E2956 Guide for Monitoring the Neutron Exposure of LWR Reactor Pressure Vessels

2.2 *ASME Standard:*[4]

Boiler and Pressure Vessel Code, Section III

2.3 *Nuclear Regulatory Documents:*[5]

Code of Federal Regulations, Chapter 10, Part 50, Appendix G Fracture Toughness Requirements

Code of Federal Regulations, Chapter 10, Part 50, Appendix H Reactor Vessel Materials Surveillance Program Requirements

Regulatory Guide 1.99, Rev. 2 Effects of Residual Elements

[1] This practice is under the jurisdiction of ASTM Committee E10 on Nuclear Technology and Applications and is the direct responsibility of Subcommittee E10.05 on Nuclear Radiation Metrology.

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[2] The boldface numbers in parentheses refer to a list of references at the end of this practice.

[3] 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.

[4] Available from American Society of Mechanical Engineers, 345 E. 47th St., New York, NY 10017.

[5] Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.