



Standard Practice for Design of Surveillance Programs for Light-Water Moderated Nuclear Power Reactor Vessels¹

This standard is issued under the fixed designation E185; 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 designing a surveillance program for monitoring the radiation-induced changes in the mechanical properties of ferritic materials in light-water moderated nuclear power reactor vessels. New advanced light-water small modular reactor designs with a nominal design output of 300 MWe or less have not been specifically considered in this practice. This practice includes the minimum requirements for the design of a surveillance program, selection of vessel material to be included, and the initial schedule for evaluation of materials.

1.2 This practice was developed for all light-water moderated nuclear power reactor vessels for which the predicted maximum fast neutron fluence ($E > 1$ MeV) exceeds 1×10^{21} neutrons/m² (1×10^{17} n/cm²) at the inside surface of the ferritic steel reactor vessel.

1.3 This practice does not provide specific procedures for monitoring the radiation induced changes in properties beyond the design life. Practice E2215 addresses changes to the withdrawal schedule during and beyond the design life.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

NOTE 1—The increased complexity of the requirements for a light-water moderated nuclear power reactor vessel surveillance program has necessitated the separation of the requirements into three related standards. Practice E185 describes the minimum requirements for design of a surveillance program. Practice E2215 describes the procedures for testing and evaluation of surveillance capsules removed from a reactor vessel. Guide E636 provides guidance for conducting additional mechanical tests. A summary of the many major revisions to Practice E185 since its original issuance is contained in Appendix X1.

NOTE 2—This practice applies only to the planning and design of surveillance programs for reactor vessels designed and built after the effective date of this practice. Previous versions of Practice E185 apply to earlier reactor vessels. See Appendix X1.

¹ This practice is under the jurisdiction of ASTM Committee E10 on Nuclear Technology and Applications and is the direct responsibility of Subcommittee E10.02 on Behavior and Use of Nuclear Structural Materials.

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2. Referenced Documents

2.1 ASTM Standards:²

- A370 Test Methods and Definitions for Mechanical Testing of Steel Products
- A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products
- E8/E8M Test Methods for Tension Testing of Metallic Materials
- E21 Test Methods for Elevated Temperature Tension Tests of Metallic Materials
- E23 Test Methods for Notched Bar Impact Testing of Metallic Materials
- E170 Terminology Relating to Radiation Measurements and Dosimetry
- E208 Test Method for Conducting Drop-Weight Test to Determine Nil-Ductility Transition Temperature of Ferritic Steels
- E482 Guide for Application of Neutron Transport Methods for Reactor Vessel Surveillance
- E636 Guide for Conducting Supplemental Surveillance Tests for Nuclear Power Reactor Vessels, E 706 (IH)
- E844 Guide for Sensor Set Design and Irradiation for Reactor Surveillance, E 706 (IIC)
- E853 Practice for Analysis and Interpretation of Light-Water Reactor Surveillance Results
- E900 Guide for Predicting Radiation-Induced Transition Temperature Shift in Reactor Vessel Materials
- E1214 Guide for Use of Melt Wire Temperature Monitors for Reactor Vessel Surveillance, E 706 (IIIE)
- E1253 Guide for Reconstitution of Irradiated Charpy-Sized Specimens
- E1820 Test Method for Measurement of Fracture Toughness
- E1921 Test Method for Determination of Reference Temperature, T_o , for Ferritic Steels in the Transition Range
- E2215 Practice for Evaluation of Surveillance Capsules from Light-Water Moderated Nuclear Power Reactor Vessels

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.