



Designation: E 261 – 98

Standard Practice for Determining Neutron Fluence, Fluence Rate, and Spectra by Radioactivation Techniques¹

This standard is issued under the fixed designation E 261; 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 describes the general procedures for the determination of neutron fluence rate, fluence, and energy spectra from the radioactivity that is induced in a detector specimen.

1.2 The practice is directed toward the determination of these quantities in connection with radiation effects on materials.

1.3 For application of these techniques to reactor vessel surveillance, see also Test Methods E 1005.

1.4 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—Detailed methods for individual detectors are given in the following ASTM test methods: E 262, E 263, E 264, E 265, E 266, E 343, E 393, E 418, E 481, E 523, E 526, E 704, E 705, and E 854.

2. Referenced Documents

2.1 ASTM Standards:

- E 170 Terminology Relating to Radiation Measurements and Dosimetry²
- E 181 Test Methods for Detector Calibration and Analysis of Radionuclides²
- E 262 Test Method for Determining Thermal Neutron Reaction and Fluence Rates by Radioactivation Techniques²
- E 263 Test Method for Measuring Fast-Neutron Reaction Rates by Radioactivation of Iron²
- E 264 Test Method for Measuring Fast-Neutron Reaction Rates by Radioactivation of Nickel²
- E 265 Test Method for Measuring Reaction Rates and Fast-Neutron Fluences by Radioactivation of Sulfur-32²
- E 266 Test Method for Measuring Fast-Neutron Reaction Rates by Radioactivation of Aluminum²
- E 343 Test Method for Measuring Reaction Rates by Analysis of Molybdenum-99 Radioactivity from Fission Dosimeters²

¹ This practice is under the jurisdiction of ASTM Committee E-10 on Nuclear Technology and Applications and is the direct responsibility of Subcommittee E10.05 on Nuclear Radiation Metrology.

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² Annual Book of ASTM Standards, Vol 12.02.

E 393 Test Method for Measuring Reaction Rates by Analysis of Barium-140 from Fission Dosimeters²

E 418 Method for Measuring Fast-Neutron Flux by Track-Etch Technique³

E 481 Test Method for Measuring Neutron Fluence Rate by Radioactivation of Cobalt and Silver²

E 523 Test Method for Measuring Fast-Neutron Reaction Rates by Radioactivation of Copper²

E 526 Test Method for Measuring Fast-Neutron Reaction Rates by Radioactivation of Titanium²

E 704 Test Method for Measuring Reaction Rates by Radioactivation of Uranium-238²

E 705 Test Method for Measuring Reaction Rates by Radioactivation of Neptunium-237²

E 844 Guide for Sensor Set Design and Irradiation for Reactor Surveillance, E 706(IIC)²

E 854 Test Method for Application and Analysis of Solid State Track Recorder (SSTR) Monitors for Reactor Surveillance, E 706(IIIB)²

E 944 Guide for Application of Neutron Spectrum Adjustment Methods in Reactor Surveillance, (IIA)²

E 1005 Test Method for Application and Analysis of Radiometric Monitors for Reactor Vessel Surveillance, E 706 (IIIA)

E 1018 Guide for Application of ASTM Evaluated Cross Section Data File, Matrix E 706 (IIB)²

2.2 ISO Standard:

Guide in the Expression of Uncertainty in Measurement

3. Terminology

3.1 Descriptions of terms relating to dosimetry are found in Terminology E 170.

4. Summary of Practice

4.1 A sample containing a known amount of the nuclide to be activated is placed in the neutron field. The sample is removed after a measured period of time and the induced activity is determined.

5. Significance and Use

5.1 *Transmutation Processes*—The effect on materials of bombardment by neutrons depends on the energy of the

³ Discontinued—see 1984 Annual Book of ASTM Standards, Vol 12.02.