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Standard Practice for Fabrication of the Neutron Radiographic Beam Purity Indicators[1]

This standard is issued under the fixed designation E 2003; 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.

ε[1] NOTE—The designation number was corrected editorially in February 2000.

1. Scope

1.1 This practice covers the material and fabrication of a Beam Purity Indicator (BPI), which can be used to determine the relative quality of radiographic images produced by direct, thermal neutron radiographic examination.

1.2 The values stated in SI units are regarded to be standard.

1.3 *This standard does not purport to address 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.*

2. Referenced Documents

2.1 *ASTM Standards:*

E 543 Practice for Agencies Performing Nondestructive Testing[2]

E 545 Method for Determining Image Quality in Direct Thermal Neutron Radiographic Examination[2]

E 748 Practices for Thermal Neutron Radiography of Materials[2]

E 1316 Terminology for Nondestructive Examinations[2]

3. Terminology

3.1 *Definitions*— For definitions of terms used in this practice, see Terminology E 1316, Section H.

4. Summary of Practice

4.1 The BPI is used for quantitative determination of thermal neutron radiographic quality. It consists of a polytetrafluoroethylene block containing two boron nitride disks, two lead disks and two cadmium wires. A key feature of the device is the ability to make visual analysis of its image for subjective quality information. Densitometric measurements of the image of the device permit quantitative determination of radiographic contrast, low-energy photon contribution, pair production contribution, image unsharpness, and information regarding film and processing quality.

4.2 Neutron radiography practices are discussed in Practice E 748.

5. Significance and Use

5.1 The BPI is designed to yield quantitative information concerning neutron beam and image system parameters that contribute to film exposure, and thereby, affect overall image quality. For proper measurements of film exposure due to the neutron beam constituents, the BPI must be fabricated in accordance with this practice.

5.2 This practice shall be followed for the fabrication of all Beam Purity Indicators to be used with Method E 545 to determine image quality in direct thermal neutron radiography.

6. Basis of Application

6.1 *Qualification of Nondestructive Agencies*—If specified in the contractual agreement, NDT agencies shall be qualified and evaluated as described in Practice E 543. The applicable revision of Practice E 543 shall be specified in the contractual agreement.

6.2 *Procedures and Techniques*—The procedures and techniques to be utilized shall be as described in this practice unless otherwise specified. Specific techniques may be specified in the contractual agreement.

6.3 *Reporting Criteria/Acceptance Criteria*—Reporting criteria for the examination results shall be in accordance with Sections 9 and 10 unless otherwise specified. Acceptance criteria, for example, for reference radiographs, shall be specified in the contractual agreement.

6.4 *Reexamination of Repaired/Reworked Items*—Reexamination of repaired/reworked items is not addressed in this practice and, if required, shall be specified in the contractual agreement.

7. Beam Purity Indicator (BPI)

7.1 The BPI shall be constructed of polytetrafluoroethylene, cadmium, lead, and boron nitride.

[1] This practice is under the jurisdiction of ASTM Committee E-07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.05 on Radiology (Neutron) Method.

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[2] *Annual Book of ASTM Standards,* Vol 03.03.