



Standard Practice for Fabrication of Neutron Radiographic Sensitivity Indicators¹

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1. Scope

1.1 This practice covers the fabrication of Sensitivity Indicators (SI), 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 inch-pound units are regarded to be standard. The SI equivalents given in parentheses in the text are for information only.

1.3 *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.*

2. Referenced Documents

2.1 ASTM Standards:

E 543 Practice for Evaluating Agencies Performing Nondestructive Testing²

E 545 Method for Determining Image Quality in Direct Thermal Neutron Radiographic Examination²

E 748 Practices for Thermal Neutron Radiography of Materials²

E 1316 Terminology for Nondestructive Examinations²

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 Sensitivity Indicator (SI) is used for qualitative determination of the sensitivity of detail visible on the neutron radiograph. It consists of a step wedge containing gaps and holes of known dimensions. Visual inspection of the image of this device provides subjective information regarding total radiographic sensitivity with respect to the step-block material, as well as optional subjective data, regarding detrimental levels of gamma exposure.

4.2 Neutron radiography practices are discussed in Practices E 748. The neutron radiograph used to determine image quality using the SI shall meet the requirements of Method E 545.

5. Significance and Use

5.1 The only truly valid image quality indicator is a material or component, equivalent to the part being neutron radiographed, with a known standard discontinuity, inclusion, omission or flaw (reference standard comparison part). The SI is designed to substitute for the reference standard, providing qualitative information on hole and gap sensitivity in a single unit. Fabrication in accordance with this practice is vital for accurate and consistent measurements.

5.2 This practice shall be followed for the fabrication of all SIs 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 edition 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, reference radiographs, shall be specified in the contractual agreement.

6.4 Reexamination of repaired/reworked items is not addressed in this practice and, if required, shall be specified in the contractual document.

7. Sensitivity Indicator (SI)

7.1 The Sensitivity Indicator (SI) shall be constructed of cast acrylic resin, lead (optional), and aluminum. The construction and dimensions are shown in Fig. 1.

7.2 The optional lead step in the SI may be replaced with a blank, cast acrylic resin step. The lead provides a visual indication of beam gamma content; however, the lead image is not used for any of the SI calculations of Method E 545.

¹ This practice is under the jurisdiction of ASTM Committee E-7 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.