



Standard Practice for Determining Relative Image Quality Response of Industrial Radiographic Imaging Systems¹

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1. Scope

1.1 This standard provides a practice whereby industrial radiographic imaging systems may be comparatively assessed using the concept of relative image quality response (RIQR). The RIQR method presented within this practice is based upon the use of equivalent penetrameter sensitivity (EPS) described within Practice E1025 and subsection 5.2 of this practice. Figure 1 illustrates a relative image quality indicator (RIQI) that has four different steel plaque thicknesses (.015, .010, .008, and .005 in.) sequentially positioned (from top to bottom) on a 3/4-in. thick steel plate. The four plaques contain a total of 14 different arrays of penetrameter-type hole sizes designed to render varied conditions of threshold visibility ranging from 1.92 % EPS (at the top) to .94 % EPS (at the bottom) when exposed to nominal 200 keV X-ray radiation. Each “EPS” array consists of 30 identical holes; thus, providing the user with a quantity of threshold sensitivity levels suitable for relative image qualitative response comparisons.

1.2 This practice is not intended to qualify the performance of a specific radiographic technique nor for assurance that a radiographic technique will detect specific discontinuities in a specimen undergoing radiographic examination. This practice is not intended to be used to classify or derive performance classification categories for radiographic imaging systems. For example, performance classifications of radiographic film systems may be found within Test Method E1815.

1.3 This practice contains an alternate provision whereby industrial radiographic imaging systems may be comparatively assessed using Lucite plastic material exposed to nominal 30 keV X-ray radiation. The RIQI for this alternate evaluation is also illustrated in Fig. 1, except the plaque and base plate materials are constructed of Lucite plastic in lieu of steel. EPS values for Lucite plastic are provided in Section 5 based upon the use of a 1 3/8-in. thick Lucite base plate. For high-energy X-ray applications (4 to 25 MeV), Test Method E1735 provides a similar RIQR standard practice.

1.4 The values stated in SI are to be regarded as the standard.

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

2. Referenced Documents

2.1 ASTM Standards:²

B152/B152M Specification for Copper Sheet, Strip, Plate, and Rolled Bar

E999 Guide for Controlling the Quality of Industrial Radiographic Film Processing

E1025 Practice for Design, Manufacture, and Material Grouping Classification of Hole-Type Image Quality Indicators (IQI) Used for Radiology

E1079 Practice for Calibration of Transmission Densitometers

E1316 Terminology for Nondestructive Examinations

E1735 Test Method for Determining Relative Image Quality of Industrial Radiographic Film Exposed to X-Radiation from 4 to 25 MeV

E1815 Test Method for Classification of Film Systems for Industrial Radiography

E2002 Practice for Determining Total Image Unsharpness in Radiology

2.2 ANSI Standard³:

ANSI PH2.19 Photography Density Measurements-Part 2: Geometric Conditions for Transmission Density

2.3 ISO Standards³:

ISO 5-2 Photography Density Measurements-Part 2: Geometric Conditions for Transmission Density

ISO 7004 Photography- Industrial Radiographic Film, Determination of ISO Speed, ISO average gradient, and ISO

¹ This practice is under the jurisdiction of ASTM Committee E07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.01 on Radiology (X and Gamma) Method.

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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.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.