



Designation: E1735 – 07

# Standard Test Method for Determining Relative Image Quality of Industrial Radiographic Film Exposed to X-Radiation from 4 to 25 MeV<sup>1</sup>

This standard is issued under the fixed designation E1735; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method covers determination of the relative image quality response of industrial radiographic film when exposed to X-radiation sources having photon energies from 4 to 25 MeV. Evaluation of the film is based on the visibility of holes in a special image quality indicator (IQI). Since results for a given film type may vary, depending on the particular processing system and processing conditions used, it is essential to state the exposure parameters and achieved density, processing chemistry, processing cycle, and processing temperature. For the purposes of this test method, it is assumed that all components of the X-ray system are operating properly and are capable of producing a given image quality. This test method is not intended to be used for films exposed with Cobalt 60 sources or X-ray sources below 4 MeV.

1.2 The values stated in either SI or inch-pound units are to be regarded as the standard. The values given in parentheses 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:<sup>2</sup>

[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](#)

<sup>1</sup> This test method 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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<sup>2</sup> 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.

[E1079 Practice for Calibration of Transmission Densitometers](#)

[E1316 Terminology for Nondestructive Examinations](#)

[E1815 Test Method for Classification of Film Systems for Industrial Radiography](#)

## 3. Terminology

3.1 *Definitions*—Definitions of terms relating to gamma and X-radiology are found in Terminology [E1316](#).

## 4. Significance and Use

4.1 This test method provides a test for determining the relative image quality response of radiographic film when exposed to 4 to 25 MeV X rays as any single component of the total X-ray system (for example, screens) is varied. By holding the technique parameters (except exposure time) and processing parameters constant, the image quality response of radiographic film may be evaluated on a relative basis.

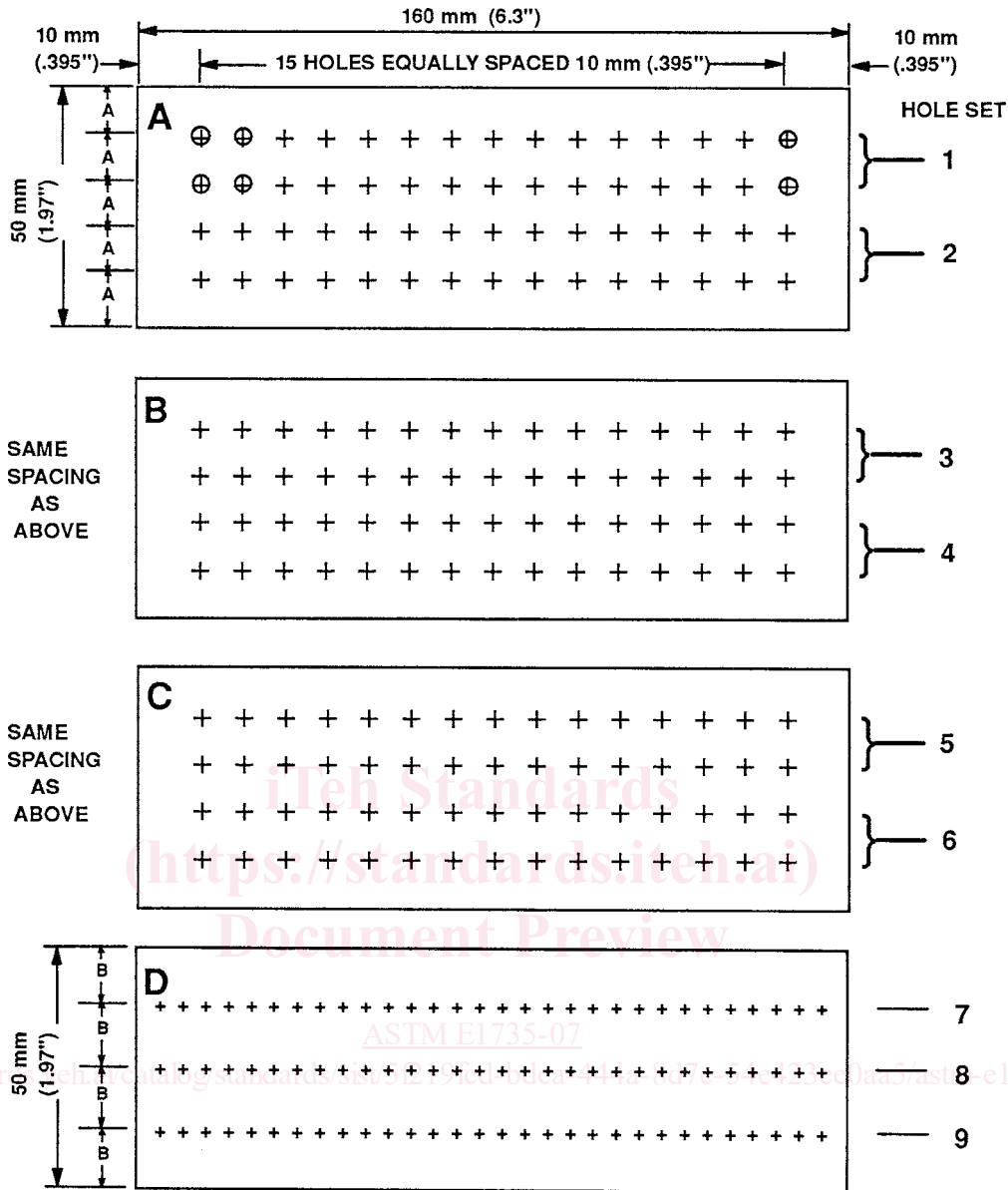
4.2 Alternately, this test method provides a test for measuring the image quality of the X-ray system or any component of the system.

## 5. Test Specimen

5.1 The test specimen will consist of a 15-cm (6-in.) steel absorber with a special IQI placed on the radiation (source) side of the absorber.

5.1.1 *Absorber*—The absorber shall be made of carbon steel or Type 300 stainless steel. The thickness of 15 cm (6 in.) can be achieved by stacking thinner plates whose length and width shall be at least 20 by 25 cm (8 by 10 in.). The surface finish of the top and bottom of the absorber shall be a maximum of 6.3- $\mu\text{m}$  (250- $\mu\text{in.}$ )  $R_a$  ground finish.

5.1.2 *Image Quality Indicator*—The IQI shall be fabricated of carbon steel or Type 300 stainless steel and shall conform to [Fig. 1](#). The IQI steps, identified as Plaques A-D, may be fabricated separately and then taped together, as shown in [Fig. 1](#), using suitable tape to form the array as shown. The tape shall not cover any of the holes in the IQI. The surface finish of the IQI top and bottom surfaces shall be a maximum of 6.3- $\mu\text{m}$  (250- $\mu\text{in.}$ )  $R_a$  ground finish.



NOTE 1—All plaques identical except hole size and plaque thickness hole: row spacing tolerance  $\pm 0.1$  mm ( $\pm 0.004$  in.), nonaccumulative Dimension A =  $10 \pm 0.1$  mm ( $0.395 \pm 0.004$  in.) and Dimension B =  $12.5 \pm 0.1$  mm ( $0.492 \pm 0.004$  in.); other dimensions in accordance with standard engineering practice.

Plaque Letter	mm	Plaque Thickness (in.)	Hole Set	mm	Hole Diameter (in.)
A	$1.6 \pm 0.025$	$(0.0625 \pm 0.001)$	1	$3.0 \pm 0.025$	$(0.118 \pm 0.001)$
B	$1.3 \pm 0.025$	$(0.050 \pm 0.001)$	2	$1.8 \pm 0.025$	$(0.072 \pm 0.001)$
C	$0.97 \pm 0.025$	$(0.038 \pm 0.001)$	3	$1.8 \pm 0.025$	$(0.072 \pm 0.001)$
D	$0.64 \pm 0.025$	$(0.025 \pm 0.001)$	4	$1.5 \pm 0.025$	$(0.060 \pm 0.001)$
			5	$1.5 \pm 0.025$	$(0.060 \pm 0.001)$
			6	$1.22 \pm 0.025$	$(0.048 \pm 0.001)$
			7	$1.42 \pm 0.025$	$(0.056 \pm 0.001)$
			8	$1.17 \pm 0.025$	$(0.046 \pm 0.001)$
			9	$0.94 \pm 0.025$	$(0.037 \pm 0.001)$

FIG. 1 Image Quality Indicator

## 6. Radiation Source

6.1 The source of radiation shall be an X-ray generator capable of operating in any part (or all) of the range from 4 to 25 MeV.

## 7. Film Holder and Screens

7.1 *Film Holder*—The film holder shall be a medical-type, hard-backed cassette or a flexible film holder with a vacuum or mechanical means for providing good film-screen contact.