



Designation: E 1735 – 95 (Reapproved 2000)^{e1}

Standard Test Method for Determining Relative Image Quality of Industrial Radiographic Film Exposed to X-Radiation from 4 to 25 MV¹

This standard is issued under the fixed designation E 1735; 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.

^{e1} NOTE—Paragraph 8.5 was corrected editorially in May 2000.

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 MV. 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 used, it is essential to state the exposure parameters, processing chemistry, and processing cycle. 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 MV.

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:

E 999 Guide for Controlling the Quality of Industrial Radiographic Film Processing²

E 1025 Practice for Hole Type Image Quality Indicators Used for Radiography²

E 1079 Practice for the Calibration of Transmission Densitometers²

E 1316 Terminology for Nondestructive Examinations²

3. Terminology

3.1 *Definitions*—Definitions of terms relating to gamma and X-radiology are found in Terminology E 1316.

¹ This test method is under the jurisdiction of ASTM Committee E-7 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.01 on Radiology (X and Gamma) Method.

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

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 MV 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- μ m (250- μ in.) R_a ground finish.

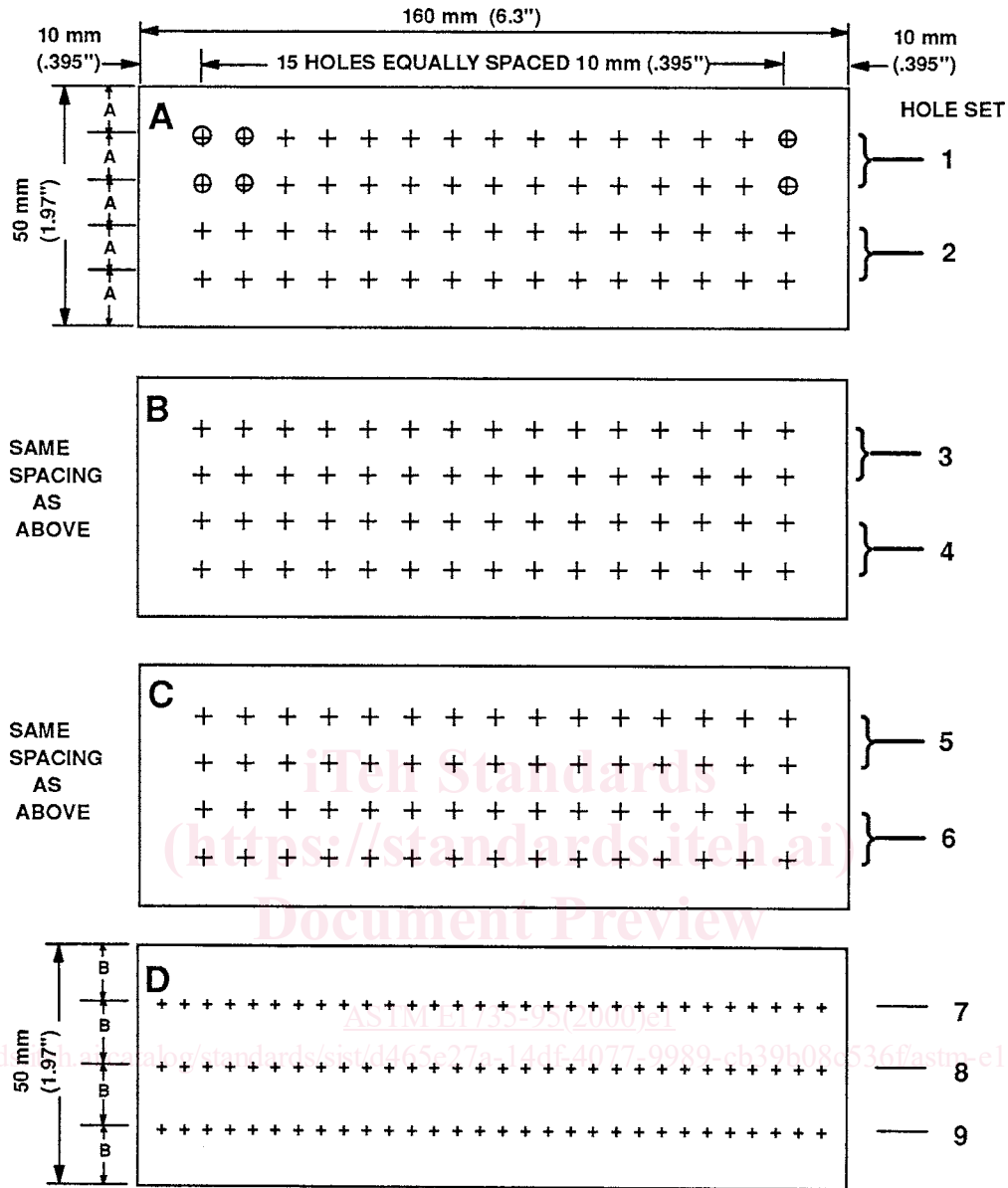
5.1.2 *Image Quality Indicator*—The IQI shall be fabricated of carbon steel or Type 300 stainless steel and shall conform to Fig. 1. The IQI steps, identified as Plaques A-D, may be fabricated separately and then taped together, as shown in Fig. 1, using suitable tape to form the array as shown. The 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- μ m (250- μ in.) R_a ground finish.

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 MV.

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.



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

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

FIG. 1 Image Quality Indicator

7.2 Screens—Lead foil screens with a front thickness of 0.010 to 0.050 in. (0.25 mm to 1.27 mm) and back thickness of 0.010 in., minimum, shall be used. Thicker screens may be

used at the user's discretion, provided that the actual thickness used is documented on the data sheet (Fig. 2) and agreed upon by all parties concerned.