



Standard Reference Radiograph for Evaluating the Performance of Radiographic Digitization Systems¹

This standard is issued under the fixed designation E1936; 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.

1. Scope

1.1 This reference radiograph covers a series of test targets suitable for evaluating, quantifying, and documenting performance parameters of the radiographic digitization process or the electronic image reconstruction process, or both. This reference radiograph can be used for visual and electronic analysis of digitization systems.

1.2 This reference radiograph provides a series of test targets to provide a vehicle for the evaluation of spatial resolution, density contrast sensitivity, dynamic range, and spatial linearity as well as other aspects of a digitization system. The test targets are suitable for evaluating a digitization system with a spatial resolution down to $\sim 1/1000$ in. (25 micrometres (μm)), a density contrast sensitivity down to 0.02 optical density (OD), a density range of 0.5 to 4.5 OD, and a film size capacity of 14 in. (355 mm) wide by 17 in. (431 mm) long.

1.3 From time to time, there may be minor changes to the process for manufacturing of the reference adjunct film. These changes could include changes in the films or processing chemistry used, text designation on the film, etc.; however, in all cases, these changes are reviewed by the Illustration Monitoring Subcommittee to ensure that there are no changes to the functional use of the reference image. Therefore, the adjunct reference films remain valid for use with this standard regardless of the date of production or the revision level of the text standard.

1.4 The values stated in inch-pound units are to be regarded as the standard, with the exception of the spatial resolution targets (6.2 and 6.7) which are stated in SI units.

1.5 *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.*

¹ This reference radiograph is under the jurisdiction of ASTM Committee E07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.02 on Reference Radiological Images.

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2. Referenced Documents

2.1 ASTM Standards:²

E1079 Practice for Calibration of Transmission Densitometers

E1254 Guide for Storage of Radiographs and Unexposed Industrial Radiographic Films

E1316 Terminology for Nondestructive Examinations

E1411 Practice for Qualification of Radioscopic Systems

2.2 ASME Standard:

Section V, Article 2, Mandatory Appendix VI, Digital Image Acquisition, Display, Interpretation and Storage for Nuclear Applications³

2.3 ASTM Adjuncts:

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3. Terminology

3.1 Definitions:

3.1.1 Refer to Terminology E1316 for definitions of terms used in this guide.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *converging line pairs*—the targets located on the reference radiograph that are used to determine the spatial resolution of the digitization system.

3.2.2 *parallel line pairs*—the targets located on the reference radiograph that are used in conjunction with the converging line pairs to determine the spatial resolution of the digitization system.

3.2.3 *reference radiograph*—the single piece of industrial radiographic film containing all of the reference targets described in this document.

3.2.4 *scan line*—it is a path that is one pixel high (vertical) by the number of pixels wide (horizontal), that is captured by

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 Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

⁴ Available from ASTM Headquarters. Order RRE1936.