



Designation: E1079 – 21

Standard Practice for Calibration of Transmission Densitometers¹

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1. Scope

1.1 This practice² covers the calibration of transmission densitometers used to perform measurements of diffuse optical density on radiographic films (see [Note 1](#)).

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

NOTE 1—For further information on the design and use of densitometers, the following literature is suggested as additional background information: ISO 5–1:2009, ISO 5–2:2009, ISO 5–3:2009, and ISO 14807:2001.

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*³

[E1316 Terminology for Nondestructive Examinations](#)

2.2 *ISO Standards:*⁴

[ISO 5–1:2009 Photography and Graphic Technology — Density Measurements — Part 1: Geometry and Functional Notation](#)

[ISO 5–2:2009 Photography and Graphic Technology — Density Measurements — Part 2: Geometric Conditions for Transmittance Density](#)

[ISO 5–3:2009 Photography and Graphic Technology — Density Measurements — Part 3: Spectral Conditions](#)
[ISO 14807:2001 Photography — Transmission and Reflection Densitometers — Method for Determining Performance](#)

3. Terminology

3.1 *Definitions*—For definitions of terms used in this practice, see Terminology [E1316](#).

4. Significance and Use

4.1 This practice provides a means for calibrating transmission densitometers used for the measurement of diffuse optical density on radiographic films. A transmission densitometer calibrated in accordance with this practice provides the assurance that accurate optical density values of radiographs are obtained.

5. Apparatus

5.1 Apparatus should consist of the following:

5.1.1 A calibrated step tablet covering the optical density range used in production radiographs shall be used. The step tablet may be a NIST X-ray Step Tablet (X-Ray Film Step Tablet Transmission Density Standard 38100C)⁵, or alternately a step tablet from another supplier that is traceable to the NIST step tablet in the range provided by NIST certification. The step tablet shall have at least five steps with optical densities, which cover the optical density range that is used for production radiographs. A calibration certificate shall be provided with the step tablet indicating the tablet ID and recorded values for the optical density of each step. For suppliers of step tablets other than NIST, the certificate shall indicate conformance of traceability to NIST, applicable ISO or ANSI standards (for example, ISO 5–3) used, verification of measurement on a NIST step tablet, the ID number of the step tablet, and calibration date of the step tablet. Precautions should be taken in the storage, handling, and use of the step tablet. In the event it becomes scratched, blemished, or exhibits other signs of deleterious wear, it should be replaced immediately. The NIST

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 ASME Boiler and Pressure Vessel Code applications, see related Practice SE-1079 in Section II of that Code.

³ 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.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁵ Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, <http://www.nist.gov>.