



Designation: E1079 – 10

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 radiographic film density measurements (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 and health 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, and ISO 14807:2001.

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 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](#).

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.

4. Significance and Use

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

5. Apparatus

5.1 Apparatus should consist of the following:

5.1.1 A calibrated step tablet 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, which is traceable to the NIST step tablet. The step tablet shall have at least five step densities, which cover the 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 each step density. For suppliers of step tablets other than NIST, the certificate shall indicate conformance of traceability to NIST instrumentation used in the calibration process, applicable ANSI standards 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 (or alternate, if used) step tablet shall be replaced four years from the date of first use.⁶

5.1.2 *Transmission Densitometers*, with either direct-scale readout or digital readout displays specifically manufactured for the purpose of measuring the range of film densities described in [5.1.1](#) may be used.

5.1.3 *Manufacturer's Operating Instructions for Appropriate Transmission Densitometer*.

6. Calibration

6.1 Full-scale linearity calibration should be performed at least every 90 days during use as follows:

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

⁶ Expiration interval of the NIST or alternate step tablet may be different than the requirements of this practice. Unless otherwise specified, requirements of this practice shall apply.