



Standard Guide for Performance Characterization of Dosimeters and Dosimetry Systems for Use in Radiation Processing¹

This standard is issued under the fixed designation E 2701; 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 guide provides guidance on determining the performance characteristics of dosimeters and dosimetry systems used in radiation processing.

1.2 This guide describes the influence quantities that might affect the performance of dosimeters and dosimetry systems and that should be considered during dosimeter/dosimetry system characterization.

1.3 Users of this guide are directed to existing standards and literature for procedures to determine the effects from individual influence quantities and from combinations of more than one influence quantity.

1.4 Guidance is provided regarding the roles of the manufacturers, suppliers, and users in the characterization of dosimeters and dosimetry systems.

1.5 This guide does not address how the dosimeter/dosimetry system characterization information is to be used in radiation processing applications or in the calibration of dosimetry systems.

NOTE 1—For guidance on the use of dosimeter/dosimetry system characterization information for the selection and use of a dosimetry system, the user is directed to Practice E 2628.

NOTE 2—For guidance on the use of dosimeter/dosimetry system characterization information for dosimetry system calibration, the user is directed to ISO/ASTM Guide 51261.

1.6 *This guide 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:²

E 170 Terminology Relating to Radiation Measurements and Dosimetry

E 456 Terminology Relating to Quality and Statistics

E 1026 Practice for Using the Fricke Reference-Standard Dosimetry System

E 1325 Terminology Relating to Design of Experiments

E 2628 Practice for Dosimetry in Radiation Processing

2.2 ISO/ASTM Standards:²

51205 Practice for Use of a Ceric-Cerous Sulfate Dosimetry System

51261 Guide for the Selection and Calibration of Dosimetry Systems for Radiation Processing

51707 Guide for Estimating Uncertainties in Dosimetry for Radiation Processing

2.3 ISO Reports:³

GUM Guide to the Expression of Uncertainty in Measurements, 1995.

VIM International Vocabulary of Basic and General Terms in Metrology

2.4 International Commission on Radiation Units and Measurements (ICRU) Reports⁴

Report 60 Fundamental Quantities and Units for Ionizing Radiation

Report 80 Dosimetry Systems for Use in Radiation Processing

3. Terminology

3.1 Definitions:

3.1.1 *calibration curve*—expression of the relation between indication and corresponding measured quantity value.

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3.1.2 *dosimeter*—device that, when irradiated, exhibits a quantifiable change that can be related to absorbed dose in a given material using appropriate measurement instruments and procedures.

3.1.3 *dosimeter batch*—quantity of dosimeters made from a specific mass of material with uniform composition, fabricated in a single production run under controlled, consistent conditions and having a unique identification code.

3.1.4 *dosimeter/dosimetry system characterization*—determination of performance characteristics, such as useful

¹ This guide is under the jurisdiction of ASTM Committee E10 on Nuclear Technology and Applications and is the direct responsibility of Subcommittee E10.01 on Radiation Processing: Dosimetry and Applications.

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² For referenced ASTM and ISO/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 the International Commission on Radiation Units and Measurements, 7910 Woodmont Ave., Suite 800, Bethesda, MD 20814, USA.

⁴ Available from the International Organization for Standardization, 1 rue de Varembe, Case Postale 56, CH-1211, Geneva 20, Switzerland..