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**Guide for performance characterization
of dosimeters and dosimetry systems for
use in radiation processing**

*Guide standard pour la caractérisation de la performance des
dosimètres et des systèmes de dosimétrie pour utilisation dans
le traitement des radiations*

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ISO/ASTM 52701:2013(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75% of the member bodies casting a vote.

ASTM International is one of the world's largest voluntary standards development organizations with global participation from affected stakeholders. ASTM technical committees follow rigorous due process balloting procedures.

A pilot project between ISO and ASTM International has been formed to develop and maintain a group of ISO/ASTM radiation processing dosimetry standards. Under this pilot project, ASTM Subcommittee E61, Radiation Processing, is responsible for the development and maintenance of these dosimetry standards with unrestricted participation and input from appropriate ISO member bodies.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. Neither ISO nor ASTM International shall be held responsible for identifying any or all such patent rights.

International Standard ISO/ASTM 52701 was developed by ASTM Committee E61, Radiation Processing, through Subcommittee E61.01 on Dosimetry, and by Technical Committee ISO/TC 85, Nuclear energy, nuclear technologies and radiological protection.

This first edition of ISO/ASTM 52701 cancels and replaces ASTM E2701-09.



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

This standard is issued under the fixed designation ISO/ASTM 52701; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision.

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 ISO/ASTM Practice 52628.

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

¹ This guide is under the jurisdiction of ASTM Committee E61 on Radiation Processing and is the direct responsibility of Subcommittee E61.01 on Dosimetry, and is also under the jurisdiction of ISO/TC 85/WG 3.

Current edition approved July 20, 2013. Published November 2013. Originally published as ASTM E2701-09. Last previous ASTM edition E2701-09. The present International Standard ISO/ASTM 52701:2013(E) replaces ASTM E2701-09.

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.

E170 Terminology Relating to Radiation Measurements and Dosimetry

E456 Terminology Relating to Quality and Statistics

E1026 Practice for Using the Fricke Dosimetry System

E1325 Terminology Relating to Design of Experiments

2.2 ISO/ASTM Standards:²

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

51261 Practice for Calibration of Routine Dosimetry Systems for Radiation Processing

51707 Guide for Estimating Uncertainties in Dosimetry for Radiation Processing

52628 Practice for Dosimetry in Radiation Processing

2.3 Joint Committee for Guides in Metrology (JCGM)

Reports:

JCGM 100:2008, GUM 1995, with minor corrections, Evaluation of measurement data – Guide to the Expression of Uncertainty in Measurement³

JCGM 100:2008, VIM, International vocabulary of metrology – Basis and general concepts and associated terms⁴

2.4 International Commission on Radiation Units and Measurements (ICRU) Reports⁵

Report 80 Dosimetry Systems for Use in Radiation Processing

Report 85a Fundamental Quantities and Units for Ionizing Radiation

3. Terminology

3.1 Definitions:

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

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 Document produced by Working Group 1 of the Joint Committee for Guides in Metrology (JCGM/WG 1). Available free of charge at the BIPM website (<http://www.bipm.org>).

⁴ Document produced by Working Group 2 of the Joint Committee for Guides in Metrology (JCGM/WG 2). Available free of charge at the BIPM website (<http://www.bipm.org>).

⁵ Available from the International Commission on Radiation Units and Measurements, 7910 Woodmont Ave., Suite 800, Bethesda, MD 20814, USA.