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Practice for dosimetry for a self- contained dry-storage gamma irradiator

*Pratique de la dosimétrie appliquée à un irradiateur gamma
renfermant une source auto-protégée entreposée à sec*



Reference number
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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 Committee 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 52116 was developed by ASTM Committee E61, Radiation Processing, through Subcommittee E61.04, Specialty Application, and by Technical Committee ISO/TC 85, Nuclear energy, nuclear technologies and radiological protection.



Standard Practice for Dosimetry for a Self-Contained Dry-Storage Gamma Irradiator¹

This standard is issued under the fixed designation ISO/ASTM 52116; 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 practice outlines dosimetric procedures to be followed with self-contained dry-storage gamma irradiators. For irradiators used for routine processing, procedures are given to ensure that product processed will receive absorbed doses within prescribed limits.

1.2 This practice covers dosimetry in the use of dry-storage gamma irradiators, namely self-contained dry-storage ¹³⁷Cs or ⁶⁰Co irradiators (shielded freestanding irradiators). It does not cover underwater pool sources, panoramic gamma sources, nor does it cover self-contained bremsstrahlung X-ray units.

1.3 The absorbed-dose range for the use of the dry-storage self-contained gamma irradiators covered by this practice is typically 1 to 10⁵ Gy, depending on the application. The absorbed-dose rate range typically is from 10⁻² to 10³ Gy/min.

1.4 For irradiators supplied for specific applications, specific ISO/ASTM or ASTM practices and guides provide dosimetric procedures for the application. For procedures specific to dosimetry in blood irradiation, see ISO/ASTM Practice 51939. For procedures specific to dosimetry in radiation research on food and agricultural products, see ISO/ASTM Practice 51900. For procedures specific to radiation hardness testing, see ASTM Practice E1249. For procedures specific to the dosimetry in the irradiation of insects for sterile release programs, see ISO/ASTM Guide 51940. In those cases covered by ISO/ASTM 51939, 51900, 51940, or ASTM E1249, those standards take precedence.

1.5 This document is one of a set of standards that provides recommendations for properly implementing and utilizing dosimetry in radiation processing. It is intended to be read in conjunction with ASTM E2628, "Practice for Dosimetry in Radiation Processing".

1.6 *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.*

¹ This practice is under the jurisdiction of ASTM Committee E61 on Radiation Processing and is the direct responsibility of Subcommittee E61.04 on Specialty Application, and is also under the jurisdiction of ISO/TC 85/WG 3.

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2. Referenced documents

2.1 ASTM Standards:²

E170 Terminology Relating to Radiation Measurements and Dosimetry

E1249 Practice for Minimizing Dosimetry Errors in Radiation Hardness Testing of Silicon Electronic Devices Using Co-60 Sources

E2628 Practice for Dosimetry in Radiation Processing

E2701 Guide for Performance Characterization of Dosimeters and Dosimetry Systems for Use in Radiation Processing

2.2 ISO/ASTM Standards:²

51261 Practice for Calibration of Routine Dosimetry Systems for Radiation Processing

51539 Guide for Use of Radiation-Sensitive Indicators

51707 Guide for Estimating Uncertainties in Dosimetry for Radiation Processing

51900 Guide for Dosimetry in Radiation Research on Food and Agricultural Products

51939 Practice for Blood Irradiation Dosimetry

51940 Guide for Dosimetry for Sterile Insects Release Programs

2.3 International Commission on Radiation Units and Measurements (ICRU) Reports:³

ICRU 85a Fundamental Quantities and Units for Ionizing Radiation

2.4 ANSI Standards:⁴

ANSI/HPS N43.7 Safe Design and Use of Self-Contained, Dry Source Storage Gamma Irradiators (Category I)

2.5 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 Measurement⁵

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 International Commission on Radiation Units and Measurements (ICRU), 7910 Woodmont Ave., Suite 800, Bethesda, MD 20810, U.S.A.

⁴ Available from the Health Physics Society, <http://hps.org>.

⁵ 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>).