



Standard Guide for Absorbed-Dose Mapping in Radiation Processing Facilities¹

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1. Scope

1.1 This document provides guidance in determining absorbed-dose distributions (mapping) in products, materials or substances irradiated in gamma, X-ray (bremsstrahlung) and electron beam facilities.

NOTE 1—For irradiation of food and the radiation sterilization of health care products, other specific ISO and ISO/ASTM standards containing dose mapping requirements exist. For food irradiation, see [ISO/ASTM 51204](#), Practice for Dosimetry in Gamma Irradiation Facilities for Food Processing and [ISO/ASTM 51431](#), Practice for Dosimetry in Electron Beam and X-Ray (Bremsstrahlung) Irradiation Facilities for Food Processing. For the radiation sterilization of health care products, see [ISO 11137-1](#), Sterilization of Health Care Products Radiation – Part 1: Requirements for Development, Validation and Routine Control of a Sterilization Process for Medical Devices. In those areas covered by [ISO 11137-1](#), that standard takes precedence. [ISO/ASTM 51608](#), Practice for Dosimetry in an X-ray (Bremsstrahlung) Facility for Radiation Processing, [ISO/ASTM 51649](#), Practice for Dosimetry in an Electron Beam Facility for Radiation Processing at Energies between 300 keV and 25 MeV, [ISO/ASTM 51702](#), Practice for Dosimetry in a Gamma Irradiation Facility for Radiation Processing, and [ISO/ASTM 51818](#), Practice for Dosimetry in an Electron Beam Facility for Radiation Processing at Energies Between 80 and 300 KeV also contain dose mapping requirements.

1.2 This guide is one of a set of standards that provides recommendations for properly implementing dosimetry in radiation processing. It is intended to be read in conjunction with ASTM Practice [E2628](#).

1.3 Methods of analyzing the dose map data are described. Examples are provided of statistical methods that may be used to analyze dose map data.

1.4 Dose mapping for bulk flow processing and fluid streams is not discussed.

1.5 Dosimetry is only one component of a total quality program for an irradiation facility. Other controls besides dosimetry may be required for specific applications such as medical device sterilization and food preservation.

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 requirements prior to use.

2. Referenced Documents

2.1 ASTM Standards:²

[E170 Terminology Relating to Radiation Measurements and Dosimetry](#)

[E178 Practice for Dealing With Outlying Observations](#)

[E2232 Guide for Selection and Use of Mathematical Methods for Calculating Absorbed Dose in Radiation Processing Applications](#)

[E2628 Practice for Dosimetry in Radiation Processing](#)

2.2 ISO/ASTM Standards:²

[ISO/ASTM 51204 Practice for Dosimetry in Gamma Irradiation Facilities for Food Processing](#)

[ISO/ASTM 51261 Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing](#)

[ISO/ASTM 51431 Practice for Dosimetry in Electron Beam and X-Ray \(Bremsstrahlung\) Irradiation Facilities for Food Processing](#)

[ISO/ASTM 51608 Practice for Dosimetry in an X-ray \(Bremsstrahlung\) Facility for Radiation Processing](#)

[ISO/ASTM 51649 Practice for Dosimetry in an Electron Beam Facility for Radiation Processing at Energies between 300 keV and 25 MeV](#)

[ISO/ASTM 51702 Practice for Dosimetry in a Gamma Irradiation Facility for Radiation Processing](#)

[ISO/ASTM 51707 Guide for Estimating Uncertainties in Dosimetry for Radiation Processing](#)

[ISO/ASTM 51818 Practice for Dosimetry in an Electron Beam Facility for Radiation Processing at Energies between 80 and 300 keV](#)

2.3 International Commission on Radiation Units and Measurements Reports:³

[ICRU Report 60 Fundamental Quantities and Units for Ionizing Radiation](#)

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 International Commission on Radiation Units and Measurements, 7910 Woodmont Ave., Suite 800, Bethesda, MD 20814.