



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 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 and Bremsstrahlung Irradiation Facilities for Food Processing. For the radiation sterilization of health care products, see ISO 11137: 1995, Sterilization of Health Care Products Requirements for Validation and Routine Control Radiation Sterilization. In those areas covered by ISO 11137, that standard takes precedence. ISO/ASTM Practice 51608, ISO/ASTM Practice 51649, and ISO/ASTM Practice 51702 also contain dose mapping requirements.

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

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

1.4 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.

1.5 *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:

E 170 Terminology Relating to Radiation Measurements and Dosimetry²

E 177 Practice for the Use of the Terms Precision and

Accuracy Applied to Measurement of a Property of Material³

E 178 Practice for Dealing with Outlying Observations³

E 666 Practice for Calculating Absorbed Dose from Gamma or X Radiation²

E 668 Practice for the Application of Thermoluminescence-Dosimetry (TLD) Systems for Determining Absorbed Dose in Radiation-Hardness Testing of Electronic Devices²

E 1026 Practice for Using the Fricke Reference Standard Dosimetry System²

E 2232 Guide for Selection and Use of Mathematical Methods for Calculating Absorbed Dose in Radiation Processing Applications²

2.2 ISO/ASTM Standards:⁴

ISO/ASTM 51204 Practice for Dosimetry in Gamma Irradiation Facilities for Food Processing

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

ISO/ASTM 51261 Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing

ISO/ASTM 51275 Practice for Use of a Radiochromic Film Dosimetry System

ISO/ASTM 51276 Practice for Use of a Polymethylmethacrylate Dosimetry System

ISO/ASTM 51310 Practice for Use of a Radiochromic Optical Waveguide Dosimetry System

ISO/ASTM 51400 Practice for Characterization and Performance of a High-Dose Radiation Dosimetry Calibration Laboratory

ISO/ASTM 51401 Practice for Use of a Dichromate Dosimetry System

ISO/ASTM 51431 Practice for Dosimetry in Electron and Bremsstrahlung Irradiation Facilities for Food Processing

ISO/ASTM 51538 Practice for Use of the Ethanol-Chlorobenzene Dosimetry System

ISO/ASTM 51540 Practice for Use of a Radiochromic Liquid Dosimetry System

ISO/ASTM 51607 Practice for Use of the Alanine-EPR Dosimetry System

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

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² Annual Book of ASTM Standards, Vol 12.02.

³ Annual Book of ASTM Standards, Vol 14.02.

⁴ Standards on Dosimetry for Radiation Processing ASTM International 2002. See Annual Book of ASTM Standards, Vol 12.02.