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## Guide for dosimetry for sterile insect release programs

Guide de la dosimétrie pour des programmes de lâchers  
d'insectes stériles



Reference number  
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ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

ASTM International, 100 Barr Harbor Drive, PO Box C700,  
West Conshohocken, PA 19428-2959, USA  
Tel. +610 832 9634  
Fax +610 832 9635  
E-mail [khooper@astm.org](mailto:khooper@astm.org)  
Web [www.astm.org](http://www.astm.org)

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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 project between ISO and ASTM International has been formed to develop and maintain a group of ISO/ASTM radiation processing dosimetry standards. Under this project, ASTM Subcommittee E10.01, Dosimetry for 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 51940 was developed by ASTM Committee E10, Nuclear Technology and Applications, through Subcommittee E10.01, and by Technical Committee ISO/TC 85, Nuclear energy.



## Standard Guide for Dosimetry for Sterile Insect Release Programs<sup>1</sup>

This standard is issued under the fixed designation ISO/ASTM 51940; 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 outlines dosimetric procedures to be followed for the radiation sterilization of live insects for use in pest management programs. The primary use of irradiated, reproductively sterile insects is in the Sterile Insect Technique, where large numbers of sterile insects are released into the field to mate with and thus control pest populations of the same species. A secondary use of sterile insects is as benign hosts for rearing insect parasitoids. The procedures outlined in this guide will help ensure that insects processed with ionizing radiation from gamma, electron, or X-ray sources receive absorbed doses within a predetermined range. Information on effective dose ranges for specific applications of insect sterilization, or on methodology for determining effective dose ranges, is not within the scope of this guide.

NOTE 1—Dosimetry is only one component of a total quality control program to ensure that irradiated insects are adequately sterilized and sufficiently competitive or otherwise suitable for their intended purpose.

1.2 This guide covers dosimetry in the irradiation of insects for these types of irradiators: self-contained dry-storage <sup>137</sup>Cs or <sup>60</sup>Co irradiators, large-scale gamma irradiators, and electron accelerators. Additional, detailed information on dosimetric procedures to be followed in installation qualification, operational qualification, performance qualification, and routine product processing can be found in ISO/ASTM Practices 51608 (X-ray [bremsstrahlung] facilities), 51649 (electron beam facilities), 51702 (large-scale gamma facilities), and ASTM Practice E 2116 (self-contained dry-storage gamma facilities).

1.3 The absorbed dose for insect sterilization is typically within the range of 20 Gy to 600 Gy.

1.4 This guide refers, throughout the text, specifically to reproductive sterilization of insects. It is equally applicable to radiation sterilization of invertebrates from other taxa (for example, Acarina, Gastropoda) and to irradiation of live insects or other invertebrates for other purposes (for example, inducing mutations), provided the absorbed dose is within the range specified in 1.3.

1.5 This guide also covers the use of radiation-sensitive indicators for the visual and qualitative indication that the insects have been irradiated.

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.*

### 2. Referenced documents

#### 2.1 ASTM Standards:<sup>2</sup>

- E 170 Terminology Relating to Radiation Measurements and Dosimetry
- E 668 Practice for Application of Thermoluminescence-Dosimetry (TLD) Systems for Determining Absorbed Dose in Radiation-Hardness Testing of Electronic Devices
- E 1026 Practice for Using the Fricke Reference Standard Dosimetry System
- E 2116 Practice for Dosimetry for a Self-Contained Gamma-Ray Irradiator
- E 2303 Guide for Absorbed-Dose Mapping in Radiation Processing Facilities
- E 2304 Practice for Use of a LiF Photo-Fluorescent Film Dosimetry System
- 2.2 ISO/ASTM Standards:<sup>2</sup>
- 51261 Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing
- 51275 Practice for Use of a Radiochromic Film Dosimetry System
- 51400 Practice for Characterization and Performance of a High-Dose Radiation Dosimetry Calibration Laboratory
- 51538 Practice for Use of the Ethanol-Chlorobenzene Dosimetry System
- 51539 Guide for the Use of Radiation-Sensitive Indicators
- 51540 Practice for Use of a Radiochromic Liquid Dosimetry System
- 51607 Practice for Use of the Alanine-EPR Dosimetry System
- 51608 Practice for Dosimetry in an X-Ray (Bremsstrahlung) Facility for Radiation Processing
- 51649 Practice for Dosimetry in an Electron Beam Facility for Radiation Processing at Energies Between 300 keV and 25 MeV

<sup>1</sup> 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 Dosimetry for Radiation Processing, and is also under the jurisdiction of ISO/TC 85/WG 3.

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<sup>2</sup> For referenced ASTM and ISO/ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.