INTERNATIONAL STANDARD

ISO/ASTM 51539

Fourth edition
2023-05

Guidance for use of radiation-sensitive indicators

Lignes directrices pour l'utilisation d'indicateurs sensibles aux rayonnements

Reference number
ISO/ASTM 51539:2023(E)

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Published in Switzerland

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by ASTM Committee E61, *Radiation processing* (as ASTM E1539-93), and drafted in accordance with its editorial rules. It was assigned to Technical Committee ISO/TC 85, *Nuclear energy, nuclear technologies and radiological protection*.

This fourth edition cancels and replaces the third edition (ISO/ASTM 51939:2013) which has been technically revised.

The main changes are as follows:

— Editorial corrections throughout the document.

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This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

ISO/ASTM 51539:2023(E)

Standard Guidance for Use of Radiation-Sensitive Indicators[1]

This standard is issued under the fixed designation ISO/ASTM 51539; 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 document covers procedures for using radiation-sensitive indicators (referred to hereafter as *indicators*) in radiation processing. These indicators may be labels, papers, inks or packaging materials which undergo a visual change when exposed to ionizing radiation (**1-5**).[2]

1.2 The purpose for using indicators is to determine visually whether or not a product has been irradiated, rather than to measure different dose levels.

1.3 Indicators are not dosimeters and should not be used as a substitute for proper dosimetry. Information about dosimetry systems for radiation processing is provided in other ASTM and ISO/ASTM documents (see ISO/ASTM Guide 51261).

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced documents

2.1 *ASTM Standards:*[3]

E170 Terminology Relating to Radiation Measurements and Dosimetry

E3083 Terminology Relating to Radiation Processing: Dosimetry and Applications

2.2 *ISO/ASTM Standards:*[3]

51261 Practice for Calibration of Routine Dosimetry Systems for Radiation Processing

51608 Practice for Dosimetry in an X-ray (Bremsstrahlung) Facility for Radiation Processing at Energies between 50 keV and 7.5 MeV

51649 Practice for Dosimetry in an Electron Beam Facility for Radiation Processing at Energies between 300 keV and 25 MeV

51702 Practice for Dosimetry in a Gamma Facility for Radiation Processing

51939 Practice for Blood Irradiation Dosimetry

51940 Guide for Dosimetry for Sterile Insect Release Programs

2.3 *International Commission on Radiation Units and Measurements (ICRU) Reports:*[4]

ICRU Report 85 Fundamental Quantities and Units for Ionizing Radiation

3. Terminology

3.1 *Definitions:*

3.1.1 *dosimetry system*—interrelated elements used for determining absorbed dose, consisting of dosimeters, measurement instruments and their associated reference standards, and procedures for the system's use.

3.1.2 *indicator*—see *radiation-sensitive indicator*.

3.1.3 *process load*—volume of material with a specified product loading configuration irradiated as a single entity.

3.1.4 *radiation-sensitive indicator*—material such as coated or impregnated adhesive-backed substrate, ink, coating or other materials which may be affixed to or printed on the process loads, and which undergoes a visual change when exposed to ionizing radiation.

3.1.4.1 *Discussion*—This visual change may be as observed with the unaided eye or with an eye aid such as an optical filter.

3.1.4.2 *Discussion*—In the past, radiation-sensitive indicators have been referred to by different names (**1-5**) including *label dosimeters*, *label indicators*, *indicator labels*, and *radiation monitoring labels*. ASTM Subcommittee E61 considers a *label dosimeter* to be fundamentally different from an *indicator*, and intends to define a label dosimeter as a type of

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

Current edition approved Jan. 12, 2023. Published February 2023. Originally published as ASTM E1539–93. The present Fourth Edition of International Standard ISO/ASTM 51539:2023(E) is a major revision of ISO/ASTM 51539:2013(E).

[2] The boldface numbers in parentheses refer to the bibliography at the end of this document.

[3] 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.

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

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