
**Guide for estimation of measurement un-
certainty in dosimetry for radiation pro-
cessing**

*Guide pour l'estimation de l'incertitude de mesure en dosimétrie
pour le traitement par irradiation*

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Contents

	Page
1 Scope	1
2 Referenced documents	1
3 Terminology	2
4 Significance and use	4
5 Basic concepts—components of uncertainty	4
6 Evaluation of Type A and Type B standard uncertainty	4
7 Examples of uncertainty budget components associated with absorbed dose measurements	5
8 Characterization of uncertainty components based on probability distributions	6
9 Statement of uncertainty	8
10 Uses of measurement uncertainty estimates	8
11 Keywords	9
Annexes	9
Bibliography	11
Figure 1 Normal distribution, also called Gaussian or “bell curve”, the most important continuous random distribution (JCGM 100:2008)	7
Figure 2 Rectangular distribution, also called continuous uniform distribution (JCGM 100:2008)	7
Table A2.1	10
Table A2.2	11

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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 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 51707 was developed by ASTM Committee E61, Radiation Processing, through Subcommittee E61.01, Dosimetry, and by Technical Committee ISO/TC 85, Nuclear energy, nuclear technologies and radiological protection.

This third edition cancels and replaces the second edition (ISO/ASTM 51707:2005), which has been technically revised.



Standard Guide for Estimation of Measurement Uncertainty in Dosimetry for Radiation Processing¹

This standard is issued under the fixed designation ISO/ASTM 51707; 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 standard provides guidance on the use of concepts described in the JCGM Evaluation of Measurement Data – Guide to the Expression of Uncertainty in Measurement (GUM) to estimate the uncertainties in the measurement of absorbed dose in radiation processing.

1.2 Methods are given for identifying, evaluating and estimating the components of measurement uncertainty associated with the use of dosimetry systems and for calculating combined standard measurement uncertainty and expanded (overall) uncertainty of dose measurements based on the GUM methodology.

1.3 Examples are given on how to develop a measurement uncertainty budget and a statement of uncertainty.

1.4 This document is one of a set of standards that provides recommendations for properly implementing dosimetry in radiation processing, and provides guidance for achieving compliance with the requirements of ISO/ASTM 52628 related to the evaluation and documentation of the uncertainties associated with measurements made with a dosimetry system. It is intended to be read in conjunction with ISO/ASTM 52628, ISO/ASTM 51261 and ISO/ASTM 52701.

1.5 This guide does not address the establishment of process specifications or conformity assessment.

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:²

E170 Terminology Relating to Radiation Measurements and Dosimetry

E456 Terminology Relating to Quality and Statistics

2.2 ISO/ASTM Standards:²

51261 Practice for Calibration of Routine Dosimetry Systems for Radiation Processing

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

51702 Practice for Dosimetry in a Gamma Facility for Radiation Processing

52628 Practice for Dosimetry in Radiation Processing

52701 Guide for Performance Characterization of Dosimeters and Dosimetry systems for Use in Radiation Processing

2.3 ISO Documents:

ISO 11137-1 Sterilization of Health Care Products – Radiation – Requirements for Development, Validation and Routine Control of a Sterilization Process³

ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories⁴

¹ This guide is under the jurisdiction of ASTM Committee E61 on Radiation Processing and is the direct responsibility of Subcommittee E61.01 on Dosimetry, and is also under the jurisdiction of ISO/TC 85/WG 3.

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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 Association for the Advancement of Medical Instrumentation, 1110 North Glebe Road, Suite 220, Arlington, VA 22201-4795, U.S.A.

⁴ Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.