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**Radiation protection — Sealed sources  
— Leakage test methods**

*Radioprotection — Sources scellées — Méthodes d'essai d'étanchéité*



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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.

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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 2, *Radiological protection*.

This second edition cancels and replaces the first edition (ISO 9978:1992), which has been technically revised. The main changes compared to the previous edition are as follows:

- [Clause 4](#): Revised to add text specifying factors to be considered in designing an effective leak testing regime for a particular type of sealed source;
- [Clause 4](#): Requirement added that personnel performing leak tests be appropriately trained and qualified, informative reference to ISO 9712 added;
- [Clause 4](#): Requirement added that measurement uncertainty shall be considered in sentencing non-binary test results;
- [Table 1](#) — “Threshold detection values and limiting values for different test methods” has been revised for clarity;
- [5.1](#): Informative reference to suitable assay techniques for immersion test liquid samples added: ISO 19361 and ISO 19581;
- [5.1.1](#), [5.1.2](#), [5.1.4](#): Composition of suitable immersion test liquids clarified;
- [5.3](#): Informative reference to suitable wipe testing techniques (ISO 7503-2) added and clarification that acceptance criteria is absolute without correction for wiping efficiency required;
- [6.1](#): Normative reference to ISO 20485 added for methods of helium leak testing and calculation of acceptance limits;
- [6.2](#): Cautionary text added to state that efficacy of tests assume ideal conditions for vision of bubbles;
- [6.2.1](#): Cautionary text added regarding bubble testing of self-heated sources;

- [A.1](#): Text expanded to clarify which tests to use under given circumstances.

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## Introduction

The use of sealed sources has become so widespread that standards to guide the user, manufacturer and regulatory agencies are necessary. When establishing these standards, radiation protection is the prime consideration.

The purpose of this document, in conjunction with ISO 2919, is to minimise the risk to the public caused by leakage of radioactive material into the general environment.

Leakage test methods for sealed sources were standardised in the first edition of this document. The experience acquired since this date has necessitated the revision of this document.

# Radiation protection — Sealed sources — Leakage test methods

## 1 Scope

This document specifies the different leakage test methods for sealed sources. It gives a comprehensive set of procedures using radioactive and non-radioactive means.

This document applies to the following situations:

- leakage testing of test sources following design classification testing in accordance with ISO 2919[1];
- production quality control testing of sealed sources;
- periodic inspections of the sealed sources performed at regular intervals, during the working life.

[Annex A](#) of this document gives guidance to the user in the choice of the most suitable method(s) according to situation and source type.

It is recognized that there can be circumstances where special tests, not described in this document, are required.

It is emphasized, however, that insofar as production, use, storage and transport of sealed radioactive sources are concerned, compliance with this document is no substitute for complying with the requirements of the relevant IAEA regulations<sup>[17]</sup> and other relevant national regulations. It is also recognized that countries can enact statutory regulations which specify exemptions for tests, according to sealed source type, design, working environment, and activity (e.g., for very low activity reference sources where the total activity is less than the leakage test limit).

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 20485:2017, *Non-destructive testing — Leak testing — Tracer gas method*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 3.1 capsule

protective envelope, used to prevent leakage of radioactive material