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Radiation protection - Sealed sources - Leakage test methods (ISO 9978:2020)



EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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ICS 13.280

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EUROPEAN STANDARD

EN ISO 9978

NORME EUROPÉENNE

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English Version

Radiation protection - Sealed sources - Leakage test methods (ISO 9978:2020)

Radioprotection - Sources scellées - Méthodes d'essai d'étanchéité (ISO 9978:2020)

Strahlenschutz - Umschlossene radioaktive Stoffe - Dichtheitsprüfungen (ISO 9978:2020)

This European Standard was approved by CEN on 18 December 2022.

This European Standard was corrected and reissued by the CEN-CENELEC Management Centre on 22 March 2023.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of ISO 9978:2020 has been prepared by Technical Committee ISO/TC 85 "Nuclear energy, nuclear technologies, and radiological protection" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 9978:2022 by Technical Committee CEN/TC 430 "Nuclear energy, nuclear technologies, and radiological protection" the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2023, and conflicting national standards shall be withdrawn at the latest by June 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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Endorsement notice

The text of ISO 9978:2020 has been approved by CEN as EN ISO 9978:2022 without any modification.

Annex 1

A-Deviation for EN ISO 9978 (Germany)

Clause	Deviation
3.9	<p>Germany</p> <p>replaced by Strahlenschutzgesetz, Section 5 (35), reading:</p> <p>(35) Sealed radioactive sources: Radioactive material that is permanently sealed in an all-over tight, solid, not radioactive capsule or material to which it is closely bonded in a way that reliably maintains leak-tightness under the conditions of use for which it was designed; one dimension of the sealed radioactive source shall be at least 0,2 cm. Radioactive sources which are used because of their radioactivity and whose encapsulation can be opened non-destructively are no sealed radioactive sources</p>

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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).

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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.

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.

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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^[17] 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