

Nuclear facilities - Criteria for design and operation of confinement systems for nuclear worksite and for nuclear installations under decommissioning (ISO 16647:2018)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 16647:2021 sisaldab Euroopa standardi EN ISO 16647:2021 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 16647:2021 consists of the English text of the European standard EN ISO 16647:2021.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 04.08.2021.	Date of Availability of the European standard is 04.08.2021.
Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 27.120.20

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele. Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis- ja Akrediteerimiskeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardimis- ja Akrediteerimiskeskusega: Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation and Accreditation: Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

**Nuclear facilities - Criteria for design and operation of
confinement systems for nuclear worksite and for nuclear
installations under decommissioning (ISO 16647:2018)**

Installations nucléaires - Critères pour la conception et
l'exploitation des systèmes de confinement des
chantiers nucléaires et des installations nucléaires en
démantèlement (ISO 16647:2018)

Kerntechnische Anlagen - Kriterien für die Planung
und den Betrieb von Einschlussystemen für
Arbeitsplätze in der Kerntechnik und in stillgelegten
kerntechnischen Anlagen (ISO 16647:2018)

This European Standard was approved by CEN on 25 July 2021.

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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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, Turkey 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 16647:2018 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 16647:2021 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 February 2022, and conflicting national standards shall be withdrawn at the latest by February 2022.

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.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: 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, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 16647:2018 has been approved by CEN as EN ISO 16647:2021 without any modification.

Contents

Page

Foreword	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Functions ensured by the confinement	4
5 Principles for radioactive substances confinement	4
5.1 General principles	4
5.2 Risk assessment procedure	5
5.3 General requirements	6
5.4 Confinement system	6
5.4.1 General	6
5.4.2 Case of a worksite containment located in an existing "confinement system"	7
5.4.3 Case of a worksite containment located beyond any "confinement system"	7
5.4.4 Summary of different natures and levels of confinement	7
5.5 Static containment	8
5.6 Dynamic confinement	9
5.7 Air clean-up modalities before release	9
6 Methodology and recommendation for confinement design	9
6.1 Classification of the installation into working areas	9
6.1.1 General	9
6.1.2 Confinement area classification	9
6.1.3 Other classifications for areas	10
6.2 Static containment design	10
6.3 Dynamic confinement design	11
6.4 Integrated confinement design (static-dynamic confinement)	12
6.5 Airtight bag and ventilated airtight bag	15
6.6 Protection against weather: sun, rain, wind, snow and extreme temperatures	16
6.7 Air-change rate	16
6.8 Air inlet filtration and air-transfer between confinement system	17
6.9 Air clean-up system design	18
6.9.1 Areas not classified under radiological dispersal	18
6.9.2 Areas classified under the radiological release	18
6.10 Connection to any existing ventilation networks	19
6.10.1 General	19
6.10.2 Worksite containment located in a building, room or enclosure equipped with a nuclear ventilation	19
6.10.3 Worksite containment beyond any nuclear ventilation	20
6.10.4 Additional recommendations	21
6.11 Recommended ventilation configuration as function of confinement class	22
6.12 Worksite containment usually used	22
7 Recommendations concerning commissioning, monitoring and operation of containment	23
7.1 General	23
7.2 Pre-commissioning inspection	23
7.3 Monitoring of the confinement	24
7.3.1 General	24
7.3.2 Monitoring of static containment	24
7.3.3 Monitoring of dynamic confinement	24
7.3.4 Monitoring of purification systems	25
7.3.5 Other monitoring	26
7.4 Containment operation	26
7.5 Containment disassembly	26

8	Considerations about other risks than radiological risks related to confinement	27
Annex A (informative)	Example of confinements classification and recommendations on associated equipment	28
Annex B (informative)	Examples for the selection of materials constituting worksite containment	31
Annex C (informative)	Practical guidance on worksite containment arrangements	32
Bibliography		35

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).

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).

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 ISO/TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, SC 2, *Radiological protection*.

Nuclear facilities — Criteria for design and operation of confinement systems for nuclear worksite and for nuclear installations under decommissioning

1 Scope

This document specifies the requirements applicable to the design and use of airborne confinement systems that ensure safety and radioprotection functions in nuclear worksites and in nuclear installations under decommissioning to protect from radioactive contamination produced: aerosol or gas.

The purpose of confinement systems is to protect the workers, members of the public and environment against the spread of radioactive contamination resulting from operations in nuclear worksites and from nuclear installations under decommissioning.

The confinement of nuclear worksites and of nuclear installations under decommissioning is characterized by the temporary and evolving (dynamic) nature of the operations to be performed. These operations often take place in area not specifically designed for this purpose.

This document applies to maintenance or upgrades at worksites which fit the above definition.

NOTE The requirements for the design and use of ventilation and confinement systems and for liquid confinement in nuclear reactors or in nuclear installations other than nuclear worksites and nuclear installations under decommissioning are developed in other ISO standards.

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 16170, *In situ test methods for high efficiency filter systems in industrial facilities*

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

climatic shelter

shelter whose function is to provide suitable protection against the weather (sun, rain, wind, snow and extreme temperatures), usually structurally separated from radiological containment

3.2

aerosol

solid particles and liquid droplets of all dimensions in suspension in a gaseous fluid