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

*Installations nucléaires — Critères pour la conception et  
l'exploitation des systèmes de confinement des chantiers nucléaires et  
des installations nucléaires en démantèlement*

Preview

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ISO 16647:2018(E)

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Published in Switzerland

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

Voorbeeld  
Preview

# 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

**3.3  
barrier**

structural element, which defines the physical limits of a volume with a particular radiological environment and which prevents or limits releases of radioactive substances from this volume

EXAMPLE Containment enclosure, shielded cell, filters.

**3.4  
discharge stack**

duct (usually vertical) at the termination of a system, from which the air is discharged to the atmosphere

**3.5  
air conditioning**

arrangement allowing the sustainment of a controlled atmosphere (temperature, humidity, pressure, dust levels, gas content, etc.) in a closed volume

**3.6  
confinement**

arrangement allowing users to maintain separate environments inside and outside an enclosure, blocking the movement between them, of process materials and substances resulting from physical and chemical reactions which are potentially harmful to workers, the external environment, or to the handled products

Note 1 to entry: The word "confinement" is used in several IAEA documents to mean the function of confining radioactive or toxic products whereas "containment" is used to mean the physical barrier that achieves the objective of confinement, i.e. a confined area.

**3.7  
worksite containment**

specific containment implemented to cover the temporary and evolving nature of worksite activities

**3.8  
dynamic confinement**

action allowing, by maintaining a preferential air flow circulation, to limit back-flow between two areas or between the inside and outside of an enclosure, in order to prevent radioactive substances being released from a given physical volume

**3.9  
contamination**

presence of radioactive substances on or in a material or a human body or any place where they are undesirable or could be harmful

**3.10  
containment enclosure**

enclosure designed to prevent either the leakage of products contained in the pertinent internal environment into the external environment, or the penetration of substances from the external environment into the internal environment, or both simultaneously

**3.11  
gas cleaning**

action of decreasing the content of undesirable constituents in a fluid

Note 1 to entry: Gas cleaning is sometimes called "scrubbing".

Note 2 to entry: Aerosol filtration and iodine trapping are examples of gas cleaning.

**3.12  
filter**

device intended to trap particles suspended in gases and fluids or to trap gases themselves



**3.13**  
**high efficiency particle air filter**  
**HEPA filter**

aerosol filter that corresponds to the classes H35, H40 or H45 according to ISO 29463-1

**3.14**  
**last filtration stage**  
**LFS**

last filtering stage implemented on the dynamic confinement release network protecting the environment

EXAMPLE HEPA filters for aerosols, iodine filters, etc.

**3.15**  
**Derived air concentration**  
**DAC**

amount of contamination in air, which, if 2 200 m<sup>3</sup> is inhaled, would result in the annual limit of intake (ALI)

Note 1 to entry: DAC is defined in ICRP 103 and expressed in Bq/m<sup>3</sup>.

Note 2 to entry: The ALI is calculated using reference conversion factors given by ICRP (International Commission for Radiological Protection) for each radionuclide (ICRP 119).

**3.16**  
**airtight bag**  
**ventilated airtight bag**

flexible containment used to establish an enclosure around a contaminated item, allowing personnel to accomplish works or manipulations potentially via gloved sleeves without contacting the contaminated environment

Note 1 to entry: The airtight bag may include inlet and extract ventilation in order to achieve an air velocity in leakage points or negative pressure within the containment.

**3.17**  
**spark arrestor**

device fitted upstream of the main filters to minimize transport of particles and the deterioration of main filters, by capture of incandescent large particles

**3.18**  
**prefilter**

filter fitted upstream of the main air filters to minimize the dust burden on the latter, by removal of large particles

**3.19**  
**negative pressure**  
**depression**

pressure difference between the pressure of a given volume, which is maintained lower than the pressure in a reference volume or the external ambient pressure

**3.20**  
**confinement system**

system constituted by a coherent set of physical barriers and/or dynamic systems intended to confine radioactive substances

**3.21**  
**ventilation system**

totality of network components such as ducts, fans, filter units and other equipment, that ensures ventilation and gas cleaning functions

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