SLOVENSKI STANDARD
SIST EN ISO 12807:2021

01-april-2021

Varen prevoz radioaktivnih snovi - Preskušanje tesnjenja embalaže (ISO 12807:2018)

Safe transport of radioactive materials - Leakage testing on packages (ISO 12807:2018)

Kernbrennstofftechnologie - Sicherer Transport von radioaktivem Material - Dichtheitsprüfung der Verpackung (ISO 12807:2018)

Sûreté des transports de matières radioactives - Contrôle de l'étanchéité des colis (ISO 12807:2018)

Ta slovenski standard je istoveten z: EN ISO 12807:2021

ICS:

13.280	Varstvo pred sevanjem	Radiation protection
27.120.30	Cepljivi materiali in jedrska gorivna tehnologija	Fissile materials and nuclear fuel technology

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EUROPEAN STANDARD

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Safe transport of radioactive materials - Leakage testing on packages (ISO 12807:2018)

Sûreté des transports de matières radioactives - Contrôle de l'étanchéité des colis (ISO 12807:2018)

Kernbrennstofftechnologie - Sicherer Transport von radioaktivem Material - Dichtheitsprüfung der Verpackung (ISO 12807:2018)

This European Standard was approved by CEN on 18 January 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.

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

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

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European foreword

The text of ISO 12807:2018 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 12807:2021 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 August 2021, and conflicting national standards shall be withdrawn at the latest by August 2021.

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.

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 12807:2018 has been approved by CEN as EN ISO 12807:2021 without any modification.

INTERNATIONAL STANDARD

ISO 12807

Second edition
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Safe transport of radioactive materials — Leakage testing on packages

Sûreté des transports de matières radioactives — Contrôle de l'étanchéité des colis

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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 5, *Nuclear installations, processes and technologies*.

This second edition cancels and replaces the first edition (ISO 12807:1996), which has been technically revised.

In this document, the word “shall” denotes a requirement; the word “should” denotes a recommendation; and the word “may” denotes permission, neither a requirement nor a recommendation. Imperative statements also denote requirements. To conform with this document, all operations shall be performed in accordance with its requirements, but not necessarily with its recommendations.

The words “can”, “could” and “might” denote possibility rather than permission.

The word “will” denotes that an event is certain to occur rather than a requirement.

Introduction

The International Atomic Energy Agency (IAEA) *Regulations for the Safe Transport of Radioactive Material* specify permitted release of radioactivity under normal and accident conditions of transport, in terms of activity per unit of time, for Type B(U), Type B(M) and Type C packages used to transport radioactive materials. Generally, it is not practical to measure activity release directly. The usual method used is to relate activity release to non-radioactive fluid leakage, for which several leakages test procedures are available. The appropriate procedure will depend on its sensitivity and its application to a specific package.

The regulations specify permissible activity release for normal and accident conditions of transport. These activity release limits can be expressed in maximum permissible activity release rates for the radioactive material carried within a containment system.

In general, it is not feasible to demonstrate that the activity release limits are not exceeded by direct measurement of activity release. In practice, the most common method to prove that a containment system provides adequate containment is to carry out an equivalent gas leakage rate test.

Safe transport of radioactive materials — Leakage testing on packages

1 Scope

This document specifies gas leakage test criteria and test methods for demonstrating that packages used to transport radioactive materials comply with the package containment requirements defined in the International Atomic Energy Agency (IAEA) *Regulations for the Safe Transport of Radioactive Material* for:

— design verification;

— fabrication verification;

— preshipment verification;

— periodic verification;

— maintenance verification.

This document describes a method for relating permissible activity release of the radioactive contents carried within a containment system to equivalent gas leakage rates under specified test conditions. This approach is called gas leakage test methodology. However, in this document it is recognized that other methodologies might be acceptable, provided that they demonstrate that any release of the radioactive contents will not exceed the regulatory requirements, and subject to agreement with the competent authority.

This document provides both overall and detailed guidance on the complex relationships between an equivalent gas leakage test and a permissible activity release rate. Whereas the overall guidance is universally agreed upon, the use of the detailed guidance shall be agreed upon with the competent authority during the Type B(U), Type B(M) or Type C packages certification process.

It should be noted that, for a given package, demonstration of compliance is not limited to a single methodology.

While this document does not require particular gas leakage test procedures, it does present minimum requirements for any test that is to be used. It is the responsibility of the package designer or consignor to estimate or determine the maximum permissible release rate of radioactivity to the environment and to select appropriate leakage test procedures that have adequate sensitivity.

This document pertains specifically to Type B(U), Type B(M) or Type C packages for which the regulatory containment requirements are specified explicitly.

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.

International Atomic Energy Agency (IAEA). *Regulations for the Safe Transport of Radioactive Material*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in the International Atomic Energy Agency (IAEA), *Regulations for the Safe Transport of Radioactive Material* and the following 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 https://www.electropedia.org/

3.1
activity release rate
loss of radioactive contents per unit time through leaks or permeable walls of a containment system

3.2
blockage mechanism
mechanism by which radioactive material might be retained within a containment system due to blockage of potential leakage paths by solid or liquid material

3.3
competent authority
any national or international authority designated or recognized as such for any purpose in connection with the International Atomic Energy Agency (IAEA) *Regulations for the Safe Transport of Radioactive Material* and other applicable regulations

3.4
containment system
assembly of components of the packaging intended to retain the radioactive material during transport

3.5
gas leakage test methodology
method of specifying a gas leakage test which relates permissible activity release rates of the radioactive contents carried within a containment system to equivalent gas leakage rates under specified test conditions

3.6
leak
any unwanted opening or openings through a containment system that could permit the escape of the contents

3.7
leakage
transfer of a material from the containment system to the environment through a leak or leaks

Note 1 to entry: See also *permeation* (3.14).

3.8
leakage rate
quantity of solid particles, liquids or gases passing through leaks per unit time

Note 1 to entry: The term leakage rate can refer to the radioactive material (gas, liquid, solid or any mixture of these) or to the test fluid.

Note 2 to entry: The dimensions of the rate of solid leakage are mass divided by time. The dimensions of the rate of liquid leakage can be mass divided by time or volume divided by time. The dimensions of the rate of gas leakage are the product of pressure and volume (this is a mass-like unit) divided by time at a known temperature.

3.9
leaktight
general term indicating that a containment system meets the required level of containment for particular contents

Note 1 to entry: See Clause 8 in Annex E.

3.10
medium
any fluid, which might or might not be radioactive itself, which could carry radioactive material through a leak or leaks

3.11
molecular flow
flow of gas through a leak under conditions such that the mean free path is greater that the largest dimension of a transverse section of the leak

Note 1 to entry: The rate of molecular flow depends on the partial pressure gradient.

3.12
package
packaging together with its radioactive contents as presented for transport

3.13
packaging
assembly of components necessary to enclose the radioactive contents completely

3.14
permeation
passage of a fluid through a solid permeable barrier (even if there are no leaks) by adsorption-diffusion-desorption mechanisms

Note 1 to entry: Permeation should not be considered as a release of activity unless the fluid itself is radioactive. In this document, permeation is applied only to gases.

3.15
permeation rate
quantity of gases passing through permeable walls per unit time

Note 1 to entry: The permeation rate depends on the partial pressure gradient.

3.16
qualitative
refers to leakage test procedures which detect the presence of a leak but do not measure leakage rate or total leakage

3.17
quantitative
leakage test procedures which measure total leakage rate(s) from a containment system or from parts of it

3.18 Sensitivity

3.18.1
sensitivity of a leakage detector
minimum usable response of the detector to tracer fluid leakage, that is, the leakage rate that will produce a repeatable change in the detector reading

3.18.2
sensitivity of a leakage test procedure
minimum detectable leakage rate that the test procedure is capable of detecting