

# SVENSK STANDARD

## SS-EN ISO 2919:2014



Fastställt/Approved: 2014-11-11  
Publicerad/Published: 2014-11-13  
Utgåva/Edition: 1  
Språk/Language: engelska/English  
ICS: 13.280

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### **Kärnenergi – Slutna radioaktiva strålkällor – Allmänna krav och klassificering (ISO 2919:2012)**

### **Radiological protection – Sealed radioactive sources – General requirements and classification (ISO 2919:2012)**



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Denna standard ersätter SS-ISO 2919:2012, utgåva 3.

The European Standard EN ISO 2919:2014 has the status of a Swedish Standard. This document contains the official version of EN ISO 2919:2014.

This standard supersedes the Swedish Standard SS-ISO 2919:2012, edition 3.

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EUROPEAN STANDARD

EN ISO 2919

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2014

ICS 13.280

English Version

## Radiological protection - Sealed radioactive sources - General requirements and classification (ISO 2919:2012)

Radioprotection - Sources radioactives scellées - Exigences générales et classification (ISO 2919:2012)

Strahlenschutz - Umschlossene radioaktive Stoffe - Allgemeine Anforderungen und Klassifikation (ISO 2919:2012)

This European Standard was approved by CEN on 25 October 2014.

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## Foreword

The text of ISO 2919:2012 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 2919:2014 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of an identical text or by endorsement, at the latest by May 2015, and conflicting national standards shall be withdrawn at the latest by May 2015.

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### Endorsement notice

The text of ISO 2919:2012 has been approved by CEN as EN ISO 2919:2014 without any modification.

## Introduction

Safety is the prime consideration when establishing standards about the use of sealed radioactive sources. Sealed-source users have established an enviable record of safe usage as a result of careful scrutiny of the conditions of application of the sealed radioactive source by the regulating authority, the supplier and the user. However, as the application of sealed radioactive sources becomes more diversified and as regulating agencies become more numerous, an International Standard is needed to specify the characteristics of a sealed radioactive source and the essential performance and safety testing methods for a particular application and, thus, maintain the record of safe usage.



# Radiological protection — Sealed radioactive sources — General requirements and classification

## 1 Scope

This International Standard establishes a classification system for sealed radioactive sources that is based on test performance and specifies general requirements, performance tests, production tests, marking and certification. It provides a set of tests by which manufacturers of sealed radioactive sources can evaluate the safety of their products in use and users of such sources can select types which are suitable for the required application, especially where protection against the release of radioactive material, with consequent exposure to ionizing radiation, is concerned. This International Standard can also serve as guidance to regulating authorities.

The tests fall into several groups, including, for example, exposure to abnormally high and low temperatures and a variety of mechanical tests. Each test can be applied in several degrees of severity. The criterion of pass or fail depends on leakage of the contents of the sealed radioactive source.

NOTE Leakage test methods are given in ISO 9978.

Although this International Standard classifies sealed sources by a variety of tests, it does not imply that a sealed source will maintain its integrity if used continuously at the rated classification. For example, a sealed source tested for 1 h at 600 °C might, or might not, maintain its integrity if used continuously at 600 °C.

A list of the main typical applications of sealed radioactive sources, with a suggested test schedule for each application, is given in Table 3. The tests constitute minimum requirements corresponding to the applications in the broadest sense. Factors to be considered for applications in especially severe conditions are listed in 4.2.

This International Standard makes no attempt to classify the design of sources, their method of construction or their calibration in terms of the radiation emitted. Radioactive materials inside a nuclear reactor, including sealed sources and fuel elements, are not covered by this International Standard.

## 2 Normative references

The following referenced documents are indispensable for the application 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 361, *Basic ionizing radiation symbol*

ISO 9978:1992, *Radiation protection — Sealed radioactive sources — Leakage test methods*

## 3 Terms and definitions

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

### 3.1

#### capsule

protective envelope used to prevent leakage of radioactive material

### 3.2

#### device

any piece of equipment designated to utilize one or several sealed sources

- 3.3 dummy sealed source**  
facsimile of a sealed source, the capsule of which has the same construction and is made of exactly the same materials as those of the sealed source it represents, but containing, in place of the radioactive material, a substance resembling it as closely as is practical in physical and chemical properties
- 3.4 leachable**  
soluble in water, yielding quantities greater than 0,1 mg/g in 100 ml of still water maintained at 50 °C for 4 h
- 3.5 leakage**  
transfer of contained radioactive material from the sealed source to the environment
- 3.6 leaktight**  
having met the limiting values given in Table 1 of ISO 9978:1992 after leakage testing
- 3.7 model designation**  
manufacturer's unique term (number, code or a combination of these) which is used to identify a specific design of sealed source
- 3.8 non-leachable**  
insoluble in water, yielding quantities less than 0,1 mg/g in 100 ml of still water maintained at 50 °C for 4 h
- 3.9 prototype sealed source**  
original of a sealed source which serves as a pattern for the manufacture of all sealed sources identified by the same model designation
- 3.10 sealed source**  
radioactive material sealed in a capsule or associated with a material to which it is closely bonded, this capsule or bonding material being strong enough to maintain leaktightness of the sealed source under the conditions of use and wear for which it was designed
- 3.11 test source**  
sample used in the performance tests described in this International Standard, having the same material and construction as sealed sources of the model for which classification is being established
- NOTE A test source may be a dummy sealed source, prototype or production source.
- 3.12 source assembly**  
sealed source contained within or attached to a source holder
- 3.13 source holder**  
mechanical device capable of retaining the sealed source
- 3.14 source in device**  
sealed source which remains within the shielded equipment during exposure, thus providing some mechanical protection during use
- 3.15 unprotected source**  
sealed source which, for use, is removed from the shielding

## 4 Designation and classification

### 4.1 Designation

The classification of the sealed source type shall be designated by the code ISO/, followed by two digits to indicate the year of approval of the standard used to determine the classification, followed by a solidus (/), followed by a letter, followed by five digits and a set of parentheses containing one or more digits.

The letter shall be either C or E:

- C indicates that the activity of the sealed source does not exceed the level specified in Table 2;
- E indicates that the activity of the sealed source exceeds the level specified in Table 2.

The five digits shall be the class numbers which describe the performances for temperature, external pressure, impact, vibration and puncture respectively, in the order shown in Table 1.

If required, a number is inserted between the parentheses describing the type of bending test the source has passed. Bending tests required for sources that have a particular shape (long slender sources, brachytherapy needles) are listed in Table 1 and specific requirements are given in 7.7. Multiple tests may be performed and described to satisfy the test criteria.

The parentheses may be omitted if no bending test is required.

#### EXAMPLES

- a typical industrial radiography source design for unprotected use would be designated “ISO/11/C43515(1)” or “ISO/11/C43515”;
- a typical brachytherapy source design would be designated “ISO/11/C53211(8)”;
- a typical irradiator source design would be designated “ISO/11/E53424(4,7)”.

### 4.2 Classification

The classification levels are given in Table 1. Table 1 provides a list of environmental test conditions with class numbers arranged in increasing order of severity. The performance requirements given in Table 3 do not consider the effects of fire, explosion and corrosion.

In their evaluation of sealed sources, the manufacturer and user shall consider the probability of fire, explosion, corrosion, etc. and the possible results from such events. Factors which should be considered when determining the need for special testing are as follows:

- a) consequences of loss of activity;
- b) quantity of radioactive material contained in the sealed source;
- c) radionuclide group;
- d) chemical and physical form of the radioactive material;
- e) environment in which the source is stored, moved and used;
- f) protection afforded to the sealed source or source-device combination.

Annex C contains some general information on adverse environmental conditions. The user and manufacturer should decide jointly on the additional tests, if any, to which the sealed source shall be subjected.

Annex D contains examples of special tests.