



SLOVENSKI STANDARD SIST EN ISO 21909-2:2023

01-september-2023

Sistemi pasivne nevtronske dozimetrije - 2. del: Metodologija in merila za kvalifikacijo osebnih dozimetričnih sistemov na delovnih mestih (ISO 21909-2:2021)

Passive neutron dosimetry systems - Part 2: Methodology and criteria for the qualification of personal dosimetry systems in workplaces (ISO 21909-2:2021)

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Systèmes dosimétriques passifs pour les neutrons - Partie 2: Méthodologie et critères de qualification des systèmes dosimétriques individuels aux postes de travail (ISO 21909-2:2021)

Ta slovenski standard je istoveten z: EN ISO 21909-2:2023

ICS:

13.280	Varstvo pred sevanjem	Radiation protection
17.240	Merjenje sevanja	Radiation measurements

SIST EN ISO 21909-2:2023

en,fr,de

EUROPEAN STANDARD

EN ISO 21909-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2023

ICS 13.280

English Version

Passive neutron dosimetry systems - Part 2: Methodology and criteria for the qualification of personal dosimetry systems in workplaces (ISO 21909-2:2021)

Systèmes dosimétriques passifs pour les neutrons -
Partie 2: Méthodologie et critères de qualification des
systèmes dosimétriques individuels aux postes de
travail (ISO 21909-2:2021)

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European foreword

The text of ISO 21909-2:2021 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 21909-2:2023 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of an identical text or by endorsement, at the latest by January 2024, and conflicting national standards shall be withdrawn at the latest by January 2024.

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Endorsement notice

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INTERNATIONAL
STANDARD

ISO
21909-2

First edition
2021-12

**Passive neutron dosimetry systems —
Part 2:
Methodology and criteria for the
qualification of personal dosimetry
systems in workplaces**

iTeh STANDARD PREVIEW

Systèmes dosimétriques passifs pour les neutrons —

*Partie 2: Méthodologie et critères de qualification des systèmes
dosimétriques individuels aux postes de travail*

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Reference number
ISO 21909-2:2021(E)

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Published in Switzerland

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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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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*.

A list of all the parts in the ISO 21909 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

ISO 21909-1 provides laboratory-based type tests, and performance requirements for passive neutron dosimetry systems to be used for measurement of personal dose equivalent, $H_p(10)$, for neutrons ranging from thermal energy to approximately 20 MeV^[1]. No distinction between the different techniques available in the marketplace is made in the description of the tests. ISO 21909 (series) aims at covering all passive neutron detectors that can be used as a personal dosimeter in parts of, or in the complete above-mentioned neutron energy range.

The main objective of ISO 21909 series is to achieve correspondence between performance tests and conditions of use at the workplaces. Dosimetry systems complying totally with ISO 21909-1 should give consistent dosimetry results in workplace environments without the requirement of precise information on the characteristics of the radiation fields (neutron energy and direction distributions).

For the case that a dosimetry system does not comply with the full range of requirements in ISO 21909-1 with regard to the dependence of the response on the energy and direction distributions of the neutron fluence, it remains necessary to evaluate the performance of the dosimetry system for the conditions of the workplace. That means that this document is systematically used to qualify at workplaces a dosimetry system that does not fulfil the criteria of ISO 21909-1 on the dependence of the response on neutron energy and direction of incidence.

This document aims to address dosimetry systems with responses that show energy and directional dependencies that do not comply with the test requirements in ISO 21909-1, but that are able to give consistent and reliable dosimetry results at selected workplaces. In this case, a specific study of the workplace where the dosimetry systems are used is necessary to demonstrate that the dosimetry systems are suited for the workplace of application and, if needed, to determine the appropriate corrections to be applied. This document gives requirements for the qualification of the dosimetry system as well as methods for evaluating its performance and qualifying it for use in the workplace.

In cases where the dosimetry system meets the requirements of ISO 21909-1, it may still be desirable to perform a similar study at the workplace to improve the performance of the neutron dosimeters. It is also recommended that this document may be implemented, not only for passive dosimetry systems, but for active dosimetry systems as well.

No qualification or correction of the dosimetry system at a workplace is required if the dosimetry system fulfils the criteria of ISO 21909-1.

All the estimations of the uncertainties in this document have to be considered in accordance with the GUM^[2]. Uncertainties quoted in this document are provided using a coverage factor $k=2$.

Passive neutron dosimetry systems —

Part 2:

Methodology and criteria for the qualification of personal dosimetry systems in workplaces

1 Scope

This document provides methodology and criteria to qualify the dosimetry system at workplaces where it is used. The criteria in this document apply to dosimetry systems which do not meet the criteria with regard to energy and direction dependent responses described in ISO 21909-1.

The qualification of the dosimetry system at workplace aims to demonstrate that:

- either, the non-conformity of the dosimetry system to some of the requirements on the energy or direction dependent responses defined in ISO 21909-1 does not lead to significant discrepancies in the dose determination for a certain workplace field;
- or, that the correction factor or function used for this specific studied workplace enables the dosimetry system to accurately determine the conventional dose value with uncertainties similar to the ones given in ISO 21909-1.

NOTE This document is directed at all stakeholders who are involved: IMSs, accreditation or regulatory bodies, and users of the particular dosimetry (the user is meant as the entity which assigns the dosimetry system to the radiation worker and records the assigned dose.)

The methodologies to characterize the work place field in order to perform the qualification of the dosimetry system are given in [Annex A](#). [Annex B](#) is complementary as it gives the practical methods to follow, once one methodology is chosen.

The provider of the dosimetry system shall provide the type test results corresponding to ISO 21909-1. However, when the dosimetry system to be qualified does not comply with all the criteria of ISO 21909-1 dealing with the energy and angle dependence of the response, some tests of the ISO 21909-1 can be not performed.

The links between ISO 21909-1 and ISO 21909-2 are described in [Annex E](#).

This document only addresses neutron personal monitoring and not criticality accident conditions.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitute 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 21909-1:2021, *Passive neutron dosimetry systems — Part 1: Performance and test requirements for personal dosimetry*

ISO 8529-2:2000, *Reference neutron radiations — Part 2: Calibration fundamentals of radiation protection devices related to the basic quantities characterizing the radiation field*

ISO 8529-3:1998, *Reference neutron radiations — Part 3: Calibration of area and personal dosimeters and determination of response as a function of energy and angle of incidence*