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Radiation protection instrumentation - Spectroscopy-based alarming personal radiation detectors (SPRD) for the detection of illicit trafficking of radioactive material

Táto norma obsahuje anglickú verziu európskej normy.  
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 03/24

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EUROPEAN STANDARD

**EN IEC 62618**

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2024

ICS 13.280

Supersedes EN 62618:2016

English Version

**Radiation protection instrumentation - Spectroscopy-based  
alarming personal radiation detectors (SPRD) for the detection of  
illicit trafficking of radioactive material  
(IEC 62618:2022)**

Instrumentation pour la radioprotection - Détecteurs  
individuels spectroscopiques d'alarme aux rayonnements  
(SPRD) pour la détection du trafic illicite des matières  
radioactives  
(IEC 62618:2022)

Strahlenschutz-Messgeräte - Spektroskopie-basierte  
alarmgebende persönliche Strahlungsdetektoren für den  
Nachweis von unerlaubt transportiertem radioaktivem  
Material  
(IEC 62618:2022)

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**EN IEC 62618:2024 (E)****European foreword**

This document (EN IEC 62618:2024) consists of the text of IEC 62618:2022 prepared by IEC/SC 45B "Radiation protection instrumentation" of IEC/TC 45 "Nuclear instrumentation".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2025-01-22
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2027-01-22

This document supersedes EN 62618:2016 and all of its amendments and corrigenda (if any).

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In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60068-2-11	NOTE	Approved as EN IEC 60068-2-11
IEC 60846-1	NOTE	Approved as EN 60846-1
IEC 61526	NOTE	Approved as EN 61526
IEC 62244	NOTE	Approved as EN IEC 62244
IEC 62327	NOTE	Approved as EN IEC 62327
IEC 62401	NOTE	Approved as EN IEC 62401
IEC 62484	NOTE	Approved as EN IEC 62484
IEC 62533	NOTE	Approved as EN 62533
IEC 62534	NOTE	Approved as EN 62534
IEC 62694	NOTE	Approved as EN 62694
IEC 63121	NOTE	Approved as EN IEC 63121

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cencenelec.eu](http://www.cencenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-395	2014	International Electrotechnical Vocabulary - Part 395: Nuclear instrumentation: Physical phenomena, basic concepts, instruments, systems, equipment and detectors	-	-
+ A1	2016		-	-
+ A2	2020		-	-
IEC 60079-11	-	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"	-	-
IEC 62706	-	Radiation protection instrumentation - Environmental, electromagnetic and mechanical performance requirements	-	-
IEC 62755	-	Radiation protection instrumentation - Data format for radiation instruments used in the detection of illicit trafficking of radioactive materials	-	-
IEC/TR 62971	2015	Radiation instrumentation - Radiation sources used in illicit trafficking detection standards - Guidance and recommendations	-	-
UL 913	-	Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations	-	-
ICRU report 39	-	Determination of Dose Equivalents Resulting from External Radiation Sources	-	-
ICRU report 47	-	Measurement of Dose Equivalents from External Photon and Electron Radiations	-	-



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# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Radiation protection instrumentation – Spectroscopy-based alarming personal radiation detectors (SPRD) for the detection of illicit trafficking of radioactive material**

**Instrumentation pour la radioprotection – Détecteurs individuels spectroscopiques d'alarme aux rayonnements (SPRD) pour la détection du trafic illicite de matières radioactives**

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Edition 2.0 2022-11

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

**Radiation protection instrumentation – Spectroscopy-based alarming personal radiation detectors (SPRD) for the detection of illicit trafficking of radioactive material**

**Instrumentation pour la radioprotection – Détecteurs individuels spectroscopiques d'alarme aux rayonnements (SPRD) pour la détection du trafic illicite de matières radioactives**

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## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references .....	7
3 Terms and definitions, abbreviated terms and symbols, quantities and units.....	8
3.1 Terms and definitions.....	8
3.2 Abbreviated terms and symbols .....	10
3.3 Quantities and units .....	10
4 General test procedure .....	11
4.1 Standard test conditions .....	11
4.2 Uncertainties.....	11
4.3 Statistical fluctuations .....	11
4.4 Background radiation during testing .....	12
4.5 Operating parameters and set up.....	12
4.6 Radiation sources .....	12
4.7 Special nuclear material (SNM) and depleted uranium (DU) sources.....	12
4.8 Speed of moving sources including scaling .....	12
4.9 Functionality test and test acceptance range requirements .....	13
4.10 Neutron measurement requirements .....	15
5 General requirements .....	16
5.1 Basic information .....	16
5.2 Mechanical characteristics .....	16
5.3 Data output.....	17
5.4 User indications .....	17
5.5 Markings .....	17
5.6 Alarms .....	18
6 Radiation detection requirements .....	18
6.1 False alarm rate.....	18
6.2 Gamma alarm .....	18
6.3 Personal protection alarm .....	19
6.4 Relative intrinsic error.....	19
6.5 Detection of gradually increasing radiation levels.....	20
6.6 Over-range .....	20
6.7 Detection of neutrons (if provided) .....	20
6.8 Gamma response of neutron detector (if provided).....	21
6.9 Identification of single radionuclides .....	22
6.10 Simultaneous radionuclide identification .....	23
6.11 Low-exposure rate identification.....	23
6.12 Over range characteristics for identification .....	23
7 Environmental requirements .....	24
7.1 Ambient temperature.....	24
7.2 Temperature shock .....	24
7.3 Relative humidity .....	24
7.4 Dust and moisture protection .....	25
8 Mechanical requirements.....	25
8.1 Vibration .....	25



8.2	Microphonics/Impact .....	26
8.3	Drop .....	26
9	Electromagnetic requirements .....	26
9.1	Electrostatic discharge (ESD) .....	26
9.2	Radio frequency (RF).....	27
9.3	Radiated RF emissions .....	27
9.4	Magnetic fields.....	27
10	Documentation .....	28
10.1	Operation and maintenance manual .....	28
10.2	Test certificate .....	28
10.3	Declaration of conformity .....	28
	Bibliography.....	29
	Table 1 – Overview of IEC radiation protection instrumentation standards .....	6
	Table 2 – Standard test conditions .....	11
	Table 3 – Test results analysis.....	15
	Table 4 – Identification acceptance criteria <sup>1</sup> .....	22

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**RADIATION PROTECTION INSTRUMENTATION –  
SPECTROSCOPY-BASED ALARMING PERSONAL  
RADIATION DETECTORS (SPRD) FOR THE DETECTION  
OF ILLICIT TRAFFICKING OF RADIOACTIVE MATERIAL****FOREWORD**

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IEC 62618 has been prepared by subcommittee 45B: Radiation protection instrumentation, of IEC technical committee 45: Nuclear instrumentation. It is an International Standard.

This second edition cancels and replaces the first edition published in 2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) making the standard consistent with the new standards for detection of illicit trafficking of radioactive material (see the Introduction);
- b) creating unformed functionality test for all environmental, electromagnetic and mechanical tests and a requirement for the coefficient of variation of each nominal mean reading;
- c) reference to IEC 62706 for the environmental, electromagnetic and mechanical test conditions;
- d) adding information regarding climatic exposures.

The text of this International Standard is based on the following documents:

Draft	Report on voting
45B/1011/FDIS	45B/1017/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

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## INTRODUCTION

It is important to detect illicit and inadvertent movement of radioactive materials in the form of radiation sources and contaminated metallurgical scrap. Radioactive sources out of regulatory control, so-called “orphan sources”, have frequently caused serious radiation exposures and widespread contamination. Although illicit trafficking of nuclear and other radioactive materials is not a new problem, concern about a nuclear “black market” has increased particularly in view of its terrorist potential.

In response to the technical policy of the International Atomic Energy Agency (IAEA), the World Customs Organization (WCO), and the International Criminal Police Organization (Interpol) related to the detection and identification of special nuclear materials and security trends, nuclear instrumentation companies have developed and manufactured radiation instrumentation to assist in the detection of illicit movement of radioactive and special nuclear materials. This type of instrumentation is widely used for security purposes at nuclear facilities, border control checkpoints, and international seaports and airports.

To ensure that measurement results made at different locations are consistent, it is imperative that radiation instrumentation be designed to specifications based upon agreed performance requirements. IEC standards have been developed to establish performance requirements for personal radiation detectors, radiation portal monitors, highly sensitive gamma and neutron detection systems, spectrometric personal radiation detectors, and backpack-based radiation detection and identification systems. Table 1 contains a list of those standards.

**Table 1 – Overview of IEC radiation protection instrumentation standards**

Type of instrumentation	IEC number	Title of the standard
Body-worn	62401	Radiation protection instrumentation – Alarming Personal Radiation Devices (PRDs) for the detection of illicit trafficking of radioactive material
	62618	Radiation protection instrumentation – Spectroscopy-Based Alarming Personal Radiation Detectors (SPRD) for the detection of illicit trafficking of radioactive material
	62694	Radiation protection instrumentation – Backpack-type radiation detector (BRD) for the detection of illicit trafficking of radioactive material
Portable or hand-held	62327	Radiation protection instrumentation – Hand-held instruments for the detection and identification of radionuclides and for the estimation of ambient dose equivalent rate from photon radiation
	62533	Radiation protection instrumentation – Highly sensitive hand-held instruments for photon detection of radioactive material
	62534	Radiation protection instrumentation – Highly sensitive hand-held instruments for neutron detection of radioactive material
Portal	62244	Radiation protection instrumentation – Installed radiation portal monitors (RPMs) for the detection of illicit trafficking of radioactive and nuclear materials
	62484	Radiation protection instrumentation – Spectrometric radiation portal monitors (SRPMs) used for the detection and identification of illicit trafficking of radioactive material
Data format	62755	Radiation protection instrumentation – Data format for radiation instruments used in the detection of illicit trafficking of radioactive materials
Mobile system	63121	Radiation protection instrumentation – Vehicle-mounted mobile systems for the detection of illicit trafficking of radioactive materials

# **RADIATION PROTECTION INSTRUMENTATION – SPECTROSCOPY-BASED ALARMING PERSONAL RADIATION DETECTORS (SPRD) FOR THE DETECTION OF ILLICIT TRAFFICKING OF RADIOACTIVE MATERIAL**

## **1 Scope**

This document applies to Spectroscopy-based alarming Personal Radiation Detectors (SPRD). SPRDs detect and identify gamma radiation and may detect neutron radiation. SPRDs can be worn on a belt or in a pocket to alert the wearer of the presence of a radiation source. SPRDs provide search, similar to that of a Personal Radiation Device (PRD), and identification capability to identify radiation sources. They can discriminate between alarms caused by Naturally Occurring Radioactive Materials (NORM) or medical radionuclides and alarms from industrial sources or Special Nuclear Material (SNM).

This document establishes performance requirements and specifies general characteristics, general test conditions, radiological, climatic, mechanical, and electromagnetic characteristics. This document also provides test methods that are used to determine if an SPRD meets the stated requirements.

This document does not apply to the performance of radiation protection instrumentation which is covered in IEC 61526 and IEC 60846-1. SPRDs are not intended for accurate measurement of personal ( $H_p(10)$ ) or ambient ( $H^*(10)$ ) dose equivalent (rate).

## **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.

IEC 60050-395:2014, *International Electrotechnical Vocabulary (IEV) – Part 395: Nuclear instrumentation – Physical phenomena, basic concepts, instruments, systems, equipment and detectors*

IEC 60050-395:2014/AMD1:2016

IEC 60050-395:2014/AMD2:2020

IEC 60079-11, *Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"*

IEC 62706, *Radiation protection instrumentation – Recommended climatic, electromagnetic and mechanical performance requirements and methods of tests*

IEC 62755, *Radiation protection instrumentation – Data format for radiation instruments used in the detection of illicit trafficking of radioactive materials*

IEC TR 62971:2015, *Radiation instrumentation – Radiation sources used in illicit trafficking detection standards – Guidance and recommendations*

UL 913, *Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations*

ICRU report 39, *Determination of Dose Equivalents Resulting from External Radiation Sources*

ICRU report 47, *Measurement of Dose Equivalents from External Photon and Electron Radiations*

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