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Radiation protection instrumentation – Spectrometric radiation portal monitors (SRPMs) used for the detection and identification of illicit trafficking of radioactive material

INTERNATIONAL
ELECTROTECHNICAL
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CONTENTS

FOREWORD 5
INTRODUCTION 7
1 Scope 8
2 Normative references 8
3 Terms and definitions, abbreviated terms and symbols, quantities and units 9
3.1 Terms and definitions 9
3.2 Abbreviated terms and symbols 10
3.3 Quantities and units 11
4 Design requirements 11
4.1 General 11
4.1.1 Overview 11
4.1.2 Pedestrian monitor 14
4.1.3 Road vehicle monitor 14
4.1.4 Rail vehicle monitor (includes rail transported containers) 14
4.1.5 Package (or conveyor) monitor 14
4.2 Physical configuration 14
4.3 Spectral identification and count rate information 15
4.4 Indication features 15
4.5 Occupancy and speed sensors 16
4.6 Markings 16
4.7 Protection of switches 16
4.8 Energy and count rate range 16
4.9 Data transfer 16
4.10 User interface 16
4.10.1 Audible (sound) alarm 16
4.10.2 Visual indicators 16
4.10.3 Warning indicators 17
4.10.4 Basic controls and functions 17
4.10.5 Advanced indications and functions 17
5 General test procedures 18
5.1 General test conditions 18
5.1.1 Nature of tests 18
5.1.2 Standard test conditions 18
5.1.3 Statistical fluctuations 18
5.2 Reference neutron radiation for alarm testing 19
5.3 Alarm categorization 19
5.4 General requirements for testing radionuclide identification ability 19
5.5 Functionality test 20
5.5.1 General 20
5.5.2 Pre-test measurements 21
5.5.3 Intermediate (during test) measurements 21
5.5.4 Post-test measurements 21
6 Radiation detection requirements 21
6.1 Stability test 21
6.1.1 Requirements 21
6.1.2 Method of test 21

6.2 Neutron radiation detection, if provided 22
6.2.1 Requirements 22
6.2.2 Method of test 22
6.3 Gamma over-range indication 22
6.3.1 Requirements 22
6.3.2 Method of test 22
6.4 Detection of neutron radiation in a high gamma field 23
6.4.1 Requirements 23
6.4.2 Method of test – large road vehicle and multiple-sided rail vehicle monitors 23
6.4.3 Method of test – all other types of monitors 23
6.5 Background effects 23
6.5.1 Requirements 23
6.5.2 Method of test 24
6.6 Radionuclide identification 24
6.6.1 Radionuclide library and identification categorization 24
6.6.2 Radionuclide identification qualification 25
6.6.3 Single radionuclide identification 25
6.6.4 Simultaneous radionuclide identification 26
6.6.5 Alarm without identification 27
7 Climatic requirements 27
7.1 General 27
7.2 Ambient temperature 27
7.2.1 Requirements 27
7.2.2 Method of test 27
7.3 Relative humidity 28
7.3.1 Requirements 28
7.3.2 Method of test 28
7.4 Dust and moisture protection 28
7.4.1 Requirements 28
7.4.2 Method of test – Dust 28
7.4.3 Test method – Moisture 28
7.5 Climatic exposure type test 29
7.5.1 Requirements 29
7.5.2 Method of test 29
8 Mechanical requirements 29
8.1 Vibration 29
8.1.1 Requirements 29
8.1.2 Method of test 29
8.2 Microphonics/Impact 30
8.2.1 Requirements 30
8.2.2 Method of test 30
9 Electric and electromagnetic requirements 30
9.1 Electrostatic discharge (ESD) 30
9.1.1 Requirements 30
9.1.2 Method of test 30
9.2 Radio frequency (RF) 30
9.2.1 Requirements 30
9.2.2 Method of test 30

9.3 Radiated RF emissions 31
9.3.1 Requirements 31
9.3.2 Method of test 31
9.4 Conducted disturbances 31
9.4.1 Requirements 31
9.4.2 Method of test 31
9.5 Surges and oscillatory waves 31
9.5.1 Requirements 31
9.5.2 Method of test 31
9.6 Line voltage and frequency fluctuations 32
9.6.1 Requirements 32
9.6.2 Method of test 32
10 Documentation 32
10.1 Operation and maintenance manual 32
10.2 Test certificate 33
10.3 Declaration of conformity 33
Annex A (informative) Identification of uranium and plutonium 36
Bibliography 37

Figure 1 – Example of a two-sided system 12

Table 1 – Standards for instrumentation used to detect illicit trafficking of radioactive and nuclear materials 7
Table 2 – Speed of moving sources 13
Table 3 – Evaluation distances for different applications 13
Table 4 – Standard test conditions 18
Table 5 – Test radionuclides 20
Table 6 – Test materials[1] 20
Table 7 – Test result analysis 21
Table 8 – Radionuclide library 24
Table 9 – Radionuclide categorisation 24
Table 10 – Identification acceptance criteria[1,2] 25
Table 11 – Summary of performance requirements – Informative 33
Table 12 – Environmental requirements – Informative[1] 35
Table A.1 – Uranium and plutonium detection and identification guidance 36

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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RADIATION PROTECTION INSTRUMENTATION – SPECTROMETRIC RADIATION PORTAL MONITORS (SRPMS) USED FOR THE DETECTION AND IDENTIFICATION OF ILLICIT TRAFFICKING OF RADIOACTIVE MATERIAL

FOREWORD

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International Standard IEC 62484 has been prepared by subcommittee 45B: Radiation protection instrumentation, of IEC technical committee 45: Nuclear instrumentation.

This second edition cancels and replaces the first edition of IEC 62484 issued in 2010. This edition constitutes a technical revision.

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

a) title modified;
b) making the standard consistent with the new standards for detection of illicit trafficking of radioactive material (see the Introduction);
c) creating unformed functionality test for all environmental, electromagnetic and mechanical tests and a requirement for the coefficient of variation of each nominal mean reading;

d) reference to IEC 62706 for the environmental, electromagnetic and mechanical test conditions;

e) adding information regarding climatic exposures.

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

FDIS	Report on voting
45B/969/FDIS	45B/971/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

Illicit and inadvertent movement of radioactive materials has become a problem of increasing importance. 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 phenomenon, concern about a nuclear "black market" has increased in the last few years 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 are developing and manufacturing 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.

However, to ensure that measurement results made at different locations are consistent, it is imperative that radiation instrumentation be designed to rigorous specifications based upon agreed performance requirements stated in international standards. Several IEC standards have been developed to address body-worn, hand-held and portal instruments, see Table 1.

Table 1 – Standards for instrumentation used to detect illicit trafficking of radioactive and nuclear materials

Type of instrumentation	IEC number	Title of the standard
Body-worn	**62401**	Radiation protection instrumentation – Alarming Personal Radiation Devices (PRD) for detection of illicit trafficking of radioactive material
	62618	Radiation protection instrumentation – Spectroscopy-Based Alarming Personal Radiation Devices (SPRD) for detection of illicit trafficking of radioactive material
	62694	Radiation protection instrumentation – Backpack-type radiation detector (BRD) for 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
Mobile	**63121**	Radiation protection instrumentation – Vehicle-mounted mobile systems for the detection of illicit trafficking of radioactive materials
Data format	**62755**	Radiation protection instrumentation – Data format for radiation instruments used in the detection of illicit trafficking of radioactive materials

RADIATION PROTECTION INSTRUMENTATION – SPECTROMETRIC RADIATION PORTAL MONITORS (SRPMS) USED FOR THE DETECTION AND IDENTIFICATION OF ILLICIT TRAFFICKING OF RADIOACTIVE MATERIAL

1 Scope

This document defines the performance requirements of installed monitors used for the detection and identification of gamma emitters and the detection of neutron radiation emitters. These monitors are commonly known as spectrometric radiation portal monitors or SRPMs. They are used to monitor vehicles, cargo containers, people, or packages and are typically used at national and international border crossings and ports of entry. SRPMs may be used at any location where there is a need for this type of monitoring.

This document establishes the general, radiological, climatic, mechanical, electric and electromagnetic and documentation requirements and associated test methods. A summary of the performance requirements is provided in Table 11. An informative listing of environmental requirements from IEC 62706 is provided in Table 12.

This document does not apply to the performance of non-spectroscopic portal monitors covered in IEC 62244.

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

IEC 60068-2-5, *Environmental testing – Part 2-5: Tests – Test S: Simulated solar radiation at ground level and guidance for solar radiation testing and weathering*

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*

IAEA-TECDOC-1311: September 2002, *Prevention of the inadvertent movement and illicit trafficking of radioactive materials*