

Radiation protection instrumentation — Alarming personal radiation devices (PRD) for detection of illicit trafficking of radioactive material

ICS 13.280

National foreword

This British Standard is the UK implementation of IEC 62401:2007.

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A list of organizations represented on this committee can be obtained on request to its secretary.

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**Radiation protection instrumentation –
Alarming personal radiation devices (PRD)
for detection of illicit trafficking
of radioactive material**



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RADIATION PROTECTION INSTRUMENTATION – ALARMING PERSONAL RADIATION DEVICES (PRD) FOR DETECTION OF ILLICIT TRAFFICKING OF RADIOACTIVE MATERIAL

1 Scope and object

This International Standard applies to alarming radiation detection instruments that are pocket-sized, carried on the body and used to detect and indicate the presence and general magnitude of penetrating ionizing radiation, including photons and/or neutrons.

Personal Radiation Devices (PRD) alert the user to the presence of a source of radiation that is distinctly above the measured average local background radiation level. They are not intended to provide a measurement of dose equivalent rate.

The object of this standard is to describe design and functioning criteria along with testing methods for evaluating the performance of instruments for detection of illicit trafficking of radioactive material (for example, for border radiation monitoring). These instruments may be used in extreme environmental conditions.

This standard does not apply to the performance of radiation protection instrumentation covered in IEC 60846, IEC 61526, and IEC 62327.

The performances of the PRD with respect to neutrons may be degraded and not warranted when they are used in other conditions than on the body.

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.

IEC 60050-393:2003, *International Electrotechnical Vocabulary (IEV) – Part 393: Nuclear instrumentation – Physical phenomena and basic concepts*

IEC 60050-394:1995, *International Electrotechnical Vocabulary (IEV) – Chapter 394: Nuclear instrumentation – Instrument*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
Amendment 1 (1999)¹

IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*
Amendment 1 (1998)
Amendment 2 (2000)²

¹ There exists a consolidated edition 2.1 (2001) that includes edition 2.0 and its amendment.

² There exists a consolidated edition 1.2 (2001) that includes edition 1.0 and its amendments.

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

ISO 4037-1:1996, *X and gamma reference radiation for calibrating dosimeters and dose rate meters and for determining their response as a function of photon energy – Part 1: Radiation characteristics and production methods*

ISO 4037-2:1997, *X and gamma reference radiation for calibrating dosimeters and dose rate meters and for determining their response as a function of photon energy – Part 2: Dosimetry for radiation protection over the energy ranges from 8 keV to 1,3 MeV and 4 MeV to 9 MeV*

ISO 4037-3:1999, *X and gamma reference radiation for calibrating dosimeters and dose rate meters and for determining their response as a function of photon energy – Part 3: Calibration of area and personal dosimeters and the measurement of their response as a function of energy and angle of incidence*

ISO 8529-1:2001, *Reference neutron radiations – Part 1: Characteristics and methods of production*

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 neutron energy and angle of incidence*

International Bureau of Weights and Measures: *The International System of Units (SI)*, Seventh edition, 1998

3 Terms, definitions, quantities and units

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-393 and 60050-394, as well as the following, apply.

3.1.1

A-weighted sound level

frequency weighting of an acoustic spectrum according to a standardized frequency response curve based on the frequency response of the human ear

3.1.2

accuracy

closeness of the agreement between the result of a measurement and the conventionally true value of the measurand

[IEV 394-20-39, modified]

3.1.3

alarm

audible, visual, or other signal activated when the instrument reading exceeds a preset value or falls outside of a preset range

[IEV 393-18-03, modified]

3.1.4**background level**

radiation field in which the instrument is intended to operate

3.1.5**conventionally true value of a quantity*****CTV***

best estimate of the value of a quantity used for a given purpose

NOTE A conventionally true value is, in general, regarded as sufficiently close to the true value for the difference to be insignificant for the given purpose. For example, a value determined from a primary or secondary standard or by a reference instrument, may be taken as the conventionally true value.

[IEV 394-20-10]

3.1.6**device**

radiation detector with its associated electronics

3.1.7**effective range of measurement**

range of values of the quantity to be measured over which the performance of a device meets the requirements of this standard

[IEV 394-20-16, modified]

3.1.8**false alarm**

alarm not caused by an increase in radiation level over background conditions

3.1.9**influence quantity**

quantity that may have a bearing on the result of a measurement without being the subject of the measurement

3.1.10**point of measurement**

place at which the conventionally true values are determined and at which the reference point of the instrument is placed for test purposes

3.1.11**readout**

value, with units, displayed and/or recorded by the instrument as a result of the instrument's response to some influence quantity

3.1.12**reference point of an assembly**

physical mark on a piece of equipment or assembly to be used in order to position it at a point where the conventionally true value of the quantity to be measured is known

[IEV 394-20-15]