

Radiation protection instrumentation — Portable photon contamination meters and monitors

ICS 13.280

National foreword

This British Standard is the UK implementation of EN 62363:2011. It is identical with IEC 62363:2008. It supersedes BS IEC 62363:2008, which is withdrawn.

The CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by [C] <C> tags.

The UK participation in its preparation was entrusted to Technical Committee NCE/2, Radiation protection and measurement.

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

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Compliance with a British Standard cannot confer immunity from legal obligations.

Amendments/corrigenda issued since publication

Date	Comments
31 August 2011	This corrigendum renumbers BS IEC 62363:2008 as BS EN 62363:2011

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**Radiation protection instrumentation -
Portable photon contamination meters and monitors
(IEC 62363:2008, modified)**

Instrumentation pour la radioprotection -
Appareils portables de mesure et de
surveillance de la contamination par des
photons
(CEI 62363:2008, modifiée)

Strahlenschutz-Messgeräte -
Tragbare Oberflächenkontaminations-
Messgeräte und -Überwachungsgeräte für
Photonenstrahlung
(IEC 62363:2008, modifiziert)

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of the International Standard IEC 62363:2008, prepared by SC 45B, Radiation protection instrumentation, of IEC TC 45, Nuclear instrumentation, together with the common modifications prepared by the Technical Committee CENELEC TC 45B, Radiation protection instrumentation, was submitted to the formal vote and was approved by CENELEC as EN 62363 on 2011-06-20.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2012-06-20
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2014-06-20

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62363:2008 was approved by CENELEC as a European Standard with agreed common modifications as given below.

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RADIATION PROTECTION INSTRUMENTATION – PORTABLE PHOTON CONTAMINATION METERS AND MONITORS

1 Scope and object

This International Standard is applicable to portable and transportable contamination meters and monitors designed for the direct measurement or the direct detection of surface contamination by photon radiation emitting radionuclides and which comprise at least:

- a detection assembly (comprising counter tube, scintillation detector or semiconductor detector, etc.), which may be connected either rigidly or by means of a flexible cable or incorporated into a single assembly;
- a measurement assembly.

The standard is applicable to:

- photon surface contamination meters;
- photon surface contamination monitors.

The standard is applicable to detection assemblies that are designed to measure photon contamination from radionuclides which emit photons with energy in excess of 5 keV. In particular, this standard should be used to assess the performance of assemblies used to demonstrate that material is free from surface contamination by photon emitting radionuclides.

This standard is also applicable to special purpose assemblies and to assemblies specifically designed to provide limited spectroscopic information to the user.

NOTE These detection assemblies may be used to measure photon emissions from radionuclides that also emit alpha and beta radiations, where the alpha and beta emissions may be shielded due to the nature of the contamination. If shielding of the radioactive emissions occurs, then strictly speaking, the contamination is near to rather than on the surface of the article being monitored.

The object of this standard is to lay down standard requirements and to give examples of acceptable methods, and also to specify general characteristics, general test conditions, radiation characteristics, electrical safety, environmental characteristics, and the requirements of the identification certificate for photon contamination meters and monitors.

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):2007, *International Electrotechnical Vocabulary (IEV) – Part 394: Nuclear instrumentation: Instruments, systems, equipment and detectors*

IEC 60068-2-27, *Environmental testing – Part 2: Tests – Test Ea and guidance: Shock*

IEC 60086 (all parts), *Primary batteries*

IEC 60325:2002, *Radiation protection instrumentation – Alpha, beta and alpha/beta (beta energy >60 keV) contamination meters and monitors*

IEC 61187:1993, *Electrical and electronic measuring equipment – Documentation*

ISO 7503-1:1988, *Evaluation of surface contamination – Part 1: Beta-emitters (maximum beta energy greater than 0,15 MeV) and alpha-emitters*

ISO 7503-3:1996, *Evaluation of surface contamination – Part 3: Isomeric transition and electron capture emitters, low energy beta-emitters ($E_{\text{Beta max}}$ less than 0,15 MeV)*

ISO 8769-2:1996, *Reference sources for the calibration of surface contamination monitors – Part 2: Electrons of energy less than 0,15 MeV and photons of energy less than 1,5 MeV*

ISO 11929-1:2000, *Determination of the detection limit and decision threshold for ionizing radiation measurements – Part 1: Fundamentals and application to counting measurements without the influence of sample treatment*

BIPM, *The international system of units (SI)*, 7th edition, 1998

3 Terms and definitions

For the purposes of this document, the general terminology concerning the detection and measurement of ionizing radiation and nuclear instrumentation given in IEC 60050-393 and IEC 60050-394 applies. Also, the terms and definitions specific to this standard given in ISO 7503-1, ISO 7503-3, ISO 8769-2 and ISO 11929-1, as well as the following, apply.

3.1

particle

very small portion of matter or energy

[IEV 393-11-01]

3.2

photon

quantum of electromagnetic radiation considered as an elementary particle of energy $h\nu$, where h is the Planck constant and ν the frequency of the radiation

[IEV 393-11-06]

3.3

surface emission rate (for a radioactive source)

number of particles of a given type, whose energies are above a given value, emerging from the face of the radioactive source or its window per unit time

[IEV 393-14-87]

NOTE In the context of this standard, a particle refers to a photon.

3.4

calibrated source activity

activity of a test source in Becquerels, as stated by the source manufacturer at the time of purchase, or an appropriately accredited calibration laboratory. The calibrated activity shall always have a correction applied to take into account radioactive decay

3.5

effective range of measurement

absolute value of the difference between the two limits of a nominal range

[IEV 394-40-16]

3.6

response time (of a measuring assembly)

duration between the instant of a step change in the measured quantity and the instant when the output signal reaches for the first time a specified percentage of its final value, that percentage being usually taken as 90 %

[IEV 394-39-09]

NOTE For integrating measuring assemblies, the response time is 90 % of the equilibrium value of the first derivative or slope of the indication.

3.7

source efficiency

ϵ_s

ratio between the surface emission rate and the number of particles of the same type created or released within the source per unit time

[ISO 8769-2, 3.3, modified]

NOTE Source efficiency will be affected by self-absorption and backscatter.

3.8

decay efficiency of a radionuclide with respect to photons

ϵ_d

ratio of the number of photons of a given energy, created per unit time by a given radionuclide, to the number of decays of this radionuclide per unit time

[ISO 7503-3, 3.1, modified]

3.9

small area source

source where the largest dimension of the active surface does not exceed 1 cm

3.10

surface emission rate response

S

ratio of the number of detected photons per unit time (for example the net count rate) to the conventionally true surface emission rate of photons of the same type per unit area, under stated conditions specified by the manufacturer

3.11

surface activity response

ratio of the number of detected photons per unit time (for example the net count rate) to the activity (in Becquerels) of the radioactive source per unit area, under stated conditions specified by the manufacturer

3.12

effective sensitive area

area under the detector, where the efficiency to a small area source located within that area is always greater than 1 % of the maximum efficiency to the same source within that area

NOTE The plane of the sensitive surface of the detection assembly is maintained 10 mm above the plane of the source.

3.13

sensitive volume (of a detector)

part of the detector which is sensitive to a radiation and is used for detection

[IEV 394-38-22]