

Radiation protection instrumentation — Radon and radon decay product measuring instruments —

Part 3: Specific requirements for radon decay product measuring instruments

ICS 13.280

National foreword

This British Standard reproduces verbatim IEC 61577-3:2002 and implements it as the UK national standard.

The UK participation in its preparation was entrusted to Technical Committee NCE/2, Health physics instrumentation, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

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**Instrumentation pour la radioprotection –
Instruments de mesure du radon
et des descendants du radon –**

**Partie 3:
Exigences spécifiques concernant les instruments
de mesure des descendants du radon**

**Radiation protection instrumentation –
Radon and radon decay product
measuring instruments –**

**Part 3:
Specific requirements for radon decay
product measuring instruments**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RADIATION PROTECTION INSTRUMENTATION –
RADON AND RADON DECAY PRODUCT
MEASURING INSTRUMENTS –**

**Part 3: Specific requirements for radon decay product
measuring instruments**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61577-3 has been prepared by subcommittee 45B: Radiation protection instrumentation, of IEC technical committee 45: Nuclear instrumentation.

The text of this standard is based on the following documents:

FDIS	Report on voting
45B/351/FDIS	45B/358/RVD

Full information on the voting for the approval of this 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 3.

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

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

INTRODUCTION

This International Standard is part of a series covering radon and radon decay product measuring instruments as well as systems for test atmospheres with radon (acronym STAR)¹⁾. This series consists of the following parts:

Part 1: General requirements

Part 2: Specific requirements for radon measuring instruments

Part 3: Specific requirements for radon decay product measuring instruments

Part 4: Instruments for rapid measurement of potential alpha energy in mines²⁾.

Part 1 covers the general characteristics of tests and calibrations of radon and radon decay product measuring instruments as well as general characteristics of radon and radon decay product measuring instruments.

¹⁾ System for test atmospheres with radon, sometimes called radon chambers. See IEC 61577-1.

²⁾ Under consideration. Presently available under reference IEC 61263.

RADIATION PROTECTION INSTRUMENTATION – RADON AND RADON DECAY PRODUCT MEASURING INSTRUMENTS –

Part 3: Specific requirements for radon decay product measuring instruments

1 Scope and object

The requirements of this part of IEC 61577 are applicable to instruments which are used to measure radon decay product activity concentration and/or volume potential alpha energy in work-places, in dwellings and outdoors.

The standard applies practically to all types of instruments that are based on grab sampling, continuous sampling technique and integrating measurement methods which include electronic equipment. The measurement of activity retained by a sampling device, for example a filtering device, can be made both during sampling or after the completion of a collection cycle.

General testing procedures and the different types of instrumentation used for measuring radon decay product activity concentration are described in IEC 61577-1.

The object of this part of IEC 61577 is to describe the specific requirements for testing instruments intended for measuring the activity concentration of airborne radon decay products and/or the volume potential alpha energy.

These requirements specify test procedures, radiation characteristics, electrical, mechanical, safety and environmental characteristics as well as identification certificates.

Requirements are to be applied in accordance with the general principles for sampling airborne radioactive materials of ISO 2889.

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):1996, *International Electrotechnical Vocabulary (IEV) – Chapter 393: Nuclear instrumentation: Physical phenomena and basic concepts*

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

IEC 60068 (all parts), *Environmental testing*

IEC 60068-2-27:1987, *Environmental testing – Part 2: Tests – Test Ea and guidance: Shock*

IEC 60181:1964, *Index of electrical measuring apparatus used in connection with ionizing radiation*

IEC 60181A:1965, First supplement

IEC 60761-2:2002, *Equipment for continuous monitoring of radioactivity in gaseous effluents – Part 2: Specific requirements for radioactive aerosol monitors including transuranic aerosols*

IEC 61577-1:2000, *Radiation protection instrumentation – Radon and radon decay product measuring instruments – Part 1: General requirements*

ISO 2889:1975, *General principles for sampling airborne radioactive materials*

3 Definitions

For the purpose of this part of IEC 61577, the following definitions apply as well as those given in IEC 60050(393), IEC 60050(394), IEC 60181, IEC 60181A and IEC 61577-1.

3.1

conventionally true value of a quantity

best estimate of the value of a quantity determined by a primary or secondary standard, or by a reference instrument that has been calibrated against a primary or secondary standard

3.2

relative intrinsic error E

the relative intrinsic error E , expressed as a percentage, is given by the relationship:

$$E(\%) = (Q_i - Q_t) 100/Q_t$$

where

Q_i is the indicated value;

Q_t is the conventionally true value

3.3

coefficient of variation

ratio of the standard deviation σ to the arithmetic mean $\bar{x}$ of a set of measurements x_i given by the formula

$$V = \sigma/\bar{x} = 1/\bar{x} \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$$

3.4

reference response R_{ref}

response of the instrument under standard test conditions to the reference source activity

3.5

response time

time delay between the initial exposure of the detection assembly to a given value of the measurement quantity and the attainment of 90 % of the equilibrium reading, or for integrating (slope) assemblies, 90 % of the equilibrium value of the first derivative of the indication, with respect to time