SLOVENSKI STANDARD
SIST EN ISO 11665-3:2020

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Nadomešča:
SIST EN ISO 11665-3:2015

Merjenje radioaktivnosti v okolju - Zrak: radon Rn-222 - 3. del: Točkovna metoda za merjenje potencialne koncentracije alfa energije njegovih kratkoživih razpadnih produktov (ISO 11665-3:2020)

Measurement of radioactivity in the environment - Air: radon-222 - Part 3: Spot measurement method of the potential alpha energy concentration of its short-lived decay products (ISO 11665-3:2020)

Ermittlung der Radioaktivität in der Umwelt - Luft: Radon-222 - Teil 3: Punktmessverfahren der potenziellen Alpha-Energiekonzentration der kurzlebigen Radon-Folgeprodukte (ISO 11665-3:2020)

Mesurage de la radioactivité dans l'environnement - Air: radon 222 - Partie 3: Méthode de mesure ponctuelle de l'énergie alpha potentielle volumique de ses descendants à vie courte (ISO 11665-3:2020)

Ta slovenski standard je istoveten z: **EN ISO 11665-3:2020**

ICS:

13.040.99	Drugi standardi v zvezi s kakovostjo zraka	Other standards related to air quality
17.240	Merjenje sevanja	Radiation measurements

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EUROPEAN STANDARD

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English Version

Measurement of radioactivity in the environment - Air: radon-222 - Part 3: Spot measurement method of the potential alpha energy concentration of its short-lived decay products (ISO 11665-3:2020)

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This European Standard was approved by CEN on 19 January 2020.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN ISO 11665-3:2020) has been prepared by Technical Committee ISO/TC 85 "Nuclear energy, nuclear technologies, and radiological protection" in collaboration with Technical Committee CEN/TC 430 “Nuclear energy, nuclear technologies, and radiological protection” the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2020, and conflicting national standards shall be withdrawn at the latest by August 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 11665-3:2015.

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Endorsement notice

The text of ISO 11665-3:2020 has been approved by CEN as EN ISO 11665-3:2020 without any modification.

INTERNATIONAL STANDARD

ISO 11665-3

Second edition
2020-01

Measurement of radioactivity in the environment — Air: radon-222 —

Part 3: Spot measurement method of the potential alpha energy concentration of its short-lived decay products

Mesurage de la radioactivité dans l'environnement — Air: radon 222 —

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: : www.iso.org/iso/foreword.html

This document was prepared by Technical Committee ISO/TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 2, *Radiological protection*.

This second edition cancels and replaces the first edition (ISO 11665-3:2012), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— update of the Introduction;

— update of the Bibliography.

A list of all the parts in the ISO 11665 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Radon isotopes 222, 219 and 220 are radioactive gases produced by the disintegration of radium isotopes 226, 223 and 224, which are decay products of uranium-238, uranium-235 and thorium-232 respectively, and are all found in the earth's crust (see ISO 11665-1:2019, Annex A for further information). Solid elements, also radioactive, followed by stable lead are produced by radon disintegration[1].

When disintegrating, radon emits alpha particles and generates solid decay products, which are also radioactive (polonium, bismuth, lead, etc.). The potential effects on human health of radon lie in its solid decay products rather than the gas itself. Whether or not they are attached to atmospheric aerosols, radon decay products can be inhaled and deposited in the bronchopulmonary tree to varying depths according to their size[2][3][4][5].

Radon is today considered to be the main source of human exposure to natural radiation. UNSCEAR[6] suggests that, at the worldwide level, radon accounts for around 52 % of global average exposure to natural radiation. The radiological impact of isotope 222 (48 %) is far more significant than isotope 220 (4 %), while isotope 219 is considered negligible (see ISO 11665-1:2019, Annex A). For this reason, references to radon in this document refer only to radon-222.

Radon activity concentration can vary from one to more orders of magnitude over time and space. Exposure to radon and its decay products varies tremendously from one area to another, as it depends on the amount of radon emitted by the soil and building materials, weather conditions, and on the degree of containment in the areas where individuals are exposed.

As radon tends to concentrate in enclosed spaces like houses, the main part of the population exposure is due to indoor radon. Soil gas is recognized as the most important source of residential radon through infiltration pathways. Other sources are described in other parts of ISO 11665 and ISO 13164 series for water[7].

Radon enters into buildings via diffusion mechanism caused by the all-time existing difference between radon activity concentrations in the underlying soil and inside the building, and via convection mechanism inconstantly generated by a difference in pressure between the air in the building and the air contained in the underlying soil. Indoor radon activity concentration depends on radon activity concentration in the underlying soil, the building structure, the equipment (chimney, ventilation systems, among others), the environmental parameters of the building (temperature, pressure, etc.) and the occupants' lifestyle.

To limit the risk to individuals, a national reference level of 100 Bq.m^{-3} is recommended by the World Health Organization[5]. Wherever this is not possible, this reference level should not exceed 300 Bq·m^{-3}. This recommendation was endorsed by the European Community Member States that should establish national reference levels for indoor radon activity concentrations. The reference levels for the annual average activity concentration in air should not be higher than 300 Bq·m^{-3}[5].

To reduce the risk to the overall population, building codes should be implemented that require radon prevention measures in buildings under construction and radon mitigating measures in existing buildings. Radon measurements are needed because building codes alone cannot guarantee that radon concentrations are below the reference level.

Variations of a few nanojoules per cubic metre to several thousand nanojoules per cubic metre are observed in the potential alpha energy concentration of short-lived radon decay products.

The potential alpha energy concentration of short-lived radon-222 decay products in the atmosphere can be measured by spot and integrated measurement methods (see ISO 11665-1). This document deals with spot measurement methods. A spot measurement of the potential alpha energy concentration relates to the time when the measurement is taken and has no significance in annual exposure. This type of measurement does not therefore apply when assessing the annual exposure.

NOTE The origin of radon-222 and its short-lived decay products in the atmospheric environment are described generally in ISO 11665-1 together with measurement methods.