ICS 13.060.60, 17.240 SLOVENSKÁ TECHNICKÁ NORMA Jún 2020

STN	**Kvalita vody Rádium 226 Časť 3: Koprecipitačná a gama-spektrometrická skúšobná metóda (ISO 13165-3: 2016)**	**STN EN ISO 13165-3 75 7629**

Water quality - Radium-226 - Part 3: Test method using coprecipitation and gamma-spectrometry (ISO 13165-3:2016)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 05/20

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EUROPEAN STANDARD

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EUROPÄISCHE NORM

EN ISO 13165-3

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English Version

Water quality - Radium-226 - Part 3: Test method using coprecipitation and gamma-spectrometry (ISO 13165-3:2016)

Qualité de l'eau - Radium 226 - Partie 3: Méthode d'essai par coprécipitation et spectrométrie gamma (ISO 13165-3:2016)

Wasserbeschaffenheit - Radium 226 - Teil 3: Verfahren mittels Kopräzipitation und Gammaspektrometrie (ISO 13165-3:2016)

This European Standard was approved by CEN on 6 October 2019.

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

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EN ISO 13165-3:2020 (E)

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European foreword

The text of ISO 13165-3:2016 has been prepared by Technical Committee ISO/TC 147 "Water quality" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 13165-3:2020 by Technical Committee CEN/TC 230 "Water analysis" the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by August 2020, and conflicting national standards shall be withdrawn at the latest by August 2020.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.

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Endorsement notice

The text of ISO 13165-3:2016 has been approved by CEN as EN ISO 13165-3:2020 without any modification.

INTERNATIONAL STANDARD

ISO 13165-3

First edition
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Water quality — Radium-226 —

Part 3: Test method using coprecipitation and gamma-spectrometry

Qualité de l'eau — Radium 226 —

Partie 3: Méthode d'essai par coprécipitation et spectrométrie gamma

Reference number
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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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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 147, *Water quality*, Subcommittee SC 3, *Radioactivity measurements*.

ISO 13165 consists of the following parts, under the general title *Water quality — Radium-226*:

— *Part 1: Test method using liquid scintillation counting*

— *Part 2: Test method using emanometry*

— *Part 3: Test method using coprecipitation and gamma-spectrometry*

Introduction

Radioactivity from several naturally occurring and human-made sources is present throughout the environment. Thus, water bodies (surface waters, ground waters, sea waters) can contain radionuclides of natural and human-made origins:

Natural radionuclides, including potassium-40, and those of the thorium and uranium decay series, in particular radium-226, radium-228, uranium-234, uranium-238, and lead-210, can be found in water for natural reasons (e.g. desorption from the soil and wash-off by rain water) or releases from technological processes involving naturally occurring radioactive materials (e.g. the mining and processing of mineral sands or phosphate fertilizer production and use).

Human-made radionuclides such as transuranium elements (americium, plutonium, neptunium, curium), tritium, carbon-14, strontium-90, and gamma emitters radionuclides can also be found in natural waters as they can be authorized to be routinely released into the environment in small quantities in the effluent discharge from nuclear fuel cycle facilities and following their use in unsealed form in medicine or industry. They are also found in the water due to the past fallout of the explosion in the atmosphere of nuclear devices and those following the Chernobyl and Fukushima accident.

Human-made radionuclides, such as transuranium elements (americium, plutonium, neptunium, curium), tritium, carbon-14, strontium-90, and some gamma emitting radionuclides, can also be found in natural waters as a result of authorized routine releases into the environment in small quantities in the effluent discharged from nuclear fuel cycle facilities. They are also released into the environment following their use in unsealed form for medical and industrial applications. They are also found in the water as a result of past fallout contamination resulting from the explosion in the atmosphere of nuclear devices and accidents such as those that occurred in Chernobyl and Fukushima.

Drinking water can thus contain radionuclides at activity concentration which could present a risk to human health. In order to assess the quality of drinking water (including mineral waters and spring waters) with respect to its radionuclide content and to provide guidance on reducing health risks by taking measures to decrease radionuclide activity concentrations, water resources (groundwater, river, lake, sea, etc.) and drinking water are monitored for their radioactivity content as recommended by the World Health Organization (WHO) and can be required by some national authorities.

The need of a standard on a test method of radium-226 activity concentrations in water samples is justified for test laboratories carrying out these measurements, required sometimes by national authorities, as they may have to obtain a specific accreditation for radionuclide measurement in drinking water samples.

Radium-226 activity concentration can vary widely according to local geological and climatic characteristics and ranges from 0,001 $Bq \cdot l^{-1}$ in surface waters up to 50 $Bq \cdot l^{-1}$ in natural groundwaters; the guidance level for radium 226 in drinking water as recommended by WHO is 1 $Bq \cdot l^{-1}$ (see Reference [13]).

NOTE The guidance level is the activity concentration (rounded to the nearest order of magnitude) with an intake of 2 $l \cdot d^{-1}$ of drinking water for 1 year that results in an effective dose of 0,1 $mSv \cdot y^{-1}$ for members of the public, an effective dose that represents a very low level of risk that is not expected to give rise to any detectable adverse health effect.

This International Standard is one of a series on determination of the activity concentration of radionuclides in water samples.

INTERNATIONAL STANDARD **ISO 13165-3:2016(E)**

Water quality — Radium-226 —

Part 3: Test method using coprecipitation and gamma-spectrometry

WARNING — Persons using this part of ISO 13165 should be familiar with normal laboratory practice. This part of ISO 13165 does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

IMPORTANT — It is absolutely essential that tests conducted in accordance with this part of ISO 13165 be carried out by suitably qualified staff.

1 Scope

This part of ISO 13165 specifies the determination of radium-226 (^{226}Ra) activity concentration in all types of water by coprecipitation followed by gamma-spectrometry (see ISO 18589-3).

The method described is suitable for determination of soluble ^{226}Ra activity concentrations greater than 0,02 Bq l^{-1} using a sample volume of 1 l to 100 l of any water type.

For water samples smaller than a volume of 1 l, direct gamma-spectrometry can be performed following ISO 10703 with a higher detection limit.

NOTE This test method also allows other isotopes of radium, ^{223}Ra, ^{224}Ra, and ^{228}Ra, to be determined.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5667-3, *Water quality — Sampling — Part 3: Preservation and handling of water samples*

ISO 10703, *Water quality — Determination of the activity concentration of radionuclides — Method by high resolution gamma-ray spectrometry*

ISO 11929, *Determination of the characteristic limits (decision threshold, detection limit and limits of the confidence interval) for measurements of ionizing radiation — Fundamentals and application*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

ISO 80000-10, *Quantities and units — Part 10: Atomic and nuclear physics*