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**Kakovost vode - Radij Ra-226 - 1. del: Preskusna metoda s štetjem s tekočinskim scintilatorjem (ISO 13165-1:2013)**

Water quality - Radium-226 - Part 1: Test method using liquid scintillation counting (ISO 13165-1:2013)

Wasserbeschaffenheit - Radium-226 - Teil-1: Verfahren mit dem Flüssigszintillationszähler (ISO 13165-1:2013)

Qualité de l'eau - Radium 226 - Partie 1: Méthode d'essai par comptage des scintillations en milieu liquide (ISO 13165-1:2013)

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**ICS:**

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17.240	Merjenje sevanja	Radiation measurements

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EUROPEAN STANDARD

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## Water quality - Radium-226 - Part 1: Test method using liquid scintillation counting (ISO 13165-1:2013)

Qualité de l'eau - Radium 226 - Partie 1: Méthode d'essai par comptage des scintillations en milieu liquide (ISO 13165-1:2013)

Wasserbeschaffenheit - Radium-226 - Teil-1: Verfahren mit dem Flüssigszintillationszähler (ISO 13165-1:2013)

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

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Contents	Page
European foreword.....	3

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## European foreword

The text of ISO 13165-1:2013 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 13165-1:2020 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of an identical text or by endorsement, at the latest by August 2020, and conflicting national standards shall be withdrawn at the latest by August 2020.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.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### Endorsement notice

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The text of ISO 13165-1:2013 has been approved by CEN as EN ISO 13165-1:2020 without any modification.

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**Water quality — Radium-226 —**

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

*Qualité de l'eau — Radium 226 —*

*Partie 1: Méthode d'essai par comptage des scintillations en milieu  
liquide*

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# Contents

Page

<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Symbols, definitions and units</b> .....	<b>1</b>
<b>4 Principle</b> .....	<b>2</b>
<b>5 Reagents and equipment</b> .....	<b>2</b>
5.1 Reagents.....	2
5.2 Equipment.....	3
<b>6 Sampling</b> .....	<b>3</b>
<b>7 Instrument set-up and calibration</b> .....	<b>4</b>
7.1 Preparation of calibration sources.....	4
7.2 Optimization of counting conditions.....	4
7.3 Detection efficiency.....	4
7.4 Blank sample preparation and measurement.....	5
<b>8 Procedure</b> .....	<b>5</b>
8.1 Direct counting.....	5
8.2 Thermal preconcentration.....	5
8.3 Sample preparation.....	6
8.4 Sample measurement.....	6
<b>9 Quality control</b> .....	<b>6</b>
<b>10 Expression of results</b> .....	<b>6</b>
10.1 Calculation of massic activity.....	6
10.2 Standard uncertainty.....	6
10.3 Decision threshold.....	7
10.4 Detection limit.....	7
10.5 Confidence limits.....	8
10.6 Calculations using the activity concentration.....	8
<b>11 Interference control</b> .....	<b>8</b>
<b>12 Test report</b> .....	<b>9</b>
<b>Annex A (informative) Set-up parameters and validation data</b> .....	<b>10</b>
<b>Bibliography</b> .....	<b>14</b>

## ISO 13165-1:2013(E)

### 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 13165-1 was prepared by Technical Committee 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*

The following part is under preparation:

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

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## Introduction

Radioactivity from several naturally occurring and human-made sources is present throughout the environment. Thus, water bodies (surface waters, groundwaters, sea waters) can contain radionuclides of natural and artificial origin (i.e. human-made).

- a) Natural radionuclides, including potassium-40, and those of the thorium and uranium decay series, in particular radium-226, radium-228, uranium-234, uranium-238, lead-210, can be found in water for natural reasons (e.g. desorption from the soil and wash-off by rain water) or release from technological processes involving naturally occurring radioactive materials (e.g. the mining and processing of mineral sands or phosphate fertilizer production and use).
- b) Human-made radionuclides such as transuranium elements (americium, plutonium, neptunium, curium), tritium, carbon-14, strontium-90 and gamma-emitting 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 discharged from nuclear fuel cycle facilities and following their use in unsealed form in medicine or industry. They are also found in water due to fallout from past explosions in the atmosphere of nuclear devices and the accidents at Chernobyl and Fukushima.

Drinking water can thus contain radionuclides at activity concentrations which 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).

An International Standard on a test method of radium-226 activity concentrations in water samples is justified for test laboratories carrying out these measurements, which are sometimes required by national authorities, as laboratories 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 l<sup>-1</sup> in surface waters up to 50 Bq l<sup>-1</sup> in natural groundwaters; the guidance level for radium-226 in drinking water as recommended by WHO is 1 Bq l<sup>-1</sup> (Reference [Z]).

**NOTE** The guidance level is the activity concentration with an intake of 2 l day<sup>-1</sup> of drinking water for 1 year that results in an effective dose of 0,1 mSv year<sup>-1</sup> 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.