Irish Standard
I.S. EN ISO 9697:2017

Water quality - Gross beta activity in non-saline water - Test method using thick source (ISO 9697:2015)

I.S. EN ISO 9697:2017

Incorporating amendments/corrigenda/National Annexes issued since publication:

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National Foreword

I.S. EN ISO 9697:2017 is the adopted Irish version of the European Document EN ISO 9697:2017, Water quality - Gross beta activity in non-saline water - Test method using thick source (ISO 9697:2015)

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 9697

June 2017

ICS 13.280; 13.060.60

English Version

Water quality - Gross beta activity in non-saline water - Test method using thick source (ISO 9697:2015)

Qualité de l'eau - Activité bêta globale des eaux non salines - Méthode d'essai par source concentrée (ISO 9697:2015)

Wasserbeschaffenheit - Bestimmung der Gesamt-Beta-Aktivität in nicht-salzhaltigem Wasser - Dickschichtverfahren (ISO 9697:2015)

This European Standard was approved by CEN on 27 May 2016.

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European foreword

The text of ISO 9697:2015 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 9697:2017 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of an identical text or by endorsement, at the latest by December 2017, and conflicting national standards shall be withdrawn at the latest by December 2017.

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

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Endorsement notice

The text of ISO 9697:2015 has been approved by CEN as EN ISO 9697:2017 without any modification.

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INTERNATIONAL STANDARD

ISO 9697

Third edition
2015-04-01

Water quality — Gross beta activity in non-saline water — Test method using thick source

Qualité de l'eau — Activité bêta globale des eaux non salines — Méthode d'essai par source concentrée

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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 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*.

This third edition cancels and replaces the second edition (ISO 9697:2008), which has been technically revised.

Introduction

Radioactivity from several naturally occurring and anthropogenic sources is present throughout the environment. Thus, water bodies (e.g. surface water, groundwater, seawater) can contain the following radionuclides of natural or human-made origins:

— natural radionuclides, including potassium-40 and those originating from the thorium and uranium decay series, particularly 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 can be released from technological processes involving naturally occurring radioactive materials (e.g. the mining and processing of mineral sands or the production and use of phosphate fertilizer);

— 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 of 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 concentrations 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.

An International Standard on a test method for gross beta activity in water samples is justified for test laboratories carrying out these measurements, required sometimes by national authorities, as laboratories might have to obtain a specific accreditation for radionuclide measurement in drinking water samples.

The screening level for gross beta activity in drinking water, as recommended by WHO, is 1 Bq l^{-1}.[1] If this value is not exceeded, an effective dose of 0,1 mSv $year^{-1}$ should not be exceeded. In case that gross beta screening level is exceeded, it is recommended that the specific radionuclides should be identified and their individual activity concentrations measured. Gross beta measurements based on the evaporation method include a contribution from potassium-40, a naturally occurring beta emitter in a fixed ratio to stable potassium. If the screening level of 1 Bq l^{-1} for gross beta is exceeded, a separate determination of total potassium in water should be performed to subtract the contribution of potassium-40 to beta activity. The factor of 27,6 Bq g^{-1} of beta activity to total potassium should be used to calculate the potassium-40 contribution.[1]

NOTE The screening level is determined based on the activity concentration with an intake of 2 l day^{-1} of drinking water for 1 year that results in an effective dose of less than 0,1 mSv $year^{-1}$ 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 set of International Standards on test methods dealing with the measurement of gross activity of radionuclides in water samples. Other related standards include

— ISO 9696,

— ISO 10704, and

— ISO 11704.

Water quality — Gross beta activity in non-saline water — Test method using thick source

WARNING — Persons using this International Standard should be familiar with normal laboratory practice. This International Standard does not purport to address all of the safety issues, 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 according to this International Standard be carried out by suitably trained staff.

1 Scope

This International Standard specifies a test method for the determination of gross beta activity concentration in non-saline waters. The method covers non-volatile radionuclides with maximum beta energies of approximately 0,3 MeV or higher. Measurement of low energy beta emitters (e.g. ^{3}H, ^{228}Ra, ^{210}Pb, ^{14}C, ^{35}S, and ^{241}Pu) and some gaseous or volatile radionuclides (e.g. radon and radioiodine) might not be included in the gross beta quantification using the test method described in this International Standard.

This test method is applicable to the analysis of raw and drinking waters. The range of application depends on the amount of total soluble salts in the water and on the performance characteristics (background count rate and counting efficiency) of the counter used.

It is the laboratory's responsibility to ensure the suitability of this method for the water samples tested.

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 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 5667-1, *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes and sampling techniques*

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

ISO 5667-14, *Water quality — Sampling — Part 14: Guidance on quality assurance and quality control of environmental water sampling and handling*

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

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

ISO/IEC Guide 98-3, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

ISO/IEC Guide 99, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*