SLOVENSKI STANDARD
SIST EN ISO 19361:2020

01-maj-2020

Merjenje radioaktivnosti - Ugotavljanje aktivnosti oddajnikov beta - Preskusna metoda s tekočinskim scintilacijskim štetjem (ISO 19361:2017)

Measurement of radioactivity - Determination of beta emitters activities - Test method using liquid scintillation counting (ISO 19361:2017)

Nachweis der Radioaktivität - Bestimmung der Aktivität von Betastrahlern - Verfahren mit Flüssigszintillationszählung (ISO 19361:2017)

Mesurage de la radioactivité - Détermination de l'activité des radionucléides émetteurs bêta - Méthode d'essai par comptage des scintillations en milieu liquide (ISO 19361:2017)

Ta slovenski standard je istoveten z: EN ISO 19361:2020

ICS:

17.240	Merjenje sevanja	Radiation measurements

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EUROPEAN STANDARD

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English Version

Measurement of radioactivity - Determination of beta emitters activities - Test method using liquid scintillation counting (ISO 19361:2017)

Mesurage de la radioactivité - Détermination de l'activité des radionucléides émetteurs bêta - Méthode d'essai par comptage des scintillations en milieu liquide (ISO 19361:2017)

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

The text of ISO 19361:2017 has been prepared by Technical Committee ISO/TC 85 "Nuclear energy, nuclear technologies, and radiological protection" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 19361:2020 by 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of an identical text or by endorsement, at the latest by August 2020, and conflicting national standards shall be withdrawn at the latest by August 2020.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.

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Endorsement notice

The text of ISO 19361:2017 has been approved by CEN as EN ISO 19361:2020 without any modification.

INTERNATIONAL STANDARD

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Measurement of radioactivity — Determination of beta emitters activities — Test method using liquid scintillation counting

Mesurage de la radioactivité — Détermination de l'activité des radionucléides émetteurs bêta — Méthode d'essai par comptage des scintillations en milieu liquide

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

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

Introduction

Everyone is exposed to natural radiation. The natural sources of radiation are cosmic rays and naturally occurring radioactive substances which exist in the earth and within the human body. Human activities involving the use of radiation and radioactive substances add to the radiation exposure from this natural exposure. Some of those activities, such as the mining and use of ores containing naturally-occurring radioactive materials (NORM) and the production of energy by burning coal that contains such substances, simply enhance the exposure from natural radiation sources. Nuclear power plants and other nuclear installations use radioactive materials and produce radioactive effluent and waste during operation and on their decommissioning. The use of radioactive materials in industry, agriculture and research is expanding around the globe.

All these human activities give rise to radiation exposures that are only a small fraction of the global average level of natural exposure. The medical use of radiation is the largest and a growing man-made source of radiation exposure in developed countries. It includes diagnostic radiology, radiotherapy, nuclear medicine and interventional radiology.

Radiation exposure also occurs as a result of occupational activities. It is incurred by workers in industry, medicine and research using radiation or radioactive substances, as well as by passengers and crew during air travel and for astronauts. The average level of occupational exposures is generally below the global average level of natural radiation exposure[13].

As uses of radiation increase, so do the potential health risk and the public's concerns. Thus, all these exposures are regularly assessed in order to: (1) improve the understanding of global levels and temporal trends of public and worker exposure; (2) to evaluate the components of exposure so as to provide a measure of their relative importance, and; (3) to identify emerging issues that may warrant more attention and study. While doses to workers are mostly directly measured, doses to the public are usually assessed by indirect methods using radioactivity measurements performed on various sources: waste, effluent and/or environmental samples.

To ensure that the data obtained from radioactivity monitoring programs support their intended use, it is essential that the stakeholders (for example, nuclear site operators, regulatory and local authorities) agree on appropriate methods and procedures for obtaining representative samples and then handling, storing, preparing and measuring the test samples. An assessment of the overall measurement uncertainty need also to be carried out systematically. As reliable, comparable and 'fit for purpose' data are an essential requirement for any public health decision based on radioactivity measurements, international standards of tested and validated radionuclide test methods are an important tool for the production of such measurement results. The application of standards serves also to guarantee comparability over time of the test results and between different testing laboratories. Laboratories apply them to demonstrate their technical qualifications and to successfully complete proficiency tests during interlaboratory comparison, two prerequisites for obtaining national accreditation. Today, over a hundred international standards, prepared by Technical Committees of the International Standardization Organization, including those produced by ISO/TC 85, and the International Electrotechnical Commission (IEC), are available for application by testing laboratories to measure the main radionuclides.

Generic standards help testing laboratories to manage the measurement process by setting out the general requirements and methods to calibrate and validate techniques. These standards underpin specific standards which describe the test methods to be performed by staff, for example, for different types of sample. The specific standards cover test methods for:

— Naturally-occurring radionuclides (including ^{40}K, ^{3}H, ^{14}C and those originating from the thorium and uranium decay series, in particular ^{226}Ra, ^{228}Ra, ^{234}U, ^{238}U, ^{210}Pb) which can be found in materials from natural sources or can be released 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, and curium), ^{3}H, ^{14}C, ^{90}Sr and gamma emitting radionuclides found in waste, liquid and gaseous

effluent, in environmental matrices (water, air, soil, biota) and food and feed as a result of authorized releases into the environment and of fallout resulting from the explosion in the atmosphere of nuclear devices and accidents, such as those that occurred in Chernobyl and Fukushima.

Many of these radionuclides are beta emitters that can be measured by liquid scintillation counting, following appropriate sample preparation.

A generic international standard on liquid scintillation counting is justified for test laboratories carrying out beta emitter measurements in fulfilment of national authority requirements. For example, testing laboratories need to obtain a specific accreditation for radionuclide measurement for the monitoring of drinking water, food, the environment or the discharges, as well as for biological samples for medical purpose.

This document describes (after appropriate sampling, sample handling and test sample preparation) the generic requirements to quantify the activity concentration of beta emitters using liquid scintillation counting. In the absence of a specific pre-treatment of the test sample (such as distillation for ^{3}H measurement, or after benzene synthesis for ^{14}C measurement), this document is to be used as a screening method unless the interference of beta emitters, others than those to be quantified, is considered negligible in the test portion.

This document is one of a set of generic International Standards on measurement of radioactivity.

