SLOVENSKI STANDARD
SIST EN ISO 22017:2021

01-januar-2021

Kakovost vode - Navodilo za hitre meritve radioaktivnosti v nujnih primerih (ISO 22017:2020)

Water quality - Guidance for rapid radioactivity measurements in nuclear or radiological emergency situation (ISO 22017:2020)

Wasserbeschaffenheit - Anleitung für Schnellverfahren zur Radioaktivitätsmessung in nuklearen oder radiologischen Notfallsituationen (ISO 22017:2020)

Qualité de l'eau - Recommandations pour les mesurages rapides de la radioactivité en situation d'urgence nucléaire ou radiologique (ISO 22017:2020)

Ta slovenski standard je istoveten z: **EN ISO 22017:2020**

ICS:

13.060.60	Preiskava fizikalnih lastnosti vode	Examination of physical properties of water
13.280	Varstvo pred sevanjem	Radiation protection
17.240	Merjenje sevanja	Radiation measurements

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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN ISO 22017

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ICS 13.060.60; 13.280; 17.240

English Version

Water quality - Guidance for rapid radioactivity measurements in nuclear or radiological emergency situation (ISO 22017:2020)

Qualité de l'eau - Recommandations pour les mesurages rapides de la radioactivité en situation d'urgence nucléaire ou radiologique (ISO 22017:2020)

Wasserbeschaffenheit - Anleitung für Schnellverfahren zur Radioaktivitätsmessung in nuklearen oder radiologischen Notfallsituationen (ISO 22017:2020)

This European Standard was approved by CEN on 22 August 2020.

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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 22017:2020) has been prepared by Technical Committee ISO/TC 147 "Water quality" in collaboration with 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of an identical text or by endorsement, at the latest by March 2021, and conflicting national standards shall be withdrawn at the latest by March 2021.

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The text of ISO 22017:2020 has been approved by CEN as EN ISO 22017:2020 without any modification.

INTERNATIONAL STANDARD

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Water quality — Guidance for rapid radioactivity measurements in nuclear or radiological emergency situation

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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 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 147, *Water quality*, SC 3, *Radioactivity measurements*.

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

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

— Natural 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}Po and ^{210}Pb 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 phosphate fertilizers production and use);

— Human-made radionuclides such as transuranium elements (americium, plutonium, neptunium and curium), ^{3}H, ^{14}C, ^{90}Sr, and some gamma emitting radionuclides can also be found in natural waters. Small quantities of these radionuclides may be discharged from nuclear fuel cycle facilities into the environment as the result of authorized routine releases. Some of these radionuclides used for medical and industrial applications are also released into the environment after use. Anthropogenic radionuclides are also found in waters as the result of past fallout contaminations resulting from the explosion in the atmosphere of nuclear devices and accidents such as those that occurred in Chernobyl and Fukushima.

Radionuclide activity concentration in water bodies can vary according to local geological characteristics and climatic conditions and can be locally and temporally enhanced by releases from nuclear installation during planned, existing, and emergency exposure situations[1]. Drinking-water may thus contain radionuclides at activity concentrations which could present a risk to human health.

The radionuclides present in liquid effluents are usually controlled before being discharged into the environment[2] and water bodies. Drinking waters are monitored for their radioactivity as recommended by the World Health Organization (WHO)[3] so that proper actions can be taken to ensure that there is no adverse health effect to the public. Following these international recommendations, national regulations usually specify radionuclide authorized concentration limits for liquid effluent discharged to the environment and radionuclide guidance levels for waterbodies and drinking waters for planned, existing, and emergency exposure situations. Compliance with these limits can be assessed using measurement results with their associated uncertainties as requested by ISO/IEC Guide 98-3 and ISO 5667-20[4].

Depending of the exposure situation, there are different limits and guidance levels that would result in an action to reduce health risk.

NOTE 1 The guidance level is the activity concentration with an intake of 2 ld^{-1} of drinking water for one year, that results in an effective dose of 0,1 $mSva^{-1}$ for members of the public. This is an effective dose that represents a very low level of risk that is not expected to give rise to any detectable adverse health effect[3].

In the event of a nuclear emergency, the WHO Codex Guideline Levels[5] indicates the activity concentrations corresponding to operational intervention levels.

NOTE 2 The Codex guidelines levels (GLs) apply to radionuclides contained in foods destined for human consumption and traded internationally, which have been contaminated following a nuclear or radiological emergency. These GLs apply to food after reconstitution or as prepared for consumption, i.e. not to dried or concentrated foods, and are based on an intervention exemption level of 1 mSv in a year for members of the public (infant and adult)[5].

Thus, the test method can be adapted so that the characteristic limits, decision threshold and detection limit, and the uncertainties ensure that the radionuclide activity concentration test results can be verified to be below the guidance levels required by a national authority for either planned-existing situations or an emergency situation[6][7].

Usually, the test methods can be adjusted to measure the activity concentration of the radionuclide(s) in either wastewaters before storage or in liquid effluents before being discharged to the environment.

The test results will enable the plant/installation operator to verify that, before their discharge, wastewaters/liquid effluent radioactive activity concentrations do not exceed authorized limits.

The test methods described in this document for emergency exposure situations may also be used during planned, existing exposure situations as well as for wastewaters and liquid effluents with specific modifications that could change the overall uncertainty, detection limit, and threshold.

The test method(s) may be used for water samples after proper sampling, sample handling, and test sample preparation (see the relevant part of ISO 5667 series).

This document has been developed to answer the need of test laboratories carrying out these measurements that may be required by national authorities during a nuclear or radiological emergency exposure situation.

This document is one of a set of International Standards on test methods dealing with the measurement of the activity concentration of radionuclides in water samples.

The ISO documents produced for radioactivity measurements in water are detailed methods. In most cases, these methods have been used in laboratory practice for a number of years and the analytical characteristics have been documented. However, these methods are generally time consuming and require well trained analysts to carry them out.

Over the last years, an increasing need was recognized for the addition of guidance on the use of so-called “rapid methods”. The nuclear accident at Fukushima in March 2011 accentuated the need for these rapid measurements. During the initial stages of such incidents, decision makers had to deal with taking protective measures for the population, such as sheltering, evacuation, and the distribution of iodine prophylaxis. It has been found that time is critical and limited for taking these protective measures.

