SLOVENSKI STANDARD
SIST EN ISO 23547:2023

01-september-2023

Merjenje radioaktivnosti - Radionuklidi, ki sevajo gama žarke - Specifikacije referenčnega merilnega standarda za kalibracijo spektrometrov žarkov gama (ISO 23547:2022)

Measurement of radioactivity - Gamma emitting radionuclides - Reference measurement standard specifications for the calibration of gamma-ray spectrometers (ISO 23547:2022)

Mesurage de la radioactivité - Radionucléides émetteurs gamma - Caractéristiques des étalons de mesure pour l'étalonnage de spectromètres gamma (ISO 23547:2022)

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17.240	Merjenje sevanja	Radiation measurements

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ICS 17.240

English Version

Measurement of radioactivity - Gamma emitting radionuclides - Reference measurement standard specifications for the calibration of gamma-ray spectrometers (ISO 23547:2022)

Mesurage de la radioactivité - Radionucléides émetteurs gamma - Caractéristiques des étalons de mesure pour l'étalonnage de spectromètres gamma (ISO 23547:2022)

This European Standard was approved by CEN on 16 July 2023.

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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 23547:2022 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 23547:2023 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of an identical text or by endorsement, at the latest by January 2024, and conflicting national standards shall be withdrawn at the latest by January 2024.

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Endorsement notice

The text of ISO 23547:2022 has been approved by CEN as EN ISO 23547:2023 without any modification.

INTERNATIONAL STANDARD

ISO 23547

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Measurement of radioactivity — Gamma emitting radionuclides — Reference measurement standard specifications for the calibration of gamma-ray spectrometers

Mesurage de la radioactivité — Radionucléides émetteurs gamma — Caractéristiques des étalons de mesure de référence pour l'étalonnage de spectromètres gamma

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Foreword

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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

Everyone is exposed to natural radiation. The natural sources of radiation are cosmic rays and naturally occurring radioactive substances existing in the Earth itself and inside the human body. Human activities involving the use of radiation and radioactive substances cause radiation exposure in addition to the natural exposure. Some individual activities, such as the mining, use of ores containing naturally radioactive substances and the production of energy by burning coal that contains such substances, can simply enhance the exposure from natural radiation sources. Nuclear installations use radioactive materials and produce radioactive effluent and waste during operations. The use of radioactive materials in industry, medicine, agriculture and research is expanding around the globe.

All these human activities generally also 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 space travel. The average level of occupational exposures is generally similar to the global average level of natural radiation exposure[10].

As the uses of radiation increase, the potential health risk and the public's concerns may increase. Thus, ionizing radiation exposures are regularly assessed in order to improve the understanding of regional levels and temporal trends of public and worker exposure, to evaluate the components of exposure to provide a measure of their relative importance, and to identify emerging issues that may warrant more attention and scrutiny. While doses to workers are usually directly measured, doses to the public are usually assessed by indirect methods using radioactivity measurements results performed on various sources, including waste, liquid or air effluent, and environmental samples. Environmental samples may include ambient air, soil, surface water, ground water, treated water, vegetation, livestock and game or other biota.

Surveillance programs require financial and technical resources. The program should be designed to acquire data to adequately monitor potential risks. To ensure that the data obtained from radioactivity monitoring programs support their intended use, it is essential in the dose assessment process that stakeholders (the operators, the regulatory bodies, the local information committee and associations, etc.) agree on appropriate data quality objectives, methods and procedures for

— the acquisition, handling, transport, storage and preparation of test samples;

— the test analytical method, and

— for calculating measurement uncertainty.

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 with successful completion of proficiency tests during laboratory intercomparison, two prerequisites to obtain national accreditation. Today, over a hundred international standards, prepared by Technical Committees of the International Organization for Standardization, including those produced by ISO/TC 85, and the International Electrotechnical Commission, are available for application by testing laboratories to measure the main radionuclides.

A reliable determination of the activity concentration of gamma-emitting radionuclides in various matrices is necessary for the assessment of any potential human exposure (public and workers) to the radioactivity of these sources.

Gamma-ray spectrometry is commonly used to determine the activity of gamma-emitting radionuclides. ISO 20042 describes the generic requirements and instrumentation to quantify the

