SLOVENSKI STANDARD
oSIST prEN ISO 20553:2024

01-februar-2024

Radiološka zaščita - Spremljanje stanja delavcev, ki so poklicno izpostavljeni tveganju notranje kontaminacije z radioaktivnim materialom (ISO/DIS 20553:2023)

Radiation protection - Monitoring of workers occupationally exposed to a risk of internal contamination with radioactive material (ISO/DIS 20553:2023)

Strahlenschutz - Überwachung von Arbeitnehmern, die beruflich der Gefahr einer internen Kontamination mit radioaktiven Stoffen ausgesetzt sind (ISO/DIS 20553:2023)

Radioprotection - Surveillance professionnelle des travailleurs exposés à un risque de contamination interne par des matériaux radioactifs (ISO/DIS 20553:2023)

Ta slovenski standard je istoveten z: **prEN ISO 20553**

ICS:

13.100	Varnost pri delu. Industrijska higiena	Occupational safety. Industrial hygiene
13.280	Varstvo pred sevanjem	Radiation protection

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Radiation protection — Monitoring of workers occupationally exposed to a risk of internal contamination with radioactive material

Radioprotection — Surveillance professionnelle des travailleurs exposés à un risque de contamination interne par des matériaux radioactifs

ICS: 13.280

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 2, *Radiological protection*.

It revises and replaces the previous version of ISO 20553, published in 2006. The main change is the reference to the recent publication of ICRP Occupational Intakes of Radionuclides (OIR) series, instead of ICRP publications 66 and 78, to calculate the maximum time intervals for routine monitoring programmes.

Introduction

In the course of employment, individuals might work with radioactive materials that, under certain circumstances, could be taken into the body. Protecting workers against risks of incorporated radionuclides requires the monitoring of potential or actual intakes. The requirement for such a monitoring programme and the selection of methods and frequencies of monitoring usually depends upon the applicable legislation or regulatory authority, the purpose of the radiation protection programme, the probabilities of potential radionuclide intakes, and the characteristics of the materials handled.

This document offers guidance for the decision whether a monitoring programme is required and how it should be designed. Its intention is to optimise the efforts for such a monitoring programme consistent with legal requirements and with the purpose of the radiation protection programme. Recommendations of international expert bodies and international experience with the practical application of these recommendations in radiation protection programmes have been considered in the development of this document. Its application facilitates the exchanges of information between authorities, supervisory institutions and employers. This document is not a substitute for legal requirements.

Radiation protection — Monitoring of workers occupationally exposed to a risk of internal contamination with radioactive material

1 Scope

This document specifies the minimum requirements for the design of programmes to monitor workers exposed to the risk of internal contamination by radioactive substances and establishes principles for the development of compatible goals and requirements for monitoring programmes.

This document addresses the

a) purposes of monitoring and of monitoring programmes;

b) description of the different categories of monitoring programmes;

c) quantitative criteria for conducting monitoring programmes;

d) suitable methods for monitoring and criteria for their selection;

e) information that has to be collected for the design of a monitoring programme;

f) general requirements for monitoring programmes (e.g. detection limits, tolerated uncertainties);

g) frequencies of measurements calculated using the ICRP Occupational Intakes of Radionuclides (OIR) series;

h) special cases of individual monitoring (intake of actinides, contamination in wounds and on the skin);

i) quality assurance; and

j) documentation, reporting and record-keeping.

This document does not address

— the monitoring of exposure to radon and its radioactive decay products;

— detailed descriptions of measuring methods and techniques;

— detailed procedures for in vivo measurements and in vitro analyses;

— interpretation of measurements results in terms of dose;

— biokinetic data and mathematical models for converting measured activities into absorbed dose, equivalent dose and effective dose; or

— the investigation of the causes or implications of an exposure or intake.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 28218, *Radiation protection — Performance criteria for radiobioassay*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
absorption types
types of materials, classified according to their rates of absorption from the respiratory tract into blood

3.1.1
absorption type V
type V
deposited materials that are assumed to be instantaneously absorbed into blood from the respiratory tract (only certain gases and vapours; very fast).

3.1.2
absorption type F
type F
deposited materials that are readily absorbed into blood from the respiratory tract (fast absorption)

3.1.3
absorption type M
type M
deposited materials that have intermediate rates of absorption into blood from the respiratory tract (moderate absorption)

3.1.4
absorption type S
type S
deposited materials that are relatively insoluble in the respiratory tract (slow absorption)

[SOURCE: ICRP publication 130]

3.2
activity
quotient of $-dN$ by dt, where dN is the change in the number of radioactive nuclei, at a particular energy state and at a given time, due to spontaneous nuclear transformations in the time interval dt

Note 1 to entry: It is expressed as $A = -dN/dt$. Activity can be calculated as $A = \lambda N$, where λ is the decay constant and N is the number of present radioactive nuclei.

Note 2 to entry: The special name for the unit of activity in the International System of Units is Becquerel (Bq), where 1 Bq = 1 s^{-1}, The use of the former unit Curie (1 Ci = 3,7 x 10^{10} Bq), is also accepted in many countries and in BIPM.

[SOURCE: ISO 12749-1:2020(E)]

3.3
activity median aerodynamic diameter
AMAD
value of aerodynamic diameter such that 50 % of the airborne activity in a specified aerosol is associated with particles smaller than the AMAD, and 50 % of the activity is associated with particles larger than the AMAD

Note 1 to entry: The aerodynamic diameter of an airborne particle is the diameter of a unit density sphere that has the same terminal settling velocity in air as the particle of interest.

3.4
clearance
net effect of the biological processes by which radionuclides are removed from the body or from a tissue, organ or region of the body

Note 1 to entry: The clearance rate is the rate at which this occurs.

3.5
radioactive contamination
radioactive substances on surfaces, or within solids, liquids or gases, including the human body, where their presence is unintended or undesirable, or the process giving rise to their presence in such places

[SOURCE: ISO 12749-2:2022(E)]

3.6
committed effective dose
quantity $E(\tau)$, defined as:

$$E(\tau)=\sum_{\mathrm{T}} W_{\mathrm{T}} \cdot H_{\mathrm{T}}(\tau)$$

where $H_{\mathrm{T}}(\tau)$ is the committed equivalent dose to tissue or organ T over the integration time τ elapsed after an intake of radioactive substances and w_{T} is the tissue weighting factor for tissue or organ T.

Note 1 to entry: The committed equivalent dose to an organ or tissue is the time integral of the equivalent dose rate to that organ or tissue after an intake of radioactive substances.

Note 2 to entry: Where τ is not specified, it is taken to be 50 years for adults and the time to the age of 70 years for intakes by children. For workers, the integration time to calculate committed equivalent doses is 50 years.

[SOURCE: ISO 12749-2:2022(E), modified by adding Note 1 and “For workers, the integration time to calculate committed equivalent doses is 50 years” in note 2]

3.7
annual committed effective dose
committed effective dose from intakes of radionuclides in one year

3.8
dose coefficient
committed effective dose per unit intake, e(50), where 50 is the dose-commitment period in years over which the dose is calculated

3.9
excretion function
set of tabulated values *m(t)* predicted by a reference biokinetic model describing the time course of the activity excreted in body fluids or waste, e.g., urine or faeces, following an acute intake at time t

Note 1 to entry: An excretion function m(t) represents the predicted activity of a radionuclide in a 24 h excreta sample at a time t after the intake.

[SOURCE: ISO 12749-2:2022(E)]