SLOVENSKI STANDARD
SIST EN ISO 23320:2022

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Nadomešča:
SIST EN 838:2010

Zrak na delovnem mestu - Plini in pare - Zahteve za vrednotenje merilnih postopkov z difuzijskimi vzorčevalniki (ISO 23320:2022)

Workplace air - Gases and vapours - Requirements for evaluation of measuring procedures using diffusive samplers (ISO 23320:2022)

Luft am Arbeitsplatz - Gase und Dämpfe - Anforderungen an die Evaluierung von Messverfahren mit Diffusionssammlern (ISO 23320:2022)

Air des lieux de travail - Gazes et vapeurs - Exigences pour l'évaluation des procédures pour le mesurage à l'aide de dispositifs de prélèvement par diffusion (ISO 23320:2022)

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Workplace air - Gases and vapours - Requirements for evaluation of measuring procedures using diffusive samplers (ISO 23320:2022)

Air des lieux de travail - Gazes et vapeurs - Exigences pour l'évaluation des procédures pour le mesurage à l'aide de dispositifs de prélèvement par diffusion (ISO 23320:2022)

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This European Standard was approved by CEN on 13 March 2022.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN ISO 23320:2022) has been prepared by Technical Committee ISO/TC 146 "Air quality" in collaboration with Technical Committee CEN/TC 137 “Assessment of workplace exposure to chemical and biological agents” 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of an identical text or by endorsement, at the latest by November 2022, and conflicting national standards shall be withdrawn at the latest by November 2022.

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 23320:2022 has been approved by CEN as EN ISO 23320:2022 without any modification.

INTERNATIONAL STANDARD

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Workplace air — Gases and vapours — Requirements for evaluation of measuring procedures using diffusive samplers

Air des lieux de travail — Gazes et vapeurs — Exigences pour l'évaluation des procédures pour le mesurage à l'aide de dispositifs de prélèvement par diffusion

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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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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 2, *Workplace atmospheres,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 137, *Assessment of workplace exposure to chemical and biological agents*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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

This document provides a framework for assessing the performance of procedures for measuring gases and vapours against the general requirements for the performance of procedures for measuring chemical agents in workplace atmospheres as specified in ISO 20581. These performance criteria include maximum values of expanded uncertainty achievable under prescribed laboratory conditions for the methods to be used.

This document enables manufacturers and users of diffusive samplers and developers and users of procedures for measuring gases and vapours to adopt a consistent approach to method validation.

This document is based on EN 838:2010, published by the European Committee for Standardization (CEN) and is also complementary to ISO 16107.

Workplace air — Gases and vapours — Requirements for evaluation of measuring procedures using diffusive samplers

1 Scope

This document specifies performance requirements and test methods under prescribed laboratory conditions for the evaluation of diffusive samplers (see Reference [1]) and of procedures using these samplers for the determination of gases and vapours in workplace atmospheres (see Reference [2]).

This document is applicable to diffusive samplers and measuring procedures using these samplers, such as ISO 16200-2 and ISO 16017-2, in which sampling and analysis are carried out in separate stages.

This document is not applicable to

— diffusive samplers which are used for the direct determination of concentrations, and

— diffusive samplers which rely on sorption into a liquid.

This document addresses requirements for method developers and/or manufacturers.

NOTE For the purposes of this document a manufacturer can be any commercial or non-commercial entity.

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 20581, *Workplace air — General requirements for the performance of procedures for the measurement of chemical agents*

ISO 22065, *Workplace air — Gases and vapours — Requirements for evaluation of measuring procedures using pumped samplers*

ISO 18158, *Workplace air — Terminology*

ISO 8655-2, *Piston-operated volumetric apparatus — Part 2: Piston pipettes*

ISO 8655-6, *Piston-operated volumetric apparatus — Part 6: Gravimetric methods for the determination of measurement error*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18158 and ISO 20581 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/

4 Symbols and abbreviated terms

NOTE See 8.4 and Annex C for symbols used in conjunction with uncertainty of measurement only.

A	cross-sectional area of sorption surface, in square centimetres (cm^2)
CRM	certified reference material
D_a	diffusion coefficient of an analyte, in square centimetres per minute ($cm^2 \cdot min^{-1}$)
D_{a1}	diffusion coefficient of analyte 1, in square centimetres per minute ($cm^2 \cdot min^{-1}$)
D_{a2}	diffusion coefficient of analyte 2, in square centimetres per minute ($cm^2 \cdot min^{-1}$)
l	length of static air layer in sampler (or equivalent for permeation types), in centimetres (cm)
m_b	mass of analyte desorbed from blank sampler, in nanograms (ng)
m_d	mass of analyte desorbed, in nanograms (ng)
m_s	mass of the analyte which can diffuse to a suitable sorbent within a certain time, i.e. the mass uptake of a diffusive sampler, in nanograms (ng)
$\dot{m}_1$	mass loss from permeation tube, in micrograms per minute ($\mu g \cdot min^{-1}$)
M_a	molar mass of analyte, in grams per mole ($g \cdot mol^{-1}$)
n	number of replicate samples
OELV	occupational exposure limit value
p_{at}	actual pressure of the test atmosphere sampled, in kilopascals (kPa)
R	recovery
R_{an}	analytical recovery
RH	relative humidity of the test atmosphere sampled, in percent (%)
t_e	exposure time, in minutes (min)
T_{at}	temperature of the test atmosphere sampled, in Kelvin (K)
$\dot{U}_d$	uptake rate, in cubic centimetres per minute ($cm^3 \cdot min^{-1}$)
$(\dot{U}_d)'$	uptake rate, in nanograms per parts per million (volume fraction) per minute ($ng \cdot ppm^{-1} \cdot min^{-1}$)
$\dot{U}_{d1}$	uptake rate of analyte 1, in cubic centimetres per minute ($cm^3 \cdot min^{-1}$)
$\dot{U}_{d2}$	uptake rate of analyte 2, in cubic centimetres per minute ($cm^3 \cdot min^{-1}$)
$\dot{v}$	flow rate into the exposure chamber, for example, in litres per minute ($l \cdot min^{-1}$)
β_a	mass concentration of the analyte in the calibration gas mixture, in milligrams per cubic metre ($mg \cdot m^{-3}$)
$(\beta_a)'$	mass concentration in parts per million (ppm);
β_{a1}	mass concentration of the given analyte at the beginning of the diffusion layer (i.e. at the distance l from the surface of the sorbent), in milligrams per cubic metre ($mg \cdot m^{-3}$)

β_{a2} mass concentration of the given analyte at the end of the diffusion layer (i.e. at the surface of the sorbent), in milligrams per cubic metre ($mg \cdot m^{-3}$)

$\bar{\beta}_{a,R}$ mean mass concentration of the analyte recovered from the test gas atmosphere, in milligrams per cubic metre ($mg \cdot m^{-3}$);

β_{cg} mass concentration of the calibration gas mixture, in milligrams per cubic metre ($mg \cdot m^{-3}$)

ϑ_{at} temperature of the test atmosphere sampled, in degree Celsius (°C)

K_v coefficient of variation (CV)(The predecessor term "relative standard deviation" is deprecated and has been replaced by the term "coefficient of variation". See also ISO 3534-1:2006, 2.38, Note 2.)

$\varnothing_a$ volume fraction of the analyte, in microlitres per litre ($\mu l \cdot l^{-1}$)

5 Types of samplers

Samplers for gases and vapours can be divided into type A samplers and type B samplers:

Type A samplers rely on sorption onto a solid or onto a support impregnated with a reagent, desorption with solvent, and subsequent analysis of the desorbate. They are usually made of polypropylene or glass and consist of one or more sorbent layers and contain an active sorbent (e.g. activated carbon) or a support impregnated with reagent.

Type B samplers rely on sorption onto a solid or onto a support impregnated with a reagent, thermal desorption, and analysis of the desorbate. They are usually made of glass or metal, are sealed with removable fittings and consist of one or more beds of sorbent (e.g. porous polymer resin).

6 Requirements

6.1 General

Some requirements (see 6.2) shall be initially verified by the manufacturer once for each type of sampler. Other requirements (see 6.3) shall be verified for each combination sampler/chemical agent.

Measuring procedures shall meet the requirements for measuring procedures specified in 6.3. When use of a sampler for measurement of a particular gas or vapour is claimed, the sampler shall meet the requirements specified in 6.2.

NOTE 1 No useful performance requirements can be given for the effect of interferents (with the exception of relative humidity). The effect of interferents is difficult to predict for a non-ideal sorbent without adsorption isotherm data on mixed systems which is normally unavailable. However, the user of diffusive samplers is cautioned that the adsorption of water vapour on certain sorbents, e.g. activated carbon and silica gel, can have a large effect on sampler capacity and analytical recovery.

NOTE 2 Because of the known effect of pressure on diffusion coefficients, a pressure test is not necessary.

6.2 Sampler requirements

6.2.1 Nominal uptake rate

The nominal uptake rate and the coefficient of variation shall be provided by the manufacturer in accordance with 8.2.1 and Annex A.

6.2.2 Air velocity/sampler orientation

The manufacturer shall test the working range of air velocity and the influence of sampler orientation in accordance with 8.2.2.