



SLOVENSKI STANDARD
oSIST prEN ISO 10882-1:2023
01-julij-2023

Varnost in zdravje pri varjenju in sorodnih postopkih - Vzorčenje prahu in plinov iz dihalnega območja varilca - 1. del: Vzorčenje prahu (ISO/DIS 10882-1:2023)

Health and safety in welding and allied processes - Sampling of airborne particles and gases in the operator's breathing zone - Part 1: Sampling of airborne particles (ISO/DIS 10882-1:2023)

iTeh STANDARD PREVIEW

Arbeits- und Gesundheitsschutz beim Schweißen und bei verwandten Verfahren - Probenahme von partikelförmigen Stoffen und Gasen im Atembereich des Schweißers - Teil 1: Probenahme von partikelförmigen Stoffen (ISO/DIS 10882-1:2023)

oSIST prEN ISO 10882-1:2023

Hygiène et sécurité en soudage et techniques connexes Échantillonnage des particules en suspension et des gaz dans la zone respiratoire des opérateurs Partie 1: Échantillonnage des particules en suspension (ISO/DIS 10882-1:2023)

Ta slovenski standard je istoveten z: prEN ISO 10882-1

ICS:

13.040.30	Kakovost zraka na delovnem mestu	Workplace atmospheres
13.100	Varnost pri delu. Industrijska higiena	Occupational safety. Industrial hygiene
25.160.01	Varjenje, trdo in mehko spajkanje na splošno	Welding, brazing and soldering in general

oSIST prEN ISO 10882-1:2023

en,fr,de

DRAFT INTERNATIONAL STANDARD

ISO/DIS 10882-1

ISO/TC 44/SC 9

Secretariat: BSI

Voting begins on:
2023-05-10Voting terminates on:
2023-08-02

Health and safety in welding and allied processes — Sampling of airborne particles and gases in the operator's breathing zone —

Part 1: Sampling of airborne particles

Hygiène et sécurité en soudage et techniques connexes — Échantillonnage des particules en suspension et des gaz dans la zone respiratoire des opérateurs —

Partie 1: Échantillonnage des particules en suspension

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ICS: 25.160.01; 13.100

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Reference number
ISO/DIS 10882-1:2023(E)

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Published in Switzerland

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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 44, *Welding*, Subcommittee SC 9, *Health and safety*.

This third edition cancels and replaces the second edition (ISO 10882-1:2011), which has been technically revised.

The main changes are as follows:

- The references to other documents have been updated.
- In [8.2](#) and [9.3.1.1](#) alternative personal sampling position(s) for air fed welder's helmets and sampling methods with more than one collection device were added.

A list of all parts in the ISO 10882 series can be found on the ISO website.

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.

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Introduction

The health of workers in many industries is at risk through exposure by inhalation to airborne particles generated by welding and allied processes (welding fume) and other airborne particles generated by welding-related operations, e.g. grinding. Industrial hygienists and other public health professionals need to determine the effectiveness of measures taken to control workers' exposure to these harmful substances and this is generally achieved by making personal exposure measurements.

This part of ISO 10882 specifies a sampling method for welding fume and airborne particles generated by welding-related operations for the purpose of making personal exposure measurements in the operator's breathing zone. It is intended to be of benefit to: agencies concerned with health and safety at work, industrial hygienists and other public health professionals, industrial users of welding and allied processes and their workers, and analytical laboratories.

It has been assumed in the drafting of this part of ISO 10882 that the execution of its provisions, and the interpretation of the results obtained, is entrusted to appropriately qualified and experienced people.

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Health and safety in welding and allied processes — Sampling of airborne particles and gases in the operator's breathing zone —

Part 1: Sampling of airborne particles

1 Scope

This part of ISO 10882 specifies a procedure for sampling airborne particles in the breathing zone of a person who performs welding and allied processes (the operator). It also provides details of relevant standards that specify required characteristics, performance requirements and test methods for workplace air measurement, and augments guidance provided in EN 689 on assessment strategy and measurement strategy. This part of ISO 10882 also specifies a procedure for making gravimetric measurements of personal exposure to airborne particles generated by welding and allied processes (welding fume) and other airborne particles generated by welding-related operations. Additionally, it provides references to suitable methods of chemical analysis, specified in other standards, to determine personal exposure to specific chemical agents present in welding fume and other airborne particles generated by welding-related operations.

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.

EN 482, *Workplace exposure — General requirements for the performance of procedures for the measurement of chemical agents*

EN 689, *Workplace exposure — Measurement of exposure by inhalation to chemical agents — Strategy for testing compliance with occupational exposure limit values*

EN 13205-1, *Workplace exposure — Assessment of sampler performance for measurement of airborne particle concentrations — Part 1: General requirements*

ISO 15767, *Workplace atmospheres — Controlling and characterizing uncertainty in weighing collected aerosols*

3 Terms and definitions

For the purposes of this document, the terms and definition given in ISO 18158 and the following apply.

ISO and IEC maintain terminology 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/>

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3.1 General definitions

3.1.1

chemical agent

any chemical element or compound, on its own or admixed, as it occurs in the natural state or as produced, used or released, including release as waste, by any work activity, whether or not produced intentionally and whether or not placed on the market

[SOURCE: Council Directive 98/24/EC,^[19] Art. 2 a)]

3.1.2

breathing zone

space around the nose and mouth from which breath is taken

Note 1 to entry: Technically the breathing zone corresponds to a hemisphere (generally accepted to be 30 cm in radius) extending in front of the human face, centred on the midpoint of a line joining the ears. The base of the hemisphere is a plane through this line, the top of the head and the larynx. This technical description is not applicable when respiratory protective equipment is used.

[SOURCE: ISO 18158:2016, 2.1.5.5]

3.1.3

exposure

<inhalation> situation in which a chemical agent or biological agent is present in the air that is inhaled by a person

[SOURCE: ISO 18158:2016, 2.1.5.1]

3.1.4

occupational exposure limit value

OELV

limit of the time-weighted average of the concentration of a chemical agent in the air within the breathing zone of a worker in relation to a specified reference period

[SOURCE: Council Directive 98/24/EC,^[19] Art. 2 d)]

Note 1 to entry: Limit values are mostly set for reference periods of 8 h, but can also be set for shorter periods or concentration excursions. Limit values for gases and vapours are stated in terms independent of temperature and air pressure variables in millilitres per cubic metre and in terms dependent on those variables in milligrams per cubic metre for a temperature of 20 °C and a pressure of 101,3 kPa. Limit values for airborne particles as well as mixtures of particles and vapours are given in milligrams per cubic metre or multiples of that unit for actual environmental conditions (temperature, pressure) at the workplace. Limit values of fibres are given in number of fibres per cubic metre or number of fibres per cubic centimetre for actual environmental conditions (temperature, pressure) at the workplace.

3.1.5

reference period

specified period of time for which the occupational exposure limit value of a chemical or biological agent applies

Note 1 to entry: The reference period is usually 8 h for long-term measurements and 15 min for short-term measurements.

[SOURCE: ISO 18158:2016, 2.1.5.7]

3.1.6

time-weighted average concentration

TWA concentration

concentration of a chemical agent in the atmosphere, averaged over a reference period

[SOURCE: ISO/DIS 25901-2:2021, 3.3.10, modified — “<occupational health>” deleted as the domain for the definition.]

3.1.7**total airborne particles**

all particles surrounded by air in a given volume of air

Note 1 to entry: Because all measuring instruments are size selective to some extent, it is often impossible to measure the total airborne particle concentration.

[SOURCE: ISO 7708:1995, 2.13^[5]]

3.1.9**workplace**

designated area or areas in which the work activities are carried out

[SOURCE: ISO 18158:2016, 2.1.6.2]

3.2 Sampling definitions**3.2.2****sample****air sample**

product of the process of (air) sampling

Note 1 to entry: An air sample is frequently considered to include the collection substrate(s) as well as the collected chemical agents and/or biological agents; or sometimes it is considered to be the fractional part of a larger volume of air.

[SOURCE: ISO 18158:2016, 2.2.1.1, modified — “<workplace air quality>” deleted as the domain for the definition.]

3.2.3**sampling****air sampling**

process consisting of the separation of chemical agents and/or biological agents from air or the withdrawal or isolation of a fractional part of a larger volume of air

[SOURCE: ISO 18158:2016, 2.2.3.1, modified — “<workplace air quality>” deleted as the domain for the definition.]

3.2.5**collection substrate****sampling substrate****collection medium****sampling medium**

medium on which airborne chemical agents and/or biological agents are collected for subsequent analysis

Note 1 to entry: Filters, polyurethane foams and sampling cassettes are examples of collection substrates for airborne particles.

[SOURCE: ISO 18158:2016, 2.2.3.7, modified — Note 2 and Note 3 to entry were deleted]

3.2.6**inhalable fraction**

mass fraction of total airborne particles which are capable of being inhaled through the nose and mouth

Note 1 to entry: The inhalable fraction depends on the speed and direction of the air movement, on the rate of breathing and other factors.

[SOURCE: ISO 7708:1995, 2.3, modified — “is” was replaced by “are capable of being”]

ISO/DIS 10882-1:2023(E)**3.2.7****inhalable sampler**

aerosol sampler that is used to collect the inhalable fraction of airborne particles from the surrounding air

[SOURCE: ISO 18158:2016, 2.2.2.1.6.1]

3.2.8**key component of a welding fume**

component of a welding fume that has the greatest occupational hygienic significance and therefore requires the most stringent control measures to ensure that a welder is not exposed to an excessive level of the substance concerned, i.e. it is the component whose limit value is exceeded at the lowest welding fume concentration

[SOURCE: ISO 15011-4:2017, 3.3^[6]]

3.2.9**personal sample**

product of the process of using a sampler attached to a person, to collect gases, vapours and/or airborne particles in the breathing zone for the purpose of measuring exposure to chemical agents and/or biological agents

[SOURCE: ISO 18158:2016, 2.2.1.3]

3.2.10**personal sampler**

sampler, attached to a person, that collects gases, vapours or airborne particles in the breathing zone for the purpose of measuring exposure to chemical agents and/or biological agents

[SOURCE: ISO 18158:2016, 2.2.2.2]

3.2.11**personal sampling**

process of using a sampler, attached to a person, to collect gases, vapours or airborne particles in the breathing zone for the purpose of measuring exposure to chemical agents and/or biological agents, representative of the exposure being evaluated

[SOURCE: ISO 18158:2016, 2.2.3.3, modified — “representative of the exposure being evaluated” was added]

3.2.12**respirable fraction**

mass fraction of inhaled particles capable of penetration to the unciliated airways

[SOURCE: ISO 7708:1995,^[5] modified — “which penetrate” was replaced by “capable of penetration”]

3.2.13**respirable sampler**

aerosol sampler that is used to collect the respirable fraction

[SOURCE: EN 1540:—^[15]]

3.2.14**sampler****air sampler**

device for separating and/or collecting chemical agents and/or biological agents from the surrounding air

Note 1 to entry: (Air) samplers are generally designed for a particular purpose, e.g. for sampling gases and vapours or for sampling airborne particles.

[SOURCE: ISO 18158:2016, 2.2.2.1, modified — “<workplace air quality>” deleted as domain.]

3.2.15

screening measurements of time-weighted average concentration

measurements performed to obtain basic information on the exposure level in order to decide whether an exposure problem exists and if so, to further investigate it

Note 1 to entry: Screening measurements of time-weighted average concentration can also be used to determine if exposure is well below or well above the limit value.

Note 2 to entry: Adapted from EN 482.

3.2.17

worst case measurements

screening measurements of time-weighted average concentration made to identify work activity during which highest exposure occurs

Note 1 to entry: Adapted from EN 482.

3.3 Welding terms

3.3.1

filler material

welding consumable added during welding to form the weld

[SOURCE: ISO/TR 25901-1:2016,^[12] 2.1.10.4]

EXAMPLE Welding rods, wire, stick electrodes.

3.3.2

harness

an assembly that provides a means of maintaining a welder's face shield in position on the head

[SOURCE: EN 175:1997,^[13] 3.7] [oSIST prEN ISO 10882-1:2023](https://standards.iteh.ai/catalog/standards/sist/ca81ef12-17b5-46b7-866a-4b779bca4ff6/osist-pren-iso-10882-1-2023)

3.3.3

headband

that part of the harness to which the welder's face shield is fixed and which surrounds the head, or that part of the welder's goggles or welder's spectacles which secures the goggles or spectacles onto the head

[SOURCE: EN 175:1997,^[13] 3.8, modified — "welder's" was added before "goggles" and "spectacles".]

3.3.4

operator

welder

person who performs welding and allied processes

3.3.5

operator's breathing zone

restricted breathing zone

Note 1 to entry: It is essential to sample as near as possible to the operator's nose and mouth when measuring exposure to welding fume because of the very steep concentration gradients that occur in the immediate vicinity of the plume.

3.3.6

welder's face shield

welder's shield worn on the head and in front of the face, usually secured in position by a harness to give protection to the eyes and face when fitted with the appropriate filter(s)

[SOURCE: EN 175:1997,^[13] 3.2]