



SLOVENSKI STANDARD

SIST ISO 8518:2002

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NfU_`bUXYcj bYa `a Yghi `E`8c`c Yj Ub`Y`gj]bWU]b`gj]b Yj]\ `gdc`]b`j `XYV\ `E`
D`Ua Ybg_UU]`YY_`fchYfa]`g_UU`ca g_UU`gcf`dW`g_UgdY_`fca Yf]`g_Ua YrcXU

Workplace air -- Determination of particulate lead and lead compounds -- Flame or electrothermal atomic absorption spectrometric method

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Air des lieux de travail -- Dosage du plomb particulaire et des composés particuliers du plomb -- Méthode par spectrométrie d'absorption atomique dans la flamme ou méthode par spectrométrie d'absorption avec atomisation électrothermique

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INTERNATIONAL STANDARD

ISO 8518

Second edition
2001-12-15

Workplace air — Determination of particulate lead and lead compounds — Flame or electrothermal atomic absorption spectrometric method

*Air des lieux de travail — Dosage du plomb particulaire et des composés
particulaires du plomb — Méthode par spectrométrie d'absorption atomique
dans la flamme ou méthode par spectrométrie d'absorption avec
atomisation électrothermique*

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ISO 8518:2001(E)**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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 8518 was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 2, *Workplace atmospheres*.

This second edition cancels and replaces the first edition (ISO 8518:1990), which has been technically revised.

Annexes A and B of this International Standard are for information only.

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Introduction

The health of workers in many industries, e.g. mining, metal refining, battery manufacture, construction, etc., is at risk through exposure by inhalation of particulate lead and lead compounds. Industrial hygienists and other public health professionals need to determine the effectiveness of measures taken to control workers' exposure, and this is generally achieved by making workplace air measurements. This International Standard provides a method for making valid exposure measurements for lead. It will be of benefit to: agencies concerned with health and safety at work; industrial hygienists and other public health professionals; analytical laboratories; industrial users and workers of metals and metalloids, etc.

It has been assumed in the drafting of this International Standard 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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Workplace air — Determination of particulate lead and lead compounds — Flame or electrothermal atomic absorption spectrometric method

1 Scope

1.1 This International Standard specifies flame and electrothermal atomic absorption spectrometric methods for the determination of the time-weighted average mass concentration of particulate lead and lead compounds in workplace air.

1.2 The method is applicable to personal sampling of the inhalable fraction of airborne particles, as defined in ISO 7708, and to static (area) sampling.

1.3 The sample dissolution procedure specifies hot plate or microwave digestion, or ultrasonic extraction (11.2). The use of an alternative, more vigorous dissolution procedure is necessary when it is desired to extract lead from compounds present in the test atmosphere that are insoluble using the dissolution procedures described herein.

1.4 The flame atomic absorption method is applicable to the determination of masses of approximately 1 µg to 200 µg of lead per sample, without dilution [1]. The electrothermal atomic absorption method is applicable to the determination of masses of approximately 0,01 µg to 0,5 µg of lead per sample, without dilution [1].

1.5 The ultrasonic extraction procedure has been validated for the determination of masses of approximately 20 µg to 100 µg of lead per sample, for laboratory-generated lead fume air filter samples [2].

1.6 The concentration range for lead in air for which this procedure is applicable is determined in part by the sampling procedure selected by the user (see 10.1).

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 648:1977, *Laboratory glassware — One-mark pipettes*

ISO 1042:1998, *Laboratory glassware — One-mark volumetric flasks*

ISO 3585:1998, *Borosilicate glass 3.3 — Properties*

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*

ISO 7708:1995, *Air quality — Particle size fraction definitions for health-related sampling*

ISO 8655-1, *Piston-operated volumetric apparatus — Part 1: Terminology, general requirements and user recommendations*

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

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ISO 8655-5, *Piston-operated volumetric apparatus — Part 5: Dispensers*

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

ISO 15202-2:2001, *Workplace air — Determination of metals and metalloids in airborne particulate matter by inductively coupled plasma atomic emission spectrometry — Part 2: Sample preparation*

EN 13205¹⁾, *Workplace atmospheres — Assessment of performance of instruments for measurement of airborne particle concentrations*

3 Terms and definitions

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

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

[EN 1540]

3.1.2**breathing zone**

space around a person's face from where he or she takes his or her breath

NOTE For technical purposes, a more precise definition is as follows: hemisphere (generally accepted to be 0,3 m 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 definition is not applicable when respiratory protective equipment is used.

[EN 1540]

3.1.3**exposure by inhalation**

situation in which a chemical agent is present in air which is inhaled by a person

3.1.4**measuring procedure**

procedure for sampling and analysing one or more chemical agents in the air, including storage and transportation of the sample

3.1.5**operating time**

period during which a sampling pump can be operated at specified flowrate and back-pressure without recharging or replacing the battery

[EN 1232]

3.1.6**time-weighted average concentration****TWA concentration**

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

1) To be published.

NOTE A more detailed discussion of TWA concentrations and their use can be found in [3].

3.1.7

limit value

reference figure for concentration of a chemical agent in air

EXAMPLE Threshold Limit Value[®] (TLV) for a given substance in workplace air, as established by the ACGIH [3].

3.1.8

reference period

specified period of time stated for the limit value of a specific chemical agent

NOTE Examples of limit values for different reference periods are short-term and long-term exposure limits, such as those established by the ACGIH [3].

3.1.9

workplace

defined area or areas in which work activities are carried out

[EN 1540]

3.2 Particle size fraction definitions

3.2.1

inhalable convention

target specification for sampling instruments when the inhalable fraction is of interest

[ISO 7708]

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3.2.2

inhalable fraction

mass fraction of total airborne particles which is inhaled through the nose and mouth

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NOTE The inhalable fraction depends on the speed and direction of air movement, on breathing rate and other factors.

[ISO 7708]

3.2.3

respirable convention

target specification for sampling instruments when the respirable fraction is of interest

[ISO 7708]

3.2.4

respirable fraction

mass fraction of inhaled particles penetrating to the unciliated airways

[ISO 7708]

3.2.5

total airborne particles

all particles surrounded by air in a given volume of air

NOTE Because all measuring instruments are size-selective to some extent, it is often impossible to measure the total concentration of airborne particles.

[ISO 7708]

ISO 8518:2001(E)**3.3 Sampling definitions****3.3.1****personal sampler**

device attached to a person that samples air in the breathing zone

[EN 1540]

3.3.2**personal sampling**

process of sampling carried out using a personal sampler

[EN 1540]

3.3.3**sampling instrument
sampler**

device for collecting airborne particles

NOTE Instruments used to collect airborne particles are frequently referred to by a number of other terms, e.g. sampling heads, filter holders, filter cassettes, etc.

3.3.4**static sampling
area sampling**

process of air sampling carried out in a particular location

3.3.5**static sampler
area sampler**

device, not attached to a person, used in static sampling

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3.4 Definitions used in analysis

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3.4.1**sample dissolution**

process of obtaining a solution containing the analytes of interest from a sample

NOTE This may or may not involve complete dissolution of the sample.

3.4.2**sample preparation**

all operations carried out on a sample, after transportation and storage, to prepare it for analysis, including transformation of the sample into a measurable state, where necessary

3.4.3**sample solution**

solution prepared by the process of sample dissolution, but possibly needing to be subjected to further operations in order to produce a test solution that is ready for analysis

3.4.4**test solution**

solution prepared by the process of sample dissolution and, if necessary, having been subjected to any further operations required to bring it into a state in which it is ready for analysis

3.5 Statistical terms**3.5.1****analytical recovery**

ratio of the mass of analyte measured when a sample is analysed to the known mass of analyte in that sample

NOTE It is expressed as a percentage.