TÖÖKOHA ÕHK
Plii ja pliiühendite sisalduse määramine õhus
Leek- ja elektrotermilise aatomabsorptsioonspektomeetria meetodid

Workplace air
Determination of particulate lead and lead compounds
Flame and electrothermal atomic absorption spectrometric methods

(ISO 8518:2022, identical)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-ISO 8518:2023 sisaldab rahvusvahelise standardi ISO 8518:2022 „Workplace air. Determination of particulate lead and lead compounds. Flame and electrothermal atomic absorption spectrometric methods“ identset ingliskeelset teksti.	This Estonian Standard EVS-ISO 8518:2023 consists of the identical English text of the International Standard ISO 8518:2022 „Workplace air. Determination of particulate lead and lead compounds. Flame and electrothermal atomic absorption spectrometric methods“.
Ettepaneku rahvusvahelise standardi ümbertrüki meetodil ülevõtuks on esitanud Sotsiaalministeerium, standardi avaldamist on korraldanud Eesti Standardimis- ja Akrediteerimiskeskus.	Proposal to adopt the International Standard by reprint method has been presented by the Ministry of Social Affairs, the Estonian Standard has been published by the Estonian Centre for Standardisation and Accreditation.
Standard EVS-ISO 8518:2023 on jõustunud sellekohase teate avaldamisega EVS Teatajas.	Standard EVS-ISO 8518:2023 has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.	This standard is available from the Estonian Centre for Standardisation and Accreditation.

Käsitlusala

See dokument täpsustab leekaatomabsorptsioonspektomeetria ja elektrotermilise aatomabsorptsioon-spektomeetria meetodid pliiosakeste ja -ühendite keskmise massikontsentratsiooni määramiseks teatud aja jooksul töökoha õhus.

Need meetodid on tavapäraselt rakendatavad lenduvate osakeste sissehingatava hulga isikupõhiseks määramiseks standardi ISO 7708 kohaselt ning staatiliseks (alapõhiseks) määramiseks. Vajaduse korral saab seda meetodit kasutada muude tervisega seotud fraktsioonide määramiseks.

Proovi lahustamine täpsustab kuuma plaadi või mikrolaineahju abil lagundamist või ultrahelieraldust (vt 11.2). Alternatiivse, jõulisema lahustamisprotseduuri kasutamine on vajalik, kui soovitakse eraldada tina katseatmosfääris leiduvatest ühenditest, mida pole võimalik eraldada siin kirjeldatud eraldusprotseduuride abil (vt peatükk 5).

Leekaatomabsorptsioonspektomeetria meetod on rakendatav umbes 1 µg kuni 200 µg pliihulga määramisel proovi kohta, ilma lahjendamata[1]. Elektrotermiline aatomabsorptsioonspektomeetria meetod on rakendatav umbes 0,01 µg kuni 0,5 µg pliihulga määramisel proovi kohta, ilma lahjendamata[1].

Ultrahelieraldus on hinnatud sobivaks umbes 20 µg kuni 100 µg pliihulga määramiseks proovi kohta laboris saadud õhusaastefiltri proovide põhjal[2].

Plii sisaldus õhus, millele see protseduur on rakendatav, määratakse osaliselt kasutaja valitud proovivõtumenetluse põhjal (vt 10.1).

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 13.040.30

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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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*.

This third edition cancels and replaces the second edition (ISO 8518:2001), which has been technically revised.

The main changes are as follows:

— a new Annex B (informative) has been added concerning sampler wall deposits;

— references and definitions have been updated;

— additional editorial changes have been made.

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

The health of workers in many industries, for example, mining, metal refining, battery manufacture, construction, 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 document 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.

During the development of this document, it has been assumed that the execution of its provisions and the interpretation of the results obtained is entrusted to appropriately qualified and experienced people.

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

1 Scope

This document 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.

These methods are typically applicable to personal sampling of the inhalable fraction of airborne particles, as defined in ISO 7708, and to static (area) sampling. It can be applied to other health-related fractions as required.

The sample dissolution procedure specifies hot plate or microwave assisted digestion, or ultrasonic extraction (see 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 (see Clause 5).

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].

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].

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 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 3585, *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: Pipettes*

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

ISO 8655-6, *Piston-operated volumetric apparatus — Part 6: Gravimetric reference measurement procedure for the determination of volume*

ISO 13137, *Workplace atmospheres — Pumps for personal sampling of chemical agents — Requirements and test methods*

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

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

ISO 17034, *General requirements for the competence of reference material producers*

ISO 18158, *Workplace air — Terminology*

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

EN 13205, *Workplace atmospheres — Assessment of performance of instruments for measurement of airborne particle concentrations*

3 Terms and definitions

For the purposes of this document, the terms and definitions 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/

3.1
sample dissolution
process of obtaining a solution containing all analytes of interest from a sample, which might or might not involve complete dissolution of the sample

[SOURCE: ISO 15202-2:2020, 3.1]

3.2
sample solution
solution prepared from a sample by the process of *sample dissolution* (3.1)

Note 1 to entry: A sample solution might need to be subjected to further operations, e.g. dilution, or addition, or both, of an internal standard(s), in order to produce a *test solution* (3.3).

[SOURCE: ISO 15202-2:2020, 3.2]

3.3
test solution
blank solution or *sample solution* (3.2) that has been subjected to all operations required to bring it into a state in which it is ready for analysis

[SOURCE: ISO 15202-2:2020, 3.3, modified — Note 1 to entry has been deleted.]

4 Principle

4.1 A known volume of air is drawn through a sampling substrate to collect particulate lead and lead compounds. For personal sampling, a sampler designed to collect the inhalable fraction of airborne particles is typically used.

