

**Ambient air quality - Standard method
for the measurement of Pb, Cd, As and
Ni in the PM10 fraction of suspended
particulate matter**

Ambient air quality - Standard method for the
measurement of Pb, Cd, As and Ni in the PM10
fraction of suspended particulate matter

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 14902:2005 sisaldab Euroopa standardi EN 14902:2005 + AC:2006 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 29.09.2005 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 14902:2005 consists of the English text of the European standard EN 14902:2005 + AC:2006.</p> <p>This document is endorsed on 29.09.2005 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>Käsitlusala:</p> <p>This European Standard specifies a method for the determination of particulate lead (Pb), cadmium (Cd), arsenic (As) and nickel (Ni) in ambient air that can be used in the framework of the European Council Directive on Ambient Air Quality Assessment and Management [1] and the 1st [2] and 4th [3] Daughter Directives.</p>	<p>Scope:</p> <p>This European Standard specifies a method for the determination of particulate lead (Pb), cadmium (Cd), arsenic (As) and nickel (Ni) in ambient air that can be used in the framework of the European Council Directive on Ambient Air Quality Assessment and Management [1] and the 1st [2] and 4th [3] Daughter Directives.</p>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

ICS 13.040.20

Võtmesõnad:

ICS 13.040.20

English version

**Ambient air quality - Standard method for the measurement of
Pb, Cd, As and Ni in the PM₁₀ fraction of suspended particulate
matter**

Qualité de l'air ambiant - Méthode normalisée pour la
mesure de Pb, Cd, As et Ni dans la fraction PM₁₀ de la
matière particulaire en suspension

Außenluftbeschaffenheit - Standardisiertes Verfahren zur
Bestimmung von Pb/Cd/As/Ni als Bestandteil der PM₁₀
Fraktion des Schwebstaubes

This European Standard was approved by CEN on 27 June 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

	Page
Foreword	3
1 Scope	4
2 Normative references	5
3 Terms, definitions and abbreviations	5
4 Principle	8
5 Requirements	9
6 Reagents and gases	10
7 Apparatus	11
8 Sampling	12
9 Analysis	14
10 Quality control	22
11 Calculation of results	23
12 Estimation of the measurement uncertainty of the method	26
13 Performance characteristics determined in field tests	27
14 Reporting of results	32
Annex A (informative) Examples of closed vessel microwave digestion procedures	33
Annex B (informative) Typical laboratory filter blank values as determined in the field validation tests	35
Annex C (informative) Analytical interferences	36
Annex D (informative) Approach to uncertainty estimation used in the field validation tests	40
Annex E (normative) List of minimum QA / QC procedures	46
Annex F (informative) Procedure for the determination of the uncertainty of the method for an individual laboratory	48
Annex ZA (informative) Relationship with EU Directives	53
Bibliography	54

Foreword

This European Standard (EN 14902:2005) has been prepared by Technical Committee CEN/TC 264 "Air quality", 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 February 2006, and conflicting national standards shall be withdrawn at the latest by February 2006.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association (see Annex ZA).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard specifies a method for the determination of particulate lead (Pb), cadmium (Cd), arsenic (As) and nickel (Ni) in ambient air that can be used in the framework of the European Council Directive on Ambient Air Quality Assessment and Management [1] and the 1st [2] and 4th [3] Daughter Directives. Performance requirements with which the method has to comply are specified in this European Standard. The performance characteristics of the method were determined in comparative field validation tests carried out at four European locations (see [4]).

This European Standard specifies a method for sampling of Pb, Cd, As and Ni as part of the PM₁₀ aerosol, microwave digestion of the samples and analysis by graphite furnace atomic absorption spectrometry or by inductively coupled plasma (quadrupole) mass spectrometry.

This European Standard is applicable for the measurement of Pb, Cd, As and Ni as part of the PM₁₀ aerosol fraction in the concentration ranges listed in Table 1.

Table 1 — Working ranges of the method in ng/m³

	From	To
Pb	1	4 000
Cd	0,1	50
As	0,5	350
Ni	2	100

The actual lower limits of the working ranges depend upon the variability of the laboratory filter blank (5.3.1). The lower limits of the working ranges given in Table 1 are expected values based upon performance achieved in the field validation tests. Similarly the upper limits of the working ranges have been set arbitrarily based upon the maximum daily values measured during the field validation tests. The method can be applied to higher concentrations provided the PM₁₀ collection characteristics of the sampler are not compromised.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12341:1998, *Air quality – Determination of the PM₁₀ fraction of suspended particulate matter – Reference method and field test procedure to demonstrate reference equivalence of measurement methods*.

ENV 13005:1999, *Guide to the expression of uncertainty in measurement*¹

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purpose of this European Standard, the following terms and definitions apply.

3.1.1

analysis

all operations carried out after sample preparation to determine the amount or concentration of the metals or metalloid of interest present in the sample

3.1.2

blank solution

solution prepared from a laboratory filter blank or a field filter blank by the process of sample dissolution

NOTE A laboratory filter blank solution or a field filter blank solution might need to be subjected to further operations, e.g. dilution and/or addition of an internal standard(s), if such operations are applied to the sample solutions in order to produce test solutions that are ready for analysis.

3.1.3

calibration blank solution

calibration solution prepared without addition of stock standard solution or working standard solution, for which the concentration of the analyte(s) of interest is considered to be zero

3.1.4

calibration solution

solution used for calibration of the analytical instrument, containing the analyte(s) of interest at (a) suitable concentration(s), prepared by dilution of the stock standard solution(s) or the working standard solution(s)

NOTE The technique of matrix-matching is normally used when preparing calibration solutions.

3.1.5

certified reference material

reference material, in which one or more of property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation that is issued by a certifying body [5]

3.1.6

field filter blank

filter that is taken through the same procedure as a sample, except that no air is drawn through it. It is transported to the sampling site, mounted in the sampling unit, dismounted, returned to the laboratory and worked up in the same way as a sample

¹ Equal to ISO Guide 30 (GUM) Geneva 1993.