

**Ambient air quality - Standard  
gravimetric measurement method for  
the determination of the PM<sub>2,5</sub> mass  
fraction of suspended particulate matter**

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measurement method for the determination of the  
PM<sub>2,5</sub> mass fraction of suspended particulate matter

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

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| <p>Käesolev Eesti standard EVS-EN 14907:2005 sisaldab Euroopa standardi EN 14907:2005 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 25.10.2005 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p> | <p>This Estonian standard EVS-EN 14907:2005 consists of the English text of the European standard EN 14907:2005.</p> <p>This document is endorsed on 25.10.2005 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> |
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| <p><b>Käsitlusala:</b></p> <p>This European Standard describes a standard method for determining the PM<sub>2,5</sub> mass concentration of suspended particulate matter in ambient air by sampling the particulate matter on filters and weighing them by means of a balance.</p> | <p><b>Scope:</b></p> <p>This European Standard describes a standard method for determining the PM<sub>2,5</sub> mass concentration of suspended particulate matter in ambient air by sampling the particulate matter on filters and weighing them by means of a balance.</p> |
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ICS 13.040.20

Võtmesõnad:

English Version

**Ambient air quality - Standard gravimetric measurement method  
for the determination of the PM<sub>2,5</sub> mass fraction of suspended  
particulate matter**

Qualité de l'air ambiant - Méthode de mesurage  
gravimétrique de référence pour la détermination de la  
fraction massique PM 2,5 de matière particulaire en  
suspension

Luftbeschaffenheit - Gravimetrisches  
Standardmessverfahren für die Bestimmung der PM<sub>2,5</sub>-  
Massenfraktion des Schwebstaubs

This European Standard was approved by CEN on 22 July 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.



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## Foreword

This European Standard (EN 14907:2005) 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 March 2006, and conflicting national standards shall be withdrawn at the latest by March 2006.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this European Standard.

As part of a continuous quality improvement, it is anticipated that this standard and EN 12341 (PM<sub>10</sub>) may be reviewed by the Technical Committee in the near future.

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.

## Introduction

For air quality across the European Union to be assessed on a consistent basis, Member States need to employ standard measurement techniques and procedures. The aim of this European Standard is to present a harmonised methodology for monitoring the  $2,5\text{ }\mu\text{m}$  mass fraction of suspended particulate matter ( $\text{PM}_{2,5}$ ) in ambient air, following Community Directive 96/62/EC on ambient air quality assessment and management [1], and Council Directive 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air [2], which sets the parameters specific to the assessment of particulate matter.

The standard method set out in this European Standard is focused primarily on harmonisation and improvement of the data quality of measurement methods used in monitoring networks, but is not necessarily best suited for practical use in routine monitoring.

There are no traceable reference standards for  $\text{PM}_{2,5}$  measurements. Therefore, the standard method set out in this European Standard defines the measured quantity by convention, specifically by the sample inlet design and associated operational parameters covering the whole measurement process. The standard contains:

- manual gravimetric standard measurement method for  $\text{PM}_{2,5}$  using single filters;
- summary of performance characteristics of the method, including measurement uncertainty;
- procedure for determining whether non-standard measurement methods (like other manual gravimetric or automatic monitoring methods) are equivalent to this standard method (Annex A).

The precision and performance characteristics described in this European Standard were determined in 9 different comparative and validation trials. The trials were performed at 9 different sites in northern, middle and southern European countries in order to cover a wide range of relevant ambient air conditions. The trials were sponsored by the European Commission and the European Free Trade Association.

In addition to the measurement procedure of the  $2,5\text{ }\mu\text{m}$  mass fraction of suspended particulate matter ( $\text{PM}_{2,5}$ ) in ambient air being described in this European Standard, there is European Standard EN 12341 [3] dealing with the measurement of  $\text{PM}_{10}$ .

## 1 Scope

This European Standard describes a standard method for determining the  $PM_{2.5}$  mass concentration of suspended particulate matter in ambient air by sampling the particulate matter on filters and weighing them by means of a balance.

Measurements are made over a sampling period of about 24 h, and in line with the Directive, are expressed as  $\mu g/m^3$ , where the volume of air is the volume at ambient conditions near the inlet at the time of sampling.

The range of application of the standard is from  $1 \mu g/m^3$  (i.e. the limit of detection of the standard measurement method expressed as its uncertainty) up to  $120 \mu g/m^3$  (i.e. the maximum concentration level observed during the field study undertaken by CEN/TC 264/WG 15 to validate the standard).

**NOTE** Although the standard is not validated for concentrations over  $120 \mu g/m^3$ , its range of application could well be extended to commonly encountered ambient concentrations up to circa  $200 \mu g/m^3$  when using glass or quartz fibre filters. At these high concentrations and particulate mass loadings no filter clogging is to be expected. Also the flow rate can be easily maintained at the nominal setting.

The equivalence procedure in Annex A specifies two approaches, depending on whether the candidate method differs slightly or fundamentally from the standard method.

In the former case, involving only slight differences from the standard method ("variations on a theme") Annex A provides a restricted procedure to compare only the pertinent differences, instead of a full field test. This part of the annex serves to give practical guidance for determining equivalence for measurement methods commonly used in monitoring networks, and includes examples of common variations to the standard method, such as different filter storing or conditioning procedures and the variation of the standard method for the application as automated filter changer.

In the latter case, involving a full set of field tests, the procedure serves to determine equivalence only within the range of conditions under which the field tests are carried out. The equivalence can be shown to hold for conditions prevailing within European countries by carrying out the field test in situations covering a suitable range of relevant ambient parameters (such as concentration and composition of the suspended particulate matter, temperature, and humidity).

Although this European Standard does not explicitly address automatic monitoring methods for the measurement of the  $PM_{2.5}$  mass fraction in ambient air, the equivalence test procedure in Annex A applies both to non-automatic and automatic methods.

## 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.

ENV 13005, *Guide to the expression of uncertainty in measurements*

CR 14377, *Air quality – Approach to uncertainty estimation for ambient air reference measurement methods*