BSI Standards Publication

Ambient air — Standard gravimetric measurement method for the determination of the PM10 or PM2,5 mass concentration of suspended particulate matter

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National foreword

This British Standard is the UK implementation of EN 12341:2023. It supersedes BS EN 12341:2014, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EH/2/3, Ambient atmospheres.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

Ambient air - Standard gravimetric measurement method for the determination of the PM10 or PM2,5 mass concentration of suspended particulate matter

Air ambiant - Méthode normalisée de mesurage gravimétrique pour la détermination de la concentration massique MP10 ou MP2,5 de matière particulaire en suspension

Außenluft - Gravimetrisches Standardmessverfahren für die Bestimmung der PM10- oder PM2,5-Massenkonzentration des Schwebstaubes

This European Standard was approved by CEN on 24 April 2023.

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Contents

Page

European foreword

This document (EN 12341:2023) 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of an identical text or by endorsement, at the latest by February 2024, and conflicting national standards shall be withdrawn at the latest by February 2024.

This document supersedes EN 12341:2014.

Technical modifications which have been made in comparison with the previous edition are summarized in Annex I.

This document 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 the introduction.

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

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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 document is to present a harmonized methodology for monitoring the mass concentrations of suspended particulate matter (PM_{10} and $PM_{2,5}$ respectively) in ambient air, following Directive 2008/50/EC on ambient air quality and cleaner air for Europe [1] which sets the parameters specific to the assessment of ambient concentration levels of particulate matter.

NOTE In principle, the methodology described in this document may also be used for measurement of mass concentrations of other PM fractions such as PM_1. However, this document does not describe standardized sampling inlets for such fractions.

The European Standard method described in this document is focused primarily on harmonization and improvement of the data quality of measurement methods used in monitoring networks with regard to avoiding unnecessary discontinuities with historical data. It is a method that is suited for practical use in routine monitoring, but not necessarily the method with the highest metrological quality.

There are no reference materials currently available to provide traceability for PM_{10} or $PM_{2,5}$ measurements in ambient air. Therefore, the standard method defines the measured quantity by convention, specifically by the sample inlet design and associated operational parameters covering the whole measurement process. This document contains:

— a description of a manual gravimetric standard measurement method for PM_{10} or $PM_{2,5}$ using sequential samplers or single-filter samplers;

— a summary of performance requirements of the method, together with associated type testing requirements for the sampler;

— requirements for suitability testing of facilities and equipment on initial application of the method;

— requirements for ongoing quality assurance / quality control when applying the method in the field;

— the assessment of measurement uncertainty of the results of this document method;

— criteria and test methods for the evaluation of the suitability of filters for application using this method.

The performance characteristics and requirements described in this document were partly determined in different comparative and validation trials. The trials were sponsored by the European Commission and the European Free Trade Association.

The requirements of this document are targeted firstly towards obtaining optimum results for the measurement of mass concentrations of PM_{10} or $PM_{2,5}$.

However, the filters collected for the purpose of determining the mass concentrations of PM_{10} or $PM_{2,5}$ can be used for further speciation, e.g. for the determination of concentrations of:

— heavy metals and polycyclic aromatic hydrocarbons (see EN 14902 [6], EN 15549 [7]) and CEN/TS 16645 [20] in conformity with Directive 2004/107/EC [8], as amended by Directive 2015/1480/EU [26].

— constituents of PM2,5 (see EN 16909 [9] and EN 16913 [10]) to be used for source apportionment as required by Directive 2008/50/EC.

Additional requirements might have to be considered for those purposes (e.g. blank values of chemical constituents).

1 Scope

This document specifies a standard method for determining the PM_{10} or $PM_{2,5}$ mass concentrations of suspended particulate matter in ambient air by sampling the particulate matter on filters and weighing them by means of a balance.

Measurements are performed with samplers with inlet designs as specified in Annex A, operating at a nominal flow rate of 2,3 m^3/h, over a nominal sampling period of 24 h. The method covers the determination of ambient air concentrations of specific fractions of suspended particulate matter in zones classified as rural areas, urban-background areas, traffic-orientated locations and locations influenced by industrial sources. Measurement results are expressed in $\mu g/m^3$, where the volume of air is the volume at ambient conditions near the inlet at the time of sampling.

The range of application of this document is for 24 h measurements from approximately 1 $\mu g/m^3$ (i.e. the limit of detection of the standard measurement method expressed as its uncertainty) up to 150 $\mu g/m^3$ for PM_{10} and 120 $\mu g/m^3$ for $PM_{2,5}$.

NOTE 1 Although the European Standard is not validated for higher concentrations, its range of application could well be extended to ambient air concentrations up to circa 200 $\mu g/m^3$ when using suitable filter materials (see 5.1.5.2).

This document specifies procedures and gives requirements for the testing and use of so-called sequential samplers, equipped with a filter changer, suitable for extended stand-alone operation. Sequential samplers are commonly used throughout the European Union for the measurement of concentrations in ambient air of PM_{10} or $PM_{2,5}$. However, this document does not exclude the use of single-filter samplers.

NOTE 2 Older versions of samplers, which conform to previous versions of EN 12341 [2 and 21], can still be used to evaluate equivalence of candidate methods, using the procedures described in EN 16450 [5] and in [11]. As newer versions of samplers tested under this document become available, discontinue the use of older reference samplers in EN 16450 and in [11]. Type testing reports of equivalent methods are still valid if they were commissioned prior to the availability of type approved reference samplers tested under this document.

This document also provides guidance for the selection and testing of filters with the aim of reducing the measurement uncertainty of the results obtained when applying this document.

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.

JCGM 100, *Evaluation of measurement data — Guide to the expression of uncertainty in measurement*

EN 15267-1:2009, *Air quality - Certification of automated measuring systems - Part 1: General principles*

EN 15267-2:2009, *Air quality - Certification of automated measuring systems - Part 2: Initial assessment of the AMS manufacturer's quality management system and post certification surveillance for the manufacturing process*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses: