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Standards

Standard Recommendation  
S.R. CEN/TS 16450:2013

# Ambient air - Automated measuring systems for the measurement of the concentration of particulate matter (PM<sub>10</sub>; PM<sub>2,5</sub>)

## S.R. CEN/TS 16450:2013

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**NSAI**  
1 Swift Square,  
Northwood, Santry  
Dublin 9

T +353 1 807 3800  
F +353 1 807 3838  
E standards@nsai.ie  
W NSAI.ie

**Sales:**  
T +353 1 857 6730  
F +353 1 857 6729  
W standards.ie

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English Version

**Ambient air - Automated measuring systems for the  
measurement of the concentration of particulate matter (PM10;  
PM2,5)**

Air ambiant - Systèmes automatisés de mesurage de la  
concentration de matière particulaire (PM10 ; PM2,5)

Außenluft - Automatische Messeinrichtungen zur  
Bestimmung der Staubkonzentration (PM10; PM2,5)

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**Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## **Foreword**

This document (CEN/TS 16450:2013) has been prepared by Technical Committee CEN/TC 264 "Air quality", the secretariat of which is held by DIN.

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

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## 1 Scope

In order to be in compliance with EU Air Quality Directive requirements [1], the reference methods given in the Directive for the measurement of mass concentrations of particulate matter are not commonly used for operation in routine monitoring networks. These networks usually apply automated continuous measurement systems (AMS), such as those based on the use of oscillating microbalances or  $\beta$ -ray attenuation, and on in-situ optical methods. Such AMS are typically capable of producing 24-hour average measurement values over a measurement range up to 1 000  $\mu\text{g}/\text{m}^3$  and 1-hour average measurement values up to 10 000  $\mu\text{g}/\text{m}^3$ , if applicable, where the volume of air is the volume at ambient conditions near the inlet at the time of sampling.

The 1-hour average values may be used for:

- direct information of the public;
- aggregation to produce daily or yearly average concentration values for regulatory reporting purposes.

EU Air Quality Directive 2008/50/EC [1] allows the use of such systems after demonstration of equivalence with the reference method, i.e., after demonstration that these systems meet the Data Quality Objectives for continuous measurements. Guidelines for the demonstration of equivalence are given in Reference [2].

This Technical Specification lays down the minimum performance requirements and test procedures for the selection of appropriate AMS for particulate matter (type approval). This includes the evaluation of its equivalence with the reference method.

Further, this Technical Specification describes minimum requirements for ongoing quality assurance – quality control (QA/QC) of AMS deployed in the field. These requirements are necessary to ensure that uncertainties of measured concentrations are kept within the required limits during extended periods of continuous monitoring in the field, and include procedures for maintenance, calibration and control checks.

Additional procedures are described that determine whether an instrument's equivalence to the reference method is maintained through possible pollution climate changes, over periods longer than five years.

Lastly, this Technical Specification describes requirements and procedures for the treatment and validation of raw measurement data that are to be used for the assembly of daily or yearly average concentration values. Experiences with existing methods for data treatment and validation – for similar AMS – have learned that the different ways of data treatment and validation applied may lead to significant differences in reported results for similar datasets [3].

When the Technical Specification is used for other purposes than the EU Directive, the range and uncertainty requirements may not apply.

This Technical Specification contains information for different groups of users.

Clauses 5 and 6 and Annex A contain general information about the principles of automated continuous measurement systems for particulate matter, and relevant equipment.

Clause 7 and Annexes B and C are specifically directed towards test houses and laboratories that perform type-approval testing of automated continuous measurement systems for particulate matter. These clauses contain information about:

- type-approval test conditions, test procedures and test requirements;
- system performance requirements;
- evaluation of the type-approval test results;
- evaluation of the uncertainty of the measurement results of the automated continuous measurement systems for particulate matter based on the type-approval test results.

Clauses 8 to 11 are directed towards monitoring networks performing the practical measurements of particulate matter in ambient air. These clauses contain information about:

- initial installation of the system in the monitoring network and acceptance testing;
- ongoing quality assurance/quality control;
- verification of equivalence;
- treatment, validation and reporting of measurement results.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12341, *Air quality — Determination of the  $PM_{10}$  fraction of suspended particulate matter — Reference method and field test procedure to demonstrate reference equivalence of measurement methods*

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

EN 15267-2, *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 and definitions

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

### 3.1

#### **ambient air**

outdoor air in the troposphere, excluding workplaces as defined by Directive 89/654/EEC [5] where provisions concerning health and safety at work apply and to which members of the public do not have regular access

[SOURCE: Directive 2008/50/EC [1]]

### 3.2

#### **automated measuring system**

AMS

entirety of all measuring instruments and additional devices necessary for obtaining a measurement result

### 3.3

#### **availability of the AMS**

fraction of the time period for which valid measuring data of the ambient air concentration is available from an AMS

[SOURCE: EN 14211 [6]]

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