
**Kakovost zraka - Ocenjevanje opreme za monitoring kakovosti zraka - 4. del:
Merila za delovanje in postopki preskušanja prenosnih avtomatskih merilnih
sistemov (P-AMS) za periodične meritve emisij iz nepremičnih virov**

Air quality - Assessment of air quality monitoring equipment - Part 4: Performance criteria and test procedures for portable automated measuring systems for periodic measurements of emissions from stationary sources

Luftbeschaffenheit - Beurteilung von Einrichtungen zur Überwachung der Luftbeschaffenheit - Teil 4: Mindestanforderungen und Prüfprozeduren für portable automatische Messeinrichtungen für wiederkehrende Messungen von Emissionen aus stationären Quellen

Qualité de l'air - Évaluation des équipements de surveillance de la qualité de l'air - Partie 4 : Spécifications de performance et modes opératoires d'essai des systèmes de mesurage automatisés portables pour le mesurage périodique des émissions de source

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**Air quality - Assessment of air quality monitoring
equipment - Part 4: Performance criteria and test
procedures for portable automated measuring systems for
periodic measurements of emissions from stationary
sources**

Qualité de l'air - Évaluation des équipements de
surveillance de la qualité de l'air - Partie 4 :
Spécifications de performance et modes opératoires
d'essai des systèmes de mesure automatisés
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de source

Luftbeschaffenheit - Beurteilung von Einrichtungen zur
Überwachung der Luftbeschaffenheit - Teil 4:
Mindestanforderungen und Prüfprozeduren für
portable automatische Messeinrichtungen für
wiederkehrende Messungen von Emissionen aus
stationären Quellen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 264.

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European foreword

This document (prEN 15267-4:2022) has been prepared by Technical Committee CEN/TC 264 “Air quality”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 15267-4:2017.

In comparison with the previous edition, the following technical modifications have been made:

- a) The title of the revised EN 15267 series has been clarified to avoid the impression that all parts deal with the certification of automated measuring systems. The title has been generalized so that specifically Part 1 and Part 2 are also applicable to other air quality monitoring equipment.
- b) The title of revised EN 15267-4 has been clarified to make it clear that Part 4 deals with portable automated measuring systems for periodic measurements of emissions from stationary sources.
- c) The performance criteria test and procedures were adapted to the state of the art in measurement technology.
- d) Requirements for portable automated measuring systems measuring mercury have been added.
- e) References have been updated.

This document is Part 4 of a series of European Standards:

- EN 15267-1, *Air quality — Assessment of air quality monitoring equipment — Part 1: General principles of certification*
- EN 15267-2, *Air quality — Assessment of air quality monitoring equipment — Part 2: Initial assessment of the manufacturer’s quality management system and post certification surveillance for the manufacturing process*
- EN 15267-3, *Air quality — Assessment of air quality monitoring equipment — Part 3: Performance criteria and test procedures for stationary automated measuring systems for continuous monitoring of emissions from stationary sources*
- EN 15267-4, *Air quality — Assessment of air quality monitoring equipment — Part 4: Performance criteria and test procedures for portable automated measuring systems for periodic measurements of emissions from stationary sources*

Introduction

0.1 General

The assessment of air quality monitoring equipment (AQME) supports the requirements of certain Directives of the European Union (EU), which require, either directly or indirectly, that this equipment complies with performance criteria, maximum permissible measurement uncertainties and test requirements. These Directives include the Directive 2010/75/EU on industrial emissions (IED), Directive (EU) 2015/2193 on medium combustion plants and the Directive 2008/50/EC on ambient air quality and cleaner air for Europe.

The assessment of AQME consists of the following sequential stages:

- a) performance testing;
- b) initial assessment of the manufacturer's quality management system (QMS);
- c) certification;
- d) surveillance for the manufacturing process.

This document specifies the performance criteria and test procedures for performance testing of portable automated measuring systems (P-AMS) used for periodic measurements of stationary source emissions. Testing applies to complete measuring systems.

NOTE 1 Portable electrical apparatus designed to measure combustion flue gas parameters of heating appliances are specified in EN 50379-1 to EN 50379-3.

The application of P-AMS for periodic measurements of stationary source emissions is based on

- specification of the standard reference method (SRM) and validation of the SRM;
- specification of the alternative method (AM) if the P-AMS is based on an AM;
- certification of the P-AMS in accordance with EN 15267-1, EN 15267-2 and EN 15267-4 including demonstration of equivalence with the SRM in the field if the P-AMS is based on an AM;
- on-going quality management by the user of the P-AMS in line with EN ISO/IEC 17025.

NOTE 2 Examples for SRM and AM for different measured components are listed in Annex A.

The overall assessment for the purposes of certification is *conformity testing*, while the evaluation of performance against specified performance criteria is *performance testing*.

0.2 Legal drivers

This document supports at least the requirements of the following EU Directives:

- Directive 2010/75/EU on industrial emissions;
- Directive (EU) 2015/2193 on the limitation of emissions of certain pollutants into the air from medium combustion plants;
- Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading.

However, this document can also be applied to the monitoring requirements specified in other EU Directives.

0.3 Periodic measurements

Certified P-AMS can be used as SRM or AM for periodic measurements of stationary source emissions.

0.4 Relationship to EN 14181

Certified P-AMS can be used as SRM or AM for the calibration and validation of stationary AMS for QAL2 and AST purposes.

0.5 Processes

Field testing of P-AMS is ordinarily carried out on industrial processes representative of the range of application of the SRM or AM. The premise is that if the P-AMS performs acceptably on these processes, then experience has shown that the P-AMS generally performs well on the majority of other processes. However, there are always exceptions and it is the responsibility of the user to ensure that the P-AMS performs adequately on a specific process.

The necessary field test of P-AMS is specified in this document.

0.6 Performance characteristics

A combination of laboratory test and field test is detailed within this document. The laboratory test is designed to assess whether P-AMS can meet, under controlled conditions, the relevant performance criteria. The field test is designed to assess whether P-AMS can continue to work and meet the relevant performance criteria in real applications including transportation to the measurement site, set-up of the P-AMS and measurement.

The main P-AMS performance characteristics are:

- response time;
- repeatability standard deviation;
- lack of fit (linearity);
- short-term drift;
- influence of ambient temperature;
- influence of supply voltage variations;
- influence of vibration;
- influence of sample gas pressure;
- influence of sample gas flow for extractive P-AMS;
- cross-sensitivity to likely interferents contained in the waste gas other than the measured component;
- converter efficiency for P-AMS measuring NO_x ;
- converter efficiency of P-AMS measuring Hg;
- response factors for P-AMS measuring TOC;
- reproducibility;

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- trueness and precision of the P-AMS against the SRM under field conditions if the P-AMS is based on an AM.

Additional performance characteristics specific to the SRM or AM are included in the performance test.

The quality assurance and quality control (QA/QC) procedures to be applied by the user of the P-AMS are also assessed in the performance test.

This document is an application and elaboration of EN ISO 9169 with additional and alternative provisions for the performance test of P-AMS. Where this document appears to differ from EN ISO 9169, it either elaborates upon the requirements of EN ISO 9169 or differs in minor ways owing to the necessity to conduct the performance test of P-AMS.

0.7 Relationship to prEN 15267-3

This document is based on prEN 15267-3, which specifies the performance test of stationary AMS for the continuous monitoring of emissions from stationary sources. Many requirements of this document are identical to those of prEN 15267-3. This document deviates from prEN 15267-3 only where the portable use and the use as SRM or AM require different or additional requirements. Therefore, this document allows a combined testing according to prEN 15267-3 and prEN 15267-4 where an AMS is designed for stationary and portable use. It also allows a reduced performance test of P-AMS, which have been already certified according to prEN 15267-3 for stationary use.

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1 Scope

This document specifies the general performance criteria and test procedures for the performance test of portable automated measuring systems (P-AMS) used for periodic measurements of stationary source emissions. It applies to the performance test of P-AMS based on measurement techniques specified by the standard reference method (SRM) or an alternative method (AM).

The performance test is based on the general performance criteria and test procedures specified in this document and on the specific requirements specified for the SRM or AM. This includes testing of the applicability and correct implementation of the QA/QC procedures specified for the SRM or AM.

This document supports the requirements of particular EU Directives.

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.

EN 14793, *Stationary source emissions - Demonstration of equivalence of an alternative method with a reference method*

EN 15259, *Air quality - Measurement of stationary source emissions - Requirements for measurement sections and sites and for the measurement objective, plan and report*

EN 50160, *Voltage characteristics of electricity supplied by public electricity networks*

EN 60068-2-6, *Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal) (IEC 60068-2-6)*

EN 60529, *Degrees of protection provided by enclosures (IP Code)*

EN ISO 14956, *Air quality - Evaluation of the suitability of a measurement procedure by comparison with a required measurement uncertainty (ISO 14956)*

3 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:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

air quality monitoring equipment

AQME

automated measuring system or data acquisition and handling system

[SOURCE: prEN 15267-1:2021, 3.1]

3.2

automated measuring system

AMS

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

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Note 1 to entry: The term “automated measuring system” applies to stationary and portable AMS.

Note 2 to entry: Apart from the actual measuring device (the analyser), a stationary AMS includes facilities for taking samples (e.g. probe, sample gas lines, flow meters and regulator, delivery pump) and for sample conditioning (e.g. dust filter, pre-separator for interferences, cooler, converter). This definition also includes testing and adjusting devices that are required for functional checks and QAL3 procedures and, if applicable, for commissioning.

Note 3 to entry: The term “automated measuring system” (AMS) is typically used in Europe. The terms “continuous emission monitoring system” (CEM) and “continuous ambient-air-quality monitoring system” (CAM) are also typically used in the UK and USA.

[SOURCE: prEN 15267-1:2021, 3.2]

3.3 portable automated measuring system

P-AMS

automated measuring system which is in a condition or application to be moved from one to another measurement site to obtain measurement results for a short measurement period

Note 1 to entry: The measurement period is typically 8 h for a day.

Note 2 to entry: The P-AMS can be configured at the measurement site for the special application but can be also set-up in a van or mobile container. The probe and the sample gas lines are installed often just before the measurement task is started.

[SOURCE: prEN 15267-1:2021, 3.3]

3.4 reference method

RM

measurement method taken as a reference by convention, which gives, the accepted reference value of the measurand

Note 1 to entry: A reference method is fully described.

Note 2 to entry: A reference method can be a manual or an automated method.

Note 3 to entry: Alternative methods can be used if equivalence to the reference method has been demonstrated.

[SOURCE: EN 15259:2007, 3.8]

3.5 standard reference method

SRM

reference method prescribed by European or national legislation

Note 1 to entry: Standard reference methods are used e.g. to calibrate and validate AMS and for periodic measurements to check compliance with limit values.

[SOURCE: EN 15259:2007, 3.9]

3.6**alternative method****AM**

measurement method which complies with the criteria given by EN 14793 with respect to the reference method

Note 1 to entry: An alternative method can consist of a simplification of the reference method.

[SOURCE: EN 14793:2017, 3.3, modified – “this European Standard” has been replaced by “EN 14793”]

3.7**measurement method**

method described in a written procedure containing all the means and procedures required to sample and analyse, namely: field of application, principle and/or reactions, definitions, equipment, procedures, presentation of results, other requirements and measurement report

[SOURCE: EN 14793:2017, 3.4]

3.8**measurement**

set of operations having the object of determining a value of a quantity

[SOURCE: prEN 15267-3:2022, 3.8]

3.9**paired measurement**

simultaneous recording of results of measurement at the same measurement point using two P-AMS of identical design

[SOURCE: prEN 15267-3:2022, 3.9]

3.10**measurand**

particular quantity subject to measurement

Note 1 to entry: The measurand is a quantifiable property of the waste gas under test, for example mass concentration of a measured component, temperature, velocity, mass flow, oxygen content and water vapour content.

[SOURCE: EN 15259:2007, 3.5]

3.11**measured component**

constituent of the waste gas for which a defined measurand is to be determined by measurement

[SOURCE: EN 15259:2007, 3.6]

Note 1 to entry: Measured component is also called determinand.

prEN 15267-4:2022 (E)**3.12****interferent**

substance present in the waste gas under investigation, other than the measured component, that affects the output

[SOURCE: prEN 15267-3:2022, 3.12]

3.13**reference material**

substance or mixture of substances, with a known concentration within specified limits, or a device of known characteristics

[SOURCE: prEN 15267-3:2022, 3.15]

3.14**zero gas**

gas mixture used to establish the zero point of a calibration curve when used with a given analytical procedure within a given calibration range

[SOURCE: prEN 15267-3:2022, 3.16]

3.15**zero point**

specified value of the output of the P-AMS which, in the absence of the measured component, represents the zero crossing of the P-AMS characteristic

Note 1 to entry: In case of oxygen and some flow monitoring AMS, the zero point is interpreted as the lowest measurable value.

[SOURCE: prEN 15267-3:2022, 3.17, modified – “AMS” has been replaced by “P-AMS”]

3.16**span point**

value of the output of the P-AMS for the purpose of calibrating, adjusting, etc. that represents a correct measured value generated by reference material between 70 % and 90 % of the range tested

[SOURCE: prEN 15267-3:2022, 3.18, modified – “AMS” has been replaced by “P-AMS”]

3.17**measured signal**

output of the P-AMS in analogue or digital form which is converted into the measured value with the aid of the analysis function of the analyser

[SOURCE: from prEN 15267-3:2022, 3.19, modified – “AMS” has been replaced by “P-AMS” and “calibration function” by “analysis function of the analyser”]

3.18**output**

reading, or digital or analogue electrical signal, generated by the P-AMS in response to a measured object

[SOURCE: prEN 15267-3:2022, 3.20, modified – “AMS” has been replaced by “P-AMS”]

3.19**independent reading**

reading that is not influenced by a previous individual reading by separating two individual readings by at least four response times

[SOURCE: prEN 15267-3:2022, 3.21]

3.20**individual reading**

reading averaged over a time period equal to at least the response time of the P-AMS

[SOURCE: prEN 15267-3:2022, 3.22, modified – “AMS” has been replaced by “P-AMS”]

3.21**averaging time**

time period over which an arithmetic or time-weighted average of concentrations is calculated

[SOURCE: prEN 15267-3:2022, 3.23]

3.22**short-term average****STA**

average related to the shortest time period used for reporting

Note 1 to entry: Short-term averages are based on the shortest time period of averages the plant must report to the authorities for each measured component. According to variations in different EU Directives the shortest time period can be 10 min, 30 min or 1 h, depending on the type and application of the plant.

[SOURCE: EN 17255-1:2019, 3.25] [oSIST prEN 15267-4:2022](https://standards.iteh.ai/catalog/standards/sist/97407b73-fec9-4983-b74b-0efe6f813468/osist-pren-15267-4-2022)

3.23**performance characteristic**

quantity assigned to the P-AMS in order to define its performance

Note 1 to entry: The values of relevant performance characteristics are determined in the performance test and compared to the applicable performance criteria.

[SOURCE: prEN 15267-3:2022, 3.24, modified – “AMS” has been replaced by “P-AMS”]

3.24**response time**

t_{90}

duration between the instant when an input quantity value of a measuring instrument or measuring system is subjected to an abrupt change between two specified constant quantity values and the instant when a corresponding indication settles within specified limits around its final steady value

Note 1 to entry: The response time is also referred to as the 90 % time.

Note 2 to entry: The response time is by convention the time taken for the output signal to pass from 0 % to 90 % of the final variation of indication.

Note 3 to entry: Beside the different wording, this definition does not technically deviate from the definition of response time in prEN 15267-3.