SLOVENSKI STANDARD
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Kakovost zraka - Certificiranje avtomatskih merilnih sistemov (AMS) - 4. del: Merila za delovanje in postopki preskušanja avtomatskih merilnih sistemov za periodične meritve emisij nepremičnih virov

Air quality - Certification of automated measuring systems - Part 4: Performance criteria and test procedures for automated measuring systems for periodic measurements of emissions from stationary sources

Luftbeschaffenheit - Zertifizierung von automatischen Messeinrichtungen - Teil 4: Mindestanforderungen und Prüfprozeduren für automatische Messeinrichtungen für wiederkehrende Messungen von Emissionen aus stationären Quellen

Qualité de l'air - Certification des systèmes de mesurage automatisés - Partie 4 : Spécifications de performance et procédures d'essai pour systèmes de mesurage automatisés

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Air quality - Certification of automated measuring systems - Part 4: Performance criteria and test procedures for automated measuring systems for periodic measurements of emissions from stationary sources

Qualité de l'air - Certification des systèmes de mesurage automatisés - Partie 4 : Spécifications de performance et procédures d'essai pour systèmes de mesurage automatisés

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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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Foreword

This document (prEN 15267-4:2015) 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 is Part 4 of a series of European Standards:

— 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*

— EN 15267-3, *Air quality — Certification of automated measuring systems — Part 3: Performance criteria and test procedures for automated measuring systems for monitoring emissions from stationary sources*

— EN 15267-4, *Air quality — Certification of automated measuring systems — Part 4: Performance criteria and test procedures for automated measuring systems for periodic measurements of emissions from stationary sources*

0 Introduction

0.1 General

CEN has established standards for the certification of automated measuring systems (AMS) used for monitoring emissions from stationary sources and ambient air quality. This product certification is based on the following four sequential stages:

a) performance testing of the AMS;

b) initial assessment of the AMS manufacturer's quality management system;

c) certification of the AMS;

d) post certification surveillance.

This European Standard 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.

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

— specification of the standard reference method (SRM) in a European Standard and validation of the SRM;

— specification of the alternative method (AM) in a European Standard 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 Examples for standard reference methods for different measured components are listed in Annex E.

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 European Standard supports the requirements of the following EU Directives:

— Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control)

— Directive 2003/87/EC on processes emitting greenhouse gases.

However, this European Standard 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 European Standard.

0.6 Performance characteristics

A combination of laboratory and field tests is detailed within this European Standard. Laboratory testing is designed to assess whether a P-AMS can meet, under controlled conditions, the relevant performance criteria. Field testing, is designed to assess whether a 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. Field testing is carried out at least at five different industrial processes representative of the intended application of the P-AMS, where one can be a suitable test bench which covers all relevant influences present in the field, with at least six measurements over the relevant averaging time (e.g. 10 min, 30 min or 1 h) for each process.

The main P-AMS performance characteristics are

— response time;

— repeatability standard deviation at zero and span point;

— lack of fit (linearity) under laboratory and field conditions;

— short-term zero and span drift under laboratory and field conditions;

— influence of ambient temperature;

— influence of 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 stack gas other than the measured component;

— converter efficiency for NO_x P-AMS;

— response factors;

— reproducibility under field conditions;

— 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 European Standard is an application and elaboration of EN ISO 9169 with additional and alternative provisions for the performance test of P-AMS. Where this European Standard 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 EN 15267-3

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

1 Scope

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

Performance testing is based on the general performance criteria and test procedures specified in this European Standard 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 European Standard supports the requirements of particular EU Directives.

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.

prEN 14793:2014, *Stationary source emissions - Demonstration of equivalence of an alternative method with a reference method*

EN 15259:2007, *Air quality - Measurement of stationary source emissions - Requirements for measurement sections and sites and for the measurement objective, plan and report*

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

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

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.

3.1
automated measuring system
AMS
entirety of all measuring instruments and additional devices for obtaining a result of measurement

Note 1 to entry: Apart from the actual measuring device (the analyser), an 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 interferents, cooler, converter). This definition also includes testing and adjusting devices that are required for functional checks and, if applicable, for commissioning.

Note 2 to entry: The term “automated measuring system” (AMS) is typically used in Europe. The term “continuous emission monitoring system” (CEMS) is also typically used in the UK and USA.

3.2
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 period (e. g. 8 h)

Note 1 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.

3.3
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]

3.4
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]

3.5
alternativ method
AM
measurement method which complies with the criteria given by prEN 14793:2014 with respect to the reference method

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

[SOURCE: prEN 14793:2014, 3.2]

3.6
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, repeatability (3.17) and other requirements, test report

[SOURCE: prEN 14793:2014, 3.14]

3.7
measurement
set of operations having the object of determining a value of a quantity

3.8
paired measurement
simultaneous recording of results of measurement at the same measurement point using two AMS of identical design

3.9
measurand
particular quantity subject to measurement

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

[SOURCE: ISO/IEC Guide 98-3:2008]

3.10
measured component
constituent of the stack gas for which a defined measurand is to be determined by measurement

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

[SOURCE: EN 15259:2007, 3.6]

3.11
interferent
substance present in the stack gas under investigation, other than the measured component, that affects the output

3.12
reference material
substance or mixture of substances, with a known concentration within specified limits, or a device of known characteristics

3.13
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

3.14
zero point
specified value of the output of the AMS which, in the absence of the measured component, represents the zero crossing of the 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.

3.15
span point
value of the output of the 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

3.16
measured signal
output from an AMS in analogue or digital form which is converted into the measured value with the aid of-the analysis function of the analyzer

3.17
output
reading, or digital or analogue electrical signal generated by an AMS in response to a measured object

3.18
independent reading
reading that is not influenced by a previous individual reading by separating two individual readings by at least four response times

3.19
individual reading
reading averaged over a time period equal to the response time of the AMS

3.20
performance characteristic
quantity assigned to an AMS in order to define its performance

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

3.21
averaging time
period of time over which an arithmetic or time-weighted average of concentrations is calculated

3.22
converter efficiency
efficiency with which the converter unit of a NO_x analyser reduces NO_2 to NO

3.23
interference
negative or positive effect that a substance has upon the output of the AMS, when that substance is not the measured component

3.24
cross-sensitivity
response of the AMS to interferents

Note 1 to entry: See interference.

3.25
drift
monotonic change of the calibration function over a stated period of unattended operation, which results in a change of the measured value

3.26
short-term zero drift
change in the AMS reading at the zero point over the measurement period

3.27
short-term span drift
change in the AMS reading at the span point over the measurement period

Note 1 to entry: The measurement period is typically 8 h for a day. Measurement periods of several days need a drift control on each day.