SLOVENSKI STANDARD
oSIST prEN 16429:2020

01-januar-2020

Emisije nepremičnih virov - Referenčna metoda za določevanje koncentracije plinastega vodikovega klorida (HCl) v odpadnih plinih, ki se sproščajo v ozračje iz industrijskih naprav

Stationary source emissions - Reference method for the determination of the concentration of gaseous hydrogen chloride (HCl) in waste gases emitted by industrial installations into the atmosphere

Emissionen aus stationären Quellen - Referenzverfahren zur Bestimmung der Konzentration von gasförmigem Chlorwasserstoff (HCl) in Abgasen, die von Industrieanlagen in die Atmosphäre emittiert werden

Émissions de sources fixes - Méthode de référence pour la détermination de la concentration de chlorure d'hydrogène gazeux (HCl) dans les gaz résiduaires émis dans l'atmosphère par des installations industrielles

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English Version

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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.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 16429:2019) 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 CEN/TS 16429:2013.

Introduction

The European Commission (EC) has charged the European Committee for Standardization (CEN) to elaborate this new standard (With Mandate M/513 of January 2013). The work was allocated to CEN/TC 264 “Air quality”/WG 3 who has prepared this document.

This document has been validated during field tests on a test bench, on a waste incineration plant and a large combustion plant for HCl concentrations with sampling periods of 30 min in the range of 2,5 mg/m^3 to 61 mg/m^3. Directive 2010/75/EU lays down emission values which are expressed in mg/m^3, on dry basis at a specified value of oxygen and at standard conditions (273 K and 101,3 kPa).

NOTE The characteristics of installations, the conditions during field tests and the values of repeatability and reproducibility in the field are given in Annex C.

1 Scope

This document specifies the standard reference method (SRM) based on an automatic method for determination of the mass concentration of hydrogen chloride (HCl) in ducts and stacks emitting to the atmosphere. It describes the sampling and gas conditioning system.

This document specifies the characteristics to be determined and the performance criteria to be fulfilled by portable automated measuring systems (P-AMS) using the infrared measurement method. It applies for periodic monitoring and for the calibration or control of automated measuring systems (AMS) permanently installed on a stack, for regulatory or other purposes.

A number of performance characteristics with associated minimum performance criteria are specified for the measuring system (see EN 15267-4:2017, Table 1 which gives an overview of the relevant performance characteristics and performance criteria). This document can be used as a SRM provided the expanded uncertainty of the method is less than 20 % relative at the daily Emission Limit Value (ELV), or 1 mg/m ^{3} for ELV below 5 mg/m ^{3}.

This document specifies criteria for demonstration of equivalence of an alternative method (AM) to the SRM by application of EN 14793.

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.

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

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 15267-4:2017, *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*

EN ISO 14956:2002, *Air quality - Evaluation of the suitability of a measurement procedure by comparison with a required measurement uncertainty (ISO 14956:2002)*

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:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
adjustment of a measuring system
set of operations carried out on a measuring system so that it provides prescribed indications corresponding to given values of a quantity to be measured

[SOURCE: VIM 3.11]

3.2
alternative method
AM
measurement method which complies with the criteria given by this document 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
ambient temperature
temperature of the air around the measuring system

3.4
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.

[SOURCE: EN 15267-4:2017]

3.5
calibration
set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring method or measuring system, and the corresponding values given by the applicable reference

Note 1 to entry: In case of automated measuring system (AMS) permanently installed on a stack, the applicable reference is the standard reference method (SRM) used to establish the calibration function of the AMS.

Note 2 to entry: Calibration should not be confused with adjustment of a measuring system.

3.6
drift
difference between two zero (zero drift) or span readings (span drift) at the beginning and at the end of a measuring period

3.7
emission limit value
ELV
emission limit value laid out in EU Directives on the basis of 30 min, one hour or one day

3.8
influence quantity
quantity that, in a direct measurement, does not affect the quantity that is actually measured, but affects the measurement result

EXAMPLES

— Ambient temperature;

— atmospheric pressure;

— presence of interfering gases in the flue gas matrix;

— pressure of the gas sample.

[SOURCE: VIM 2.52, modified]

3.9
interference
negative or positive effect upon the response of the measuring system, due to a component of the sample that is not the measurand

3.10
lack of fit
systematic deviation within the range of application between the measurement result obtained by applying the calibration function to the observed response of the measuring system measuring test gases and the corresponding accepted value of such test gases

Note 1 to entry: Lack of fit could be a function of the measurement result.

Note 2 to entry: The expression “lack of fit” is often replaced in everyday language by “linearity” or “deviation from linearity”.

3.11
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: EN 15259:2007]

3.12
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]

3.13
measurement plane
plane normal to the centreline of the duct at the sampling position

Note 1 to entry: Measurement plane is also known as sampling plane.

[SOURCE: EN 15259:2007]

3.14
measurement point
position in the measurement plane at which the sample stream is extracted or the measurement data are obtained directly

Note 1 to entry: Measurement point is also known as sampling point.

[SOURCE: EN 15259:2007]

3.15
measuring system
complete set of measuring instruments and other equipment assembled to carry out specified measurements

[SOURCE: VIM 3.2, modified]

3.16
performance characteristic
one of the quantities (described by values, tolerances, range…) assigned to equipment in order to define its performance

3.17
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.

[SOURCE: EN 15267-4:2017]

3.18
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 may be used if equivalence to the reference method has been demonstrated.

[SOURCE: EN 15259:2007]

3.19
repeatability in the laboratory
closeness of the agreement between the results of successive measurements of the same measurand carried out under the same conditions of measurement

Note 1 to entry: Repeatability conditions include:

— the same measurement procedure;

— the same laboratory;

— the same measuring system, used under the same conditions;

— the same location;

— repetition over a short period of time.

Note 2 to entry: Repeatability may be expressed quantitatively in terms of the dispersion characteristics of the results.

Note 3 to entry: In this document, the repeatability is expressed as a value with a level of confidence of 95 %.

[SOURCE: VIM 2.20, modified]

3.20
residence time in the measuring system
time period for the sampled gas to be transported from the inlet of the probe to the inlet of the measurement cell

3.21
response time
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: By convention time taken for the output signal to pass from 0 % to 90 % of the final change.

[SOURCE: JCGM 200:2012]

3.22
span gas
test gas used to adjust and check a specific point on the response line of the measuring system

Note 1 to entry: This concentration is often chosen around 80 % of the upper limit of the range or around the emission limit value.

3.23
standard reference method
SRM
reference method prescribed by European or national legislation

[SOURCE: EN 15259:2007]

3.24
uncertainty
parameter associated with the result of a measurement, that characterises the dispersion of the values that could reasonably be attributed to the measurand

3.24.1
standard uncertainty *u*
uncertainty of the result of a measurement expressed as a standard deviation *u*

3.24.2
expanded uncertainty *U*
quantity defining a level of confidence about the result of a measurement that could be expected to encompass a specific fraction of the distribution of values that could reasonably be attributed to a measurand

$$U = k \cdot u$$

Note 1 to entry: In this document, the expanded uncertainty is calculated with a coverage factor of k = 2n, and with a level of confidence of 95 %.

3.24.3
combined uncertainty u_c
standard uncertainty u_c attached to the measurement result calculated by combination of several standard uncertainties according to GUM

3.25
uncertainty budget
calculation table combining all the sources of uncertainty according to EN ISO 14956 or ENV 13005 in order to calculate the expanded uncertainty of the method at a specified value

4 Principle

4.1 General

This document describes a method for the determination of the mass concentration of hydrogen chloride (HCl) in ducts and stacks emitting to atmosphere by means of an automatic analyser using the infrared absorption principle. The specific components and requirements for the sampling system and the infrared analyser are described in Clause 6. A number of performance characteristics with associated minimum performance criteria and an expanded uncertainty of the method are given. Requirements and recommendations for quality assurance and quality control are given for measurements in the field (see Table 1 in 7.3).

4.2 Measuring principle

The HCl concentration is measured with an infrared absorption method. The attenuation of infrared light passing through a sample cell is a measure of the concentration of HCl in the cell, according to the Lambert- Beer law. Not only HCl but also most hetero-atomic molecules absorb infrared light, in particular water and CO_2 have broad bands that can interfere with the measurement of HCl. Different technical solutions have been developed to suppress cross-sensitivity, instability and drift in order to design automatic monitoring systems with acceptable properties. For instance: Gas Filter Correlation, Tunable Diode Laser (TDL) and Fourier Transform Infrared Spectroscopy (FTIR).

Special attention is paid to infrared light absorbing gases such as water vapour, carbon dioxide, nitrous oxide, nitrogen dioxide and also hydrocarbons for some special applications.