SLOVENSKI STANDARD
SIST EN 16429:2021

01-maj-2021

Nadomešča:
SIST-TS CEN/TS 16429:2013

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 effluents gazeux émis dans l'atmosphère par des installations industrielles

Ta slovenski standard je istoveten z: **EN 16429:2021**

ICS:

13.040.40	Emisije nepremičnih virov	Stationary source emissions

SIST EN 16429:2021 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16429

March 2021

ICS 13.040.40

Supersedes CEN/TS 16429:2013

English Version

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

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

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

This European Standard was approved by CEN on 1 February 2021.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 16429:2021 E

Contents

Page

European foreword

This document (EN 16429:2021) 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 September 2021, and conflicting national standards shall be withdrawn at the latest by September 2021.

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.

This document supersedes CEN/TS 16429:2013.

List of significant technical changes compared to CEN/TS 16429:2013:

— Clause 6 "Analyser equipment": The description of the analyser equipment has been replaced by the reference to performance criteria given in EN 15267-4.

— The informative Annex "Examples of schematics of non-dispersive infrared spectrometer" was deleted.

— The informative Annex "Validation of the method in the field" was added. EN 16429 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/m3 to 61 mg/m3. The characteristics of installations, the conditions during field tests and the values of repeatability and reproducibility in the field are given in Annex C.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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.

The infrared measurement method described in 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, and the criteria associated to performance characteristics described in EN 15267-4 for portable automated measuring systems (P-AMS), are fulfilled.

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.

EN 14793, *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 15267-3:2007, *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 15267-4:2017, *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)*

CEN/TS 17337, *Stationary source emissions — Determination of mass concentration of multiple gaseous species — Fourier transform infrared spectroscopy*

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

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 https://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: JCGM 200:2012]

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 a specified period (e.g. 10 min, 30 min, one hour, one day…)

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

EXAMPLES

— ambient temperature;

— atmospheric pressure;

— presence of interfering gases in the flue gas matrix;

— pressure of the gas sample.

[SOURCE: JCGM 200:2012, examples have been adapted]

3.9
interference
negative or positive effect that a substance has upon the output of the P-AMS, when that substance is not the measured component

[SOURCE: EN 15267-4:2017]

3.10
cross-sensitivity
response of the P-AMS to interferents

Note 1 to entry: See interference.

[SOURCE: EN 15267-4:2017]

3.11
lack of fit
systematic deviation, within the measurement range, between the accepted value of a reference material applied to the measuring system and the corresponding result of measurement produced by the calibrated measuring system

Note 1 to entry: In common language lack of fit is often called “linearity” or “deviation from linearity”. Lack of fit test is often called “linearity test”.

[SOURCE: EN 15267-4:2017]

3.12
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]

3.13
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]

3.14
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]

3.15
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]

3.16
measuring system
set of one or more measuring instruments and often other devices, including any reagent and supply, assembled and adapted to give information used to generate measured quantity values within specified intervals for quantities of specified kinds

[SOURCE: JCGM 200:2012]

3.17
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 testing and compared to the applicable performance criteria.

[SOURCE: EN 15267-4:2017]

3.18
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: EN 15267-4:2017]

3.19
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]

3.20
repeatability

condition of measurement, out of a set of conditions that includes the same measurement procedure, same operators, same measuring system, same operating conditions and same location, and replicable measurements on the same or similar objects over a short period of time

3.21
repeatability in the field
closeness of the agreement between the results of simultaneous measurements of the same measurand carried out with two sets of equipment under the same conditions of measurement

Note 1 to entry: These conditions include:

— same measurement method;

— two sets of equipment, the performance of which fulfils the requirements of the measurement method, used under the same conditions;

— same location;

— implemented by the same laboratory;

— typically calculated on short periods of time in order to avoid the effect of changes of influence parameters (e.g. 30 min).

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 under field conditions is expressed as a value with a level of confidence of 95 %.

3.22
reproducibility in the field
closeness of the agreement between the results of simultaneous measurements of the same measurand carried out using several sets of equipment under the same conditions of measurement

Note 1 to entry: These conditions are called field reproducibility conditions and include:

— same measurement method;

— several sets of equipment, the performance of which are fulfilling the requirements of the measurement method, used under the same conditions;

— same location;

— implemented by several laboratories.

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

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

3.23
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

3.24
response time
t_{90}
time interval between the instant of a sudden change in the value of the input quantity to an AMS and the time as from which the value of the output quantity is reliably maintained above 90 % of the correct value of the input quantity

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

[SOURCE: EN 15267-3:2007]

3.25
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.

3.26
standard reference method
SRM
reference method prescribed by European or national legislation

[SOURCE: EN 15259:2007]

3.27
uncertainty
parameter associated with the result of a measurement, that characterises the dispersion of the values that could reasonably be attributed to the measurand

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

3.28
standard uncertainty
uncertainty of the result of a measurement expressed as a standard deviation *u*

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

3.29
combined standard uncertainty
standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities, equal to the positive square root of a sum of terms, the terms being the variances or covariances of these other quantities weighted according to how the measurement result varies with changes in these quantities

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

3.30
expanded uncertainty
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

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

Note 1 to entry: The interval about the result of measurement is established for a level of confidence of 95 %.

3.31
uncertainty budget
statement of a measurement uncertainty, of the components of that measurement uncertainty, and of their calculation and combination

[SOURCE: JCGM 200:2012; Note 1 added]

Note 1 to entry: Calculation table combining all the sources of uncertainty according to EN ISO 14956 or ISO/IEC Guide 98-3:2008.

4 Principle

4.1 General

This document specifies 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 5 and 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).