SLOVENSKI STANDARD
SIST-TS CEN/TS 17340:2020

01-december-2020

Emisije nepremičnih virov - Določevanje masne koncentracije fluoriranih spojin, izraženih kot fluorovodikova kislina (HF) - Standardna referenčna metoda

Stationary source emissions - Determination of mass concentration of fluorinated compounds expressed as HF - Standard reference method

Emissionen aus stationären Quellen - Bestimmung des Massenkonzentration von gasförmigen Fluoriden, angegeben als HF - Standardreferenzverfahren

Emissions de sources fixes - Détermination de la concentration massique en composés fluorés exprimée en HF - Méthode de référence

Ta slovenski standard je istoveten z: **CEN/TS 17340:2020**

ICS:

13.040.40	Emisije nepremičnih virov	Stationary source emissions

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TECHNICAL SPECIFICATION

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TECHNISCHE SPEZIFIKATION

CEN/TS 17340

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ICS 13.040.40

English Version

Stationary source emissions - Determination of mass concentration of fluorinated compounds expressed as HF - Standard reference method

Émissions de sources fixes - Détermination de la concentration massique en composés fluorés, exprimée en HF - Méthode de référence normalisée

Emissionen aus stationären Quellen - Bestimmung der Massenkonzentration fluorierter Verbindungen, angegeben als HF - Standardreferenzverfahren

This Technical Specification (CEN/TS) was approved by CEN on 17 August 2020 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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

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European foreword

This document (CEN/TS 17340:2020) has been prepared by Technical Committee CEN/TC 264 “Stationary source emissions”, 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 shall not be held responsible for identifying any or all such patent rights.

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1 Scope

This document specifies a manual method for the determination of the concentration of fluorinated compounds expressed in HF. Two cases are presented:

— first case: the measurand is the concentration of gaseous and bound to particulates fluorides;

— second case: the measurand is the concentration of gaseous fluorides.

Three analytical techniques are proposed: ionometry, spectrophotometry and ion-exchange chromatography.

This document specifies the performance characteristics to be determined and the performance criteria to be fulfilled when it is used as the Standard Reference Method (SRM) for periodic monitoring and for calibration or control of Automated Measuring Systems (AMS) permanently installed on a stack, for regulatory or other purposes.

This document applies to fluoride concentrations which may vary between 0,1 mg HF/m^3 and 10 mg HF/m^3, at standard conditions of pressure and temperature (see NOTE). The limit of quantification of the method is estimated at 0,1 mg/m^3 for a sampled volume of 0,1 m^3.

Interference may occur for some matrices. Known elements that may lead to interference are mentioned in Annex C.

NOTE The Emission Limit Values (ELV) for HF are expressed in mg/m^3, for dry gases at the standard conditions (T_{std} = 273 K and P_{std} = 101,3 kPa).

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 13284-1, *Stationary source emissions - Determination of low range mass concentration of dust - Part 1: Manual gravimetric 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 ISO 10304-1, *Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (ISO 10304-1)*

ISO/IEC Guide 98-3, *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:

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

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

3.1
absorber
device in which the compound to be trapped is absorbed into the absorption solution

3.2
absorption efficiency
ε
ratio in % of quantity of the collected analyte q_1 (for two absorbers) or $q_1 + q_2$ (for three absorbers) divided by the quantity of the analyte collected in the series of absorbers

— $\varepsilon = (q_1 / (q_1 + q_2)) \times 100$ % for 2 absorbers;

— or $\varepsilon = ((q_1 + q_2)/ (q_1 + q_2 + q_3)) \times 100$ %, in the case of 3 absorbers.

3.3
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]

3.4
analytical 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 instrument, 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. In this document, repeatability is expressed as a repeatability standard deviation with a level of confidence of 95 %.

3.5
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]

3.6
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 systems (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: In case of manual methods the applicable reference can be reference materials used as calibration standards to establish the relationship between the output signal of the analytical device and the reference values.

Note 3 to entry: Calibration should not be confused with adjustment of a measuring system.

3.7
emission limit value
ELV
emission limit value according to regulations on the basis of 30 min, 1 hour or 1 day

3.8
field blank procedure
procedure used to ensure that no significant contamination has occurred during all the steps of the measurement

Note 1 to entry: This includes for instance the equipment preparation in laboratory, its transport and installation in the field as well as the subsequent analytical work in the laboratory.

[SOURCE: EN 13284-1:2017]

3.9
field blank value
value determined by a specific procedure used to ensure that no significant contamination has occurred during all the measurement steps and to verify that the operator can reach a level of quantification suitable for the measurement

3.10
fluorinated compounds

— particulate: particle-bound fluorides present on the filter and analysed according to one of the methods described in Annex C

— gaseous: fluorinated compounds not retained by the filter and trapped in the absorbers

— Total: sum of gaseous and bound to particulates fluorides

3.11
limit of detection
L_D
concentration value of the measurand below which there is at least 95 % level of confidence that the measured value corresponds to a sample free of that measurand

3.12
limit of quantification
L_Q
lowest amount of an analyte that is quantifiable with a given confidence level

Note 1 to entry: For a manual method the limit of quantification is usually calculated as ten times the standard deviation of field blank measurements. If the blank is not negligible then the L_Q is added to ten times the standard deviation. This corresponds to a confidence level of 95 %.

3.13
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]

3.14
measurement line
line in the measurement plane along which the measurement points are located, bounded by the inner duct wall

[SOURCE: EN 15259:2007]

3.15
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]

3.16
measurement point
specific position on a measurement plane at which a sample is extracted

3.17
measurement port
opening in the waste gas duct along the measurement line, through which access to the waste gas is gained

Note 1 to entry: Measurement port is also known as sampling port or access port.

[SOURCE: EN 15259:2007]

3.18
measurement series
several successive measurements carried out on the same measurement plane and at the same process operating conditions

[SOURCE: EN 13284-1]

3.19
measurement site
place on the waste gas duct in the area of the measurement plane(s) consisting of structures and technical equipment, for example working platforms, measurement ports, energy supply

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

[SOURCE: EN 15259:2007]

3.20
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]

3.21
performance characteristic
one of the quantities (described by values, tolerances, range) assigned to equipment in order to define its performance

3.22
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]

3.23
repeatability of the measurement method in the field
closeness of the agreement between the results of simultaneous measurements of the same measurand carried out with two sets of equipment meeting the performance criteria set out in the document under the same conditions of measurement

Note 1 to entry: These conditions include:

— the same measurement procedure;

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

— the 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.

3.24
reproducibility of the measurement method in the field

closeness of the agreement between the results of simultaneous measurements of the same measurand, carried out with several sets of equipment under the same conditions of measurement

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

— the same measurement procedure;

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

— the same location;

— measurements carried out by several laboratories.

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

3.25
standard reference method
SRM
reference method prescribed by European or national legislation

3.26
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]

3.27
standard uncertainty
u
uncertainty of the result of a measurement expressed as a standard deviation

3.28
combined uncertainty
u_C
standard uncertainty attached to the measurement result calculated by combination of several standard uncertainties according to the principles laid down in ISO/IEC Guide 98-3 (GUM)

3.29
expanded uncertainty
U
quantity defining a level of confidence about the result of a measurement that may be expected to encompass a specific fraction of the distribution of values that could reasonably be attributed to a measurand

$$U = k \times u$$

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

Note 2 to entry: The expression overall uncertainty is sometimes used to express the expanded uncertainty.

4 Symbols and abbreviations

4.1 Symbols

C_m	mass concentration of hydrofluoric acid in the gas sample, in milligrams per cubic metre (of gas)
lC_r	repeatability confidence interval, in milligrams per cubic metre
lC_R	reproducibility confidence interval, in milligrams per cubic metre
L_Q	limit of quantification, in milligrams per litre of F
m_s	weight of the sample solution (absorption solution used for sampling + rinsing solution), in grams

P_m pressure at the gas volume meter, in kilopascals

P_{std} standard pressure (101,3 kPa)

$P_{sat\ (Tm)}$ saturation vapour pressure of water at gas volume meter temperature, in kilopascals

q_s mass concentration of fluoride in sample absorption solution, in milligrams per litre (of solution)

q_{cb} mass concentration of fluoride in chemical blank solution, in milligrams per litre (of solution)

r repeatability, in milligrams per cubic metre or percentage

R reproducibility, in milligrams per cubic metre or percentage

R_s volume of titration solution used for titration of sample absorption solution, in millilitres

S_{cb} volume of titration solution used for titration of chemical blank solution, in millilitres

S_r repeatability standard deviation, in milligrams per cubic metre or percentage

S_R reproducibility standard deviation, in milligrams per cubic metre or percentage

S_s volume of titration solution used for the titration of the aliquot of the pre-treated sample solution, in millilitres

t_1 retention time of the first peak, in seconds

t_2 retention time of the second peak, in seconds

T_j temperature at the gas meter, in Kelvin

T_m mean temperature at the gas volume meter, in Kelvin

T_{std} standard temperature (273 K)

V_1 reading at the gas volume meter at the beginning of the sampling period, in cubic metres

V_2 reading of gas volume meter, at the end of the sampling period, in cubic metres

$V_{m\ (std)}$ dry gas volume measured, corrected to standard conditions, in cubic metres

V_s volume of the sample solution (absorption solution used for sampling + rinsing solution), in litres

w_1 peak width on the time axis, of the first peak, in seconds

w_2 peak width on the time axis, of the second peak, in seconds

ε absorption efficiency, in percentage

σ conductivity, in micro-siemens per metre

ρ_{20}^{4} density of a liquid at 20 °C compared to that of water at 4 °C, in kilograms per litre volume content, in percentage