SIST

SLOVENSKI STANDARD
SIST EN ISO 21877:2019

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Emisije nepremičnih virov - Določevanje masne koncentracije amoniaka - Ročna metoda (ISO 21877:2019)

Stationary source emissions - Determination of the mass concentration of ammonia - Manual method (ISO 21877:2019)

Emissionen aus stationären Quellen - Ermittlung der Massenkonzentration von Ammoniak - Manuelles Verfahren (ISO 21877:2019)

Émissions de sources fixes - Détermination de la concentration en masse de l'ammoniac dans les gaz de combustion - Méthode manuelle (ISO 21877:2019)

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Stationary source emissions - Determination of the mass concentration of ammonia - Manual method (ISO 21877:2019)

Émissions de sources fixes - Détermination de la concentration en masse de l'ammoniac dans les gaz de combustion - Méthode manuelle (ISO 21877:2019)

Emissionen aus stationären Quellen - Ermittlung der Massenkonzentration von Ammoniak - Manuelles Verfahren (ISO 21877:2019)

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN ISO 21877:2019) has been prepared by Technical Committee ISO/TC 146 "Air quality" in collaboration with 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of an identical text or by endorsement, at the latest by April 2020, and conflicting national standards shall be withdrawn at the latest by April 2020.

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The text of ISO 21877:2019 has been approved by CEN as EN ISO 21877:2019 without any modification.

INTERNATIONAL STANDARD

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Stationary source emissions — Determination of the mass concentration of ammonia — Manual method

Émissions de sources fixes — Détermination de la concentration en masse de l'ammoniac — Méthode manuelle

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 1, *Stationary source emissions*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Ammonia emissions arise to a large extent from agriculture. Industries such as chemical production processes (e.g. fertilizer production plants) emit ammonia as well as power plants, cement factories and waste incineration plants with SCR and non-SCR reactors with ammonia slip. The ammonia emissions are measured and often controlled by legislation.

This document specifies an independent method of measurement for intermittent monitoring of ammonia emissions as well as for the calibration and validation of automated ammonia measuring systems.

This document can be used in conjunction with ISO 17179 which specifies performance characteristics of automated measuring systems (AMS) for the determination of the mass concentration of ammonia in waste gas. According to ISO 17179, permanently installed AMS for continuous monitoring of ammonia emissions are calibrated and validated by comparison with an independent method of measurement. The uncertainty of measured values obtained by permanently installed AMS for continuous monitoring are determined by comparison measurements with an independent method of measurement as part of the calibration and validation of the AMS. This ensures that the measurement uncertainty is representative of the emission at a specific plant.

Stationary source emissions — Determination of the mass concentration of ammonia — Manual method

1 Scope

This document specifies a manual method of measurement including sampling and different analytical methods for the determination of the mass concentration of ammonia (NH_3) in the waste gas of industrial plants, for example combustion plants or agricultural plants. All compounds which are volatile at the sampling temperature and produce ammonium ions upon dissociation during sampling in the absorption solution are measured by this method, which gives the volatile ammonia content of the waste gas.

This document specifies an independent method of measurement, which has been validated in field tests in a NH_3 concentration range of approximately 8 mg/m^3 to 65 mg/m^3 at standard conditions. The lower limit of the validation range was determined under operational conditions of a test plant. The measurement method can be used at lower values depending, for example, on the sampling duration, sampling volume and the limit of detection of the analytical method used.

NOTE 1 The plant, the conditions during field tests and the performance characteristics obtained in the field are given in Annex A.

This method of measurement can be used for intermittent monitoring of ammonia emissions as well as for the calibration and validation of permanently installed automated ammonia measuring systems.

NOTE 2 An independent method of measurement is called standard reference method (SRM) in EN 14181.

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.

ISO 7150-1, *Water quality — Determination of ammonium — Part 1: Manual spectrometric method*

ISO 11732, *Water quality — Determination of ammonium nitrogen — Method by flow analysis (CFA and FIA) and spectrometric detection*

ISO 14911, *Water quality — Determination of dissolved* Li^+, Na^+, NH_4^+, K^+, Mn^{2+}, Ca^{2+}, Mg^{2+}, Sr^{2+} *and* Ba^{2+} *using ion chromatography — Method for water and waste water*

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:

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

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

3.1
mass concentration
mass of a substance in an emitted waste gas divided by the volume of the emitted waste gas

Note 1 to entry: Mass concentration is often expressed as milligrams per cubic metre (mg/m^3).

3.2
measurement site
place on the waste gas duct in the area of the *measurement plane(s)* (3.3) consisting of structures and technical equipment, for example working platforms, *measurement ports* (3.4), energy supply

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

3.3
measurement plane
plane normal to the centre line of the duct at the sampling position

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

3.4
measurement port
opening in the waste gas duct along the *measurement line* (3.5), through which access to the waste gas is gained

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

3.5
measurement line
line in the *measurement plane* (3.3) along which the *measurement points* (3.6) are located, bounded by the inner duct wall

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

3.6
measurement point
position in the *measurement plane* (3.3) 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.

3.7
isokinetic sampling
sampling at a rate such that the velocity and direction of the gas entering the sampling nozzle is the same as that of the gas in the duct at the *measurement point* (3.6)

3.8
field blank
test sample obtained according to the field blank procedure

3.9
field blank value
result of a measurement performed according to the field blank procedure at the plant site and in the laboratory

3.10
uncertainty of measurement
parameter associated with the result of a measurement, that characterises the dispersion of the values that could reasonably be attributed to the measurand

3.11
standard uncertainty
u
uncertainty of the result of a measurement expressed as a standard deviation

3.12
combined uncertainty
u_c
standard uncertainty (3.11) 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)

3.13
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

$$U = k \times u_c$$

Note 1 to entry: The value of the coverage factor *k* depends on the number of degrees of freedom and the level of confidence. In this document a level of confidence of 95 % is used.

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

3.14
uncertainty budget
calculation table combining all the sources of uncertainty according to ISO 14956 or ISO/IEC Guide 98-3 in order to calculate the combined uncertainty of the method at a specified value

4 Symbols and abbreviated terms

For the purposes of this document, the following symbols apply.

a	intercept of the calibration function
A	peak area
b	slope of the calibration function
c	second order slope of the calibration function
c_m	NH_3 mass concentration at standard conditions
c_{corr}	NH_3 mass concentration corrected to oxygen reference volume concentration
c_{dry}	mass concentration expressed on dry basis
c_{wet}	mass concentration expressed on wet basis
E_λ	absorbance at wavelength λ
f	instrument specific factor for converting the result determined for NH_4^+ into a result for NH_3 and the unit mg/ml
f_N	factor for converting NH_4^+ to NH_3 (f_N = 0,944)