PAIKSETE HEITEALLIKATE HEITED
Lämmastikoksiidide massikontsentratsiooni määramine suitsugaasides
Automaatmõõtesüsteemi suutlikkusnäitajad

Stationary source emissions
Determination of the mass concentration of nitrogen oxides in flue gas
Performance characteristics of automated measuring systems
(ISO 10849:2022, identical)

EESTI STANDARDIMIS- JA AKREDITEERIMISKESKUS
ESTONIAN CENTRE FOR STANDARDISATION AND ACCREDITATION

EESTI STANDARDI EESSÕNA	NATIONAL FOREWORD
See Eesti standard EVS-ISO 10849:2023 sisaldab rahvusvahelise standardi ISO 10849:2022 „Stationary source emissions. Determination of the mass concentration of nitrogen oxides in flue gas. Performance characteristics of automated measuring systems“ identset ingliskeelset teksti.	This Estonian Standard EVS-ISO 10849:2023 consists of the identical English text of the International Standard ISO 10849:2022 „Stationary source emissions. Determination of the mass concentration of nitrogen oxides in flue gas. Performance characteristics of automated measuring systems“.
Ettepaneku rahvusvahelise standardi ümbertrüki meetodil ülevõtuks on esitanud EVS/TK 28, standardi avaldamist on korraldanud Eesti Standardimis- ja Akrediteerimiskeskus.	Proposal to adopt the International Standard by reprint method has been presented by EVS/TK 28, the Estonian Standard has been published by the Estonian Centre for Standardisation and Accreditation.
Standard EVS-ISO 10849:2023 on jõustunud sellekohase teate avaldamisega EVS Teatajas.	Standard EVS-ISO 10849:2023 has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.	This standard is available from the Estonian Centre for Standardisation and Accreditation.

Käsitlusala

See dokument täpsustab lämmastikoksiidide (NO_x) määramise meetodi paiksete heiteallikate suitsugaasides ning kirjeldab automaatmõõtesüsteemi põhikonstruktsiooni ja peamisi suutlikkusnäitajaid.

Meetod võimaldab NO_x suitsugaaside kontsentratsiooni pidevat seiret püsivalt paigaldatud mõõtesüsteemidega.

See dokument kirjeldab gaasi väljavõtuga (ekstraktiivse) ja mitteekstraktiivse (saasteallikasiseste (*in situ*)) süsteeme erinevate analüsaatoritega, mille töö põhineb näiteks järgmistel meetoditel:

— kemoluminestsents (*chemiluminescence*, CL);

— dispersioonita infrapunaspektroskoopia (*infrared absorption*, NDIR);

— Fourier'i teisendusega infrapuna (*Fourier transform infrared*, FTIR) spektroskoopia;

— dispersioonita ultraviolettspektroskoopia (*ultraviolet absorption*, NDUV);

— diferentsiaalne optiline absorptsioonspektromeetria (*differential optical absorption spectroscopy*, DOAS).

Kasutada võib ka muid samaväärseid mõõtemeetodeid, näiteks laserspektroskoopilisi tehnikaid, eeldusel, et need vastavad selles dokumendis sätestatud suutlikkuse miinimumnõuetele. Mõõtesüsteemi saab valideerida võrdlusmaterjalidega selle dokumendi kohaselt või võrreldavate meetoditega.

Eespool loetletud meetoditel põhinevat automaatmõõtesüsteemi (*automated measuring system*, AMS) on edukalt kasutatud selles rakenduses mõõtevahemike jaoks, nagu on näidatud lisas F.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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*.

This second edition cancels and replaces the first edition (ISO 10849:1996), which has been technically revised.

The main changes are as follows:

— the structure and the components have been updated to be similar to the latest editions of e.g. ISO 12039 (measurement of CO, CO_2 and O_2), ISO 17179 (measurement of NH_3), ISO 13199 (measurement of total VOC), ISO 25140 (measurement of CH_4), ISO 21258 (measurement of N_2O);

— Clause 3 has been updated (addition or deletion and change in terms and definitions);

— a new analytical technique has been added (Fourier transform infrared spectroscopy) for measurement of NO and NO_2 or NO_x;

— the performance characteristics and criteria as well as QA/QC procedures have been changed to harmonize with latest ISO standards;

— examples of performance test results and the results of uncertainty calculation have been added for NO and NO_2 or NO_x measurement.

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

Nitrogen oxides are produced during most combustion processes. In fossil fuel combustion, nitrogen oxides are produced from nitrogen contained in the fuel and from the oxidation of nitrogen in the air used for combustion. The quantity of nitrogen oxides produced depends upon the nitrogen content of the fuel, the combustor design, and the combustor operating conditions.

In flue gases from conventional boiler combustion systems, the nitrogen oxides consist of approximately 95 % nitrogen monoxide (NO). The remaining oxide is predominantly nitrogen dioxide (NO_2) formed from the oxidation of NO when the flue gas temperature decreases. These two oxides (NO + NO_2) are generally designated as NO_x. It should be noted that in other processes the ratio of NO to NO_2, may be different and other nitrogen oxides may be present.

There are numerous ways of determining nitrogen oxides in the gases of combustion plants, both wet chemical/analytical methods and instrumental techniques.

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Stationary source emissions — Determination of the mass concentration of nitrogen oxides in flue gas — Performance characteristics of automated measuring systems

1 Scope

This document specifies a method for the determination of nitrogen oxides (NO_x) in flue gas of stationary sources and describes the fundamental structure and the key performance characteristics of automated measuring systems.

The method allows continuous monitoring with permanently installed measuring systems of NO_x emissions.

This document describes extractive systems and in situ (non-extractive) systems in connection with a range of analysers that operate using, for example, the following principles:

— chemiluminescence (CL);

— infrared absorption (NDIR);

— Fourier transform infrared (FTIR) spectroscopy;

— ultraviolet absorption (NDUV);

— differential optical absorption spectroscopy (DOAS);

Other equivalent instrumental methods such as laser spectroscopic techniques can be used provided they meet the minimum performance requirements specified in this document. The measuring system can be validated with reference materials, in accordance with this document, or comparable methods.

Automated measuring system (AMS) based on the principles listed above has been used successfully in this application for the measuring ranges as shown in Annex F.

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 9169, *Air quality — Definition and determination of performance characteristics of an automatic measuring system*

ISO 14956, *Air quality — Evaluation of the suitability of a measurement procedure by comparison with a required measurement uncertainty*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

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

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