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Stationary source emissions – Determination of the mass concentration of dinitrogen monoxide (N₂O) – Reference method: Non-dispersive infrared method (ISO 21258:2010)

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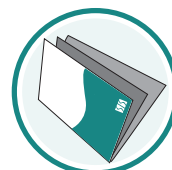
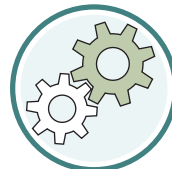
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 21258

June 2010

ICS 13.040.40

English Version

Stationary source emissions - Determination of the mass concentration of dinitrogen monoxide (N₂O) - Reference method: Non-dispersive infrared method (ISO 21258:2010)

Émissions de sources fixes - Détermination de la concentration massique de protoxyde d'azote (N₂O) - Méthode de référence: Méthode infrarouge non dispersive (ISO 21258:2010)

Emissionen aus stationären Quellen - Bestimmung der Massenkonzentration von Distickstoffmonoxid (N₂O) - Referenzverfahren: Nicht-dispersives Infrarot-Verfahren (ISO 21258:2010)

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN ISO 21258:2010) 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of an identical text or by endorsement, at the latest by December 2010, and conflicting national standards shall be withdrawn at the latest by December 2010.

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Introduction

Dinitrogen monoxide (N_2O , also known as nitrous oxide) is an important greenhouse gas with a global warming potential 310 times that of carbon dioxide (CO_2). N_2O is of both natural and anthropogenic origin. Increased emissions of N_2O have been observed, for example, in the exhaust gas of combustion processes using nitrogenous fuels at temperatures below 900 °C, and in the reduction of NO_x using the selective non-catalytic reduction (SNCR) process, in particular when urea is used. There is considerable uncertainty over current N_2O emissions, which is reflected in the wide range of emission factors cited. The largest uncertainties are for emissions from natural and agricultural sources, which are difficult to measure accurately. In the past, emissions from stationary sources such as coal-fired plants and industry were overestimated due to a serious artefact in the grab-sampling methodology used to measure emissions. N_2O is involved in the EU emission trading scheme along with CO_2 and methane (CH_4).

Improved measurement techniques are helping to reduce uncertainties in emission estimates. Improved measurement techniques are also a prerequisite for accurate information on N_2O and its potential role in the enhanced greenhouse effect.

Stationary source emissions — Determination of the mass concentration of dinitrogen monoxide (N₂O) — Reference method: Non-dispersive infrared method

1 Scope

This International Standard specifies a method for sampling, sample conditioning and determination of dinitrogen monoxide (N₂O) content in the flue gas emitted from ducts and stacks to atmosphere. It sets out the non-dispersive infrared (NDIR) analytical technique, including the sampling system and sample gas conditioning system.

This International Standard is a reference method for periodic monitoring and for calibration, adjustment or control of automatic monitoring systems permanently installed on a stack.

This reference method has been successfully tested on a sewage sludge incinerator where the N₂O concentration in the flue gas was up to about 200 mg/m³.

2 Normative references

The following referenced documents are indispensable for the application 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 9169:2006, *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*

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.

3.1

influence quantity

quantity that is not the measurand but that affects the result of the measurement

[ISO/IEC Guide 98-3:2008, B.2.10]

3.2

interference

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

3.3

interferent interfering substance

substance present in the air mass under investigation, other than the measurand, that affects the response

[ISO 9169:2006, 2.1.12]

3.4

lack of fit

systematic deviation within the range of application between the measurement results obtained by applying the calibration function to the observed response of the measuring system measuring reference materials and the corresponding accepted value of such reference materials

NOTE 1 Lack of fit may be a function of the measurement result.

[ISO 9169:2006, 2.2.9]

NOTE 2 The expression “lack of fit” is often replaced in everyday language for linear relations by “linearity” or “deviation from linearity”.

3.5

measurand

particular quantity subject to measurement

[ISO/IEC Guide 98-3:2008, B.2.9]

3.6

performance characteristic

one of the quantities assigned to equipment in order to define its performance

NOTE Performance characteristics can be described by values, tolerances, or ranges.

3.7

reference gas

gaseous mixture of stable composition used to calibrate the reference measuring system and which is traceable to national or international standards

3.8

reference method

measurement method taken as a reference by convention, which gives the accepted reference value of the measurand

3.9

repeatability in the laboratory

precision under repeatability conditions in the laboratory

NOTE 1 Repeatability can be expressed quantitatively in terms of the dispersion characteristics of the results. In this International Standard, the repeatability is expressed as a value with a level of confidence of 95 %.

NOTE 2 Adapted from ISO 3534-2:2006^[1], 3.3.5.

3.10

repeatability conditions in the laboratory

observation conditions where independent test results are obtained with the same method on identical test items in the same test or measuring facility by the same operator using the same equipment within short intervals of time in the laboratory

NOTE 1 Repeatability conditions in the laboratory include:

— the same measurement procedure at the same laboratory;

- the same operator;
- the same measuring instrument used under the same conditions;
- the same location;
- repetition over a short period of time.

NOTE 2 Adapted from ISO 3534-2:2006^[1], 3.3.6.

3.11

repeatability in the field

precision under repeatability conditions in the field

NOTE 1 Repeatability can be expressed quantitatively in terms of the dispersion characteristics of the results. In this International Standard the repeatability under field conditions is expressed as a value with a level of confidence of 95 %.

NOTE 2 Adapted from ISO 3534-2:2006^[1], 3.3.5.

3.12

repeatability conditions in the field

observation conditions where independent test results are obtained with the same method on identical test items in the same test or measuring facility by the same operator using the same equipment within short intervals of time in the field

NOTE 1 Repeatability conditions in the field 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.

NOTE 2 Adapted from ISO 3534-2:2006^[1], 3.3.6.

3.13

reproducibility in the field

precision under reproducibility conditions in the field

NOTE 1 Reproducibility in the field can be expressed quantitatively in terms of the dispersion characteristics of the results. In this International Standard the reproducibility under field conditions is expressed as a value with a level of confidence of 95 %.

NOTE 2 Adapted from ISO 3534-2:2006^[1], 3.3.10.

NOTE 3 Results are usually understood to be corrected results.

3.14

reproducibility conditions in the field

observation conditions where independent test results are obtained with the same method on identical test items in different test or measurement facilities with different operators using different equipment in the field

NOTE 1 Reproducibility conditions in the field include:

- the same measurement procedure;