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Utsläpp och utomhusluft – Bestämning av masskoncentrationen av totalt gasformigt organiskt kol – Kontinuerlig analys med flamjonisationsdetektor

Stationary source emissions – Determination of the mass concentration of total gaseous organic carbon – Continuous flame ionisation detector method

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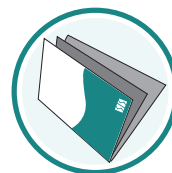
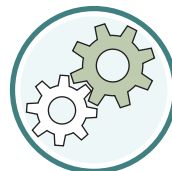
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Denna standard ersätter SS-EN 12619, utgåva 1 och SS-EN 13526, utgåva 1.

The European Standard EN 12619:2013 has the status of a Swedish Standard. This document contains the official version of EN 12619:2013.

This standard supersedes the Swedish Standard SS-EN 12619, edition 1 and SS-EN 13526, edition 1.

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EUROPEAN STANDARD

EN 12619

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2013

ICS 13.040.40

Supersedes EN 12619:1999, EN 13526:2001

English Version

Stationary source emissions - Determination of the mass concentration of total gaseous organic carbon - Continuous flame ionisation detector method

Emissions de sources fixes - Détermination de la concentration massique en carbone organique total - Méthode du détecteur continu à ionisation de flamme

Emissionen aus stationären Quellen - Bestimmung der Massenkonzentration des gesamten gasförmigen organisch gebundenen Kohlenstoffs - Kontinuierliches Verfahren mit dem Flammenionisationsdetektor

This European Standard was approved by CEN on 24 November 2012.

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.

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

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Foreword

This document (EN 12619:2013) 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 July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12619:1999 and EN 13526:2001.

The list of the most significant technical changes that have been made in this new edition is to be found in Annex E.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

SS-EN 12619:2013 (E)

1 Scope

This European Standard specifies a flame ionisation detector (FID) method. It is intended for use as a standard reference method for the measurement of the mass concentration of gaseous and vaporous organic substances (expressed as TVOC) in stationary source emissions (e.g. emissions from waste incinerators and solvent using processes, emission measurements according to 2010/75/EU) in the concentration range up to 1 000 mg/m³.

This European Standard specifies the requirements for an instrument using flame ionisation detection, together with procedures for its operation. The results obtained using this standard are expressed in milligrams per cubic metre (mg/m³) as total carbon (TVOC).

This European Standard is not applicable for permanently installed automated measuring systems (AMS).

Alternative methods to this method may be used provided that the user can demonstrate equivalence, based on the principles of CEN/TS 14793.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15259, *Air quality — Measurement of stationary source emissions — Requirements for measurement sections and sites and for the measurement objective, plan and report*

EN 15267-1, *Air quality — Certification of automated measuring systems — Part 1: General principles*

EN 15267-2, *Air quality — Certification of automated measuring systems — Part 2: Initial assessment of the AMS manufacturer's quality management system and post certification surveillance for the manufacturing process*

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

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

3 Terms and definitions

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

3.1

combustion air

air supply used for the combustion of fuel gas in an instrument using flame ionisation detection

3.2

detection limit

minimum concentration of a substance which produces an observable response, which is two times the standard deviation at zero

3.3

dilution gas

gas used to dilute sampled flue gas to prevent water condensation

3.4

flame ionisation detector (FID)

instrument using flame ionisation detection

3.5

flue gas

product from a combustion, incineration or solvent process containing gaseous and/or particulate compounds

3.6

fuel gas

gas of known composition used to maintain the flame of the FID

3.7

mass concentration of gaseous total organic carbon

quotient of the mass of total organic carbon to the volume of the dry gas under specified reference conditions of temperature and pressure, normally expressed in milligrams per cubic metre (mg/m^3) as total carbon

3.8

residence time

time period for the sampled gas to be transported from the inlet of the probe to the inlet of the measurement cell

3.9

response factor

dimensionless quotient of the response of the FID with any carbon based compound or compounds to its response to propane, in each case referred to the number of carbon atoms of the molecule

3.10

response time

time which elapses between the moment when a change is produced and the moment when the instrument response reaches a value of 90 % of the final change in instrument response as a consequence of a stepwise change in the total organic carbon concentration

3.11

span gas

test gas used to check and adjust a specific point on a calibration curve

3.12

total volatile organic carbon (TVOC)

total volatile organic compounds which are measured by the FID, expressed in milligrams per cubic metre (mg/m^3) as total carbon

3.13

zero gas

test gas used to check and adjust the zero point on a calibration curve

3.14

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: ENV 13005]

4 The principle of the technique

4.1 Flame ionisation detector (FID)

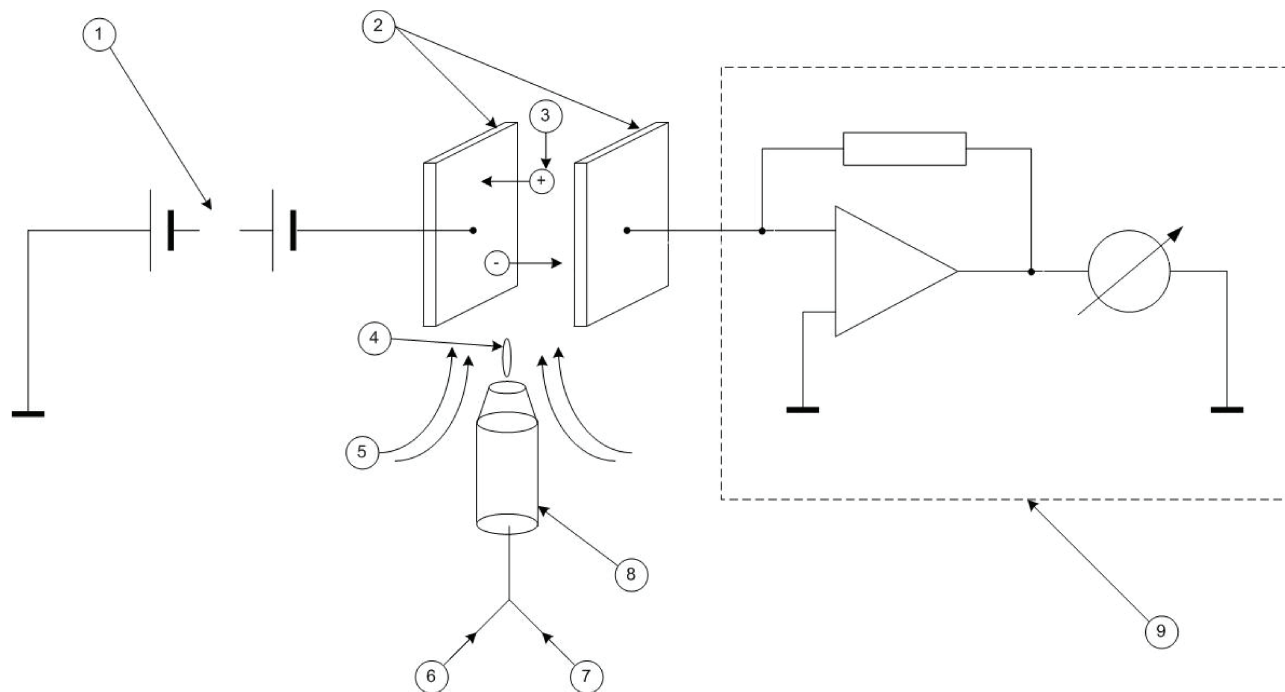
The measurement technique utilised by the flame ionisation detector (FID) is the ionisation of organically bound carbon atoms in a hydrogen flame. The ionisation current measured by the FID depends on the number of C-atoms of organic compounds burning in the fuel gas flame, the form of bonding (straight chain or branched chain) and of bonding partners.

The response factor is a function of the specific design of the detector and the adjusted operating conditions. The advantage of the FID is that it responds to organic carbon compounds and has negligible response to inorganic flue gas compounds (such as CO, CO₂, NO, H₂O).

A number of different instrument configurations exist. Figure 1 is an example of the principle whereby in the detector a sample gas is fed into a hydrogen flame across which a DC electrical potential is placed. The introduction of the sampled gas causes a specific ionisation current to flow, which is measured using suitable equipment. Defined test gases are required to determine the response factors. These can be produced by a number of methods including: static methods (with gas collectors or direct injection) or dynamic methods (e.g. vapour pressure method or certified test gases from compressed gas bottles).

The span of the instrument shall be adjusted with propane (C₃H₈) for which the response factor, defined in this standard, has been set at 1,00. The final value will be expressed as TVOC in milligrams per cubic metre.

Refer to Annex B for more information on the use and effects of an FID instrument.



Key

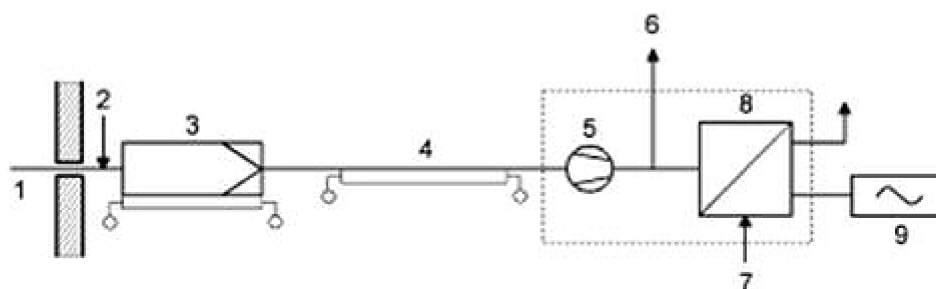
- | | |
|------------------------|-------------------------|
| 1 polarisation voltage | 6 fuel gas |
| 2 electrodes | 7 sample gas |
| 3 ions | 8 jet |
| 4 flame | 9 amplifier and readout |
| 5 combustion air | |

Figure 1 — Principle of FID

4.2 Sampling and sampling device

Sampling is the process of extracting from the flue gas a partial volume flow which is representative of the composition of the main gas stream.

A partial flow of the flue gas is directly fed into the FID analyser via the sampling probe, the particle filter and the heated sampling line. An example of the set-up of the measuring system is shown in Figure 2. The sampling device including the filter needed to remove fine particles, which could clog the burner, is heated to avoid sample condensation.



Key

1	sampling probe	6	bypass (optional)
2	zero and span gas inlet	7	test gas inlet for functional tests
3	particle filter, heated	8	FID
4	sampling line, heated	9	data evaluation system
5	external sample pump (optional), heated		

Figure 2 — Example of the set-up of the measuring system

5 Requirements for apparatus and gases

5.1 Requirements for the measurement system

The sampling system shall meet the following requirements:

- It shall be made of stainless steel, polytetrafluoroethylene or polypropylenefluoride. If an alternative material is used, it shall be proven that it is chemically and physically inert to the constituents of the flue gas under analysis.
- The design and configuration of the sampling device used shall ensure the residence time of the sample gas within the device is minimised in order to reduce the response time of the measuring system. It will be designed to ensure a sample residence time less than 60 s. With long sampling lines or high flow resistance, the use of an external pump with bypass is recommended.
- It shall be heated throughout to at least 180 °C.

NOTE Sampling lines in PTFE have a maximum temperature of 200 °C. All instruments that are certified are tested at 180 °C.

- It shall have a heated filtering device upstream of the sampling line to trap all particles liable to impair the operation of the apparatus.
- It shall have an inlet for applying zero and span gases at or close to the probe inlet of the sampling probe, upstream of the filter. This is to check the sampling system including the filter assembly.

The FID and sampling system shall comply with the performance requirements of EN 15267-3.