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Emisije nepremičnih virov - Merilne metode za ubežne emisije - Pregled standardov in drugih dokumentov

Stationary source emissions - Diffuse emissions measurement methods - Overview of standards and other documents

Emissionen aus stationären Quellen - Methoden zur Messung diffuser Emissionen - Übersicht über Normen und andere Dokumente

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TECHNICAL REPORT

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FprCEN/TR 18442

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ICS

English Version

Stationary source emissions - Diffuse emissions measurement methods - Overview of standards and other documents

Emissionen aus stationären Quellen - Methoden zur Messung diffuser Emissionen - Übersicht über Normen und andere Dokumente

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

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European foreword

This document (FprCEN/TR 18442:2026) has been prepared by Technical Committee CEN/TC 264, "Air quality", the secretariat of which is held by DIN.

This document is currently submitted to the Vote on TR.

1 Scope

This document provides an overview of existing standards and other documents at international level in the field of diffuse emissions. It provides information on the measurement and detection methods that can be used for the characterization of atmospheric diffuse emissions of gases and particulate matter, from industrial and intensive agriculture sources. It aims at:

— describing the existing standards and other documents in the field of diffuse emissions from stationary sources with their scope/field of application and

— identifying the gaps and needs in standardized methods.

All methods are based on concentration measurements of chemical species, with the exception of optical gas imaging, which is predominantly a visualization technique. The techniques and methods described in this document include measurements and measurements combined with modelling techniques.

The methods summarized in this document are grouped based on measuring at the source or in the plume downwind from the source.

2 Normative references

There are no normative references in this document.

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:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
emission
discharge of substances into the atmosphere

Note 1 to entry: This term comprises four types of *emission* (3.1) sources:
— Accounted channelled emissions (from monitored stacks)
— Unaccounted channelled emissions (from, e.g. vents, flares)
— Fugitive emissions (leaks from, e.g. valves, seals)
— Area emissions (from, e.g. water treatment basins, coke storage)

[SOURCE: EN 17628:2022, 3.10]

3.2
channelled emission
emission (3.1) of pollutants to air through an emission point such as a stack

3.3
diffuse emission
emission (3.1) to the atmosphere from an identified site or facility, not specifically directed to identified stack emission points

Note 1 to entry: This term comprises the sum of various unaccounted channelled emissions, fugitive emissions and area emissions.

Note 2 to entry: This term can include a combination of individual emission sources within an area of interest some of which can be channelled e.g. vents, fugitive and area sources. It usually excludes point sources such as emission stacks that are directly monitored.

[SOURCE: EN 17628: 2022, 3.12 modified - Addition of note 2]

3.4
fugitive emission
emission (3.1) to the atmosphere caused by loss of tightness of an item which is designed to be tight

[SOURCE: EN 15446:2008, 3.1]

3.5
emission factor
ratio of the rate at which an air pollutant is emitted as a result of some activity, to the rate of that activity

EXAMPLE The mass, in kilograms, of particulate emitted per tonne of coal burned, the mass, in kilograms, of NOx per tonne of clinker produced in a country per year, or the mass, in tonnes, of CO2 emitted per megajoule of energy produced.

Note 1 to entry: An emission factor differs from a mass emission rate, the latter has specific dimensions of mass divided by time.

[SOURCE: ISO 11771:2010 [1] , 2.1 adapted - Notes 1, 2 and 3 removed.]

3.6
remote sensing method
measurement method that determines a measurand in the open atmosphere without extractive sampling and at a spatial distance to the measurement device

3.7
tracer gas
gas which is added to the air or the exhaust gas and can be measured at very low concentrations in order to investigate air movement

Note 1 to entry: Tracer gas is often referred to as indicator gas.

3.8
component
assembly or mechanical part of an item of main equipment

Note 1 to entry: Examples are fitting, flange, pump, seal, valve.

[SOURCE: EN 17628:2022, 3.7]

3.9
reverse/inverse dispersion modelling
use of atmospheric dispersion models to determine source parameters such as emission rate and source location from measured downwind concentrations and meteorological data

4 Abbreviations

The Table 1 lists the abbreviations and their meanings.

Table 1 — Abbreviations

Abbreviation	Meaning
BATs	Best Available Techniques
BATCs	Best Availaible Techniques Conclusions
BREF	BAT REFerence document
DIAL	Differential Absorption Lidar
DOAS	Differential Optical Absorption Spectroscopy
ELVs	Emission Limit Values
EPA	Environmental Protection Agency
FID	Flame-Ionization Detector
FTIR	Fourier Transform InfraRed spectroscopy
IED	Industrial Emission Directive
IR	InfraRed
LDAR	Leak Detection And Repair
LIDAR	LIght Detection And Range
OGI	Optical Gas Imaging
PID	Photo-Ionisation Detector
POP	Persistant Organic Polluant
RDM	Reverse Dispersion Modelling
SOF	Solar Occultation Flux
TC	Tracer Correlation
UAV	Unmanned Aerial Vehicle
VOCs	Volatile Organic Compounds

5 Standards, draft standards, regulations and other applicable documents

The main regulatory document to consider is the European Directive 2024/1785/EU of 24 April 2024 amending Directive 2010/75/EU on industrial and livestock rearing emissions (integrated pollution prevention and control) and Council Directive 1999/31/EC on the landfill of waste. The IED aims to achieve a high level of environmental protection by preventing and reducing air and water pollution from industrial and agricultural emissions. The IED, and the associated industry-specific reference documents, describe the BATs (Best Available Techniques) in BAT Reference Documents (BREFs) and their associated BAT Conclusions (BATCs). BATCs provide the ranges of Emission Limit Values (ELVs) for air and water, which are used by national and local authorities to set permits for a wide range of activities. The BATC documents also prescribe European standards for measurement and detection of emissions to air and water.

The Table A.1 in Annex A describes the BREFs for which BATs on diffuse emissions are mentioned, and the typical diffuse sources identified in the BREFs.

Table 2 lists European standards, draft European standards, national standards and other documents dealing with the characterization of atmospheric diffuse emissions.

Table 3 lists European standards, draft European standards, national standards and other documents that can be useful references.

Table 2 — Standards and other documents describing methods for the characterisation of atmospheric diffuse emissions

Reference	Title	Level/status	Scope/information
EN 15445 *(October 2008)*	Fugitive and diffuse emissions of common concern to industry sectors - Qualification of fugitive dust sources by Reverse Dispersion Modelling	European standard	This standard specifies a Reverse Dispersion Modelling (RDM) method to qualify the fugitive emission rates of diffuse fine and coarse dust sources of industrial plants or areas. The application needs calculations using a dispersion model, and the definition of a sampling experimental set-up taking into account field data such as number, height and width of diffuse dust sources, sampling distances, and meteorological information. The RDM method does not allow quantification in absolute figures of the dust emission rates because of an undetermined accuracy depending on various site conditions, but it is a tool which enables each industrial plant to identify its dust sources that emit the most, and then to implement actions reducing their importance by self-control and related improvement process as part of environmental management. In this framework, the RDM method should not be used to control or verify any compliance with air quality threshold global values which might be contained in an operating permit, or to carry out comparison between different plants belonging to the same industrial sector.
EN 15446 *(March 2008)*	Fugitive and diffuse emissions of common concern to industry sectors - Measurement of fugitive emission of vapours generating from equipment and piping leaks	European standard	This standard applies to the measurement of fugitive emissions of volatile organic compounds (VOCs) from process equipment. The method is based on US EPA 21. The leak sources include, but are not limited to, valves, flanges and other connections, pressure relief devices, process drains, open-ended valves, pump and compressor seal systems, agitator seals, and access door seals. It does not apply to instrument tubing connections. This standard applies to all products of which at least 20 % wt has a vapour pressure higher than 0,3 kPa at 20 °C. For the petroleum industry, this includes all light products and excludes kerosene and all heavier products. The standard is based on the measurement of the gas concentration at the interface of a leak. This concentration is measured with a portable instrument. It is converted to a mass emission rate by use of a set of correlations. The scope of this standard includes the complete data processing, from the initial concentration measurement up to the generation of an emission report over a reporting period (which is generally one year). This standard does not prescribe the number of potential emission points that should be screened each year nor the frequency at which these points should be screened. This sampling strategy shall indeed take into

Reference	Title	Level/status	Scope/information
			account the plant characteristics and the required level of control over fugitive emissions. Optical methods are currently under development to ease the detection of leaks in plants and use of this standard in conjunction with these methods might be possible. In any case, measurements shall be performed according to the requirements of this standard. To enable direct quantification of total fugitive emissions based only on these methods, a subsequent revision of this standard is needed.
EN 17628 *(April 2022)*	Fugitive and diffuse emissions of common concern to industry sectors — Standard method to determine diffuse emissions of volatile organic compounds into the atmosphere	European standard	This document specifies the framework for determining emissions to the atmosphere of Volatile Organic Compounds (VOCs). It specifies a system of methods to detect and/or identify and/or quantify VOC emissions from industrial sources. These methods include Optical Gas Imaging (OGI), Differential Absorption Lidar (DIAL), Solar Occultation Flux (SOF), Tracer Correlation (TC), and Reverse Dispersion Modelling (RDM). It specifies the methodologies for carrying out all the above, and also the performance requirements and capabilities of the direct monitoring methods, the requirements for the results and their measurement uncertainties. This document specifically addresses, but is not restricted to, the petrochemicals, oil refining, and chemical industries receiving, processing, storing, and/or exporting of VOCs, and includes the emissions of VOCs from the natural gas processing/ conditioning industry and the storage of natural gas and similar fuels. The methods specified in this document have been validated at onshore facilities. This document is applicable to diffuse VOC emissions to atmosphere but not to the emissions of VOCs into water and into solid materials such as soils. It is complementary to EN 15446 [9], the standardized method for the detection, localization of sources (individual leaks from equipment and piping), and quantification of fugitive VOC emissions within the scope of a Leak Detection and Repair Programme (LDAR). This document has been validated for non-methane VOCs, but the methodology is in principle applicable to methane and other gases. This document specifies methods to determine (detect, identify and/or quantify) VOC emissions during the periods of monitoring. It does not address the extrapolation of emissions to time periods beyond the monitoring period

Reference	Title	Level/status	Scope/information
EN 13725 (February 2022)	Stationary source emissions - Determination of odour concentration by dynamic olfactometry and odour emission rate	European Standard	This document specifies an objective method for the determination of the odour concentration of a gaseous sample using dynamic olfactometry with human assessors. The document also specifies a method for the determination of the odour emission rate from stationary sources, in particular: a) point sources (conveyed or ducted emissions); b) active area sources (e.g. biofilters). The primary application of this document is to provide a common basis for evaluation of odour emissions. Annex M (informative) - Sampling of passive area sources This standard does not prescribe a standard method for measuring the specific odour emission rate for passive area sources, expressed in the measurement unit ouE/m2/s, because no standard meteorological or operational conditions for odour emission measurement for passive area sources could be defined. In this informative annex the useful information which was generated in the drafting process of this standard is summarized, intended to provide a starting point for future development of a standard method.

Reference	Title	Level/status	Scope/information
Pr CEN/TS 18393 *(In progress)*	Fugitive and diffuse emissions of common concern to industry sectors — Detection of fugitive emission of vapours generating from equipment and piping leaks using Optical Gas Imaging (OGI)	Draft European standard	This document has been developed to provide detailed guidance on the use of optical gas imaging (OGI) cameras for visualising leaks of vapours and gases that can be detected using their spectral properties in the infrared (IR) region of the electro-magnetic spectrum. European legislation for a set of industrial activities requires the operators of affected installations to put in place a leak detection and repair (LDAR) programme to risk-assess, identify and either eliminate or reduce fugitive and other diffuse emissions of certain vapours and gases that are harmful to human health and the environment. Under legislation, certain categories of industrial installations within the sectors for energy, waste management, oil and gas refining, and the chemical sectors must have a LDAR programme. LDAR required by legislation specifies the use of OGI cameras to detect leaks. Although legislation does not currently prescribe OGI within LDAR programmes for other types of industrial activity, the technique is still a powerful tool for visualising leaks of gases and vapours with have an infrared absorption profile that OGI cameras can detect. These activities include, but are not limited to: small anaerobic digestion plants; landfill-gas infrastructure, and; natural-gas distribution systems. OGI cameras have proven to be an effective detection technique, where an IR sensor is used to visualise emissions of volatile organic compounds (VOCs), methane and other compounds (e.g. SF_6, NH_3), which cannot normally be seen by the human eye. This document focuses on the use of OGI cameras dedicated to leak detection of VOCs, and methane. OGI cameras can also be utilised for detecting other types of emissions, e.g. venting or non-fugitive diffuse emissions. Although quantification of VOC emissions it is not yet established as a proven technique, OGI cameras enable the user to see emissions. In some cases, it is possible to make a comparative assessment between small, medium and large emissions. Investigations are underway to determine how effective OGI cameras are for making systematic estimates of the quantity of emissions, although this document is restricted to OGI as a leak detection technique.

Reference	Title	Level/status	Scope/information
			The strength of an OGI camera is that it allows many components to be inspected in a relatively short time, making this camera a powerful instrument for making fugitive emissions visible and then controlling them. Although OGI cameras are highly portable and readily deployed and seem to be easy to use they require users to be trained and sufficiently experience to be proficient. A typical deployment would use the OGI cameras to detect the larger leaks or as a complement of a conventional LDAR programme by enabling screening of components inaccessible to point sampling technique according to EN 15446, commonly known as “sniffing”, and applied to the framework described in EN 17628.

Reference	Title	Level/status	Scope/information
CEN/TS 264225 *(In progress)*	Fugitive and diffuse emissions of common concern to industry sectors — Standard method to determine diffuse emissions of CH_4 into the atmosphere	European standard	This document has been developed to provide a framework for the selection and use of monitoring methods to quantify the emission to the air of methane (CH_4) from diffuse sources, in particular due to the extraction, storage, transfer and handling (loading/unloading) of gas containing methane, within certain industrial sectors (e.g. oil and gas, bio methane, waste, intensive agriculture) and other activities (e.g. landfill). The European Standard EN 17628 has primarily been developed for VOC detection and quantification. This document is a follow-up of EN 17628 and addresses specific monitoring techniques able to quantify methane emissions. Emissions of methane from anthropogenic, biogenic and other natural sources contribute to global warming, because methane is a powerful greenhouse gas second only to carbon dioxide in its overall contribution to climate change. It is responsible for about a third of current climate warming. In addition, methane is a significant contributor to the formation of tropospheric ozone, a potent air pollutant that causes serious health problems. Better determination of the anthropogenic contribution can help to reduce these impacts. A wide range of human activities can give rise to emissions (e.g. extraction, transport, storage and distribution of methane containing products, etc..). Emission sources can be complex and diffuse sources are difficult to determine accurately. Their determination has hitherto required the use of specific measurement and estimation methods not subject to standardization. By setting out appropriate standardization criteria and demonstrating their use with certain techniques, the determination of diffuse methane should be improved, assisting the management of emissions and consequential benefits. EN 17628 has been validated for non-methane VOCs, but the methodology is in principle applicable to methane and other gases. According to the importance of methane emissions and variety of technical solutions, this document for methane needs to be better defined.

Reference	Title	Level/status	Scope/information
GA X 43-138 *(November 2014)*	Stationary source emissions - Diffuse emissions at skylights - Recommendations for the implementation of the measurement method	National (France)	Diffuse atmospheric emissions can greatly contribute to the overall emissions of an industrial site. Various French industrial sectors are concerned by this, and there are various kinds of sources. These include buildings with openings (windows, skylights, roof domes, static ventilators, louvres, etc..) in which "hot" industrial processes are performed. Due to the thermal gradient in the building between the emission points inside the building and the openings that are generally located in the upper section of the building, they are liable to be points for diffuse emissions of the substances discharged by the implemented processes. One method used to obtain the mass flow rate of each opening is to measure the concentrations of the studied species and discharge velocities and take account of the surface of each opening to the outside. Integrating the sum of these mass flows for each of the surfaces is the building's source term. The first diffuse emission characterization tests involving taking samples at skylights date back to the 70s and 80s. This method, also used by some French testing laboratories to characterize these types of emissions, has not since been the subject of a normative reference at French or European level. As a result, practices are fairly inconsistent between test laboratories and operators, and therefore do not generate comparable data. This document provides guideline for managing the implementation of this method and guaranteeing the quality of the services provided in this area and the comparability of the results given, via compliance with performance criteria. This document, in line with EN 15259:2007 [2], aims to establish a number of recommendations relating to: - specifications prior to measurements; - the observation phase on site, the process(es) conducted on site and the intervention conditions;