SLOVENSKI STANDARD
kSIST-TS FprCEN/TS 17874:2022

01-september-2022

Metodologija za vrednotenje emisij metana za sisteme za prenos, distribucijo in skladiščenje plina ter terminale za utekočinjeni zemeljski plin

Methodology for methane emissions quantification for gas transmission, distribution and storage systems and LNG terminals

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Abschätzung von Methanemissionen für Gastransportund -verteilnetze

(standards.iteh.ai)

Evaluation des emissions de methane pour les réseaux de transport et de distribution de gaz

kSIST-TS FprCEN/TS 17874:2022
https://standards.iteh.ai/catalog/standards/sist/c23e31c5-afc6-4158-a9ae-

Ta slovenski standard je istoveten z: **FprCEN/TS 17874**

ICS:

75.200	Oprema za skladiščenje nafte, naftnih proizvodov in zemeljskega plina	Petroleum products and natural gas handling equipment

kSIST-TS FprCEN/TS 17874:2022 **en,fr,de**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

kSIST-TS FprCEN/TS 17874:2022
https://standards.iteh.ai/catalog/standards/sist/c23e31c5-afc6-4158-a9ae-2b8df7aa3368/ksist-ts-fprcen-ts-17874-2022

kSIST-TS FprCEN/TS 17874:2022

TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

FINAL DRAFT
FprCEN/TS 17874

July 2022

ICS 75.200

English Version

Methodology for methane emissions quantification for gas transmission, distribution and storage systems and LNG terminals

Méthodologie pour la quantification des émissions de méthane relatives aux réseaux de transmission, de distribution, aux stockages de gaz, et aux terminaux GNL

Abschätzung von Methanemissionen für Gastransportund -verteilnetze

This draft Technical Specification is submitted to CEN members for Vote. It has been drawn up by the Technical Committee CEN/TC 234.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

kSIST-TS FprCEN/TS 17874:2022

Warning : This document is not a Technical Specification. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a Technical Specification.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2022 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. FprCEN/TS 17874:2022 E

kSIST-TS FprCEN/TS 17874:2022

Content

iTeh STANDARD PREVIEW
(standards.iteh.ai)
kSIST-TS FprCEN/TS 17874:2022

kSIST-TS FprCEN/TS 17874:2022

iTeh STANDARD PREVIEW
(standards.iteh.ai)
kSIST-TS FprCEN/TS 17874:2022
https://standards.iteh.ai/catalog/standards/sist/e23e31c5-afc6-4158-a9ae-

kSIST-TS FprCEN/TS 17874:2022

European foreword

This document (FprCEN/TS 17874:2022) has been prepared by Technical Committee CEN/TC 234 “Gas infrastructure”, the secretariat of which is held by DIN.

This document is currently submitted to the Vote on TS.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
kSIST-TS FprCEN/TS 17874:2022
https://standards.iteh.ai/catalog/standards/sist/c23e31c5-afc6-4158-a9ae-2b8df7aa3368/ksist-ts-fprcen-ts-17874-2022

kSIST-TS FprCEN/TS 17874:2022

Introduction

Greenhouse gas (GHG) emissions, and more specifically methane (CH_4) emissions are considered to have an important impact on climate change. It is crucial for the gas industry to assess and to mitigate methane emissions in the gas supply chain to support and contribute actively to European greenhouse gas emission reduction targets.

Methane emissions management and reduction is a priority for the European natural gas industry. To address this challenge a high level of transparency and reliability when reporting its emissions of methane is required with harmonized standards.

A lack of harmonized standards to address the quantification of methane emissions from the natural gas industry has been detected and, therefore, developed the present document that describes a methodology, based on a source-level approach, to identify and to quantify all types of methane emissions from transmission, distribution and storage systems and LNG terminals.

Some international initiatives have been recently launched with the intention to tackle the methane emissions issue in the energy sector. Among those, the Oil and Gas Methane Partnership (OGMP), a multi-stakeholder partnership supported by UNEP, stands out and intends to provide the industry with a credible mechanism to address their methane emissions. The new OGMP standard commits participating companies to increase the accuracy and granularity of their methane emissions reporting for operated and non-operated assets.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Following the launch of the European methane strategy in October 2020, the European Commission is encouraging the widespread adoption of the measurement and reporting framework developed under the OGMP standard.

The quantification methodology described in this document can be used for OGMP reporting needs. It should be a technical guideline for gas companies across Europe to support fast and harmonized implementation of methane emissions quantification process.

kSIST-TS FprCEN/TS 17874:2022
https://standards.iteh.ai/catalog/standards/sist/223e51e5-afe6-4158-a9ae-2b8df7aa3568/ksist-ts-fprcen-ts-17874-2022

This methodology is based in large parts on the document prepared by Marcogaz “Assessment of methane emissions for gas Transmission and Distribution system operators” [18]. Marcogaz is the Technical Association of the European Natural Gas industry.

kSIST-TS FprCEN/TS 17874:2022

1 Scope

This document describes a methodology to identify different types of methane emissions from gas infrastructure and it explains, step by step, how to quantify each type of emission in a gas transmission, distribution and/or storage system and in an LNG terminal. Gas is considered any product with a high methane content that is in gaseous form inside the respective gas infrastructure (e.g. natural gas, biogas or mixtures thereof with each other or with hydrogen).

Methane emission from utilisation, CNG/LNG fuelling stations, biomethane production and upgrading plants and LNG liquefaction and transport are not covered in this document, except if they are inside the covered asset (see Annex I on granularity).

NOTE 1 These principles can also be applied to other parts of the gas value chain.

NOTE 2 Natural emission by the soil or seepage of methane due to gas field above or next to the storage reservoir are not taken into account.

The document specifies a source-level method of quantification of identified methane sources.

NOTE 3 Source-level method - Emissions from each identified source are individually quantified. Total emissions on a given asset are calculated by adding each type of emission source data.

This quantification method consists in splitting the gas systems into groups of assets, devices and components and indicating categories of emission that can be expected from these groups to determine the emission factors (EF) and the activity factors (AF). It comprises measurements of the amount of methane emitted from different origin, estimation of emissions from groups of assets or calculation based on available data. In case of individual measurements or calculations, the total emissions are found by summing the quantified methane emissions.

Finally, a general method to calculate the uncertainties associated with the quantified amounts of emitted methane is described.

NOTE 4 Part of the methods of this document are retrieved by an international research program initiated by GERG for DSO.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CEN/TC 234 standards and the following 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

NOTE The terms and definitions of CEN/TC 234 are compiled in CEN/TC 234 Doc N 776 [7]. Any new terms used in CEN/TC 234 standards and related to hydrogen are to be added to CEN/TC 234 document.

kSIST-TS FprCEN/TS 17874:2022

3.1
Activity Factor
AF
numerical value describing the size of the population of emitting equipment such as length of pipelines, number of valves (per type), number of pneumatic devices (per type), or the number of emitting events such as number of operating vents, multiplied, if relevant, by the duration of the emission

Note 1 to entry: The question whether or not to multiply by the duration of the emission is examined later in this document.

3.2
annulus
space between two strings of pipes or between the casing and the borehole

3.2
asset
part of the gas system owned by a natural gas company, comprising multiple devices that allows the company to process, transport, store, and/or distribute gas (see Annex I)

3.3
block valve
valve used to isolate a segment of the main transmission pipeline for tie-in or maintenance purposes

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Note 1 to entry: Block valves are located along each line to limit the amount of piping that may need to be depressurized for tie-ins and maintenance, and to reduce the amount of gas that would be lost in the event of a line break.

kSIST-TS FprCEN/TS 17874:2022
https://standards.iteh.ai/catalog/standards/sist/c23e31c5-afc6-4158-a9ae-2b8df7aa3368/ksist-ts-fprcen-ts-17874-2022

3.4
blow down valve
valve used to empty a gas pipeline section or a whole asset and, when actuated, initiates the gas blowdown (e.g. when gas compressor units are shut down)

3.5
component
part or element of a larger whole, e.g.. flange, valve, connection (see Annex I)

3.6
connection
area of contact between two or more linked parts, axially or radially, normally sealed by mechanical means in order to keep tightness

3.7
device
equipment (active or passive) related to a gas system and needed in order to keep the normal operation of the network (see Annex I)

Note 1 to entry: It can be found as in-line equipment (like valves) or auxiliary equipment (like analysers).

Note 2 to entry: Methane emissions can appear from devices in unexpected way or as consequence of its function.

kSIST-TS FprCEN/TS 17874:2022

3.8
control valve
modulating valve that controls either the flow rate or pressure through the pipeline and flowlines

Note 1 to entry: In the latter case, it is often referred to as a regulator station.

Note 2 to entry: High pressure gas from the pipeline may be used as the supply medium needed to energize the valve actuator.

3.9
discharge coefficient
C_D
coefficient, which relates the actual flowrate to the theoretical flowrate through an opening and accommodates the friction of the real flow as well as boundary layer effects (jet contraction)

Note 1 to entry: Needs to be determined experimentally and is nearly one for well-rounded openings.

Note 2 to entry: According to several data sources, a value of about 0.6 can be applied for sharp edged holes, welding cracks or ruptures ([24], [25], [26]).

3.10
equipment
asset, device or component (see Annex I) of a gas system depending on the considered granularity

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.11
emission factor
EF
factor that describes typical methane emissions of a component or part of the gas system (e.g. valve, pipeline section) or from an event and can have units like [kg/km] or [kg/event]

kSIST-TS FprCEN/TS 17874:2022

3.12
fugitive emission
leakages due to tightness failure and permeation

Note 1 to entry: Some type of vented emissions, e.g. those from specific connections detected during survey, cannot always be clearly distinguished from fugitive emissions. When reporting methane emission double counting should be avoided.

Note 2 to entry: This term comprises the sum of various unaccounted channelled emissions, fugitive emissions and area emissions.

Note 3 to entry: Permeation is leakage intrinsic to the use of permeable materials.

3.13
gas compressor station [5]
asset used for:

— transporting gas in pipelines;

— compressing gas from a pipeline to a gas storage facility or vice versa

Note 1 to entry: More than one of the above functions could be done simultaneously or alternatively.

kSIST-TS FprCEN/TS 17874:2022

3.14
gas distribution system [7]
pipeline system for supplying natural gas comprising mains and service lines including piping above and below ground and all other equipment necessary to supply the gas to the consumer

Note 1 to entry: Operating pressure is normally less than 16 bar.

3.15
gas transmission system [12]
gas transport network, which mainly contains high-pressure pipelines, other than an upstream pipeline network and other than the part of high-pressure pipelines primarily used in the context of local distribution of gas, with a view to its delivery to customers, but not including supply

Note 1 to entry: Transmission lines transport natural gas across long distances and occasionally across interstate boundaries. They are connected to the distribution grid via city gate stations and/or pressure regulating stations.

Note 2 to entry: High-pressure gas transport over long distance including pipelines, compressor stations, metering and regulating stations and a variety of above-ground facilities to support the overall system. Underground gas storage and LNG terminals are excluded. Operating pressure is normally equal or greater than 16 bar.

3.16
gate station
facility located adjacent to a transmission grid where at least one of the following functions is performed: pressure reduction, odorization, measurement or flow of gas through a splitter system for distribution to different districts or areas

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.17
gas system [13]
any transmission networks, distribution networks, LNG facilities and/or storage facilities owned and/or operated by a natural gas undertaking, including linepack and its facilities supplying ancillary services and those of related undertakings necessary for providing access to transmission, distribution and LNG

kSIST-TS FprCEN/TS 17874:2022
https://standards.iteh.ai/catalog/standards/sist/e23e31e5-afc6-4158-a9ae-

3.18
incident [5]
unexpected occurrence, which could lead to an emergency situation

3.19
incident emission
methane emissions from unplanned events

Note 1 to entry: This will be from failures of the system due to third party activity, external factors, corrosion, etc.

3.20
incomplete combustion emissions
unburned methane in the exhaust gases from natural gas combustion devices, such as turbines, engines, boilers or flares

3.21
LNG terminal
asset which is used either for the liquefaction of natural gas, exportation, or for the importation, offloading, and re-gasification of LNG, and includes ancillary services and temporary storage necessary for the re-gasification process and subsequent delivery to the transmission system, but does not include any part of LNG terminals used for storage

kSIST-TS FprCEN/TS 17874:2022

3.22
methane emission
release of methane to the atmosphere, whatever the origin, reason and duration

3.23
main lines of distribution [3]
pipework in a gas supply system to which service lines are connected

3.24
operational emission
methane emissions from normal or planned operating activities

Note 1 to entry: This includes release through stacks; blow off valves, pressure release and purging of turbines and emissions due to normal maintenance inspection and control. Operational vents comprise planned venting and purging of pipelines, which is usually done during commissioning, decommissioning, renewal and maintenance of pipelines for safety reasons to prevent the risk of explosions. Pneumatic emissions are also operational emissions.

3.25
permeation
penetration of a permeate (such as a liquid, gas, or vapour) through a solid

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Note 1 to entry: In case of natural gas through pipelines made of polymer materials, it is directly related to the pressure of the gas, intrinsic permeability of polymer materials and wall thickness. Polymers can be polyethylene, polyamide or PVC.

kSIST-TS FprCEN/TS 17874:2022
https://standards.iteh.ai/catalog/standards/sist/c23e31c5-afc6-4158-a9ae-268df7aa3368/ksist-ts-fprcen-ts-17874-2022

3.26
pneumatic emission
emissions caused by gas operated valves, continuous as well as intermittent emissions

3.27
point of delivery [7]
point where the gas is transferred to the user

Note 1 to entry: This can be at a means of isolation (e.g. at the outlet of an LPG storage vessel) or at a meter connection. For this document the point of delivery is typically nominated by the distribution system operator and can be defined in National Regulations or Codes of Practices.

3.28
pressure regulating station [3]
asset comprising all the equipment including the inlet and outlet pipework as far as the isolating valves and any structure within which the equipment is housed, used for gas pressure regulation and over-pressure protection

3.29
purge factor
$\mathbf{f_{purge}}$
factor, which accounts for the emissions caused by purge operations

Note 1 to entry: Purging of the air inside a pipeline or facility is necessary to mitigate the risk of explosions. The purge factor herein does not refer to the amount of purge gas used but to the amount of the gas vented.

EXAMPLE: If purging is done with 1.5 times the pipeline volume, one volume stays in the pipe and 0.5 volumes are vented to the atmosphere. The purge factor is in this case 0.5. If the actual purge factor is not known for an operation, country specific factors should be used.

kSIST-TS FprCEN/TS 17874:2022

3.30
purging [7]
process for safely removing air or inert gas from pipework and/or pipeline components and replacing it with gas, or the reverse process

3.31
regulator [1]
device which reduces the gas pressure to a set value and maintains it within prescribed limits

3.32
service lines [3]
pipework from the main lines to the point of delivery of the gas into the installation pipework

Note 1 to entry: Service line is usually a short, small diameter pipeline that delivers gas from distribution main or transmission pipeline to the customer. They are usually made of steel pipe or steel tubing (either cathodically protected or not), or plastic (usually polyethylene, but sometimes PVC or other plastic), although copper tubing was also used in the past. Service lines can be installed under or above ground.

3.33
site
all sources within a physical unit

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Note 1 to entry: They can be compressor station, transmission station, pipeline segment, LNG terminal, etc.

Note 2 to entry: Site-level measurement/reporting would consider sites as the appropriate level to reasonably and transparently reporting Level 4.

kSIST-TS FprCEN/TS 17874:2022
https://standards.iteh.ai/catalog/standards/sist/c23e31c5-afc6-4158-a9ae-2b8df7aa3368/ksist-ts-fprcen-ts-17874-2022

3.34
source
component within a process or equipment that releases methane to the atmosphere either intentionally or unintentionally, intermittently or persistently

3.35
subsurface containment
capability of the storage reservoir or cavern and the storage wells to resist leakage or migration of the fluids contained therein

3.36
uncertainty (of measurement) [19]
parameter, associated with the result of a measurement, that characterizes the dispersion of the values that could reasonably be attributed to the measurand

Note 1 to entry: The parameter may be, for example, a standard deviation (or a given multiple of it), or the half-width of an interval having a stated level of confidence.

Note 2 to entry : Uncertainty of measurement comprises, in general, many components. Some of these components may be evaluated from the statistical distribution of the results of series of measurements and can be characterized by experimental standard deviations. The other components, which also can be characterized by standard deviations, are evaluated from assumed probability distributions based on experience or other information.

Note 3 to entry: It is understood that the result of the measurement is the best estimate of the value of the measurand, and that all components of uncertainty, including those arising from systematic effects, such as components associated with corrections and reference standards, contribute to the dispersion.

Note 4 to entry: The definition of uncertainty can also apply to characterize the dispersion for estimated values and calculated values.

kSIST-TS FprCEN/TS 17874:2022

3.37
underground gas storage
UGS
part of the gas supply chain that stores natural gas underground under pressure, to be used when there is a high demand

Note 1 to entry: Underground gas storage facilities are created in depleted gas or oil reservoirs, salt cavern formations and aquifers.

3.38
vented emissions
gas released into the atmosphere intentionally from processes or activities that are designed to do it, or unintentionally when equipment malfunctions or operations are not normal

Note 1 to entry: In the case of transmission and distribution grids, unintentional vented emissions during not normal operation cover also vents due to external interference (third-party damage), ground movements, over pressure, etc.).

3.39
venting
operational release of gas into the atmosphere

Note 1 to entry: Often carried out in order to maintain safe conditions.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.40
well
borehole and its technical equipment including the wellhead

https://standards.iteh.ai/catalog/standards/sist/c23e31c5-afc6-4158-a9ae-2b8df7aa3368/ksist-ts-fprcen-ts-17874-2022

3.41
well integrity
well condition without uncontrolled release of fluids throughout the life cycle

3.42
working gas
portion of the gas in an underground gas storage that may be stored and retrieved during normal operation cycles

kSIST-TS FprCEN/TS 17874:2022

4 Symbols and abbreviations

Table 1 provides an overview of symbols used in this document and Table 2 provides an overview of abbreviations used in this document.

Table 1 — Symbols applied within this report

Symbol	Description	Unit (if not specified otherwise)
A	Area	m^2
AF	Activity factor (used in combination with EF)	shall be consistent with EF unit (examples: number of events, km of pipelines, number of devices)
c	Concentration	$vol\ \%$
C_D	Discharge coefficient	–
d	Diameter	m
E	Methane emission	$\frac{kg_{CH4}}{a}$
EF	Emission factor (used in combination with AF)	shall be consistent with AF unit (examples: $\frac{kg_{CH4}}{a}$, $\frac{kg_{CH4}}{km\ a}$, $\frac{kg_{CH4}}{event}$)
F_{pv}	Super compressibility factor	–
f_{purge}	Purge factor	–
k	Permeability of the soil	m^2
$\kappa;\ \gamma$	Adiabatic index of natural gas	–
l	Length of pipelines	km
M	Molar mass	$\frac{kg}{kmol}$
µ	Dynamic viscosity of the gas	$Pa \cdot s$
n	Number (e.g. of leaks, incidents, events, etc.)	$\frac{leaks}{a}$ or $\frac{leaks}{km \cdot a}$, etc.
PC	Permeation coefficient	$\frac{cm^3}{m \cdot bar \cdot d}$
P	Absolute pressure	$bar(a)$
Q_m	Mass flow rate	$\frac{kg}{a}$
Q_v	Volume flow rate	$\frac{m^3}{a}$
R	Ideal gas constant	$\frac{J}{mol \cdot K}$
r	Radius	m
ρ	Density	$\frac{kg}{m^3}$

iTeh STANDARD PREVIEW
(standards.iteh.ai)
kSIST-TS FprCEN/TS 17874:2022
https://standards.iteh.ai/catalog/standards/sist/c23e31c5-afc6-4158-a9ae-
3368/ksist-ts-fprcen-ts-17874-2022