SLOVENSKI STANDARD
oSIST prEN 16726:2024

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Infrastruktura za plin - Kakovost plina - Skupina H

Gas infrastructure - Quality of gas - Group H

Gasinfrastruktur - Beschaffenheit von Gas - Gruppe H

Infrastructures gazières - Qualité du gaz - Groupe H

Ta slovenski standard je istoveten z: **prEN 16726**

ICS:

75.060 Zemeljski plin Natural gas

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English Version

Gas infrastructure - Quality of gas - Group H

Infrastructures gazières - Qualité du gaz - Groupe H

Gasinfrastruktur - Beschaffenheit von Gas - Gruppe H

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

If this draft becomes a European Standard, 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.

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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.

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

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European foreword

This document (prEN 16726:2023) 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 CEN Enquiry.

This document will supersede EN 16726:2015+A1:2018.

In comparison with the previous edition, the following technical modifications have been made:

— Inclusion of a Wobbe Index requirement (5.3), i.e. Wobbe Index exit classification requirement and a Wobbe Index entry recommendation and related informative Annexes:

  o Annex H - Limitations of the end-use gas applications to cope with the broad Wobbe Index entry range;

  o Annex I - General considerations on adjustment and re-adjustment of residential and commercial appliances;

  o Annex J - Onside adjustment of end-use applications;

— Addition of an admissible hydrogen concentration (subclause 5.1, Table 1) and related informative Annex E;

— Revision of the minimum relative density (subclause 5.1, Table 1);

— Revision of the admissible oxygen content (subclause 5.1, Table 1) and addition of related informative Annex B;

— Revision of the admissible sulfur content (subclause 5.1, Table 1) and addition of related informative Annex C;

— Clarification on the admissible methane number in this standard (subclause 5.1, Table 1 Note g) in relation to the general design of engines and addition of related informative Annex F.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

The need for a European Standard concerning the specification of the quality of gases of group H is derived from the standardization request M/400 issued to CEN by the European Commission.

According to this standardization request the goal is to define specifications that are as wide as possible within reasonable costs. This means that the specifications enhance the free flow of gas within the internal EU market, in order to promote competition and security of supply minimizing the negative effects on gas infrastructure and gas networks, efficiency and the environment and allow appliances to be used without compromising safety.

Some requirements specified in this European Standard, Clause 5, cannot be implemented by *xyz* due to existing conflicting national legislation. The related A-Deviations are listed in Annex L *(to be verified during Public Enquiry).*

Introduction

This document sets requirements for gas quality with the aim to allow the free flow of gas between the CEN member states and to enable the security of supply taking into account the impact on the whole value chain from gas production and supply to end uses.

The Wobbe Index requirements in this document are based on the proposal of the CEN Sector Forum Gas Joint Working Group Pre-normative studies of H-gas quality parameters (CEN SFGas GQS).

NOTE Responsibility and liability issues in the context of this document are subject to European or national regulations.

1 Scope

This document specifies gas quality characteristics, parameters and their limits, for gases classified as group H that are to be transmitted, injected into and from storages, distributed and utilized.

NOTE For information on gas families and gas groups, see EN 437.

This document does not cover gases conveyed on isolated networks.

For specific requirements on biomethane, reference is made to EN 16723-1.

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.

EN ISO 13443, *Natural gas — Standard reference conditions (ISO 13443)*

EN ISO 14532, *Natural gas — Vocabulary (ISO 14532)*

ISO 14912, *Gas analysis — Conversion of gas mixture composition data*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 14532 and the following apply.

NOTE Some legal definitions which are considered useful for the topic of this document are given in Annex H for information. Due to the normative character of this clause, they cannot be integrated here.

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/

3.1
isolated network
network where transmission, distribution and utilization of gas are combined and which is physically unconnected to other networks

3.2
entry (point)
point – except interconnection points – at which gas enters a gas distribution or gas transmission system

3.3
interconnection point
physical point connecting adjacent entry-exit systems or connecting an entry-exit system with an interconnector

3.4
maximum operating pressure
maximum pressure at which a network can be operated continuously under normal conditions expressed as absolute pressure

Note 1 to entry: Normal conditions are: no fault in any device or stream.

[SOURCE: EN 1594:2013, 3.23, modified]

3.5
application
equipment that utilizes the transported and distributed gas

Note 1 to entry: Some examples of gas applications are: gas appliances (domestic or commercial), processes (chemical or industrial), power plants, vehicles, greenhouses, etc.

3.6
shipper
individual or company that contracts with a gathering, transmission or distribution system for transportation of customer-owned natural gas

[SOURCE: Enbridge Glossary of Terms, modified]

3.7
system operator
private or public organization authorized to design, construct and/or operate and maintain a system

3.8
distributed gases
gases available at an exit point conveyed through the gas network

3.9
gases from renewable sources or renewable gases
means gases from renewable non-fossil sources by fermentation, gasification and/or power-to-gas processes

3.10
Wobbe Index
WI
ratio of the calorific value of a gas per unit volume and the square root of its relative density under the same reference conditions; the Wobbe Index is said to be gross or net according to whether the calorific value used is the gross or net calorific value

Note 1 to entry: Two fuel gases with the same Wobbe Index will release the same amount of heat in a combustion system, as long as the nozzle pressure and the nozzle diameter remain constant. The gas temperature is assumed to remain constant in this context. The Wobbe Index is the primary gas interchangeability criterion for residential and commercial appliances as well as for some large-scale combustion equipment in industry and power generation.

Note 2 to entry: The Gross Wobbe Index (WI calculated with GCV) is used in this document.

[SOURCE: EN 437:2018, 3.13, modified]

3.11
rate of change (RoC) = speed of change
change of the value of a gas quality property at a location per unit of time

Note 1 to entry: Nearly instantaneous change in local gas quality is often referred to as 'plug flow'.

3.12
range
values between maximum and minimum for a given gas quality property in absolute terms

3.13
bandwidth
difference between a maximum and a minimum of a range

EXAMPLE The WI range of a defined gas is between 46,44 MJ/m^3 and 50,00 MJ/m^3. The bandwidth is 3,56 MJ/m^3.

3.14
exit (point)
point at which gas leaves the gas transmission or distribution system for end-use

Note 1 to entry: A number of connected exit points with the same class in the same topological and geographic region are considered to be a cluster of exit point.

3.15
cluster of exit points
homogeneous group of exit points located within the vicinity of each other and which are considered as one exit point for the application of the Wobbe Index classification system proposal

[SOURCE: Taken from Art. 3(19), TAR NC and modified]

3.16
interconnection (point)
physical point connecting adjacent gas transmission and distribution systems and/or storage systems

3.17
affected user
end-user whose installation experiences a switch of class

Note 1 to entry: Some affected users might be considered sensitive users, as well.

3.18
adjustment
setting a gas appliance or a gas application in such a way that the nominal operational process parameters (e.g. firing rate, air excess ratio, required process temperatures, emission values) and expected lifetime of the system, as prescribed by the manufacturer, are met

Note 1 to entry: For residential and commercial appliances, this can be done with a reference gas like G20 (pure methane). For industrial and power generation equipment, the adjustment is usually part of the commissioning process and carried out with the locally available gas and the ambient conditions at the time of commissioning. This is called on-site adjustment.

3.19
gas blending
deliberate activity of mixing two or more separate gas streams for a specific purpose where a relevant fuel quality criterion (e.g. WI or GCV) of the resulting gas blend is specified. It takes place at specific locations in the network (e.g. a blending station)

3.20
mitigation measure
any measure in order to avoid, prevent or reduce, significant adverse effects of gas quality changes on the end-user

3.21
cost benefit analysis
analytical tool used to appraise an investment decision in order to assess the welfare change attributable to it and with the purpose to facilitate a more efficient allocation of resources, demonstrating the convenience of a particular intervention rather than possible alternatives

[SOURCE: European Commission Guide to Cost-Benefit Analysis of Investment Projects]

3.22
continuous experienced case
exit points or cluster of exit points experiencing the same Wobbe Index range as they have been receiving for an extended period of time in the past

3.23
exceptional event or force majeure
any unplanned event that is not reasonably controllable, preventable or outside the sphere of influence of the parties and that may cause, for a limited period, capacity reductions, affecting thereby the quantity or quality of gas, with possible consequences on interactions between the different stakeholders of the gas value chain

3.24
notice time
time between the announcement of the Wobbe Index change to the end-user and the moment when the switch effectively takes place

Note 1 to entry: The notice time takes into account market dynamics, technical needs and constraints.

3.25
intensity of deviation of a class
extent (in MJ/m^3) of Wobbe Index value exceeding on both sides the defined Wobbe Index limits of a class allocated to an exit point

3.26
duration of deviation of a class
accumulated time (e.g. number of days per year) during which the Wobbe Index of the distributed gases is outside of the defined Wobbe Index range of the assigned class to an exit point/cluster of exit points

3.27
frequency of deviation of a class
number of times (e.g. per year) where the Wobbe Index of the distributed gases is outside of the defined Wobbe Index range of the assigned class to an exit point/cluster of exit points

3.28
validity duration of a class
period of time (to be determined) during which the bandwidth and the lower and upper Wobbe Index values [of the class] are remaining the same

3.29
combustion reference conditions
specified temperature *T* and pressure p at which a fuel is notionally burned

3.30
metering reference conditions
specified temperature *T* and pressure p at which an amount of fuel to be burned is notionally determined

Note 1 to entry: There is no a priori reason for the metering reference conditions to be the same as the combustion reference conditions.

[SOURCE: EN ISO 14532:2017, 2.6.1.2]

4 Reference conditions and pressure units

Unless stated otherwise, all volumes are given for the real dry gas at ISO standard reference conditions of 15 °C (288,15 K) and 1 013,25 mbar (101,325 kPa). Unless otherwise stated, all pressures are absolute pressures.

Whenever data on the volume, gross calorific value (GCV), energy and Wobbe Index are communicated, it shall be specified under which reference conditions these values were calculated, as these are necessary to quantify the calorific properties (Wobbe Index, Calorific Value) of a fuel.

NOTE 1 In the EU, two reference systems exist which are commonly used. EN ISO 13443 and EN ISO 14532 define the reference system with 15 °C as a combustion reference temperature and 15 °C for volume with 1 013,25 mbar as reference pressure, with energy contents given in MJ/m³, whilst many other documents and national and or European regulations use a reference system with 25 °C as a combustion reference temperature and 0 °C for volume (also with 1 013,25 mbar as reference pressure). Calorific properties, e.g. CV or WI, can be given as kWh/m³ as well.

In assessing compliance with this European Standard, parameters should be determined directly at ISO standard reference conditions. If the properties are only available at other reference conditions and the actual gas composition is not known then conversion to ISO standard reference conditions shall be carried out using the procedure described in EN ISO 13443.

NOTE 2 Besides the ISO standard reference conditions, particular in gas transmission, normal reference conditions (25/0 °C) are used according to the Network Code Interoperability and Data exchange. These are indicated in Table 1 for information.

NOTE 3 The use of the reference condition 15 °C/15 °C is in line with the standardization request M/400. The values in 25 °C/0 °C (kWh) will be indicated in this document, where considered relevant for information (Annex C for conversion factors, based on EN ISO 13443).

5 Requirements

5.1 Requirements to the gas quality

Gas shall comply with the requirements given in Table 1 and shall be accepted for conveyance.

Table 1 — Requirements

<table>
<tr><th rowspan="2">Parameter</th><th rowspan="2">Unit</th><th colspan="2">Limits based on standard reference condition 15 °C/15 °C</th><th colspan="2">Limits based on normal reference condition 25 °C/0 °C (for information)</th><th rowspan="2">Reference standards for test methodsf (informative)</th></tr>
<tr><th>Min.</th><th>Max.</th><th>Min.</th><th>Max.</th></tr>
<tr><td>Wobbe index</td><td>MJ/m³
kWh/m³</td><td colspan="4">See subclauses 5.2 and 5.3</td><td>EN ISO 6976</td></tr>
<tr><td>Relative density</td><td>no unit</td><td>0,45[a]</td><td>0,70</td><td>0,45</td><td>0,70</td><td>EN ISO 6976,
EN ISO 15970</td></tr>
<tr><td rowspan="2">Total sulfur without odorant</td><td>mg/m³</td><td>not applicable</td><td>11[b]</td><td>not applicable</td><td>11[b]</td><td>EN ISO 19739</td></tr>
<tr><td colspan="6">A maximum total sulfur concentration of 20 mg/m³ may apply provided that sulfur components other than those mentioned in this table are experienced in the grid.
For existing practices with respect to transmission of odorized gas between high pressure networks higher sulfur content value up to 30 mg/m³ may be accepted.
NOTE Odorization is considered as a safety issue, dealt with at national level. Some information about sulfur odorant content is given in Annex B.</td></tr>
<tr><td>Hydrogen sulphide + Carbonyl sulphide (as sulfur)</td><td>mg/m³</td><td>not applicable</td><td>5[b]</td><td>not applicable</td><td>5[b]</td><td>EN ISO 6326-1,
EN ISO 6326-3,
EN ISO 19739</td></tr>
<tr><td>Mercaptan sulfur without odorant (as sulfur)</td><td>mg/m³</td><td>not applicable</td><td>6[b]</td><td>not applicable</td><td>6[b]</td><td>EN ISO 6326-3,
EN ISO 19739</td></tr>
<tr><td rowspan="2">Oxygen</td><td>mol/mol</td><td>not applicable</td><td>1 % or 0,001 % for sensitive users (see below)</td><td>not applicable</td><td>1 % or 0,001 % for sensitive users (see below)</td><td>EN ISO 6974-3,
EN ISO 6974-6,
EN ISO 6975</td></tr>
<tr><td colspan="6">In the gas infrastructure the mole fraction of oxygen shall be no more than 1 %. However, if it can be demonstrated that a gas with oxygen content can flow to installations sensitive to oxygen, e.g. underground gas storage, a maximum limit down to 0,001 %, expressed as a moving 24 hour average, at those exit point shall be applied, unless there is no technical need (for most applications a level of e.g. 0,01 % or higher is sufficient). The evaluation of the applicable level shall be done by an assessment process.
If the technical need for a low oxygen limit is not confirmed within the required assessment process, then higher oxygen concentrations can be agreed on. The evaluation of the applicable level shall be done by a case-by-case analysis for the grid that is influenced by the oxygen content based on concrete input e.g. from requester for gas injection, gas infrastructure operators and relevant end-users.
NOTE 2 0,01 % is equal to 100 ppm and 0,001 % is equal to 10 ppm.</td></tr>
<tr><td rowspan="2">Carbon dioxide</td><td>mol/mol</td><td>not applicable</td><td>2,5 % or 4 % (see below)</td><td>not applicable</td><td>2,5 % or 4 % see below</td><td>EN ISO 6974 parts 1 to 6,
EN ISO 6975</td></tr>
<tr><td colspan="6">At network entry points and interconnection points the mole fraction of carbon dioxide shall be no more than 2,5 %. However, where the gas can be demonstrated not to flow to installations sensitive to higher levels of carbon dioxide, e.g. underground storage systems, a higher limit of up to 4 % may be applied.</td></tr>
</table>

Parameter	Unit	Limits based on standard reference condition 15 °C/15 °C		Limits based on normal reference condition 25 °C/0 °C (for information)		Reference standards for test methods[f] (informative)
		Min.	Max.	Min.	Max.	
Hydro carbon dew point[d,e] at any pressure from 0,1 MPa to 7 MPa (70 bar) absolute pressure	°C	not applicable	−2	not applicable	−2	ISO 23874, ISO/TR 12148
Water dew point[d,e] at 7 MPa (70 bar) or, if less than 7 MPa (70 bar), at maximum operating pressure of the system in which the gas flows	°C	not applicable	−8	not applicable	−8	EN ISO 6327, EN ISO 18453, EN ISO 10101 parts 1 to 3
Hydrogen	mol%	not applicable	2	not applicable	2	none
	A hydrogen concentration shall be accepted up to two percent by mole across the whole value chain. It may deviate nationally, regionally or locally for higher values of hydrogen concentration than 2 % in the grids provided that the requirements of the sensitive users are met (see 5.4 and Annex E)					
Methane number	no unit	65[g] (see normative Annex A, Annex F)	not applicable	65[g]	not applicable	none
Contaminants	The gas shall not contain constituents other than listed in Table 1 at levels that prevent its transportation, storage and/or utilization without quality adjustment or treatment.					

[a] An approval of the legal weights and measurement regulation is necessary in some European countries.

[b] Figures are indicated without post-comma digits due to analytical uncertainty.

[c] More information on oxygen origin, challenges, mitigation measures and measurement are given in Annex C.

[d] Under given climatic conditions, a higher water dew point and hydrocarbon dew point may be accepted at national level.

[e] For further information on water dew point and hydrocarbon dew point, see Annex D.

[f] Test methods other than those listed in the reference standards indicated in Table 1 may be applied, provided their fitness for purpose can be demonstrated.

[g] This limit value does not imply that gas engines should be designed for the minimum *MN* of 65. The gas engines should be designed for the expected gas quality. They are generally designed for a minimum *MN* of 70 or above (see Annex F).

Gas quality shall not impede safety of gas appliances and operations of end users. Appropriate measures shall be taken.

NOTE Applications are sensitive towards variations of the gas quality depending on the type of application and the degree of variation.