



SLOVENSKI STANDARD
oSIST prEN 1594:2022

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Infrastruktura za plin - Cevovodni sistemi za najvišji delovni tlak nad 16 bar - Funkcionalne zahteve

Gas infrastructure - Pipelines for maximum operating pressure over 16 bar - Functional requirements

Gasinfrastruktur - Rohrleitungen für einen maximal zulässigen Betriebsdruck über 16 bar - Funktionale Anforderungen

Infrastructures gazières - Canalisations pour pression maximale de service supérieure à 16 bar - Prescriptions fonctionnelles

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Gas infrastructure - Pipelines for maximum operating pressure over 16 bar - Functional requirements

Infrastructures gazières - Canalisation pour pression maximale de service supérieure à 16 bar - Prescriptions fonctionnelles

Gasinfrastruktur ζ Rohrleitungen für einen maximal zulässigen Betriebsdruck über 16 bar ζ Funktionale Anforderungen

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 1594:2022) 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 CEN Enquiry.

This document will supersede EN 1594:2013.

The main changes between this document and the previous edition are as follows:

- addition of supplements with respect to available technologies, like aspects of pipeline inspection, corrosion protection, aspects of gases with low ignition energy considered such as hydrogen;
- restructuring and rephrasing of scope to improve understanding (Clause 1);
- update of references to other documents (Clause 2 and Bibliography);
- revision of terms and definitions including clarification of substance ‘gas’ (Clause 3).
- addition of arrangements for venting, recompression and flaring (Clause 7);
- adjustment of minimum impact energy values to appropriate safety values (Clause 8);
- removal of all annexes, because they were outdated and considered covered in other European standards;
- addition of new normative annex with requirements for fracture arrest of line pipe (Annex A), adopted from EN ISO 3183:2012 as they were taken out in the current edition of EN ISO 3183 (published in 2019);
- addition of new informative with recommendations related to hydrogen pipelines (Annex B).

There is a complete suite of functional standards prepared by CEN/TC 234 “Gas infrastructure” to cover all parts of the gas infrastructure from the input of gas to the transmission system up to the inlet connection of the gas appliances, whether for domestic, commercial or industrial purposes.

Conformance to this document ensures the interoperability, safety and reliability requirements of pipeline systems.

Directive 2009/73/EC concerning common rules for the internal market in natural gas and the related Regulation (EC) No 715/2009 on conditions for access to the natural gas transmission networks also aim at technical safety (security) including technical reliability of the European gas system. These aspects and Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources are also in the scope of CEN/TC 234 standardization. In this respect, CEN/TC 234 evaluated the indicated EU legislation and amended this document accordingly, where required and appropriate.

CEN/TC 234 will continue its work updating this document to the latest developments at regular intervals.

Introduction

This document describes the general functional requirements for gas supply through pipe systems and covers the pressure range greater than 16 bar maximum operating pressure for steel systems. It gives normative and informative references for safe and secure gas infrastructure. It applies to their design, construction, operation and the related aspects of safety, environment and public health, all in order to provide a safe and secure supply of gas.

The requirements of this document are based on safe gas engineering practice under conditions normally encountered in the gas industry. Requirements for all unusual conditions cannot be specifically provided for, nor are all engineering and construction details prescribed.

Existing industrial safety regulations applying to work areas, safety devices and safe work practices are not intended to be supplanted by this document.

Managers with responsibilities for the design, construction and operation of gas infrastructure will have regard to the guidance given in this document and to other relevant standards. It is the responsibility of these managers and engineers to apply these functional requirements, supplemented with other proven good practice to the particular circumstances of all gas infrastructures.

The designer, constructor or operator of pipeline systems is cautioned that this document is not a design handbook or code of practice. Additional national or company standards describing the details are needed. These detailed standards should be in line with the basic principles of this document.

In preparing this document it was recognized that the suite of relevant European standards is incomplete. Where appropriate, reference is made to international, national or other standards until relevant European standards are available.

In preparing this document, a basic understanding of gas supply by the user has been assumed. Gas infrastructure is complex and the importance on safety of their construction and use has led to the development of very detailed codes of practice and operating manuals in member countries. These detailed statements embrace recognized standards of gas engineering and specific requirements imposed by legal structures of these member countries.

1 Scope

This document describes the functional requirements for pipelines for maximum operating pressure over 16 bar. This document also describes the mechanical requirements for pipework in stations with a maximum operating pressure greater than 16 bar.

NOTE Welding requirements are described in EN 12732. Functional requirements for stations are given in EN 1776, EN 1918-5, EN 12186, and EN 12583.

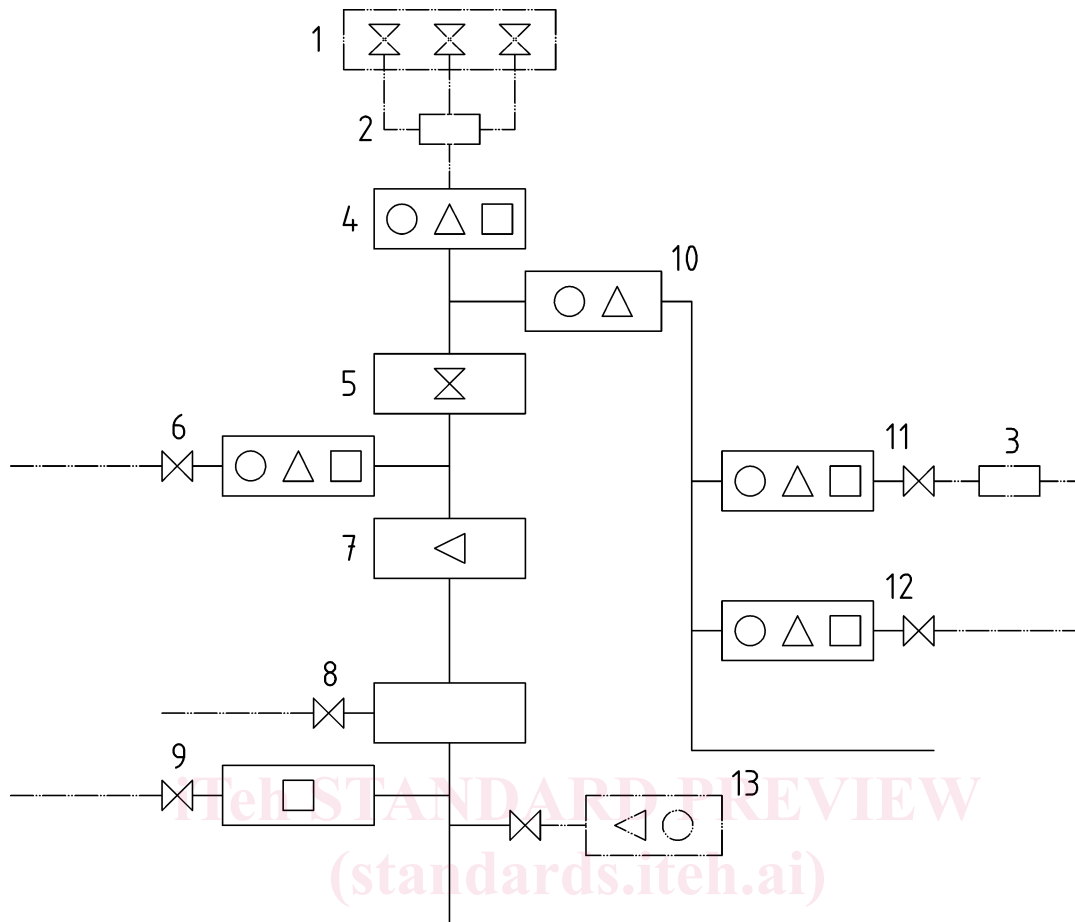
This document is applicable for transporting gas via onshore high-pressure steel pipeline infrastructures, where the following applies:

- onshore:
 - from the point where the pipeline first crosses what is normally accepted as battery limit between onshore and offshore, and that is not located within commercial or industrial premises as an integral part of the industrial process on these premises except for any pipelines and facilities supplying such premises;
 - pipeline system with a starting point onshore, also when parts of the pipeline system on the mainland subsequently cross fjords, lakes, etc.
- high pressure: gas with a maximum operating pressure over 16 bar and a design temperature between -40 °C and 120 °C .
- steel pipeline infrastructure: infrastructure consisting of pipeline components, such as pipes, valves, couplings and other equipment, restricted to components made of unalloyed or low alloyed carbon steel and joined by welds, flanges or mechanical couplings.
- gas: non-corrosive natural gas, biomethane gas, hydrogen gas and mixtures of these gases where technical evaluation has ensured that operating conditions or constituents or properties of the gas do not affect the safe operation of the pipeline.

Gas infrastructures covered by this document begin after the gas producer's metering station. The functional demarcation of the pipeline system within a plant area is usually directly after the first isolating valve of the installation, but can differ in particular situations.

A schematic representation of pipelines for gas infrastructure is given in Figure 1.

This document can also be applied to the repurposing of existing pipelines.



Key

Symbols

-
- △
-
- ◁
- ⊗
- ⊗

- pipelines covered by this document
- pipelines not covered by this document
- pressure regulation
- pressure safety system
- metering, gas analysis and sampling system
- compression
- valve
- isolation device

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Stations

- 1 P - well, production
- 2 T - treatment
- 3 D - odorization
- 4 S 1 - gas receiving
- 5 S 2 - valve station
- 6 S 3 - delivery station
- 7 S 4 - compressor station
- 8 S 5 - other supply (e.g. for blending)
- 9 S 6 - export or import (e.g. storage and neighbouring network)
- 10 S 7 - pressure regulating
- 11 S 8 - domestic distribution
- 12 S 9 - industrial distribution
- 13 S 10 - storage

Figure 1 — Schematic representation of pipelines for gas supply over 16 bar

This document specifies common basic principles for gas infrastructure. Users of this standard are expected to be aware that more detailed national standards and/or code of practice can exist in the CEN member countries.

This document is intended to be applied in association with these national standards and/or codes of practice setting out the above-mentioned basic principles.

In the event of conflicts in terms of more restrictive requirements in national legislation/regulation with the requirements of this standard, the national legislation/regulation takes precedence as illustrated in CEN/TR 13737.

CEN/TR 13737 gives:

- clarification of all legislations/regulations applicable in a member state;
- if appropriate, more restrictive national requirements;
- a national contact point for the latest information.

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 1515-3, *Flanges and their joints - Bolting - Part 3: Classification of bolt materials for steel flanges, class designated*

EN 1759-1, *Flanges and their joint - Circular flanges for pipes, valves, fittings and accessories, Class designated - Part 1: Steel flanges, NPS 1/2 to 24*

EN 1998-4, *Eurocode 8 - Design of structures for earthquake resistance - Part 4: Silos, tanks and pipelines*

<https://standards.iteh.ai/catalog/standards/sist/2bd92453-4cbd-4321-b5b4-42022>
EN 10204, *Metallic products - Types of inspection documents*

EN 10289, *Steel tubes and fittings for onshore and offshore pipelines - External liquid applied epoxy and epoxy-modified coatings*

EN 10290, *Steel tubes and fittings for onshore and offshore pipelines - External liquid applied polyurethane and polyurethane-modified coatings*

EN 12186, *Gas infrastructure - Gas pressure regulating stations for transmission and distribution - Functional requirements*

EN 12327, *Gas infrastructure - Pressure testing, commissioning and decommissioning procedures - Functional requirements*

EN 12560-1, *Flanges and their joints - Gaskets for Class-designated flanges - Part 1: Non-metallic flat gaskets with or without inserts*

EN 12560-2, *Flanges and their joints - Dimensions of gaskets for Class-designated flanges - Part 2: Spiral wound gaskets for use with steel flanges*

EN 12560-3, *Flanges and their joints - Gaskets for Class-designated flanges - Part 3: Non-metallic PTFE envelope gaskets*

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EN 12560-4, *Flanges and their joints - Gaskets for Class-designated flanges - Part 4: Corrugated, flat or grooved metallic and filled metallic gaskets for use with steel flanges*

EN 12583, *Gas Infrastructure - Compressor stations - Functional requirements*

EN 12732, *Gas infrastructure - Welding steel pipework - Functional requirements*

EN 14141, *Valves for natural gas transportation in pipelines - Performance requirements and tests*

EN ISO 3183:2019, *Petroleum and natural gas industries - Steel pipe for pipeline transportation systems (ISO 3183:2019)*

EN ISO 6892-1, *Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1)*

EN ISO 12944-1, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 1: General introduction (ISO 12944-1)*

EN ISO 12944-2, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 2: Classification of environments (ISO 12944-2)*

EN ISO 12944-3, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 3: Design considerations (ISO 12944-3)*

EN ISO 12944-4, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 4: Types of surface and surface preparation (ISO 12944-4)*

EN ISO 12944-5, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 5: Protective paint systems (ISO 12944-5)*

EN ISO 12944-6, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 6: Laboratory performance test methods (ISO 12944-6)*

EN ISO 12944-7, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 7: Execution and supervision of paint work (ISO 12944-7)*

EN ISO 12944-8, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 8: Development of specifications for new work and maintenance (ISO 12944-8)*

EN ISO 15741, *Paints and varnishes - Friction-reduction coatings for the interior of on- and offshore steel pipelines for non-corrosive gases (ISO 15741)*

EN ISO 15589-1, *Petroleum, petrochemical and natural gas industries - Cathodic protection of pipeline systems - Part 1: On-land pipelines (ISO 15589-1)*

EN ISO 21809-1, *Petroleum and natural gas industries - External coatings for buried or submerged pipelines used in pipeline transportation systems - Part 1: Polyolefin coatings (3-layer PE and 3-layer PP) (ISO 21809-1)*

EN ISO 21809-3, *Petroleum and natural gas industries - External coatings for buried or submerged pipelines used in pipeline transportation systems - Part 3: Field joint coatings (ISO 21809-3)*

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 <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

abandonment

permanent decommissioning where a pipeline or a pipeline section is physically isolated from the gas pipeline system

3.2

battery limit

defined boundary between two areas of responsibility, which can be physical or represented by a map coordinate

Note 1 to entry: Physical boundary can be flange on a pipe.

3.3

casing

protection by means of a construction around the pipeline in order to prevent external loads, or third party interference

3.4

commissioning

activities required to pressurise pipework, stations, equipment and assemblies with gas and to put them into operation

3.5

control zone

strip of land along the pipeline over which the pipeline operator has a right to control activities

3.6

decommissioning

activities required to take out of service any pipework, station, equipment or assemblies filled with gas and to disconnect them from the system

3.7

design factor

f_0

factor applied when calculating the wall thickness or pressure

3.8

design pressure

DP

pressure on which design calculations are based

3.9

design temperature

temperature on which design calculations are based

prEN 1594:2022 (E)**3.10****emergency**

situation which could affect the safe operation of the gas infrastructure and/or the safety of the surrounding area, requiring urgent action

3.11**gas**

substance which is in gaseous state at a temperature of 15 °C under atmospheric pressure (1,013 25 bar absolute)

Note 1 to entry: For the purpose of this document, gas is considered non-toxic and non-corrosive natural gas, biomethane gas, hydrogen gas and mixtures of these gasses where technical evaluation has ensured that operating conditions or constituents or properties of the gas do not affect the safe operation of the pipeline.

3.12**gas distribution system**

pipeline system including piping above and below ground and all other equipment necessary to supply the gas to the consumers

3.13**gas transmission**

activity intended to convey gas from one place to another through pipelines in order to supply gas to distribution systems or to industrial consumers

3.14**golden weld**

weld on which a strength test is not performed

EXAMPLE The test sections tie-in welds and the test section-station tie-in welds are considered “golden welds”.

3.15**horizontal drilling direction****HDD**

steerable trenchless method of installing underground pipelines in a shallow arc along a prescribed bore path by using a surface-launched drilling rig, with minimal impact on the surrounding area

Note 1 to entry: Directional boring is used when trenching excavating is not practical.

3.16**incident**

unexpected occurrence, which could lead to an emergency situation

Note 1 to entry: This includes a leakage of gas or plant failure.

3.17**incidental pressure****IP**

pressure which occurs incidentally within a system at which a safety device becomes operative

3.18**inspection**

process of measuring, examining, testing, gauging or otherwise determining the status of items of the pipeline system, or installation and comparing it with the applicable requirements

3.19**installation**

equipment and facilities for the extraction, production, chemical treatment, measurement, compression, control, blend, storage, or off-take of the transported gas

3.20**installation temperature**

temperature arising from ambient or installation conditions during laying or during construction

3.21**maintenance**

combination of all technical and associated administrative actions intended to keep an item in, or restore it to, a state in which it can perform its required function

3.22**maximum incidental pressure****MIP**

maximum pressure which a gas system can experience during a short time, limited by the safety devices

3.23**maximum operating pressure****MOP**

maximum pressure at which a system can be operated continuously under normal conditions

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

3.24**national requirement**

requirement following from national legislation or more detailed or stringent national standards

3.25**onshore pipeline**

buried and/or above-ground pipeline including those sections laid in or across inland lakes or water courses

3.26**operating pressure****OP**

pressure which occurs within a system under normal operating conditions

3.27**operating temperature****OT**

temperature which occurs within a system under normal operating conditions

3.28**pig**

device which is driven through a pipeline for performing various internal activities

Note 1 to entry: The internal activities depend on pig type and can include separating fluids, cleaning or inspecting the pipeline.