SLOVENSKI STANDARD
SIST EN 12007-1:2000

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Sistemi oskrbe s plinom - Cevovodni sistemi za najvišji delovni tlak do vključno 16 bar - 1. del: Splošna funkcionalna priporočila

Gas supply systems - Pipelines for maximum operating pressure up to and including 16 bar - Part 1: General functional recommendations

Gasversorgungssysteme - Rohrleitungen mit einem maximal zulässigen Betriebsdruck bis einschließlich 16 bar - Teil 1: Allgemeine funktionale Empfehlungen

Systemes d'alimentation en gaz - Canalisations pour pression maximale de service inférieure ou égale a 16 bar - Partie 1: Recommandations fonctionnelles générales

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Gas supply systems - Pipelines for maximum operating pressure up to and including 16 bar - Part 1: General functional recommendations

Systèmes d'alimentation en gaz - Canalisations pour pression maximale de service inférieure ou égale à 16 bar - Partie 1: Recommandations fonctionnelles générales

Gasversorgungssysteme - Rohrleitungen mit einem maximal zulässigen Betriebsdruck bis einschließlich 16 bar - Teil 1: Allgemeine funktionale Empfehlungen

This European Standard was approved by CEN on 9 April 1999.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 234 "Gas supply", 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 2000, and conflicting national standards shall be withdrawn at the latest by July 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

There is a complete suite of functional standards prepared by CEN/TC 234 "Gas Supply" to cover all parts of the gas supply system 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.

In preparing this standard a basic understanding of gas supply by the user has been assumed.

Gas supply systems are 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 the member countries. These detailed statements embrace recognised standards of gas engineering and the specific requirements imposed by the legal structures of the member countries.

1 Scope

This European Standard describes the general functional recommendations for pipelines up to the point of delivery, and also for buried sections of pipework after the point of delivery, for maximum operating pressures up to and including 16 bar for gaseous fuels in accordance with table 1 of EN 437:1993 . It applies to their design, construction, commissioning, decommissioning, operation, maintenance, renovation, extension and other associated works.

This European Standard does not apply to the materials, design, construction, testing and commissioning of gas supply systems in use prior to the publication of this standard. However, this European Standard does apply to the operation, maintenance, renovation and extension of all gas supply systems.

Specific functional recommendations for polyethylene pipelines are given in EN 12007-2, for steel pipelines in EN 12007-3 and for the renovation of pipelines in EN 12007-4. Functional recommendations for pipework for buildings are given in EN 1775.

Functional requirements for pressure testing, commissioning and decommissioning are given in EN 12327.

Functional requirements for measuring systems are given in EN 1776.

Functional requirements for pressure regulating stations are given in EN 12186. Functional requirements for pressure regulating installations are given in EN 12279.

Functional requirements for gas transmission are given in EN 1594.

This European Standard specifies common basic principles for gas supply systems.Users of this European Standard should be aware that more detailed national standards and/or codes of practice can exist in the CEN member countries.

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

2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 437: 1993	Test gases - Test pressures - Appliance categories.
EN 1594	Gas supply systems - Pipelines for maximum operating pressure over 16 bar - Functional requirements
EN 1775	Gas supply - Gas pipework for buildings - Maximum operating pressure ≤ 5 bar - Functional recommendations
EN 1776	Gas supply - Natural gas measuring stations - Functional requirements
EN 12007-2	Gas supply systems - Pipelines for maximum operating pressure up to and including 16 bar - Part 2: Specific functional recommendations for polyethylene (MOP up to and including 10 bar)
EN 12007-3	Gas supply systems -Pipelines for maximum operating pressure up to and including 16 bar - Part 3: Specific functional recommendations for steel
EN 12007-4	Gas supply systems - Pipelines for maximum operating pressure up to and including 16 bar - Part 4: Specific functional recommendations for renovation
EN 12186	Gas supply systems - Gas pressure regulating stations for transmission and distribution
EN 12279	Gas supply systems - Gas pressure regulating installations for service lines

EN 12327 Gas supply systems - Pressure testing, commissioning and decommissioning procedures - Functional requirements

3 Definitions and abbreviations

For the purposes of this standard, the following definitions and abbreviations apply:

3.1 gas supply system: The pipeline systems including pipework and their associated stations or plants for the transmission and distribution of gas.

3.2 pipeline: A system of pipework with all associated equipment and stations up to the point of delivery. This pipework is mainly below ground but includes also above ground parts.

3.3 pipeline components: The elements from which the pipeline is constructed. The following are distinct pipeline elements:

– pipes, including cold formed bends;

– fittings;

EXAMPLE 1: Reducers, tees, factory-made elbows and bends, flanges, caps, welding stubs, mechanical joints

– ancillaries;

EXAMPLE 2: Valves, expansion joints, insulating joints, pressure regulators, pumps, compressors

– pressure vessels.

3.4 main: A pipework in a gas supply system to which service lines are connected.

3.5 service line: The pipework from the main to the point of delivery of the gas into the installation pipework.

3.6 installation pipework: The pipework, downstream of the point of delivery terminating at the appliance inlet connection.

NOTE: This pipework is normally the property of the customer.

3.7 point of delivery: The point of transfer of ownership of gas from the supplier to the customer.

NOTE: This can be at a means of isolation or at the meter outlet connection.

3.8 competent authority: A body authorised by the member country to ensure that the pipeline operator fulfils the requirements of this and other relevant standards.

3.9 pipeline operator: The private or public organisation authorized to design, construct and or operate and maintain the gas supply system.

3.10 competent person: A person who is trained, experienced and approved to perform activities relating to gas supply systems.

NOTE: Means of approval, if any, will be determined within each member country.

3.11 gas: A gaseous fuel which is in gaseous state at a temperature of 15 °C under atmospheric pressure (1,013 25 bar absolute).

3.12 pressure: The gauge pressure of the fluid inside the system, measured in static conditions.

3.13 design pressure (DP): The pressure on which design calculations are based.

3.14 maximum operating pressure (MOP): The maximum pressure at which a system can be operated continuously under normal operating conditions.

NOTE: Normal operating conditions are: no fault in any device or stream.

3.15 temporary operating pressure (TOP): The pressure at which a system can be operated temporarily under control of the regulating devices.

3.16 maximum incidental pressure (MIP): The maximum pressure which a system can experience during a short time, limited by the safety devices.

3.17 strength test pressure (STP): The pressure applied to a system during strength testing.

3.18 combined test pressure (CTP): The pressure applied to a system during combined testing.

3.19 lower explosive limit (LEL): The concentration of flammable gas or vapour in air, below which the gas atmosphere is not explosive

4 Quality

4.1 Quality management

To provide a consistent and appropriate standard of quality management the pipeline operator shall have organisational, operational and administrative procedures to ensure that activities can be undertaken in a safe and technically sound manner. The pipeline operator shall have suitable systems for technical audit, safety audit and performance review to ensure that established procedures and training programmes continue to meet the obligations of the pipeline operator to users. These should take into account experiences gained.

EXAMPLE 1: Operational incidents or other relevant dangerous occurrences.

This system should include, for each activity:

- adequate numbers of competent persons
- adequate other resources.

EXAMPLE 2: vehicles, communication systems and appropriate tools.

4.2 Competence

The qualification of competent persons involved in the design, construction, operation and maintenance of a gas supply system, or parts of it, shall be in accordance with the characteristics of the pipeline system they are working on. These characteristics include, but are not limited to the following:

- family of gas;
- local conditions;
- design or operating pressure;
- materials used in the system;
- jointing techniques;
- emergency procedures.

5 Gas characteristics

5.1 Gas quality and family

The quality and family of gas supplied through a gas supply system shall be specified so that its characteristics are known to system designers, and pipeline operators. This specification includes all relevant characteristics which contribute to safe operation and combustion. Changes in the properties of the gas which fall outside pre-determined operating limits shall be notified to pipeline operators in advance.

Gas may also be treated or conditioned for operational and maintenance reasons.

EXAMPLE 1: For the control of leakage

EXAMPLE 2: For the control of icing conditions at pressure regulating stations and installations.

Safe operating procedures for systems supplying gases heavier than air shall recognise the tendency for these gases to settle downwards should they escape from the system.

5.2 Odourisation

Gas supplied to end users should possess a distinctive odour.

Where gas is to possess a distinctive odour its presence in the atmosphere shall be readily detectable at all gas concentrations of one fifth of the lower explosive limit and above. Where the gas does not possess a natural distinctive odour one shall be added for the purpose.

The odourant, where added, shall be non-toxic and harmless for the concentrations employed in normal applications, and the odour shall disappear after combustion.

An odourant may be omitted in gas delivered specifically for further processing or other special purposes. In this case alternative means shall be available to detect leaks.

5.3 Toxicity and lack of oxygen

The potential toxic effects of gas constituents and the potential lack of oxygen shall be considered to ensure safety in all work practices undertaken on the gas supply system, in using the gas and in dealing with escaping gas.

6 Materials

The characteristics of materials of pipes, fittings and components and the mode of construction of pipelines shall be appropriate to the types of gas being supplied and the conditions under which they are operated.

Materials and products shall conform to the relevant European Standards or, in their absence, to the national or other established standards and shall be of a quality fit for purpose. Consideration shall be given to the effects of climatic conditions on material behaviour and its consequential influence on performance. Materials can give a different technical performance in risk or long term behaviour when exposed to or stored under extreme climatic conditions. For further information reference should be made to the specific standards for the materials concerned.

EXAMPLE 1: The critical pressure for rapid crack propagation in polyethylene pipe is reduced at lower temperatures.

EXAMPLE 2: Loss of resilience can occur in steel pipes at low temperatures, or disbondment of coatings at high temperatures.

7 Design

7.1 General

Gas supply systems are designed to provide a safe and continuous supply of gas. This design considers technical aspects and procedures together with environmental and safety aspects.

The gas supply system consists of pipeline components arranged in networks or single lines, with associated pressure regulating stations or installations and connections to consumers via service lines.

NOTE: During the design phase these parts of the system can be considered separately.

Basic data and design principles should be documented together with the actual data as the gas supply system is built. Data such as the diameter, material, design pressure, family of gas and routing maps should be available as long as the gas supply system is in operation (see 13.2).

7.2 Basic design data

The design of any gas supply system, or part thereof, should commence with a study collecting relevant basic data for the part of the gas supply system to be installed. This basic data include, but are not limited to the following:

- the family of gas;
- anticipated gas flow;
- design pressure;
- diameter(s);
- construction materials;
- layout of the existing gas supply system;
- the need for pressure regulation;
- provisional routing of pipeline sections.

The design of the gas supply system for flow rate capacity shall as a minimum take account of, but not be limited to the following:

a) the family of the gas;

b) the location and number of actual or anticipated customers, the predicted customer type, consumption patterns and climatic conditions in the area to be served. Due account should be taken of the diversity of demand in establishing design flow rates;

c) the technical operating values to be applied such as:

1) the pressure, which is required to be maintained within values that permit correct functioning of pressure regulators and specific user appliances, at all parts of the system;

2) the requirement to maintain a minimum pressure in the supply system according to the rules of the member countries and the normal pressure range for the system concerned to ensure the safe use of gas;

3) the gas velocity in the pipes, which should be sufficiently low as to limit excessive movement of any impurities and the generation of unacceptable noise phenomena;

d) the diameter sizing formulas, elected from those generally used according to pressure ranges. In the case of complex networks, appropriate computer calculation procedures can be used. The parameters identified above should be explicitly indicated in the design process;

e) the dynamic variations in gas flow due to special industrial applications.

EXAMPLE: on-off burners.

7.3 Pressure relationships

The relationship between pressures is given in Table 1.

Table 1: Pressure relationships

MOP[1] bar	TOP ≤	MIP ≤	STP/CTP >
5<P≤16	1,2 MOP	1,30 MOP	MIP
2<P≤5	1,3 MOP	1,40 MOP	MIP
0,1<P≤2	1,5 MOP	1,75 MOP	MIP
P≤ 0,1	1,5 MOP	2,50 MOP[2]	MIP
[1]These relations are only valid when DP=MOP			
[2]When gas appliances, tightness tested at 150 mbar, are directly connected to installation pipework, the MIP downstream of the regulator shall be limited to 150 mbar.			

MOP shall be equal to or less than the design pressure of the system, including its components. The maximum set value of the active pressure regulator in the working stream shall not exceed MOP.

NOTE: Where MOP is less than DP, the pressure relationships given in table 1 can be related to DP.

EXAMPLE: Where DP is equal to 0,1 bar and MOP equal to 0,075 bar TOP can reach 1,5 X 0,1 bar and MIP can reach 2,5 X 0,1 bar.

For information on specific pressure settings reference should be made to EN 12186 and EN 12279.

7.4 Pipeline sections

Pipeline sections shall be supported, anchored or buried in such a way that, during their lifetime the pipeline sections will not move with respect to their installed position, except for the foreseen permitted displacements.

Submerged pipes shall have enough own weight or outside loading during the construction and operation phases to guarantee horizontal and vertical stability. The pipe wall thickness selection should be based on sufficient resistance to internal pressure and also the forces expected during handling and transportation.

Additional measures should be provided as necessary to protect the pipe against third party damage, these measures include, but are not limited to the following:

- increased depth of cover;
- a control zone along the pipeline route;
- increased wall thickness;
- additional mechanical protection;
- increased frequency of surveillance.

7.4.1 Routing

7.4.1.1 Public area

Pipelines routed along public streets should comply with legal requirements concerning consent, location and distances. Where there is a choice, mains should be laid preferably in footways or verges.