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**Sistemi oskrbe s plinom - Cevovodni sistemi za najvišji delovni tlak do vključno 16 bar - 3. del: Posebna funkcionalna priporočila za jekla**

Gas supply systems - Pipelines for maximum operating pressure up to and including 16 bar - Part 3: Specific functional recommendations for steel

Gasversorgungssysteme - Rohrleitungen mit einem maximal zulässigen Betriebsdruck bis einschließlich 16 bar - Teil 3: Besondere funktionale Empfehlungen für Stahl

Systemes d'alimentation en gaz - Canalisations pour pression maximale de service inférieure ou égale a 16 bar - Partie 3: Recommandations fonctionnelles spécifiques pour l'acier

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**EN 12007-3**

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**Gas supply systems - Pipelines for maximum operating pressure  
up to and including 16 bar - Part 3: Specific functional  
recommendations for steel**

Systèmes d'alimentation en gaz - Canalisations pour  
pression maximale de service inférieure ou égale à 16 bar -  
Partie 3: Recommandations fonctionnelles spécifiques pour  
l'acier

Gasversorgungssysteme - Rohrleitungen mit einem  
maximal zulässigen Betriebsdruck bis einschließlich 16 bar  
- Teil 3: Besondere funktionale Empfehlungen für Stahl

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 specific functional recommendations for steel pipelines in addition to the general functional recommendations of EN 12007-1 for maximum operating pressures up to and including 16 bar.

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 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.

prEN 1092-1	Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 1: Steel flanges
EN 1514-1	Flanges and their joints - Dimensions of gaskets for PN-designated flanges - Part 1: Non-metallic flat gaskets with or without inserts
EN 1514-2	Flanges and their joints - Dimensions of gaskets for PN-designated flanges - Part 2: Spiral wound gaskets for use with steel flanges
EN 1514-3	Flanges and their joints - Dimensions of gaskets for PN-designated flanges - Part 3: Non-metallic PTFE envelope gaskets
EN 1514-4	Flanges and their joints - Dimensions of gaskets for PN-designated flanges - Part 4: Corrugated flat or grooved metallic and filled metallic gaskets for use with steel flanges
prEN 1515-1	Flanges and their joints - Bolting - Part 1: Selection of bolting
prEN 1515-2	Flanges and their joints - Bolting - Part 2: Combination of flange and bolting materials for steel flanges - PN designated
prEN 1591	Flanges and their joints - Design rules for gasketed circular flange connections - Calculation method
prEN 1594	Gas supply systems - Pipelines - Maximum operating pressure over 16 bar - Functional requirements
EN 10204	Metallic products - Types of inspection documents

EN 10208-1	Steel pipes for pipelines for combustible fluids - Technical delivery conditions - Part 1: Pipes of requirement class A
EN 10208-2	Steel pipes for pipelines for combustible fluids - Technical delivery conditions - Part 2: Pipes of requirement class B
ENV 10220	Seamless and welded steel tubes - Dimensions and masses per unit length
prEN 10226-1	Pipe threads where pressure tight joints are made on the threads - Part 1: Designation, dimensions and tolerances
prEN 10285	Steel tubes and fittings for on and offshore pipelines - External three layer extruded polyethylene based coatings
prEN 10286	Steel tubes and fittings for on and offshore pipelines - External three layer extruded polypropylene based coatings
prEN 10287	Steel tubes and fittings for on and offshore pipelines - External fused polyethylene based coatings
prEN 10288	Steel tubes and fittings for on and offshore pipelines - External two layer extruded polyethylene based coatings
prEN 10289	Steel tubes and fittings for on and offshore pipelines - External liquid applied epoxy and epoxy-modified coatings
prEN 10290	Steel tubes and fittings for on and offshore pipelines - External liquid applied polyurethane and polyurethane-modified coatings
EN 12007-1	Gas supply systems - Pipelines for maximum operating pressure up to and including 16 bar - Part 1: General functional recommendations
EN 12068	Cathodic protection - External organic coatings for the corrosion protection of buried or immersed steel pipelines used in conjunction with cathodic protection - Tapes and shrinkable materials
prEN 12560-1	Flanges and their joints - Dimensions of gaskets for Class-designated flanges - Part 1: Non-metallic flat gaskets with or without inserts
prEN 12560-2	Flanges and their joints - Dimensions of gaskets for Class-designated flanges - Part 2: Spiral wound gaskets for use with steel flanges
prEN 12560-3	Flanges and their joints - Dimensions of gaskets for Class-designated flanges - Part 3: Non-metallic PTFE envelope gaskets
prEN 12560-4	Flanges and their joints - Dimensions of gaskets for Class-designated flanges - Part 4: Corrugated, flat or grooved metallic and filled metallic gaskets for use with steel flanges
prEN 12560-5	Flanges and their joints - Dimensions of gaskets for Class-designated flanges - Part 5: Metallic ring-joint gaskets for use with steel flanges
prEN 12732	Gas supply systems - Welding steel pipework - Functional requirements

### 3 Definitions

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

**3.1 compression joint:** A type of joint in which gas tightness is achieved by compression within a socket with or without a seal.

**3.2. threaded joint:** A type of joint in which gas tightness is achieved by metal to metal contact within threads with the assistance of a sealant.

**3.3 flanged joint:** A type of joint in which gas tightness is achieved by compression of a gasket between the faces of two flanges.

**3.4 insulating joint:** A fitting installed to insulate electrically one section of pipeline from another.

**3.5 inspection:** The 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.

**3.6 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.

**3.7 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;

## 4 Design

### 4.1 General requirements for selection of steel materials

Pipes and other pipeline components shall conform to the relevant European Standards. In the absence of such standards or where such standards are incomplete, characteristics such as chemical and mechanical properties or dimensions of the final product or manufacturing or test procedures shall be subject of agreement between pipeline operator and manufacturer.

#### 4.1.1 Base material

Pipes and other pipeline components shall be manufactured from fully killed steel. Steel made by the Martin process shall not be used.

#### 4.1.2 Quality level

The quality level as defined by the relevant standards for other pipeline components shall be consistent with the quality level of the pipes.

#### 4.1.3 Weldability

Pipes and other pipeline components shall be capable of being welded reliably under site conditions.

To meet the weldability criteria the value of the carbon equivalent CE of pipes and other pipeline components shall be less than or equal to 0,45 for grades with specified minimum yield strength SMYS not exceeding 360 Mpa unless otherwise agreed between pipeline operator and manufacturer. This value shall be guaranteed by the manufacturer. For all grades of steel the maximum carbon content shall not exceed 0,21 % and the maximum guaranteed values of sulphur and phosphorus contents shall not exceed 0,035 % for each element or 0,05 % in total on the ladle analysis.

NOTE: Carbon equivalent is given by the formula:

$$CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Cu + Ni}{15}$$

Where:

CE	is the carbon equivalent,
C	is the weight percentage of carbon content,
Mn	is the weight percentage of manganese content,
Cr	is the weight percentage of chromium content,
Mo	is the weight percentage of molybdenum content,
V	is the weight percentage of vanadium content,
Cu	is the weight percentage of copper content,
Ni	is the weight percentage of nickel content.

If in exceptional cases grades of steel are used which do not fulfil these requirements, the manufacturer shall give detailed data concerning the weldability of the material. The pipeline operator may fix a test of weldability, if the provided data are not sufficient.

#### 4.1.4 Impact energy

Where climatic conditions require materials with proven impact properties reference shall be made to EN 10208-2.

#### 4.1.5 Inspection documents for components

Conformity of components for the use with maximum operating pressures up to and including 5 bar shall be certified by an inspection document 2.2 in accordance with EN 10204. Conformity of components for the use with maximum operating pressures over 5 bar shall be certified by an inspection document 3.1B in accordance with EN 10204.

#### 4.1.6 Other steels

Steel types or grades other than those listed in EN 10208-1 may also be used when their suitability has been demonstrated. The requirements of the relevant standards referred to shall be used for guidance in establishing material properties.

#### 4.2 Pipes and fittings

##### 4.2.1 Steel pipes

Steel pipes of external diameter up to and including 1 626 mm shall conform to EN 10208-1.

The criteria for steel pipes of external diameter greater than 1 626 mm shall be agreed upon between pipeline operator and manufacturer.

Where the nominal wall thickness is greater than or equal to the value given in Table 1 it is not necessary to carry out any stress calculations to take account of internal pressure.

**Table 1: Nominal wall thickness**

Dimensions in mm

nominal diameter $DN$	25	40	50	65	80	100	125	150
external diameter $D$	33,7	48,3	60,3	76,1	88,9	114,3	139,7	168,3
nominal wall thickness $s$	2,6	2,6	2,9	2,9	3,2	3,2	3,6	4
nominal diameter $DN$	200	250	300	350	400	500	600	> 600
external diameter $D$	219,1	273	323,9	355,6	406,4	508	610	> 610
nominal wall thickness $s$	4,5	5,0	5,6	5,6	6,3	6,3	6,3	1% of $D$

Consideration should be given to using pipes of greater wall thickness than given in Table 1 in certain situations.

EXAMPLE: Horizontal drilled sections, crossings with major public works (dykes, waterways, roads), areas with great soil settlement differences, pipes being subjected to abnormal ground loading.

Where wall thicknesses less than those given in Table 1 are being considered design calculations shall be undertaken. Guidance on wall thickness calculation is given in annex C.

The minimum pipe wall thicknesses shall be as given in Table 2.

**Table 2: Minimum wall thickness**

Dimensions in mm

nominal diameter $DN$	25 - 50	65 - 125	150 - 300	350 - 400	$\geq 450$
minimum wall thickness $s_{min}$	2,3	2,6	3,5	4,5	1 % of $D$

##### 4.2.2 Fittings

Fittings shall comply with the appropriate European Standards.

Safety factors applied to the design of factory made bends and reducers shall be at least equal to the safety factor of the pipes. For other fittings the safety factor shall be at least 1,8.

Design calculations shall be undertaken for pipe bends hot formed from straight pipe, with bend radii less than 1,5 times the external pipe diameter where the wall thickness is less than that specified in ENV 10220 construction series D and the final yield strength is less than 240 N/mm<sup>2</sup>.



## 4.3 Insulating joints

### 4.3.1 Type test

Insulating joints shall be type tested.

Insulating joints can be designed as insulating couplings or insulating flanges.

### 4.3.2 Strength test

Any insulating coupling shall be hydrostatically tested at a test pressure of at least 1,5 times the design pressure of the component. End sealing methods which subject the coupling to axial compression shall not be used.

The hydrostatic cycle test sequence should be agreed upon between pipeline operator and manufacturer.

### 4.3.3 Tightness test

Following a successful hydrostatic test, any insulating coupling shall be tested with air at 5 bar. There shall be no leakage.

### 4.3.4 Electrical test

Any insulating joint shall be tested in dry condition for 1 minute at a minimum voltage of 2000 V a.c. (50 Hz). This shall not give rise to any corona effects or an insulation breakdown.

Following a successful hydrostatic test, where applicable, the resistance in the dry condition shall not be less than 0,1 M $\Omega$  when tested with a minimum voltage of 500 V d.c.

### 4.3.5 Inspection documents

Conformity of insulating joints shall be certified by an inspection document 3.1B in accordance with EN 10204.

## 4.4 Valves

Valves shall comply with the appropriate European Standards where appropriate. In the absence of a European Standard the appropriate standard of a member country may be used.

NOTE: European Standards for valves are being prepared by CEN/TC 69.

## 4.5 Corrosion protection

Corrosion protection systems shall conform to the following European Standards, as far as available.

Such standards include, but are not limited to the following:

- 1) for passive systems the European Standards prEN 10285, prEN 10286, prEN 10287, prEN 10288, prEN 10289, prEN 10290;
- 2) for passive and active systems the European Standard EN 12068.

Conformity of coating shall be certified by an inspection document 2.2 in accordance with EN 10204.

## 4.6 Off-take connections made of straight pipes

Off-take connections made of straight pipes with nominal wall thicknesses equal to those given in Table 1 do not require any further design calculation, where the nominal diameter of the off-take does not exceed the appropriate value given in Table 3 and where the main pipe and off-take are of the same material specification. In all other cases design calculations shall be undertaken.