SLOVENSKI STANDARD
SIST EN 12007-2:2013

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Nadomešča:
SIST EN 12007-2:2000

Infrastruktura za plin - Cevovodni sistemi za najvišji delovni tlak do vključno 16 bar - 2. del: Posebne funkcionalne zahteve za polietilen (najvišji delovni tlak do vključno 10 bar)

Gas infrastructure - Pipelines for maximum operating pressure up to and including 16 bar - Part 2: Specific functional requirements for polyethylene (MOP up to and including 10 bar)

Gasinfrastruktur - Rohrleitungen mit einem maximal zulässigen Betriebsdruck bis einschließlich 16 bar - Teil 2: Besondere funktionale Anforderungen für Polyethylen (MOP bis einschließlich 10 bar)

Infrastructures gazières - Canalisations pour pression maximale de service inférieure ou égale à 16 bar - Partie 2: Recommandations fonctionnelles spécifiques pour polyéthylène (MOP inférieure ou égale à 10 bar)

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91.140.40 Sistemi za oskrbo s plinom Gas supply systems

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EUROPEAN STANDARD
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English Version

Gas infrastructure - Pipelines for maximum operating pressure up to and including 16 bar - Part 2: Specific functional requirements for polyethylene (MOP up to and including 10 bar)

Infrastructures gazières - Canalisations pour pression maximale de service inférieure ou égale à 16 bar - Partie 2: Exigences fonctionnelles spécifiques pour le polyéthylène (MOP inférieure ou égale à 10 bar)

Gasinfrastruktur - Rohrleitungen mit einem maximal zulässigen Betriebsdruck bis einschließlich 16 bar - Teil 2: Spezifische funktionale Anforderungen für Polyethylen (MOP bis einschließlich 10 bar)

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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 CEN-CENELEC Management Centre has the same status as the official versions.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Contents

Page

Foreword

This document (EN 12007-2:2012) has been prepared by Technical Committee CEN/TC 234 “Gas infrastructure”, 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 February 2013, and conflicting national standards shall be withdrawn at the latest by February 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12007-2:2000.

Annex C provides details of significant technical changes between this European Standard and the previous edition.

EN 12007 *Gas infrastructure — Pipelines for maximum operating pressure up to and including 16 bar* consists of the following parts:

Part 1: General functional requirements

Part 2: Specific functional requirements for polyethylene (MOP up to and including 10 bar)Part 3: Specific functional requirements for steel

Part 4: Specific functional requirements for renovation

Part 5: Specific functional recommendations of new service lines[1]

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

[1] To be published.

1 Scope

This European Standard describes the specific functional requirements for polyethylene (PE) pipelines in addition to the general functional requirements of EN 12007-1 for:

a) a maximum operating pressure (MOP) up to and including 10 bar;

b) an operating temperature between -20 °C and +40 °C.

This European Standard covers three types of pipe:

— PE pipes including any identification stripes;

— PE pipes with co-extruded layers on either or both the outside and/or inside of the pipe;

— PE pipes with a peelable, contiguous thermoplastics additional layer on the outside of the pipe.

This European Standard specifies common basic principles for gas infrastructure. Users of this European Standard should be aware that more detailed national standards and/or code of practice may 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.

In the event of conflicts in terms of more restrictive requirements in national legislation/regulation with the requirements of this European Standard, the national legislation/regulation takes precedence as illustrated in CEN/TR 13737 (all parts).

CEN/TR 13737 (all parts) give:

— 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, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1555-1, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 1: General*

EN 1555-2, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 2: Pipes*

EN 1555-3, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 3: Fittings*

EN 1555-4, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 4: Valves*

EN 1555-5, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 5: Fitness for purpose of the system*

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

ISO 12176-1, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 1: Butt fusion*

ISO 12176-2, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 2: Electrofusion*

3 Terms, definitions, symbols and abbreviations

For the purposes of this document, the following terms, definitions, symbols and abbreviations apply.

3.1
nominal outside diameter
d_n
specified outside diameter

3.2
nominal wall thickness
e_n
numerical designation of the wall thickness of a component, which is a convenient round number, approximately equal to the manufacturing dimension in millimetres

3.3
standard dimension ratio
SDR
number approximately equal to the quotient of the nominal outside diameter and the nominal wall thickness

3.4
maximum operating pressure
MOP
maximum pressure at which a system can be operated continuously under normal operating conditions

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

3.5
maximum incidental pressure
MIP
maximum pressure which a system can experience during a short time limited by the safety devices

3.6
butt fusion joint
method of jointing PE pipes and fittings where the two pipe ends are heated and brought together to be fused without the use of a separate fitting or filler material

3.7
electrofusion joint
method of jointing PE pipes, using fittings which have an integrated electric heating element

3.8
squeeze-off
act of squeezing a pipe to prevent the flow of gas

3.9
minimum required strength
MRS
value of the lower confidence limit rounded down to the next lower value of the R10 series when the lower confidence limit is below 10 MPa, or to the next lower value of the R20 series when the lower confidence limit is 10 MPa or greater

Note 1 to entry: R10 and R20 series are the Renard number series conforming to ISO 3 and ISO 497.

3.10
lower confidence limit
LCL
quantity, expressed in MPa, which can be considered as a material property, representing the 97,5 % lower confidence limit of the predicted long term hydrostatic strength for water at 20 °C for 50 years

3.11
critical rapid crack propagation pressure
P_{RCP}
pressure level at which a rapid crack propagation (RCP) can occur in a PE pipeline, defined at a reference temperature

Note 1 to entry: Reference temperature is 0 °C.

3.12
peelable pipe
PE pipes with a peelable, contiguous thermoplastics additional layer on the outside of the pipe for the purpose of marking and colour identification and intended to be removed for the purposes of making welds or fusing pipe and fittings

4 Design

4.1 General

The PE 80 an PE 100 products are covered by CEN/TC 155, *Plastics piping systems and ducting systems*. Purchasing products to CEN standards can be part of a quality programme to ensure the safety and integrity of gas systems over their design life in service.

Developments in the gas market have required new kinds of PE pipe products in addition to the original PE 80 and PE 100 materials.

EXAMPLE New products include thinner wall pipes for renovation and products for trenchless techniques applications.

The selection of materials, SDR series, dimensions and assembling techniques shall be the responsibility of the pipeline operator.

4.2 Materials and components

PE materials and components used shall comply with EN 1555-1, EN 1555-2, EN 1555-3, EN 1555-4 and EN 1555-5.

Other components not covered by EN 1555-1, EN 1555-2, EN 1555-3, EN 1555-4 and EN 1555-5 shall conform to the relevant European Standards and International Standards or, in their absence, to national or other established standards and shall be fit for their purpose.

4.3 Maximum operating pressure

4.3.1 General

The *MOP* should be selected on the basis of the gas infrastructure operating requirements provided that the *MOP* does not exceed 10 bar and the conditions in 4.3.2 and 4.3.3 are satisfied.

4.3.2 Verification of the overall service (design) coefficient

The overall service (design) coefficient C shall be calculated using the formula as given below and in Figure 1 shall be greater than or equal to 2. This coefficient C takes into consideration service conditions as well as the properties and components of a pipeline.

$$C \geq \frac{20 \times MRS}{MOP \times (SDR - 1) \times D_F}$$

All pressures measured in bar.

NOTE Derating factor (D_F) is a coefficient used in the calculation of MOP which takes into account the influence of operating temperature. Derating factors are listed in EN 1555-5.

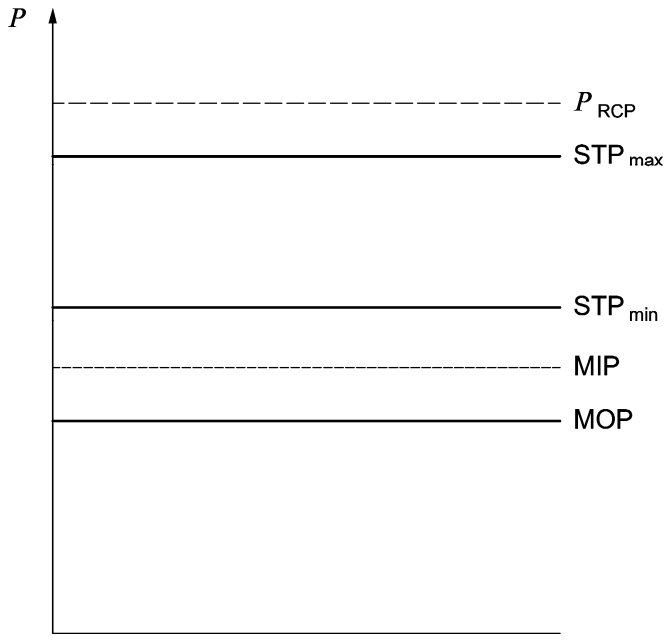
4.3.3 Verification of the RCP criterion

The ratio of critical RCP pressure to MOP shall be greater than or equal to 1,5.

The RCP criterion is the critical pressure, is dependent on pipe size and material, and shall be determined in accordance with EN 1555-2.

The critical RCP pressure is based on a temperature of 0 °C.

Where pipe temperature decreases below 0 °C the P_{ROP}/MOP ratio should be recalculated in accordance with EN 1555-5 using a value of RCP pressure determined from the minimum expected operating temperature of the pipe. The value of MOP should be reduced so as to maintain the P_{RCP}/MOP ratio at a value greater than or equal to 1,5. See Figure 1.



Key

P pressure levels;

P_{RCP} critical rapid crack propagation pressure;

STP_{max} maximum strength test pressure;

STP_{min} minimum strength test pressure;

MIP maximum incidental pressure;

MOP maximum operating pressure.

System design

$$MOP \leq \frac{20 \times MRS}{C \times (SDR - 1) \times D_F}$$

$$MOP \leq \frac{P_{RCP}}{1,5}$$

Pressure testing

$$1,5 \times MOP \leq STP \leq \frac{20 MRS}{SDR - 1}$$

$$MIP < STP \leq 0,9 P_{RCP}$$

NOTE For RCP conditions see EN 1555-2 and EN 1555-5.

Figure 1 — Pressure conditions in a PE-system

4.4 Assembly techniques

Jointing procedures can vary depending upon the PE material and sizes used.

The acceptable jointing methods that shall be used are:

— fusion joints; or

— mechanical joints.

Joints made between new and existing PE gas pipework shall be compatible with the materials being joined.

The fusion jointing techniques for the construction of PE pipelines shall be butt fusion and electrofusion.

Written jointing procedures, authorized by the pipeline operator, shall be available prior to the construction of a pipeline.

4.5 Material properties for flow stopping by squeeze-off

When squeeze-off techniques are considered, the suitability of pipe for squeeze-off shall be established in accordance with EN 1555-2.

4.6 Pipework inside buildings

The pipework element of the gas infrastructure situated in buildings shall be designed, constructed and protected so that the effects of a fire on pipework do not lead to an explosion or significant aggravation of the fire. Further guidance is given in EN 12007-1.

In accessible areas service lines shall be protected from external interference.

5 Construction

5.1 Storage, handling and transportation

Care shall be taken during the transport, handling and storage of pipes, fittings and other components to ensure at all stages that their specified properties and conditions, which can be affected by environmental factors, are preserved and that physical damage and distortions are avoided.

EXAMPLE At low temperatures, flexibility and fracture resistance are reduced.

Pipes and fittings shall be inspected and those with surface defects deeper than 10 % of the nominal wall thickness shall not be used.

PE pipes and fittings stored outside are subjected to UV degradation when exposed to direct daylight. PE materials are stabilized to give protection for a UV radiation level of 3,5 GJ/m^2. National bodies should give recommendations for allowed storage times in their countries. The average radiation level for one year in European countries are given in Figure 2.