SLOVENSKI STANDARD
oSIST prEN 12007-2:2011

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Infrastruktura za plin - Cevovodni sistemi za najvišji delovni tlak do vključno 16 bar - 2. del: Posebna funkcionalna priporočila 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 recommendations for polyethylene (MOP up to and including 10 bar)

Gasinfrastruktur - Rohrleitungen mit einem maximal zulässigen Betriebsdruck bis einschließlich 16 bar - Teil 2: Besondere funktionale Empfehlungen 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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Gas infrastructure - 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)

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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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Foreword

This document (prEN 12007-2:2010) 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 12007-2:2000.

1 Scope

This European Standard describes the specific functional recommendations for polyethylene (PE) pipelines in addition to the general functional recommendations of prEN 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 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

The following referenced documents are indispensable for the application 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.

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

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

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

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

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

prEN 12007-1, *Gas infrastructure — Pipelines for maximum operating pressure up to and including 16 bar — Part 1: General functional recommendations*

prEN 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/DIS 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 in millimetres

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
design pressure
DP
pressure on which design calculations are based

3.5
maximum operating pressure
MOP
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.

3.6
maximum incidental pressure
MIP
maximum pressure which a system can experience during a short time limited by the safety devices

3.7
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

3.8
electrofusion joint
method of jointing PE pipes, using fittings which have an integrated electric heating element

3.9
squeeze-off
act of squeezing a pipe to prevent the flow of gas

3.10
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 R10 and R20 series are the Renard number series conforming to ISO 3 and ISO 497.

3.11
lower confidence limit
LCL
quantity, expressed in megapascals, 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

3.12
critical rapid crack propagation pressure
***P*ROP**
pressure level at which a rapid crack propagation (ROP) can occur in a PE pipeline, defined at a reference temperature

NOTE Reference temperature is usually 0 °C.

4 Design

4.1 General

Developments in the gas market have required new kinds of PE pipe products in addition to the original PE 80 materials. These new products include thinner wall pipes with SDR down to 21, higher strength pipes such as PE 100 and multilayer pipes for cleaning the pipe prior to jointing. The technical standards for these PE products are covered by CEN TC 155: Plastic pipes and ducts. 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. Quality management is related to design, construction, control, maintenance and removal.

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

There are 2 SDRs in common use: SDR 17,6 and SDR 11. Other SDRs are also used.

EXAMPLE Renovation.

4.2 Materials and components

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

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

4.3 Maximum operating pressure

The MOP should be selected on this basis of the gas supply system operating requirements provided that

MOP does not exceed 10 bar and the following conditions are satisfied:

a) Verification of the overall service (design) coefficient

The overall service (design) coefficient *C* shall be calculated using the equation as given below and 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.

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

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 prEN 1555-5.

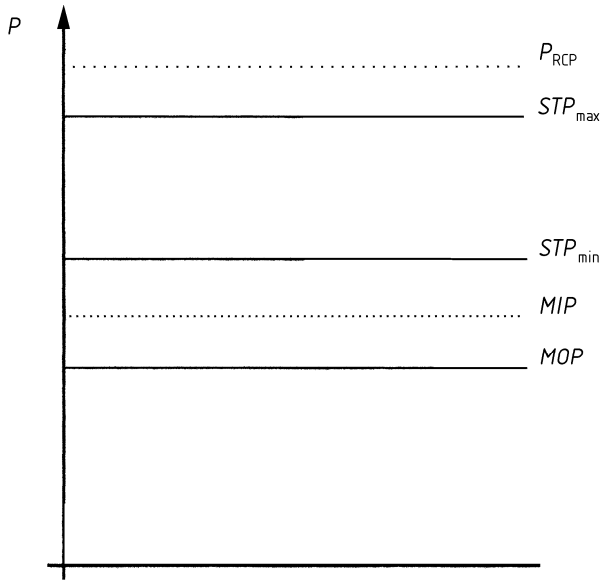
b) Verification of the ROP criterion

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

The RPO criterion is the critical ROP pressure is dependant upon pipe size and material and should be determined in accordance with prEN 1555-2.

The critical ROP 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 prEN 1555-5 using a value of ROP pressure determined from the minimum expected operating temperature of the pipe. If necessary the value of MOP should be reduced so as to maintain the P_{ROP}/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

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

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

Pressure Testing

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

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

NOTE RCP conditions: see prEN 1555 parts 2 and 5.

Figure 1 — Pressure conditions in a PE-system