

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)

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National foreword

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- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 21 and a back cover.

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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)

Systèmes d'alimentation en gaz — Canalisations pour pression maximale de service inférieure ou égale à 16 bar — Partie 2: Recommandations fonctionnelles spécifiques pour le polyéthylène (MOP inférieure ou égale à 10 bar)

Gasversorgungssysteme — Rohrleitungen mit einem maximal zulässigen Betriebsdruck bis einschließlich 16 bar — Teil 2: Besondere funktionale Empfehlungen für Polyethylen (MOP bis einschließlich 10 bar)

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

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Contents

	Page
Foreword	3
1 Scope	4
2 Normative references	4
3 Definitions and abbreviations	5
4 Design	5
4.1 General	5
4.2 Materials and components	5
4.3 Maximum operating pressure	6
4.4 Assembly techniques	7
4.5 Material properties for flow stopping by squeeze-off	7
4.6 Pipework inside buildings	7
5 Construction	8
5.1 Storage, handling and transportation	8
5.2 Jointing	8
5.3 Laying	9
5.4 Connection to existing systems	10
6 Quality control	11
6.1 Inspection prior to installation	11
6.2 Inspection during laying	11
7 Pressure testing	11
Annex A (INFORMATIVE) Storage, handling and transportation	12
Annex B (INFORMATIVE) Fusion joint integrity	15
Annex C (INFORMATIVE) Bibliography	21

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of an identical text or by endorsement, at the latest by July 2000, and conflicting national standards shall be withdrawn at the latest by July 2000.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 transport 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 recognized standards of gas engineering and the specific requirements imposed by the legal structures of the member countries.

1 Scope

This standard describes the specific functional recommendations for polyethylene (PE) pipelines in addition to the general functional recommendations 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 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.

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
EN 12007-1	Gas supply systems - Pipelines for maximum operating pressure up to and including 16 bar – Part 1: General functional recommendations
EN 12327	Gas supply systems - 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 Definitions and abbreviations

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

3.1 nominal outside diameter (d_n): The specified outside diameter in millimetres (mm).

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 (mm).

3.3 standard dimension ratio (SDR): The number approximately equal to the quotient of the nominal outside diameter and the nominal wall thickness.

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

3.5 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.

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

3.7 butt fusion joint: A 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: A method of jointing PE pipes, using fittings which have an integrated electric heating element.

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

3.10 minimum required strength (MRS): The 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): A quantity, expressed in megapascals (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.

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

NOTE: Reference temperature is usually 0 °C.

4 Design

4.1 General

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 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 RCP pressure is dependant upon pipe size and material and should be determined in accordance with prEN 1555-2.

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

Where pipe temperature decreases below 0 °C the P_{RCP}/MOP ratio should be recalculated in accordance with prEN 1555-5 using a value of RCP 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_{RCP}/MOP ratio at a value greater than or equal to 1,5. See figure 1.