
Infrastruktura za plin - Cevovodni sistemi za najvišji delovni tlak do vključno 16 bar - 6. del: Posebne funkcionalne zahteve za neplastificirani poliamid (PA-U)

Gas infrastructure - Pipelines for maximum operating pressure up to and including 16 bar - Part 6: Specific functional recommendations for unplasticized polyamide (PA-U)

Gasinfrastruktur - Rohrleitungen mit einem maximal zulässigen Betriebsdruck bis einschließlich 16 bar - Teil 6: Spezifische funktionale Anforderungen für weichmacherfreies Polyamid

Infrastructures gazières - Canalisations pour pression maximale de service inférieure ou égale à 16 bar - Partie 6 : Recommandations fonctionnelles spécifiques pour le polyamide non plastifié (PA-U)

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Gas infrastructure - Pipelines for maximum operating
pressure up to and including 16 bar - Part 6: Specific
functional recommendations for unplasticized polyamide
(PA-U)

Infrastructures gazières - Canalisations pour pression
maximale de service inférieure ou égale à 16 bar -
Partie 6 : Recommandations fonctionnelles spécifiques
pour le polyamide non plastifié (PA-U)

Gasinfrastruktur - Rohrleitungen mit einem maximal
zulässigen Betriebsdruck bis einschließlich 16 bar -
Teil 6: Spezifische funktionale Anforderungen für
weichmacherfreies Polyamid

This draft Technical Specification is submitted to CEN members for Vote. It has been drawn up by the Technical Committee CEN/TC 234.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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FprCEN/TS 12007-6:2020 (E)

European foreword

This document (FprCEN/TS 12007-6:2020) 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 Vote on TS.

The basis of this document has been provided by an Ad Hoc group of interested parties consisting variously of pipe manufacturers, material suppliers and gas network engineers. The aim is to support the introduction of Polyamide pipe, PA-U, into Europe for use in natural gas pipe networks operating at working pressures up to and including 16 bar. The Secretariat of the Ad Hoc group was held by NEN.

This document is part of the following series of standards, which are in the responsibility of CEN/TC 234 Working Group 2, Secretariat held by BSI:

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*

NOTE CEN TC 234/WG 10, Secretariat held by NEN, is directly responsible for EN 12007-5: Specific functional recommendations for new service lines.

This document has been written in the style and form of the above functional EN standards, but at this time has the status only of a CEN TS. This document will be amended under the authority of CEN/TC 234 as soon as more supporting evidence of the safe use of PA-U becomes available.

1 Scope

This document describes the specific functional requirements for polyamide (PA) pipelines in addition to the general functional requirements of EN 12007-1 for:

- a) a maximum operating pressure (MOP) up to and including 16 bar;
- b) an operating temperature between -20 °C and $+40\text{ °C}$.

This document covers one type of pipe:

- PA pipes single layer solid wall.

This document specifies common basic principles for gas infrastructure.

NOTE 1 Users of this document are aware that more detailed national standards and/or code of practice can exist in the CEN member countries.

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

NOTE 2 In the event of conflicts in terms of more restrictive requirements in national legislation/regulation with the requirements of this document, 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 are referred to in the text in such a way that some or all of their content constitutes requirements 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 ISO 16486-1, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 1: General*

prEN ISO 16486-2, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 2: Pipes*

prEN ISO 16486-3, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 3: Fittings*

prEN ISO 16486-4, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 4: Valves*

prEN ISO 16486-5, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 5: Fitness for purpose of the system*

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

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

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

ISO 17885, *with AMD, Plastic Piping Systems — Mechanical fittings for pressure piping systems — Specifications* for different thermoplastic materials

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

- 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

¹ This standard is also applicable for PA-U without any changes.

² This standard is also applicable for PA-U without any changes.

3.6**butt fusion joint**

method of jointing PA-U 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 PA-U 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 PA-U pipeline, defined at a reference temperature

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

4 Symbols and abbreviations

PA-U unplasticized polyamide

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5 Design

5.1 General

The PA-U 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.

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

5.2 Materials and components

PA-U materials and components used shall comply with prEN ISO 16486-1, prEN ISO 16486-2, prEN ISO 16486-3, prEN ISO 16486-4 and prEN ISO 16486-5.

Other components not covered by future prEN ISO 16486-1, prEN ISO 16486-2, prEN ISO 16486-3, prEN ISO 16486-4 and prEN ISO 16486-5 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.

5.3 Maximum operating pressure

5.3.1 General

The *MOP* should be selected on the basis of the gas infrastructure operating requirements provided that the *MOP* does not exceed 16 bar and the conditions in 5.3.2 and 5.3.3 are satisfied.

5.3.2 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.

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

All pressures measured in bar.

Derating factor (D_F) is a coefficient used in the calculation of *MOP* which takes into account the influence of operating temperature.

NOTE Derating factors are listed in Annex A of prEN ISO 16486-6:2012 will be moved to Annex A of prEN ISO 16486-5 during the ongoing revision.

5.3.3 Verification of the RCP criterion

The ratio of critical *RCP* pressure to *MOP* shall be greater than or equal to 1,5 (according to prEN ISO 16486-2)

The *RCP* criterion is the critical pressure, is dependent on pipe size and material, and shall be determined in accordance with prEN ISO 16486-2.

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 ISO 16486-5 using a value of *RCP* pressure determined from the minimum