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Cevni sistemi iz polimernih materialov za oskrbo s plinastimi gorivi - Cevni sistemi iz nemehčanega poliamida (PA-U) z zvari in mehanskimi spoji - 1. del: Splošno (ISO/DIS 16486-1:2019)

Plastics piping systems for the supply of gaseous fuels - Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing - Part 1: General (ISO/DIS 16486-1:2019)

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Kunststoff-Rohrleitungssysteme für die Gasversorgung - Rohrleitungssysteme aus weichmacherfreiem Polyamid (PA-U) mit Schweißverbindungen und mechanischen Verbindungen - Teil 1: Allgemeines (ISO/DIS 16486-1:2019)

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Systèmes de canalisations en matières plastiques pour la distribution de combustibles gazeux - Systèmes de canalisations en polyamide non plastifié (PA-U) avec assemblages par soudage et assemblages mécaniques - Partie 1: Généralités (ISO/DIS 16486-1:2019)

Ta slovenski standard je istoveten z: **prEN ISO 16486-1**

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83.140.30	Polimerne cevi in fitingi za snovi, ki niso tekočine	Plastics pipes and fittings for non fluid use

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Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing —

Part 1: General

Systèmes de canalisations en matières plastiques pour la distribution de combustibles gazeux — Systèmes de canalisations en polyamide non plastifié (PA-U) avec assemblages par soudage et assemblages mécaniques —

Partie 1: Généralités

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oSIST prEN ISO 16486-1:2019

Contents

Page

Foreword ... **iv**
Introduction ... **vi**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **3**
3.1 Geometrical characteristics ... 3
3.2 Materials ... 4
3.3 Material characteristics ... 4
3.4 Related to service conditions ... 5
4 Symbols and abbreviated terms ... **5**
4.1 Symbols ... 5
4.2 Abbreviated terms ... 6
5 Material ... **6**
5.1 Material of the components ... 6
5.2 Compound ... 6
5.2.1 Additives ... 6
5.2.2 Colour ... 6
5.2.3 Identification compound ... 6
5.2.4 Rework material ... 6
5.2.5 Characteristics ... 6
5.2.6 Change of compound formulation ... 9
5.3 Fusion compatibility ... 9
5.4 Classification and designation ... 10
5.5 Maximum operating pressure (MOP) ... 10
Annex A (normative) **Assessment of degree of pigment or carbon black dispersion in unplasticized polyamide compounds** ... **11**
Annex B (normative) **Chemical resistance**[9] ... **15**
Annex C (normative) **Hoop stress at burst** ... **18**
Annex D (informative) **Continuous liquid hydrocarbon exposure from transported fluid or soil contamination** ... **20**
Annex E (informative) **Permeation resistance against different gases** ... **21**
Bibliography ... **24**

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SIST EN ISO 16486-1:2020
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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This document was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 4, *Plastics pipes and fittings for the supply of gaseous fuels*.

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This second edition cancels and replaces the first edition (ISO 16486-1:2012), which has been technically revised.

The main changes compared to the previous edition are as follows:

— Amendment 1 of ISO 16486-1:2012 is incorporated;

— In subclause 5.2.5 characteristics include the need to saturate pipes for LTHS testing;

— In Table 1 the Carbon black content is changed into (1,0 to 2,5) % (by mass);

— In Table 2 former 6 hours has been changed to 16 hours for conditioning before hydrostatic strength testing in line with the phrasing on top of the table;

— In subclause 5.2.6 change of compound refers to PPI TR-3 as guidance;

— A new informative Annex D – Continuous liquid hydrocarbon exposure from transported fluid or soil contamination – is included;

— A new informative Annex E –Permeation resistance against different gases – is included.

ISO 16486 consists of the following parts, under the general title *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing*:

Part 1: General

Part 2: Pipes

Part 3: Fittings

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Part 4: Valves

Part 5: Fitness for purpose of the system

Part 6: Code of practice for design, handling and installation

Part 7: Assessment of conformity of the system (proposal in preparation).

A list of all parts in the ISO 16486- series can also be found on the ISO website.

Parts 1 (this document), 2, 3, 5 and 6 have been prepared by ISO/TC138/SC4, and a future part 7: *Assessment of conformity* is under preparation. Part 4 has been prepared by Technical Committee ISO/TC138/SC 7 *Valves and auxiliary equipment of plastics materials*.

Part 6 will not be implemented as European Standard under the Vienna Agreement.

NOTE Future CEN/TS 12007-x, *Gas infrastructure — Pipelines for maximum operating pressure up to and including 16 bar — Part x: Design, handling, installation and operation of unplasticized polyamide (PA-U) piping systems with fusion joining and mechanical jointing - Functional recommendation*, to be prepared by Technical Committee CEN/TC234 *Gas infrastructure* will deal with the recommended practice for installation of plastics pipes system in accordance with EN ISO 16486 (all parts except for part 6).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

This part of ISO 16486 specifies the general requirements for a piping system and its components made from unplasticized polyamide (PA-U), and which is intended to be used for the supply of gaseous fuels.

Requirements and test methods for components of the piping system are specified in ISO 16486-2, ISO 16486-3, and ISO 16486-4.

Characteristics for fitness for purpose of the system and generic fusion parameters are covered in ISO 16486-5.

Recommended practice for installation is given in ISO 16486-6, which will not be implemented as European Standard under the Vienna Agreement. Recommended practice for installation will be given in future CEN/TS 12007-x, *Gas infrastructure — Pipelines for maximum operating pressure up to and including 16 bar — Part x: Design, handling, installation and operation of unplasticized polyamide (PA-U) piping systems with fusion joining and mechanical jointing - Functional recommendation*, that is under preparation by Technical Committee CEN/TC234 *Gas infrastructure*.

Assessment of conformity of the system is to form the subject of a future part 7.

NOTE A list of ASTM standards related to polyamide pipes and fittings for the supply of gas is given in the Bibliography[1],[2],[3],[4].

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Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing —

Part 1: General

1 Scope

This document specifies the general properties of unplasticized polyamide (PA-U) compounds for the manufacture of pipes, fittings and valves made from these compounds, intended to be buried and used for the supply of gaseous fuels. It also specifies the test parameters for the test methods to which it refers.

The ISO 16486- series is applicable to PA-U piping systems the components of which are connected by fusion jointing and/or mechanical jointing.

This document establishes a calculation and design scheme on which to base the maximum operating pressure (MOP) of a PA-U piping system.

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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.

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ISO 179-1:2010, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test*

ISO 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 307, *Plastics — Polyamides — Determination of viscosity number*

ISO 472, *Plastics — Vocabulary*

ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles*

ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*

ISO 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics*

ISO 1110, *Plastics — Polyamides — Accelerated conditioning of test specimens*

ISO 1167-1, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method*

ISO 1167-2, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 2: Preparation of pipe test pieces*

ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pycnometer method and titration method*

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ISO 1183-2, *Plastics — Methods for determining the density of non-cellular plastics — Part 2: Density gradient column method*

ISO 2505, *Thermoplastics pipes — Longitudinal reversion — Test method and parameters*

ISO 6259-1, *Thermoplastics pipes — Determination of tensile properties — Part 1: General test method*

ISO 6259-3, *Thermoplastics pipes — Determination of tensile properties — Part 3: Polyolefin pipes*

ISO 6964, *Polyolefin pipes and fittings — Determination of carbon black content by calcination and pyrolysis — Test method*

ISO 9080, *Plastics piping and ducting systems — Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation*

ISO 12162, *Thermoplastics materials for pipes and fittings for pressure applications — Classification, designation and design coefficient*

ISO 13477, *Thermoplastics pipes for the conveyance of fluids — Determination of resistance to rapid crack propagation (RCP) — Small-scale steady-state test (S4 test)*

ISO 13478, *Thermoplastics pipes for the conveyance of fluids — Determination of resistance to rapid crack propagation (RCP) — Full-scale test (FST)*

ISO 13479, *Polyolefin pipes for the conveyance of fluids — Determination of resistance to crack propagation — Test method for slow crack growth on notched pipes*

ISO 13954, *Plastics pipes and fittings — Peel decohesion test for polyethylene (PE) electrofusion assemblies of nominal outside diameter greater than or equal to 90 mm*

ISO 15512, *Plastics — Determination of water content*

ISO 16396-1, *Plastics — Polyamide (PA) moulding and extrusion materials — Part 1: Designation system, marking of products and basis for specifications*

ISO 16396-2, *Plastics — Polyamide (PA) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

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*

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*

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*

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*

ISO 16486-6, *Plastics piping systems for the supply of gaseous fuels - Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 6: Code of practice for design, handling and installation*

ISO 16871, *Plastics piping and ducting systems — Plastics pipes and fittings — Method for exposure to direct (natural) weathering*

ISO 17885, *Plastics piping systems — Mechanical fittings for pressure piping systems — Specifications*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472, ISO 1043-1 and ISO 16396-1 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 Geometrical characteristics

3.1.1
nominal outside diameter
d_n
specified outside diameter of a component, which is identical to the minimum mean outside diameter, $d_{em,min}$, in millimetres

3.1.2
outside diameter at any point
d_e
outside diameter measured through the cross-section at any point on a pipe, or the spigot end of a fitting, rounded up to the nearest 0,1 mm

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3.1.3
mean outside diameter
d_{em}
measured length of the outer circumference of a pipe, or the spigot end of a fitting, divided by π (≈ 3,142), rounded up to the nearest 0,1 mm

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3.1.4
minimum mean outside diameter
$d_{em,min}$
minimum value for the mean outside diameter as specified for a given nominal size

3.1.5
maximum mean outside diameter
$d_{em,max}$
maximum value for the mean outside diameter as specified for a given nominal size

3.1.6
out-of-roundness
⟨pipe or fitting⟩ difference between the measured maximum outside diameter and the measured minimum outside diameter in the same cross-sectional plane of a pipe or spigot end of a fitting

3.1.7
out-of-roundness
⟨socket⟩ difference between the measured maximum inside diameter and the measured minimum inside diameter in the same cross-sectional plane of a socket

3.1.8
nominal wall thickness
e_n
wall thickness, in millimetres, corresponding to the minimum wall thickness, e_{min}

3.1.9
wall thickness at any point
e
measured wall thickness at any point around the circumference of a component, rounded up to the nearest 0,1 mm

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3.1.10
minimum wall thickness at any point
e_{min}
minimum value for the wall thickness at any point around the circumference of a component, as specified

3.1.11
standard dimension ratio
SDR
ratio of the nominal outside diameter, d_n, of a pipe to its nominal wall thickness, e_n

3.2 Materials

3.2.1
compound
homogenous mixture of base polymer (PA-U) and additives, i.e. antioxidants, pigments, UV stabilisers and others, at a dosage level necessary for the processing and use of components conforming to the requirements of this document

3.2.2
virgin material
material in a form such as granules or powder that has not been previously processed other than for compounding and to which no rework material or recyclable material has been added

3.2.3
rework material
material from a manufacturer's own production (of compounds and of pipes, fittings or valves) that has been reground or pelletized for reuse by that same manufacturer

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3.3 Material characteristics

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3.3.1
lower confidence limit of the predicted hydrostatic strength
σ_{LPL}
quantity, with the dimensions of stress, which represents the 97,5 % lower confidence limit of the predicted hydrostatic strength at a temperature θ and time t

Note 1 to entry: The quantity is expressed in megapascals (MPa).

Note 2 to entry: Temperature, θ, is expressed in degrees Celsius and time, t, is expressed in years.

3.3.2
minimum required strength
MRS
value of σ_{LPL} at 20 °C and 50 years, rounded down to the next smaller value of the R10 series or the R20 series

Note 1 to entry: The R10 series conforms to ISO 3[5] and the R20 series conforms to ISO 497[6].

3.3.3
categorized required strength at temperature θ and time t
$CRS_{\theta,t}$
value of σ_{LPL} at temperature θ and time t, rounded down to the next smaller value of the R10 series or the R20 series

Note 1 to entry: $CRS_{\theta,t}$ at 20 °C and 50 years equals MRS.

Note 2 to entry: Temperature, θ, is expressed in degrees Celsius and time, t, is expressed in years.

Note 3 to entry: The R10 series conforms to ISO 3[5] and the R20 series conforms to ISO 497[6].

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