
Cevni sistemi iz polimernih materialov za oskrbo s plinastimi gorivi - Cevni sistemi iz nemehčanega poliamida (PA-U) z zvari in mehanskimi spoji - 2. del: Cevi (ISO/DIS 16486-2:2019)

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/DIS 16486-2:2019)

Kunststoff-Rohrleitungssysteme für die Gasversorgung - Rohrleitungssysteme aus weichmacherfreiem Polyamid (PA-U) mit Schweißverbindungen und mechanischen Verbindungen - Teil 2: Rohre (ISO/DIS 16486-2:2019)

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 2: Tubes (ISO/DIS 16486-2:2019)

Ta slovenski standard je istoveten z: prEN ISO 16486-2

ICS:

| | | |
|-----------|---|---|
| 75.200 | Oprema za skladiščenje nafte, naftnih proizvodov in zemeljskega plina | Petroleum products and natural gas handling equipment |
| 83.140.30 | Polimerne cevi in fittingi za snovi, ki niso tekočine | Plastics pipes and fittings for non fluid use |

oSIST prEN ISO 16486-2:2019**en**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 16486-2

ISO/TC 138/SC 4

Secretariat: NEN

Voting begins on:
2019-10-25Voting terminates on:
2020-01-17

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

Part 2: Pipes

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 2: Tubes

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ICS: 83.140.30; 75.200

[SIST EN ISO 16486-2:2020](https://standards.iteh.ai/catalog/standards/sist/ade1329b-6907-425d-9ef1-2d0ccd3bb7dd/sist-en-iso-16486-2-2020)

<https://standards.iteh.ai/catalog/standards/sist/ade1329b-6907-425d-9ef1-2d0ccd3bb7dd/sist-en-iso-16486-2-2020>

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

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.

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING



Reference number
ISO/DIS 16486-2:2019(E)

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 16486-2:2020

<https://standards.iteh.ai/catalog/standards/sist/ade1329b-6907-425d-9ef1-2d0ccd3bb7dd/sist-en-iso-16486-2-2020>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

| | Page |
|---|-----------|
| Foreword..... | iv |
| Introduction..... | vi |
| 1 Scope | 1 |
| 2 Normative references | 1 |
| 3 Terms and definitions | 2 |
| 4 Compound | 2 |
| 5 General Characteristics | 2 |
| 5.1 Appearance..... | 2 |
| 5.2 Colour..... | 2 |
| 5.3 Fusion compatibility..... | 2 |
| 6 Geometrical characteristics | 3 |
| 6.1 Measurement of dimensions..... | 3 |
| 6.2 Mean outside diameters, out-of-roundness and their tolerances..... | 3 |
| 6.3 Wall thicknesses and tolerances..... | 4 |
| 6.3.1 Minimum wall thickness..... | 4 |
| 6.3.2 Tolerances on wall thickness at any point..... | 4 |
| 7 Mechanical characteristics | 5 |
| 7.1 Conditioning..... | 5 |
| 7.2 Requirements..... | 5 |
| 8 Physical characteristics | 8 |
| 8.1 Conditioning..... | 8 |
| 8.2 Requirements..... | 8 |
| 9 Marking | 8 |
| Annex A (normative) Squeeze-off technique | 10 |
| Annex B (informative) Examples of the water uptake over time as function of the sample thickness | 11 |
| Bibliography | 13 |

ISO/DIS 16486-2:2019(E)

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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.

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*.

This second edition cancels and replaces the first edition (ISO 16486-2:2012), which has been technically revised.

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

- [Tables 1](#) and [2](#) are extended with nominal outside diameters up to and including 630 mm;
- In [Table 2](#) former 6 hours has been changed to 16 hours in line with the phrasing on top of the table
- In [Table 3](#) the range for the minimum wall thickness is extended up to and including 37 mm;
- [Table 4](#) allows for $e > 12$ mm to use Type 3 specimen with 10 mm/min for the determination of the elongation at break;
- Informative [Annex A](#) – Butt fusion procedure for jointing PA-U pipes – was deleted and referenced;
- A new normative [Annex A](#) – Squeeze of technique – is included;
- A new informative [Annex B](#) – Water uptake over time as function of the sample thickness – 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

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, 2 (this document), 3, 5 and 6 have been prepared by ISO/TC 138/SC 4, 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 16486-2:2020

<https://standards.iteh.ai/catalog/standards/sist/ade1329b-6907-425d-9ef1-2d0ccd3bb7dd/sist-en-iso-16486-2-2020>

ISO/DIS 16486-2:2019(E)

Introduction

This part of ISO 16486 specifies the 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 material and components, other than pipes of the piping system are specified in ISO 16486-1, 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*.

This part of ISO 16486 covers the characteristics of pipes.

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 16486-2:2020](https://standards.iteh.ai/catalog/standards/sist/ade1329b-6907-425d-9ef1-2d0ccd3bb7dd/sist-en-iso-16486-2-2020)

<https://standards.iteh.ai/catalog/standards/sist/ade1329b-6907-425d-9ef1-2d0ccd3bb7dd/sist-en-iso-16486-2-2020>

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

Part 2: Pipes

1 Scope

This document specifies the physical and mechanical properties of pipes made from unplasticized polyamide (PA-U) in accordance with ISO 16486-1, 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.

In addition, it lays down dimensional characteristics and requirements for the marking of pipes.

Pipes conforming to this part of ISO 16486 are jointed typically by using mechanical, electrofusion or butt fusion (see [Annex A](#)) techniques, but not by solvent cement jointing.

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.

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

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

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

ISO 1133-2, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 2: Method for materials sensitive to time-temperature history and/or moisture*

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

ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions*

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 11922-1, *Thermoplastics pipes for the conveyance of fluids — Dimensions and tolerances — Part 1: Metric series*

ISO/DIS 16486-2:2019(E)

ISO 12176-4, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 4: Traceability coding*

ISO/DIS 12176-5, *Plastics pipes and fittings – Equipment for fusion jointing polyethylene systems Part 5: Two-dimensional data coding of components for PE piping systems*

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

ISO 15512, *Plastics — Determination of water content*

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*

EN 12106, *Plastics piping systems - Polyethylene (PE) and crosslinked polyethylene (PE-X) pipes - Test method for the resistance to internal pressure after application of squeeze-off*

3 Terms and definitions

For the purposes of this document, the terms, definitions, symbols and abbreviated terms given in ISO 16486-1 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/>

4 Compound

The pipes shall be made from virgin material. Rework material shall not be used.

The compound from which the pipes are made shall be in accordance with ISO 16486-1.

5 General Characteristics**5.1 Appearance**

When viewed without magnification, the internal and external surfaces of pipes shall be smooth, clean and free from scoring, cavities and other surface defects which can affect pipe performance. The pipe ends shall be cut cleanly and square to the axis of the pipe.

5.2 Colour

The colour of the pipes shall be yellow or black.

5.3 Fusion compatibility

Pipes made from PA-U 11 shall be heat fusion jointed only to pipes and/or components made from PA-U 11.

Pipes made from PA-U 12 shall be heat fusion jointed only to pipes and/or components made from PA-U 12.

Pipes made from PA-U are not fusion compatible with pipes and/or components made from other polymers.

NOTE Test methods for assuring fusibility are given in ISO 16486-3[4] and ISO 16486-5[2].

6 Geometrical characteristics

6.1 Measurement of dimensions

Dimensions shall be measured in accordance with ISO 3126 at $(23 \pm 2) ^\circ\text{C}$, after being conditioned for at least 4 h. The measurement shall not be made less than 24 h after manufacture.

6.2 Mean outside diameters, out-of-roundness and their tolerances

The mean outside diameter of the pipe, d_{em} , and the out-of-roundness and their tolerances shall be in accordance with [Table 1](#).

For maximum mean outside diameter grade B tolerances, ISO 11922-1 shall apply.

Table 1 — Mean outside diameters and out-of-roundness

Dimensions in millimetres

| Nominal outside diameter d_n | Mean outside diameter | | Maximum of absolute out-of-roundness ^a | |
|-----------------------------------|-----------------------|--------------|---|----------------------|
| | $d_{em,min}$ | $d_{em,max}$ | Grade K ^b | Grade N ^c |
| 16 | 16,0 | 16,3 | 1,2 | 1,2 |
| 20 | 20,0 | 20,3 | 1,2 | 1,2 |
| 25 | 25,0 | 25,3 | 1,5 | 1,2 |
| 32 | 32,0 | 32,3 | 2,0 | 1,3 |
| 40 | 40,0 | 40,4 | 2,4 | 1,4 |
| 50 | 50,0 | 50,4 | 3,0 | 1,4 |
| 63 | 63,0 | 63,4 | 3,8 | 1,5 |
| 75 | 75,0 | 75,5 | — | 1,6 |
| 90 | 90,0 | 90,6 | — | 1,8 |
| 110 | 110,0 | 110,7 | — | 2,2 |
| 125 | 125,0 | 125,8 | — | 2,5 |
| 140 | 140,0 | 140,9 | — | 2,8 |
| 160 | 160,0 | 161,0 | — | 3,2 |
| 180 | 180,0 | 181,1 | — | 3,6 |
| 200 | 200,0 | 201,2 | — | 4,0 |
| 225 | 225,0 | 226,4 | — | 4,5 |
| 250 | 250,0 | 251,5 | — | 5,0 |
| 280 | 280,0 | 281,7 | — | 9,8 |
| 315 | 315,0 | 316,9 | — | 11,1 |
| 355 | 355,0 | 357,2 | — | 12,5 |
| 400 | 400,0 | 402,4 | — | 14,0 |
| 450 | 450,0 | 452,7 | — | d |
| 500 | 500,0 | 503,0 | — | c, d |
| 560 | 560,0 | 563,4 | — | d |
| 630 | 630,0 | 633,8 | 633,8 | d |

^a Measurement of out-of-roundness shall be made at the point of manufacture according to ISO 3126.

^b For coiled pipe with $d_n \leq 63$ mm, grade K according to ISO 11922-1 applies; for pipe with $d_n \geq 75$ mm, the maximum out-of-roundness shall be specified by agreement.

^c Grade N according to ISO 11922-1.

^d The maximum out-of-roundness shall be specified by agreement.