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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

Reference number
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Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **2**
3.1 Terms related to geometrical characteristics ... 3
3.2 Terms related to materials ... 3
3.3 Terms related to material characteristics ... 4
3.4 Terms related to service conditions ... 4
4 Symbols and abbreviated terms ... **5**
4.1 Symbols ... 5
4.2 Abbreviated terms ... 5
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 Virgin 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 ... 9
5.5 Maximum operating pressure (MOP) ... 10
5.6 Effects of transport of liquid hydrocarbons and hydrogen ... 10
Annex A (normative) **Chemical resistance** ... **11**
Annex B (normative) **Hoop stress at burst** ... **14**
Annex C (informative) **Continuous liquid hydrocarbon exposure from transported fluid or soil contamination** ... **16**
Annex D (informative) **Permeation of different gases** ... **17**
Bibliography ... **22**

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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 document 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).

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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,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 155, *Plastics piping systems and ducting systems,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 16486-1:2020), which has been technically revised.

The main changes are as follows:

— in Table 1, the old requirement for "pigment or carbon black dispersion" has been substituted by new requirements with reference to ISO 18553 and no reference to Annex A. Footnote [a] has also been corrected;

— the former Annex A, “Assessment of degree of pigment or carbon black dispersion in unplasticized polyamide compounds,” has been deleted and reference is made to ISO 18553 instead;

— in Table D.2 and Figure D.2, permeation coefficients of methane for PA-U 11 are given;

— in Table D.4 and Figure D.4, permeation coefficients of hydrogen for PA-U 11 are given.

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

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

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

Characteristics for fitness for purpose of the system and generic fusion parameters as well as related requirements and test methods are covered in ISO 16486-5.

Recommended practice for installation is given in ISO 16486-6 which will not be implemented as a European Standard under the Vienna Agreement.

Assessment of conformity of the system forms the subject of ISO/TS 16486-7.

ISO/TS 16486-8 specifies the training and assessment of fusion operators.

NOTE 1 Recommended practice for installation is also given in CEN/TS 12007-6,[7] which has been prepared by Technical Committee CEN/TC 234, *Gas infrastructure*.

NOTE 2 EN 13067[8] also gives recommendations for the qualification of welders for thermoplastics welded assemblies.

NOTE 3 A list of ASTM standards related to polyamide pipes and fittings for the supply of gas is given in the Bibliography.[9], [10], [11], [12]

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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.

NOTE For the purpose of this document the term gaseous fuels includes, for example, natural gas, methane, butane, propane, hydrogen, manufactured gas, biogas, and mixtures of these gases.

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 179-1, *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 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 11413:2019, *Plastics pipes and fittings — Preparation of test piece assemblies between a polyethylene (PE) pipe and an electrofusion fitting*

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

ISO 18553, *Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds*

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 terminology databases for use in standardization at the following addresses:

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

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

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