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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 3:  
Fittings**

*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 3: Raccords*



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ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 16486-3 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 first edition of ISO 16486-3 cancels and replaces the first edition of ISO 22621-3:2007 which has been technically revised.

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 5: Fitness for purpose of the system
- Part 6: Code of practice for design, handling and installation

## Introduction

Thin wall thickness unplasticized polyamide (PA-U) pipes and solvent cement joints are used typically for low pressures, while thicker wall thickness pipes and butt fusion, electrofusion or mechanical joints are typically used for high pressures.

For technical and safety reasons, it is not possible to mix the components of the two types of piping system (thin wall thickness pipes cannot be jointed by butt fusion or mechanical joints and vice versa). In particular, solvent cement joints must not be used for jointing for high pressure piping systems.

So for the time being, the standardization programme dealing with unplasticized polyamide (PA-U) piping systems for the supply of gaseous fuels is split into two series of International Standards, with one series (ISO 17467) covering piping systems the components of which are connected by solvent cement jointing and the other (ISO 16486) the components of which are connected by fusion jointing and/or mechanical jointing. When more experience will be gained from the field, it might be reasonable to merge the ISO 17467 series and the ISO 16486 series in one single series applicable to PA-U piping systems.

A similar series (ISO 17135) for fusion and mechanically jointed plasticized polyamide (PA-P) piping systems is in preparation.



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

## Part 3: Fittings

### 1 Scope

This part of ISO 16486 specifies the physical and mechanical properties of fittings 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.

ISO 16486 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 fittings.

In conjunction with the other parts of ISO 16486, it is applicable to PA-U fittings, their joints, to joints with components of PA-U and to joints with mechanical fittings of other materials, and to the following fitting types:

- fusion fittings — electrofusion fittings and butt fusion fittings;
- transition fittings.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 1167-1, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method*

ISO 1167-4, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 4: Preparation of assemblies*

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

ISO 4433-1, *Thermoplastics pipes — Resistance to liquid chemicals — Classification — Part 1: Immersion test method*

ISO 11922-1:1997, *Thermoplastic pipes for the conveyance of fluids — Dimensions and tolerances — Part 1: Metric series*

ISO 13951:2001, *Plastics piping systems — Test method for the resistance of polyolefin pipe/pipe or pipe/fitting assemblies to tensile loading*

ISO 13953:2001, *Polyethylene (PE) pipes and fittings — Determination of the tensile strength and failure mode of test pieces from a butt-fused joint*

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 13955:1997, *Plastics pipes and fittings — Crushing decohesion test for polyethylene (PE) electrofusion assemblies*

ISO 13956:2010, *Plastics pipes and fittings — Decohesion test of polyethylene (PE) saddle fusion joints — Evaluation of ductility of fusion joint interface by tear test*

ISO 13957:1997, *Plastics pipes and fittings — Polyethylene (PE) tapping tees — Test method for impact resistance*

ISO 16486-1:2012, *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 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 16486-5, *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 682, *Elastomeric seals — Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids*

IEC 60529:2001, *Degrees of protection provided by enclosures (IP Code)*

### 3 Terms, definitions, symbols and abbreviated terms

For the purposes of this document, the terms, definitions, symbols and abbreviated terms given in ISO 16486-1 and the following apply.

#### 3.1

##### **electrofusion socket fitting**

polyamide (PA-U) fitting which contains one or more integral heating elements that are capable of transforming electrical energy into heat to realise a fusion joint with a spigot end and/or a pipe

#### 3.2

##### **electrofusion saddle fitting**

unplasticized polyamide (PA-U) fitting which contains one or more integral heating elements that are capable of transforming electrical energy into heat to realize fusion onto a pipe

#### 3.3

##### **tapping tee**

electrofusion saddle fitting (top loading or wraparound) which contains an integral cutter, used to cut through the wall of the main pipe, and holds the coupon inside the cutter

NOTE The cutter remains in the body of the saddle after installation.

#### 3.4

##### **branch saddle**

electrofusion saddle fitting (top loading or wraparound), which requires an ancillary cutting tool for drilling the hole in the main pipe

#### 3.5

##### **spigot end fitting**

unplasticized polyamide (PA-U) fitting where the outside diameter of the spigot length is equal to the nominal outside diameter,  $d_n$ , of the corresponding pipe