
**Plastics piping systems for the supply
of gaseous fuels — Unplasticized
polyamide (PA-U) piping systems
jointed by solvent cement —**

**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 assemblage par collage —*

Partie 3: Raccords





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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 17467-3 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 17467-3 cancels and replaces the first edition of ISO 15439-3:2007, which has been technically revised.

ISO 17467 consists of the following parts, under the general title *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems jointed by solvent cement*:

- *Part 1: General*
- *Part 2: Pipes*
- *Part 3: Fittings*

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 standardisation 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 ISO 17467 series and ISO 16486 series in one single series applicable to PA-U piping systems.

A similar series (ISO 17135) of International Standards 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 jointed by solvent cement —

Part 3: Fittings

1 Scope

This part of ISO 17467 specifies the physical and mechanical characteristics of fittings made from unplasticized polyamide (PA-U) in accordance with ISO 17467-1, intended to be buried and used for the supply of gaseous fuels for maximum operating pressure up to and including 4 bar.

It also specifies the test parameters for the test methods to which it refers.

This part of ISO 17467 also lays down requirements for dimensions and the marking of fittings.

In conjunction with ISO 17467-1 and ISO 17467-2, this part of ISO 17467 is applicable to PA-U fittings, their joints and to joints with components of PA-U.

These fittings can be of the following types

- solvent cement socket fittings;
- solvent cement spigot fittings;
- solvent cement saddle fittings.

2 Normative references

The following referenced documents are indispensable for the application 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 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 17467-1:2012, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems jointed by solvent cement — Part 1: General*

ISO 17467-2:2012, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems jointed by solvent cement — Part 2: Pipes*

3 Terms and definitions

For the purposes of this document, the terms, definitions, symbols and abbreviated terms given in ISO 17467-1 apply.

4 Material

The fittings shall be made from virgin PA-U material. Own and external reprocessable materials and recyclable material shall not be used.

The compound from which the fittings are made shall conform to ISO 17467-1. It may be unpigmented.

5 Appearance

When viewed without magnification, the internal and external surfaces of the fitting shall be smooth, clean and free from scoring, cavities and other surface defects to an extent that would prevent conformity of the fitting to this part of ISO 17467.

6 Geometrical characteristics

6.1 Measurement of dimensions

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

6.2 Dimensions of solvent cement socket fittings

6.2.1 Diameters and lengths of sockets

When measured in accordance with 6.1, the diameters, lengths and tapers of sockets (see Figure 1) shall be as specified in Table 1.

6.2.2 Wall thicknesses

The minimum wall thickness e_{\min} of the fittings shall be as specified in Table 1.

6.3 Dimensions of solvent cement spigot fittings

6.3.1 Diameters and lengths of the spigots

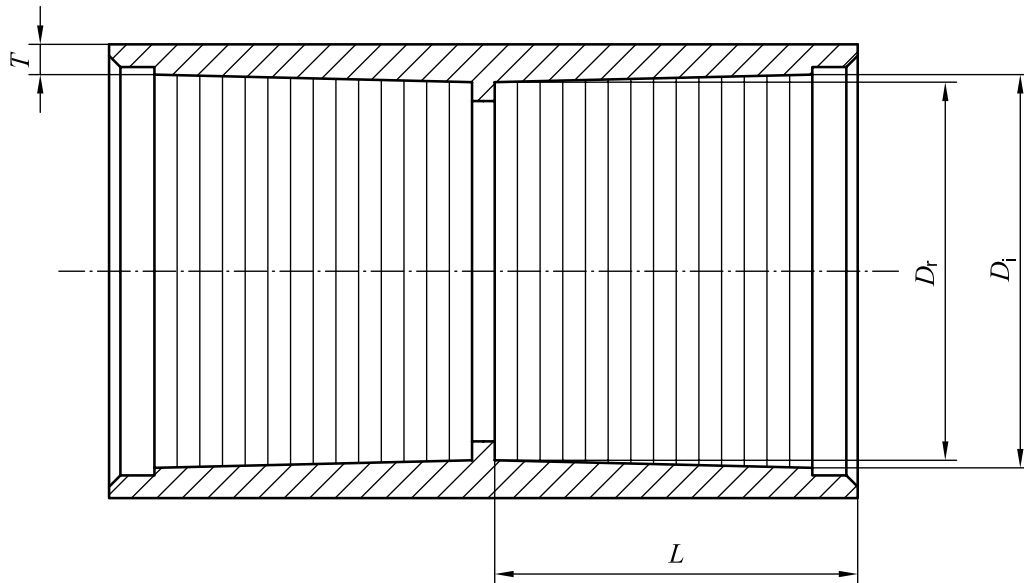
When measured in accordance with 6.1, the spigot lengths shall conform to the minimum socket length, L , as specified in Table 1.

The mean outside diameters of the spigot ends, d_{em} , shall be as specified in ISO 17467-2:2012, Table 1.

6.3.2 Wall thicknesses

The minimum wall thicknesses e_{\min} of the fittings shall be as specified in Table 1.



**Key**

- D_i is the mean inside diameter measured in the plane of the socket mouth;
- D_r is the inside diameter measured in the plane of the socket root;
- L is the length of the socket;
- T is the wall thickness of the body of the fitting.

Figure 1 — Socket dimensions

Table 1 — Dimensions of sockets

Dimensions in millimetres

Nominal outside diameter	Mean mouth diameter		Socket length, minimum	Wall thickness, minimum	Taper, maximum ^a
	d_n	$D_{i,min}$			
12	11,6	11,9	30	2,5	0,2
16	15,6	15,9	30	2,5	0,2
18	17,6	17,9	30	2,5	0,2
20	19,6	19,9	32	2,5	0,2
23	22,6	22,9	32	2,5	0,2
25	24,6	24,9	32	2,5	0,2
32	31,6	31,9	32	3,0	0,3
40	39,6	39,9	40	3,0	0,3
50	49,6	49,9	50	4,2	0,4
63	62,5	62,9	63	4,6	0,4
75	74,5	74,9	75	5,0	0,6
90	89,4	89,9	90	5,5	0,6
110	109,4	109,9	110	6,0	0,7
125	124,4	124,9	125	7,5	0,7
140	139,4	139,9	140	8,1	0,8
160	159,3	159,9	160	8,9	0,9
180	179,3	179,9	180	9,7	1,0
200	199,2	199,9	200	10,5	1,1
225	224,2	224,9	225	11,5	1,2
250	249,1	249,9	250	12,5	1,3

a The socket root diameter, D_r , shall not be greater than the socket mouth diameter, D_i , i.e. taper is not mandatory in the socket.

6.4 Dimensions of solvent cement saddle fittings

The minimum wall thicknesses e_{min} of the saddle fittings shall be as specified in Table 1. Other dimensions are dependent on the saddle design geometry and shall be specified by the manufacturer.

7 Mechanical characteristics

7.1 Conditioning

Unless otherwise specified by the applicable test method, the test pieces shall be conditioned for at least 16 h at 23 °C and 50 % relative humidity in accordance with ISO 291 before testing in accordance with Table 2.

7.2 Requirements

When tested in accordance with the test methods as specified in Table 2 using the indicated parameters, the fitting shall have mechanical characteristics conforming to the requirements given in Table 2.

Test specimens shall consist of a solvent-cement pipe-to-fitting assembly prepared in accordance with the manufacturer's instructions. The setting time of the solvent cement shall be a minimum of 24 h at normal laboratory atmosphere.

Table 2 — Mechanical characteristics

Characteristic	Requirements	Test parameters		Test method
Hydrostatic strength (20 °C, 1 000 h)	No failure during the test period of any test piece	End caps Orientation Conditioning time Type of test Circumferential (hoop) stress: PA-U 11 160 and PA-U 12 160 ^a PA-U 11 180 and PA-U 12 180 ^a Test period Test temperature	Type a) Free 6 h Water-in-water 19,0 MPa 20,0 MPa 1 000 h 20 °C	ISO 1167-1 ISO 1167-4
Hydrostatic strength (80 °C, 165 h)	No failure during the test period of any test piece	End caps Orientation Conditioning time Type of test Circumferential (hoop) stress PA-U 11 160 and PA-U 12 160 ^a PA-U 11 180 and PA-U 12 180 ^a Test period Test temperature	Type a) Free 6 h Water-in-water 10,0 MPa 11,5 MPa 165 h 80 °C	ISO 1167-1 ISO 1167-4
^a For material classification and designation, see ISO 17467-1:2012, 5.3.				

8 Physical characteristics

8.1 Conditioning

Unless otherwise specified by the applicable test method, the test pieces shall be conditioned for at least 16 h at 23 °C and 50 % relative humidity in accordance with ISO 291 before testing in accordance with Table 3.

8.2 Requirement

When tested in accordance with the test method as specified in Table 3 using the indicated parameters, the fittings shall have physical characteristics conforming to the requirement given in Table 3.

Table 3 — Physical characteristics

Characteristic	Requirement	Test parameters		Test method
Viscosity number	≥ 180 ml/g	Solvent	m-Cresol	ISO 307

9 Marking

9.1 General

All fittings shall be permanently and legibly marked in such a way that the marking does not initiate cracks or other types of failure.

If printing is used, the colour of the printed information shall differ from the basic colour of the product.

The marking shall be such that it is legible without magnification.

NOTE The manufacturer is not responsible for any marking that is illegible due to actions caused during installation and use such as painting, scratching, covering of components or using detergents etc on the components unless agreed or specified by the manufacturer.

There shall be no marking over the minimum spigot length of the fitting.

9.2 Minimum required marking of fittings

The minimum required marking shall conform to Table 4.

Table 4 — Minimum required marking on the fitting

Aspects	Marking or symbol
Manufacturer's name or trademark	Name or code
Nominal diameter	e.g. 110
Manufacturer's information	A
Material and designation	e.g. PA-U 11 160
NOTE For providing traceability the following details shall be given:	
— the production period, year and month, in figures or in code;	
— a name or code for the production site if the manufacturer is producing in different sites.	

9.3 Additional information required on fittings or labels

The following additional information given in Table 5 shall be either marked on the fitting or printed on a label attached to the fitting or to its individual bag. The label shall be of sufficient quality to be intact and legible at the time of installation.

Table 5 — Additional information required on the fitting or a label

Aspects	Marking or symbol
Reference to this part of ISO 17467	ISO 17467-3
Internal fluid	Gas

ICS 23.040.20, 23.040.45

Price based on 6 pages