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**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.

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# 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 reprocessible 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

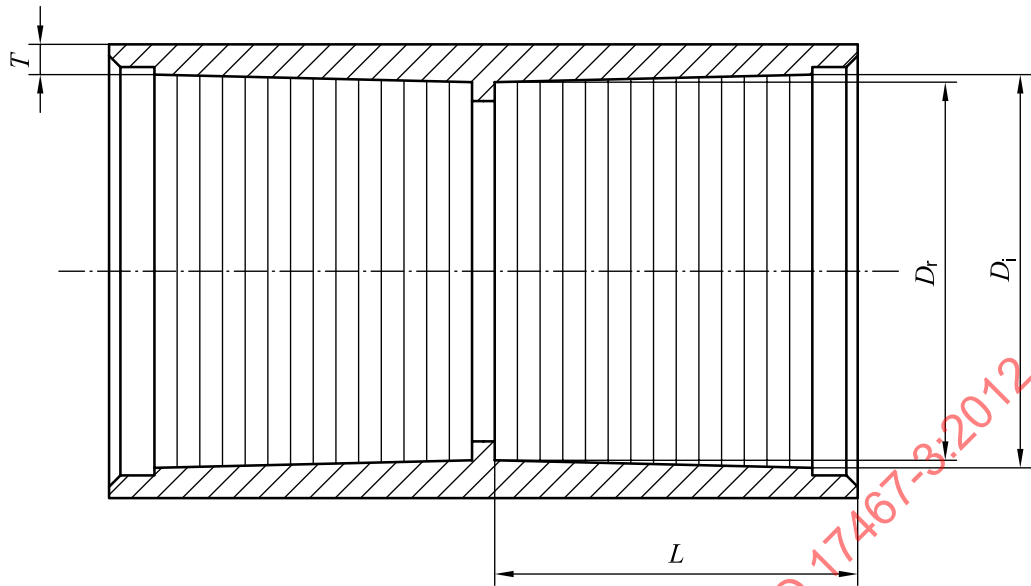
##### 6.3.1 Diameters and lengths of the spigots

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,  $d_{\text{em}}$ , 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 <sup>a</sup> |
|--------------------------|---------------------|-------------|------------------------|-------------------------|-----------------------------|
| $d_n$                    | $D_{i,min}$         | $D_{i,max}$ | $L_{min}$              | $e_{min}$               | $D_i - D_r$                 |
| 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<br>(20 °C, 1 000 h) | No failure during the test period of any test piece | End caps<br>Orientation<br>Conditioning time<br>Type of test<br>Circumferential (hoop) stress:<br>PA-U 11 160 and PA-U 12 160 <sup>a</sup><br>PA-U 11 180 and PA-U 12 180 <sup>a</sup><br><br>Test period<br>Test temperature | Type a)<br>Free<br>6 h<br>Water-in-water<br><br>19,0 MPa<br><br>20,0 MPa<br><br>1 000 h<br>20 °C | ISO 1167-1<br>ISO 1167-4 |
| Hydrostatic strength<br>(80 °C, 165 h)   | No failure during the test period of any test piece | End caps<br>Orientation<br>Conditioning time<br>Type of test<br>Circumferential (hoop) stress:<br>PA-U 11 160 and PA-U 12 160 <sup>a</sup><br>PA-U 11 180 and PA-U 12 180 <sup>a</sup><br><br>Test period<br>Test temperature | Type a)<br>Free<br>6 h<br>Water-in-water<br><br>10,0 MPa<br><br>11,5 MPa<br><br>165 h<br>80 °C   | ISO 1167-1<br>ISO 1167-4 |

<sup>a</sup> 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.