INTERNATIONAL STANDARD

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Plastics piping systems for the supply of gaseous fuels for maximum operating pressure up to and including 0,4 MPa (4 bar) — Polyamide (PA) —

Part 3: **Fittings**

Systèmes de canalisations en matières plastiques pour la distribution de combustibles gazeux pour une pression maximale de service inférieure ou égale à 0,4 MPa (4 bar) — Polyamide (PA) —

Partie 3: Raccords

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Foreword

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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 15439-3 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*.

ISO 15439 consists of the following parts, under the general title *Plastics piping systems for the supply of gaseous fuels for maximum operating pressure up to and including 0,4 MPa (4 bar) — Polyamide (PA)*:

— *Part 1: General*

— *Part 2: Pipes*

— *Part 3: Fittings*

Introduction

As polyamide material is used for piping systems for the supply of gaseous fuels both at very low pressure and high pressure, ISO/TC 138/SC 4 experts decided to split the standardization programme over two standards, one for low pressure up to 4 bar, one for high pressure up to 20 bar.

On the one hand, thin wall thickness pipes and solvent cement joints are used typically for pressure up to 4 bar, on the other hand, thicker wall thickness pipes and butt fusion, electrofusion and mechanical joints are typically used for pressure up to 20 bar. For technical and safety reasons, it is not possible to mix the components of the two types of piping systems (thin wall thickness pipes cannot be jointed by butt fusion or mechanical joints and vice and versa). Especially, solvent cement joints are not used for jointing for high pressure piping systems.

Plastics piping systems for the supply of gaseous fuels for maximum operating pressure up to and including 0,4 MPa (4 bar) — Polyamide (PA) —

Part 3: Fittings

1 Scope

This part of ISO 15439 specifies the physical and mechanical characteristics of fittings made from polyamide in accordance with Part 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 15439 also lays down requirements for dimensions and the marking of fittings.

In conjunction with parts 1 and 2 of ISO 15439 it is applicable to PA fittings, their joints and to joints with components of PA.

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 15439-1, *Plastics piping systems for the supply of gaseous fuels for maximum operating pressure up to and including 0,4 MPa (4 bar) — Polyamide (PA) — Part 1: General*

ISO 15439-2:2007, *Plastics piping systems for the supply of gaseous fuels for maximum operating pressure up to and including 0,4 MPa (4 bar) — Polyamide (PA) — Part 2: Pipes*

3 Terms and definitions

For the purposes of this document, the terms and the definitions, symbols and abbreviations given in ISO 15439-1 apply.

4 Material

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

The compound from which the fittings are made shall conform to ISO 15439-1. 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 15439.

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 ± 2) °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

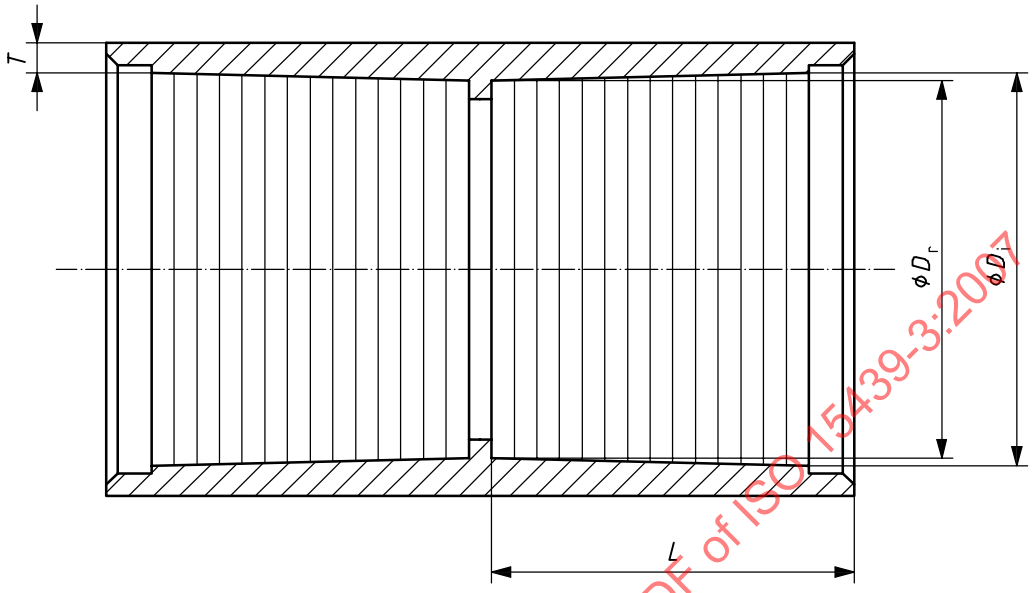
6.3.1 Diameters and lengths of the spigots

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 Table 1 of ISO 15439-2:2007.

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	$D_{i,min}$	$D_{i,max}$	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 (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 11 160 and PA 12 160 PA 11 180 and PA 12 180 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 11 160 and PA 12 160 PA 11 180 and PA 12 180 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

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.