INTERNATIONAL STANDARD

ISO 16486-4

First edition
2016-06-01

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

Part 4:
Valves

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 4: Robinets

Reference number
ISO 16486-4:2016(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

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 documents 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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 138 *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 7 *Valves and auxiliary equipment of plastics materials*.

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 4: Valves*

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

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

Part 4: Valves

1 Scope

This part of ISO 16486 specifies the characteristics of valves made from unplasticized polyamide (PA-U) in accordance with ISO 16486-1, intended to be buried and used for the supply of gaseous fuels.

Valves made from other material than unplasticized polyamide designed for the supply of gaseous fuels conforming to the relevant standards are permitted to be used in PA-U piping system according to ISO 16486 provided they have relevant PA-U connections for butt fusion or electrofusion ends (see ISO 16486-3). The component, i.e. the complete valve, shall fulfil the requirements of this part of ISO 16486.

It also specifies the test parameters for the test methods referred to in this part of ISO 16486.

It is applicable to bi-directional valves with spigot end or electrofusion socket intended to be jointed with PA-U pipes conforming to ISO 16486-2 without any fittings or with PA-U fittings conforming to ISO 16486-3.

This part of ISO 16486 covers valves for pipes with a nominal outside diameter, d_n, ≤250 mm.

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 3127, *Thermoplastics pipes — Determination of resistance to external blows — Round-the-clock method*

ISO 8233, *Thermoplastics valves — Torque — Test method*

ISO 9393-1:2004, *Thermoplastics valves for industrial applications — Pressure test methods and requirements — Part 1: General*

ISO 16010, *Elastomeric seals — Material requirements for seals used in pipes and fittings carrying gaseous fuels and hydrocarbon fluids*

ISO 16486-1, *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 16486-3:2012, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 3: Fittings*

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*

ISO 17778, *Plastics piping systems — Fittings, valves and ancillaries — Determination of gaseous flow rate/pressure drop relationships*

EN 736-1, *Valves Terminology — Part 1: Definition of types of valves*

EN 736-2, *Valves Terminology — Part 2: Definition of components of valves*

EN 1680, *Plastics piping systems — Valves for polyethylene (PE) piping systems — Test method for leaktightness under and after bending applied to the operating mechanisms*

EN 1704, *Plastics piping systems — Thermoplastics valves — Test method for the integrity of a valve after temperature cycling under bending*

EN 1705, *Plastics piping systems — Thermoplastics valves — Test method for the integrity of a valve after an external blow*

EN 12100, *Plastics piping systems — Polyethylene (PE) valves — Test method for resistance to bending between supports*

EN 12119, *Plastics piping systems — Polyethylene (PE) valves — Test method for resistance to thermal cycling*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16486-1, EN 736-1, EN 736-2 and the following apply.

3.1
external leaktightness
leaktightness (3.3) of the *valve body* (3.6) enveloping the space containing the gas, with respect to the atmosphere

3.2
internal leaktightness
leaktightness (3.3) between the inlet and the outlet of the valve, with the valve in the closed position

3.3
leaktightness test
test for both of the following characteristics:

a) the *internal leaktightness* (3.2) of a valve's closing seat when closed and pressurized from either side;

b) the *external leaktightness* (3.1) of a valve when half open

3.4
initiating torque
torque required to initiate movement of the obturator

3.5
running torque
torque required to achieve full opening or closing of the valve at maximum allowable operating pressure

3.6
leakage
emission of gas from a *valve body* (3.6) or any component of a valve

3.7
valve body
main part of a valve which contains the obturating device (closing element, the seat, the packing seals and the operating stop), as applicable and provides the terminal ends for connection to the PA-U pipe/fittings

3.8
operating device
part of a valve for connection with the operating key which allows the opening and the closing of the valve

3.9 Terms relating to design

3.9.1
full bore valve
valve with a flow section equal to or greater than 80 % of the section corresponding to the nominal inside diameter of the body end port

[SOURCE: EN 736-3]

3.9.2
clearway valve
valve designed to have an unobstructed flow way, which allows for the passage of a theoretical sphere with a diameter that is not less than the nominal inside diameter of the body end port

[SOURCE: EN 736-3]

3.9.3
reduced bore valve
valve with a flow section equal to or greater than 36 % of the section corresponding to the nominal inside diameter of the body end port and which does not correspond to the *full bore valve* (3.9.1)

4 Material

4.1 PA-U compound

The valves shall be made from virgin material.

The compound from which the valves are made shall be in accordance with ISO 16486-1.

4.2 Material for non-unplasticized polyamide parts

4.2.1 General

The materials and constituent elements used in making the valve shall be resistant to the external and internal environments in which they are intended to be used

a) during storage,

b) under the effect of the fluids being conveyed, and

c) taking account of the service environment and operating conditions.

Valves materials, including elastomers, greases, and lubricants in contact with the PA-U pipe, shall not adversely affect pipe performance or initiate stress cracking.

Metal valve bodies for PA-U piping systems up to 20 bar should conform to the relevant standard of ISO/TC 153"Valves".

4.2.2 Metal parts

All parts susceptible to corrosion shall be adequately protected, providing this is necessary for the durability and function of the system.

When dissimilar metallic materials are used which may be in contact with moisture, steps shall be taken to avoid the possibility of galvanic corrosion.

4.2.3 Elastomers

Elastomeric materials used for the manufacture of seals shall be in accordance with ISO 16010.

Other sealing materials are permitted if proven suitable for gas service.

4.2.4 Other materials

Greases and lubricants shall not exude on to the fusion areas and shall not affect the long-term performance of the pipe/valve.

Other materials conforming to 4.2.1 may be used provided that it is proven that the valves conform to this part of ISO 16486.

5 General characteristics

5.1 Appearance of the valve

When viewed without magnification, the internal and external surfaces of valves shall be smooth, clean, and free from scoring, cavities, or other surface defects to an extent that would prevent conformity to this part of ISO 16486.

No component of the valve shall show any signs of damage, scratches, pitting, bubbles, blisters, inclusions, or cracks to an extent that would prevent conformity of the valves to this part of ISO 16486.

5.2 Colour

The colour of the PA-U parts of valves shall be either black or yellow.

5.3 Design

5.3.1 General

The design of the valve shall be such that, when assembling the valve onto the pipe or other components, the electrical coils, if any, and/or seals or any other ancillary parts are not displaced.

PA-U valves bodies and their PA-U spigot ends or electrofusion sockets shall have a pressure rating of at least that of the pipe to which they are jointed.

5.3.2 Valve body

The valve body shall be such that it cannot be dismantled.

5.3.3 Operating device

The operating device shall be integral with or connected to the stem in such a way that disconnection is not possible during normal operation.

The valve shall close by turning the operating device clockwise. For a quarter-turn valve, the position of the obturator shall be clearly indicated on the top side of the operating device.

Stops shall be provided at the fully open and closed positions.

5.3.4 Seals

The seals, which elastomeric materials are conforming to 4.2.3, shall be so mounted as to be resistant to normally occurring mechanical loads. Creep and cold flow effects shall be taken into account. Any mechanism that puts a loading on the seals shall be permanently locked. Line pressure shall not be used as the sole means of seal activation.

5.4 Fusion compatibility

Components made from PA-U 11 shall be heat fusion jointed only to components made from PA-U 11.

Components made from PA-U 12 shall be heat fusion jointed only to components made from PA-U 12.

Components made from PA-U are not fusion compatible with components made from other polymers.

6 Geometrical characteristics

6.1 General

Each valve shall be characterized by its dimensions and associated end connections.

Technical data given by the manufacturer shall include at least the following information:

a) the dimensional characteristics, by working drawings;

b) the assembly instructions.

In order to prevent stress concentrations, any changes in the wall thickness of the valve body should be gradual.

6.2 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 and after conditioning for at least 4 h at (23 ± 2) °C.

6.3 Dimensions of spigot ends for valves

The dimensions of spigot ends shall conform to ISO 16486-3:2012, Table 4, up to and including d_n 250 mm.

6.4 Dimensions of valves with electrofusion sockets

The dimensions of electrofusion sockets shall conform to ISO 16486-3:2012, Table 1, up to and including d_n 250 mm.