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Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) —

Part 4: Valves

Systèmes de canalisations en plastique pour la distribution des combustibles gazeux — Polyéthylène (PE) —

Partie 4: Robinets

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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.

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*.

This first edition cancels and replaces ISO 10933:1997.

ISO 4437 consists of the following parts, under the general title *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE)*:

— *Part 1: General*

— *Part 2: Pipes*

— *Part 3: Fittings*

— *Part 4: Valves*

— *Part 5: Fitness for purpose of the system*

Introduction

Characteristics for fitness for purpose are covered in ISO 4437-5. ISO/TS 10839 gives recommended practices for installation.

Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) —

Part 4: Valves

1 Scope

This part of ISO 4437 specifies the characteristics of valves made from polyethylene (PE) for piping systems in the field of the supply of gaseous fuels.

It also specifies the test parameters for the test methods referred to in this part of ISO 4437.

In conjunction with ISO 4437-1, ISO 4437-2, ISO 4437-3:2014, and ISO 4437-5, it is applicable to PE valves, their joints, and to joints with components of PE and other materials intended to be used under the following conditions:

a) the maximum operating pressure, MOP, is based on the design stress determined from the compound MRS divided by the C factor and taking into account RCP requirements;

b) temperature of 20 °C as reference temperature;

NOTE 1 For other operating temperatures, derating coefficients are given in ISO 4437-5:2014.

c) operating temperature between −20 °C and +40 °C.

This International Standard covers a range of maximum operating pressures and gives requirements concerning colours and additives.

NOTE 2 It is the responsibility of the purchaser or specifier to make the appropriate selections from these aspects, taking into account their particular requirements and any relevant national regulations and installation practices or codes.

It is applicable to bi-directional valves with spigot ends or electrofusion sockets intended to be jointed with PE pipes conforming to ISO 4437-2 without any fittings or with PE fittings conforming to ISO 4437-3:2014.

This part of ISO 4437 covers valves for pipes with a nominal outside diameter $d_n \leq 400$ mm.

NOTE 3 Valves made from materials other than polyethylene designed for the supply of gaseous fuels conforming to the relevant standards are permitted to be used in PE piping systems according to ISO 4437 provided that they have relevant PE connections for butt fusion or electrofusion ends (see ISO 4437-3). The component, i.e. the complete valve, shall fulfil the requirements of this part of ISO 4437.

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 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*

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 4437-1, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 1: General*

ISO 4437-2, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 2: Pipes*

ISO 4437-3:2014, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 3: Fittings*

ISO 4437-5, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 5: Fitness for purpose of the system*

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

ISO 11357-6, *Plastics — Differential scanning calorimetry (DSC) — Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)*

ISO 12176-4, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 4: Traceability coding*

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

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, definitions, symbols, and abbreviations

For the purposes of this document, the terms, definitions, symbols, and abbreviations given in ISO 4437-1, EN 736-1, EN 736-2, and the following apply.

3.1 General terms

3.1.1
external leaktightness
leaktightness of the valve body enveloping the space containing the gas with respect to the atmosphere

3.1.2
internal leaktightness
leaktightness between the inlet and the outlet of the valve with the valve in the closed position

3.1.3
leaktightness test
test for both of the following characteristics:

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

b) external leaktightness of a valve when half open

3.1.4
initiating torque
torque required to initiate movement of the obturator

3.1.5
running torque
torque required to achieve full opening or closing of the valve at maximum allowable operating pressure

3.1.6
leakage
emission of gas from a valve body or any component of a valve

3.1.7
valve body
main part of a valve which contains the obturating device (closing element, seat, packing seals, and operating stop) as applicable and provides the terminal ends for connection to the PE pipe/fittings

3.1.8
operating device
part of a valve for connection with the operating key which allows the opening and the closing of the valve

3.2 Terms relating to design

3.2.1
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 736-3:2008]

3.2.2
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 736-3:2008]

3.2.3
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

[SOURCE: EN 736-3:2008]

4 Material

4.1 PE compound

The PE compound from which the valve body with spigot ends or electrofusion sockets is made shall conform to ISO 4437-1. The stress bearing parts shall only be made from virgin material conforming to ISO 4437-1.

4.2 Material for non-polyethylene parts

4.2.1 General

All components shall conform to the relevant International Standards. Alternative standards may be applied in cases where suitable International Standards do not exist.

In all cases, fitness for purpose of the components shall be demonstrated.

The materials and the constituent elements used in making the valve (including elastomers, greases, and any metal parts, as may be used) shall be resistant to the external and internal environments as the other elements of the piping system and shall have a life expectancy under the following conditions at least equal to that of the PE pipes conforming to ISO 4437-2 with which they are intended to be used:

a) during storage;

b) under the effect of the gas conveyed therein;

c) with respect to the service environment and operating conditions.

The requirements for the level of material performance of non-polyethylene parts shall be at least as stringent as that of the PE compound for the piping system. Rework materials shall not be used for stress bearing polymeric parts.

Other materials used in valves in contact with the PE pipe shall not adversely affect pipe performance or initiate stress cracking.

Metal valve bodies for PE piping systems up to 10 bar should conform to the relevant standard of ISO 153.

4.2.2 Metal parts

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

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

4.2.3 Elastomers

Elastomeric seals shall conform to ISO 16010.

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

4.2.4 Other materials

Greases or lubricants shall not exude onto fusion areas and shall not affect the long-term performance of the valve materials.

Other materials conforming to 4.2.1 may be used provided that it is proven that the valves conform to this part of ISO 4437.

5 General characteristics

5.1 Appearance of the valve

When viewed without magnification, the internal and external surfaces of valves shall be smooth and clean and shall have no scoring, cavities, and other surface defects to an extent that would prevent conformity to this part of ISO 4437.

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 the requirements of this part of ISO 4437.

5.2 Colour

The colour of the PE parts of valves shall either be black, yellow, or orange.

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 and/or seals or any other ancillary parts are not displaced.

PE valves bodies and their PE 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, 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 Appearance of factory made joints

The internal and external surfaces of the pipe and valve parts after fusion jointing, examined visually without magnification, shall be free from melt exudation outside the confines of the valve, apart from that which can be declared acceptable by the valve manufacturer or used deliberately as a fusion marker.

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) dimensional characteristics, by working drawings;

b) assembly instructions.

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