BS EN 1555-4:2011

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

Part 4: Valves

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National foreword

This British Standard is the UK implementation of EN 1555-4:2011. It supersedes BS EN 1555-4:2002 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/88/2, Plastics piping for pressure applications.

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Foreword

This document (EN 1555-4:2011) has been prepared by Technical Committee CEN/TC 155 “Plastics piping systems and ducting systems”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2011, and conflicting national standards shall be withdrawn at the latest by November 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1555-4:2002.

It has been prepared in liaison with Technical Committee CEN/TC 234 "Gas infrastructure".

System Standards are based on the results of the work undertaken in ISO/TC 138 "Plastics pipes, fittings and valves for the transport of fluids", which is a Technical Committee of the International Organization for Standardization (ISO).

They are supported by separate standards on test methods to which references are made throughout the System Standard.

The System Standards are consistent with general standards on functional requirements and on recommended practice for installation.

EN 1555 consists of the following parts:

— EN 1555-1, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 1: General;*

— EN 1555-2, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 2: Pipes;*

— EN 1555-3, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 3: Fittings;*

— EN 1555-4, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 4: Valves* (this standard);

— EN 1555-5, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 5: Fitness for purpose of the system;*

— CEN/TS 1555-7, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 7: Guidance for the assessment of conformity.*

NOTE EN 12007-2:2000 [1] prepared by CEN/TC 234 “Gas infrastructure” deals with the recommended practice for installation of plastics pipes system in accordance with EN 1555 (all parts).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

The System Standard, of which this is Part 4, specifies the requirements for a piping system and its components made from polyethylene (PE) and which is intended to be used for the supply of gaseous fuels.

Requirements and test methods for material and components, other than valves, are specified in EN 1555-1, EN 1555-2 and EN 1555-3.

Characteristics for fitness for purpose are covered in EN 1555-5. CEN/TS 1555-7 [2] gives guidance for assessment of conformity. Recommended practice for installation is given in EN 12007-2:2000 [1] prepared by CEN/TC 234.

This part of EN 1555 covers the characteristics of valves.

1 Scope

This part of EN 1555 specifies the characteristics of valves made from polyethylene (PE) for piping systems in the field of the supply of gaseous fuels.

NOTE 1 Valves made from other material than polyethylene designed for the supply of gaseous fuels conforming to the relevant standards are permitted to be used in PE piping system according to EN 1555 provided they have relevant PE connection for butt fusion or electrofusion ends (see EN 1555-3).

It also specifies the test parameters for the test methods referred to in this standard.

In conjunction with Parts 1, 2, 3 and 5 of EN 1555, 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) a maximum operating pressure, MOP, up to and including 10 bar [1)];

b) an operating temperature of 20 °C as reference temperature;

NOTE 2 For other operating temperatures, derating coefficients should be used, see EN 1555-5.

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

EN 1555 (all parts) covers a range of maximum operating pressures and gives requirements concerning colours and additives.

NOTE 3 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 end or electrofusion socket intended to be fused with PE pipes conforming to EN 1555-2 without any fittings or with PE fittings conforming to EN 1555-3.

This European Standard covers valves for pipes with a nominal outside diameter $d_n \leq 315$ mm.

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.

EN 682, *Elastomeric Seals — Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids*

EN 736-1:1995, *Valves — Terminology — Part 1: Definition of types of valves*

EN 736-2:1997, *Valves — Terminology — Part 2: Definition of components of valves*

EN 744:1995, *Plastics piping and ducting systems — Thermoplastics pipes — Test method for resistance to external blows by the round-the-clock method*

EN 1555-1:2010, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 1: General*

EN 1555-2, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 2: Pipes*

1) 1 bar = 0,1 MPa.

EN 1555-3:2010, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 3: Fittings*

EN 1555-5, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 5: Fitness for purpose of the system*

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 12117, *Plastics piping systems — Fittings, valves and ancillaries — Determination of gaseous flow rate/pressure drop relationships*

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

EN 28233, *Thermoplastic valves — Torque — Test method (ISO 8233:1988)*

EN ISO 1133, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics (ISO 1133:2005)*

EN 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 1167-1:2006)*

EN 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 1167-4:2007)*

EN ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions (ISO 3126:2005)*

ISO 10933, *Polyethylene (PE) valves for gas distribution systems*

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

3 Terms and definitions, symbols and abbreviations

For the purposes of this document, the terms and definitions, symbols and abbreviations given in EN 1555-1:2010, EN 736-1:1995, EN 736-2:1997 and the following apply.

3.1
external leaktightness
leaktightness of the valve body enveloping the space containing the gas, with respect to the atmosphere

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

b) the external leaktightness 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, 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 PE 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

[EN 736-3:2008]

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

[EN 736-3:2008]

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

[EN 736-3:2008]

4 Material

4.1 PE compound

The PE compound from which the valve body with spigot or electrofusion socket is made shall conform to EN 1555-1. The PE components of the valve shall be made only from virgin material conforming to EN 1555-1.

4.2 Material for non-polyethylene parts

4.2.1 General

All components shall conform to the relevant EN standard(s). Alternative standards may be applied in cases where the suitable EN standard(s) do not exist provided a 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 as 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 EN 1555-2 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.

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

NOTE Metal valve bodies for PE piping systems up to 10 bars should conform to the relevant standard of CEN/TC 69 "Industrial valves".

4.2.2 Metal parts

All metal 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 seals shall conform to EN 682.

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 PE valve or valve body.

Other materials conforming to 4.2.1 may be used provided that it is proven that the valves conform to this standard.

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 standard.

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 standard.

5.2 Colour

The colour of the PE parts of valves shall be either 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 end or electrofusion socket shall have a pressure rating of at least that of the pipe to which they are assembled. PE spigot ends or electrofusion sockets shall have sufficient fusion compatibility (see EN 1555-5) to the pipe to which it is fused to meet the requirements of this standard.

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 impossible without special equipment.

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 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.

6 Geometrical characteristics

6.1 General

Each valve shall be characterised 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.

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

6.2 Measurement of dimensions

Dimensions shall be measured in accordance with EN ISO 3126 at (23 ± 2) °C, after being conditioned for at least 4 h. The measurement shall not be made less than 24 h after manufacture.

NOTE Indirect measurement at the stage of production is allowed at shorter time periods providing evidence is shown of correlation.

6.3 Dimensions of spigot ends for valves

The dimensions of spigot ends shall conform to EN 1555-3:2010, Table 3, up to and including d_n 315 mm.

6.4 Dimensions of valves with electrofusion sockets

The dimensions of electrofusion sockets shall conform to EN 1555-3:2010, Table 1, up to and including d_n 315 mm.

6.5 Dimensions of the operating device

For a quarter-turn valve, the dimension of the operating devices shall be designed so it can be operated with a $(50\,^{+0,5}_{0})$ mm square socket, (40 ± 2) mm depth.

NOTE For a non-quarter-turn operated valve, the attention is drawn on the requirements specified in EN ISO 5210 [3].

7 Mechanical characteristics of assembled valves

7.1 General

All tests shall be carried out on valves assembled with pipe from the same series conforming to EN 1555-2, in accordance with the technical instructions and the extreme installation conditions of utilisation described in EN 1555-5.

NOTE The properties of an assembled valve depend on the properties of the pipes and the valve and on the conditions of their installation (i.e. geometry, temperature, type, method of conditioning, assembly and fusion procedures).

The technical descriptions of the manufacturer shall include at least the following information:

a) service conditions (e.g. valve temperature limits);

b) assembly instructions;

c) for valves with electrofusion sockets, the fusion instructions (power requirements or fusion parameters with limits).

7.2 Requirements

Unless otherwise specified by the applicable test method, the test pieces shall be conditioned at (23 ± 2) °C before testing in accordance with Table 1.

When tested in accordance with the test methods as specified in Table 1 using the indicated parameters, the valves shall have mechanical characteristics conforming to the requirements given in Table 1.

Table 1 — Mechanical characteristics

Characteristic	Requirements	Test parameters		Test method
		Parameter	Value	
Hydrostatic strength (20 °C, 100 h)	No failure during the test period of any test piece	Conditioning time [a] Number of test pieces [b] Type of test Circumferential (hoop) stress: PE 80 PE 100 Test period Test temperature	Shall conform to EN ISO 1167-1 3 Water-in-water 10,0 MPa 12,0 MPa 100 h 20 °C	EN ISO 1167-1 and EN ISO 1167-4
Hydrostatic strength (80 °C, 165 h)	No failure during the test period of any test piece [c]	Conditioning time [a] Number of test pieces [b] Type of test Circumferential (hoop) stress: PE 80 PE 100 Test period Test temperature	Shall conform to EN ISO 1167-1 3 Water-in-water 4,5 MPa 5,4 MPa 165 h 80 °C	EN ISO 1167-1 and EN ISO 1167-4
Hydrostatic strength (80 °C, 1000 h)	No failure during the test period of any test piece	Conditioning time [a] Number of test pieces [b] Type of test Circumferential (hoop) stress: PE 80 PE 100 Test period Test temperature	Shall conform to EN ISO 1167-1 3 Water-in-water 4,0 MPa 5,0 MPa 1000 h 80 °C	EN ISO 1167-1 and EN ISO 1167-4
Leaktightness of seat and packing	No leakage during the test period	Test temperature Type fluid Number of test pieces [b] Test pressure Duration of the test	23 °C Air or nitrogen 1 25 mbar 1 h	Annex A
Leaktightness of seat and packing	No leakage during the test period	Test temperature Type fluid Number of test pieces [b] Test pressure Duration of the test	23 °C Air or nitrogen 1 1,5 MOP 30 s	Annex A
SAFETY PRECAUTIONS — Safety precautions need to be taken when testing with air or nitrogen up to 1,5 MOP. For testing with air or nitrogen a pressure of a maximum of 6 bar should be used. For MOP > 4 bar, testing with water should be considered, and the test conditions shall be agreed between the manufacturer and end user.				
Pressure drop	Air flow rate (value indicated by the manufacturer)	Type of test Number of test pieces [b] Test pressure Pressure drop for $d_n \leq 63$ mm $d_n > 63$ mm	Air 1 25 mbar 0,5 mbar 0,1 mbar	EN 12117

Table 1 — Mechanical characteristics *(continued)*

Characteristic	Requirements	Test parameters		Test method
		Parameter	Value	
Operating torque [d]	Torque range: - For $d_n \leq 63$ mm 5 Nm < $M \leq 35$ Nm - For 63 mm < $d_n \leq 125$mm 10 Nm < $M \leq 70$ Nm - For 125 mm < $d_n \leq 315$ mm 10 Nm < $M \leq 150$ Nm	Test temperatures Number of test pieces [b]	–20 °C and +23 °C and +40 °C 1	EN 28233
Stop resistance	a) No failure at stops, and b) No leakage at seat and packing	Test temperature Number of test pieces [b] Torque	–20 °C and +40 °C 1 2 times the value of the maximum measured operating torque with minimum 150 Nm, during 15 s	a) EN 28233 followed by b) Annex A
Actuation mechanism resistance	Maximum value: 1,5 times the value of the maximum measured operating torque (see this table)	Pressure Test temperature Number of test pieces [b]	6 bar 23 °C 1	EN 28233
Resistance to bending between supports	No leakage and maximum value for operating torque (see examination of operating torque)	Load applied for: 63 mm < $d_n \leq 125$ mm 125 mm < $d_n \leq 315$ mm Number of test pieces [b]	 3,0 kN 6,0 kN 1	EN 12100
Thermal cycling resistance $d_n > 63$ mm	No leakage and maximum value for operating torque (see examination of operating torque)	Number of test pieces [b]	1	EN 12119
Leaktightness under bending with thermal cycling $d_n \leq 63$ mm	No leakage	Number of cycles Temperature of cycling Number of test pieces [b]	50 –20 °C to +40 °C 1	EN 1704
Leaktightness under tensile load	No leakage and maximum value for operating torque (see examination of operating torque)	Test temperature Test pressure Number of test pieces [b]	23 °C 25 mbar 1	ISO 10933
Leaktightness under and after bending applied to the operating mechanism	No leakage	Number of test pieces [b]	1	EN 1680
Impact loading resistance	No leakage and maximum value for operating torque (see examination of operating torque)	Position of test piece Drop height Mass of the striker Type of the striker Test temperature Number of test pieces [b]	Vertical, see Figure 1 2 m 2,5 kg d 90 conforming to EN 744:1995 –20 °C 1	EN 1705

Table 1 — Mechanical characteristics of valves *(concluded)*

Characteristic	Requirements	Test parameters Parameter	Value	Test method
Multiple test [e]				
1) Resistance to long-term internal pressure loading	The test piece shall fulfil the requirements of the following characteristics:	Conditioning time [a] Type of test Number of test pieces [b] Test pressure for: PE 80 PE 100 Test period Test temperature	Shall conform to EN ISO 1167-1 Water-in-water 1 16,0 bar 20,0 bar 1 000 h 20 °C	EN ISO 1167-1 and EN ISO 1167-4
2) Leaktightness of seat and packing	No leakage during the test period	Test temperature Type fluid Number of test pieces [b] Test pressure Duration of the test	23 °C Air or nitrogen 1 25 mbar 1 h	Annex A
3) Leaktightness of seat and packing	No leakage during the test period	Test temperature Type fluid Number of test pieces [b] Test pressure Duration of the test	23 °C Air or nitrogen 1 1,5 MOP 30 s	Annex A
SAFETY PRECAUTIONS — Safety precautions need to be taken when testing with air or nitrogen up to 1,5 MOP. For testing with air or nitrogen a pressure of a maximum of 6 bar should be used. For MOP > 4 bar, testing with water should be considered, and the test conditions shall be agreed between the manufacturer and end user.				
4) Operating torque [d]	Torque range: - For $d_n \leq 63$ mm 5 Nm < $M \leq$ 35 Mn - For 63 mm < $d_n \leq$ 125mm 10 Nm < $M \leq$ 70 Nm - For 125 mm < $d_n \leq$ 315 mm 10 Nm < $M \leq$ 150 Nm	Test temperatures Number of test pieces [b]	–20 °C and +23 °C and +40 °C 1	EN 28233
5) Impact loading resistance	No leakage and maximum value for operating torque (see examination of operating torque)	Position of sample Drop height Mass of the striker Type of the striker Test temperature Number of test pieces [b]	Vertical, see Figure 1 2 m 2,5 kg d90 conforming to EN 744:1995 –20 °C 1	EN 1705

[a] The valves shall not be pressurized within 24 h after fusion.

[b] The numbers of test pieces given indicate the numbers required to establish a value for the characteristic described in the table. The numbers of test pieces required for factory production control and process control should be listed in the manufacturer's quality plan. For guidance see CEN/TS 1555-7 [2].

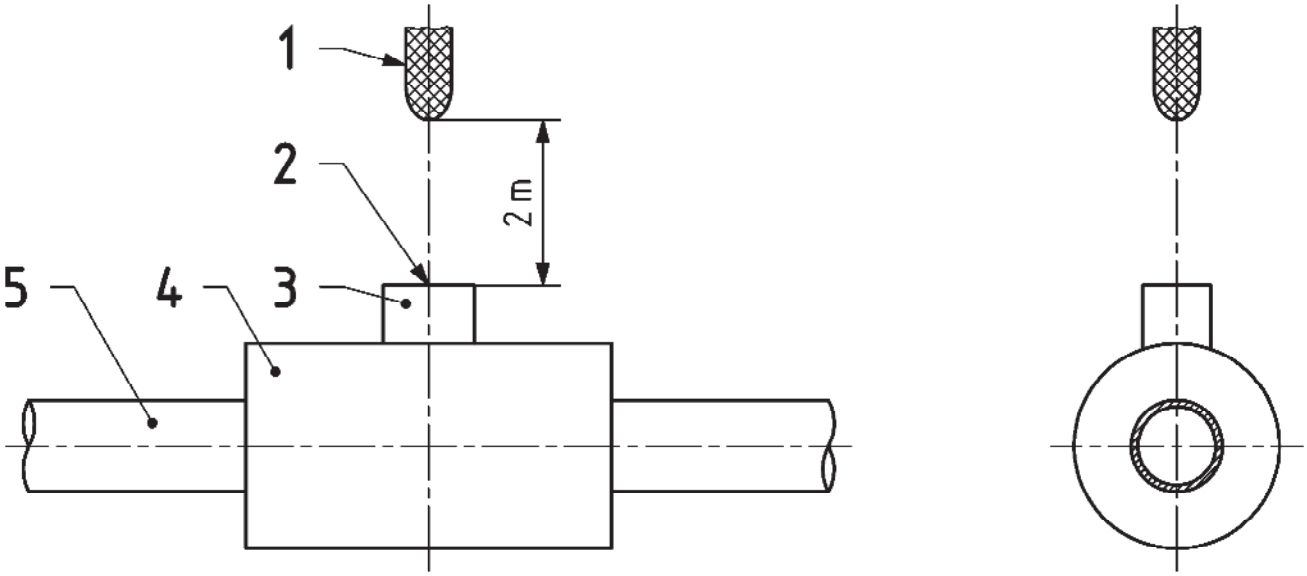
[c] Only brittle failures shall be taken into account. If a ductile failure occurs before 165 h, the test may be repeated at a lower stress. The stress and the associated minimum test period shall be selected from Table 2 or from a line based on the stress/time points given in Table 2.

[d] The initiating torque and the running torque shall be within the torque range given in the this table.

[e] As soon as possible after the completion of the internal pressure test the other four tests shall be carried out on the valve in the order stated.

Table 2 — Circumferential (hoop) stress at 80 °C and associated minimum test period

PE 80		PE 100	
Stress MPa	Minimum test period h	Stress MPa	Minimum test period h
4,5	165	5,4	165
4,4	233	5,3	256
4,3	331	5,2	399
4,2	474	5,1	629
4,1	685	5,0	1 000
4,0	1 000	––	––



Key

1 striker
2 impact point
3 operating device
4 valve body
5 valve outlet

Figure 1 — Position of the test piece for the impact loading test

8 Physical characteristics

8.1 Conditioning

Unless otherwise specified by the applicable test method, the test pieces shall be conditioned at (23 ± 2) °C before testing in accordance with Table 3.

8.2 Requirements

When tested in accordance with the test methods specified in Table 3 using the indicated parameters, the valves shall have physical characteristics conforming to the requirements given in Table 3.

Table 3 — Physical characteristics

Characteristic	Requirements	Test parameters		Test method
		Parameter	Value	
Oxidation induction time (thermal stability)	≥ 20 min	Test temperature Number of test pieces[a] Test environment Specimen weight	200 °C [b] 3 Oxygen 15 mg ± 2 mg	ISO 11357-6
Melt mass-flow rate (MFR)	After processing maximum deviation of ± 20 % of the value measured on the batch used to manufacture the valve	Loading mass Test temperature Time Number of test pieces [a]	5 kg 190 °C 10 min Shall conform to EN ISO 1133	EN ISO 1133

[a] The number of test pieces given indicate the numbers required to establish a value for the characteristic described in the table. The number of test pieces required for factory production control and process control should be listed in the manufacturer's quality plan, for guidance see CEN/TS 1555-7 [2].

[b] Test may be carried out at 210 °C or 220 °C providing there is clear correlation to the results at 200 °C; in case of dispute the reference temperature shall be 200 °C.

9 Performance requirements

When valves conforming to this standard are assembled to each other or to components conforming to other parts of EN 1555, the joints shall conform to EN 1555-5.

10 Marking

10.1 General

10.1.1 Unless otherwise stated in Table 4, the marking elements shall be printed or formed directly on the valve in such a way that after storage, weathering, handling and installation legibility is maintained during use of the valve.

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

10.1.2 Marking shall not initiate cracks or other types of defects which adversely influence the performance of the valve.

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

10.1.4 The size of the marking shall be such that it is legible without magnification.

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

10.2 Minimum required marking

The minimum required marking shall conform to Table 4.

Table 4 — Minimum required marking

Aspects	Mark or symbol
Number of the System Standard [a]	EN 1555
Manufacturer's name and/or trademark	Name or symbol
Nominal outside diameter(s)of pipe, d_n	e.g. 110
Material and designation	e.g. PE 100
Design application series	e.g. SDR 11
Manufacturer's information[b]	
Internal fluid [a]	Gas
Flow direction (only for unidirectional valve)	Arrow

[a] This information may be printed on a label associated with the valve or on an individual bag.

[b] For providing traceability, the following details shall be given:

- the production period, year, month and/or week, in figures or in code;
- a name or code for the production site if the manufacturer is producing in different sites.

10.3 Additional marking

Valves conforming to this standard, which are third party certified by a certification body, may be marked accordingly.

11 Delivery conditions

The valves shall be packaged in bulk or individually protected where necessary in order to prevent deterioration and contamination. Whenever possible, they shall be placed in individual bags, in cardboard boxes or cartons.

NOTE 1 It is recommended to protect the spigot end by external caps.

The cartons and/or individual bags shall bear at least one label with the manufacturer's name, type and dimensions of the part, number of units in the box, and any special storage conditions and storage time limits.

NOTE 2 Valves should be stored in their original packing, until ready for use.

Annex A
(normative)

Determination of the leaktightness of seat and packing

A.1 General

This annex specifies the test method to verify the leaktightness of the seat and packing of a valve/valve body made from PE.

A.2 Test method

Test equipment shall not subject the valve to externally applied stresses which may affect the results of the tests.

The valve shall be tested by closing the obturator in the normal manner.

The method of internal leakage testing shall result in the application of the full differential test pressure specified in Table 1 across the seat or seats in the direction for which they are designed. Tests for typical types of valves shall be as specified in Table A.1.

Any unidirectional flow valve shall be tested in the specified flow direction only. Bidirectional valve shall be tested in both flow directions.

The duration of test shall conform to the specified values specified in Table 1.

Table A.1 — Obturator tightness test methods

Type of valves	Test method
Gate valves Ball valves Plug valves	The bonnet cavity shall be filled with the test fluid. Pressure shall be applied successively to each side of the closed valve and the valve shall be subsequently checked for leakage. Valves with independent double seating (such as two-piece obturator or double-seated valves) may be tested by applying pressure between the seats, and each side of the closed valve checked for leakage.
Butterfly valves Diaphragm valves	Pressure shall be applied in the most adverse direction; valves with symmetrical seating may be tested in either direction.
Check valves	Pressure shall be applied in the direction tending to close the obturator and the opposite side shall be checked for leakage.

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