

Ventiler til gasdistributionssystemer med et maksimalt driftstryk, der er mindre end eller lig med 16 bar – Ydeevnekrav

Valves for gas distribution systems with maximum
operating pressure less than or equal to 16 bar –
Performance requirements

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English Version

**Valves for gas distribution systems with maximum operating
pressure less than or equal to 16 bar - Performance
requirements**

Appareils de robinetterie pour les systèmes de distribution
du gaz avec une pression maximale de service inférieure
ou égale à 16 bar - Exigences de performance

Armaturen für Gasverteilungssysteme mit zulässigen
Betriebsdrücken kleiner oder gleich 16 bar - Anforderungen
an die Gebrauchstauglichkeit

This European Standard was approved by CEN on 28 December 2012.

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Foreword

This document (EN 13774:2013) has been prepared by Technical Committee CEN/TC 69 “Industrial valves”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by August 2013, and conflicting national standards shall be withdrawn at the latest by August 2013.

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 13774:2003.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

The following is a list of the main changes compared to the previous edition:

- a) the Scope has been modified;
- b) the Normative References (Clause 2) have been updated;
- c) requirements of type tests and production tests (Clause 5) have been completely revised, in particular:
 - 1) requirements for “strength design” (5.3.2), for “extended drain, vent and sealant lines” (5.3.8), for “end-to-end dimensions” (5.4.3), for “mechanical resistance against excessive actuating forces” (5.7) have been added;
 - 2) requirements for “resistance to wear” (5.12) and for “reference flow rate” (5.13) became optional;
 - 3) requirements for “bending resistance” and for “resistance to liquid agents” have been deleted;
- d) the annex on analysis of the technical file and recording of the initial conditions has been deleted;
- e) the annex on test methods for valves (Annex A) has been updated;
- f) the annex on additional characteristics on request from the purchaser has been deleted;
- g) the annex on resistance to bending moment applied via the stem or the shaft has been deleted;
- h) the annex providing the European Standards for valves (Annex B) has been updated;
- i) the annex giving a summary of tests on product and type tests (Annex C) has been added;
- j) the Bibliography has been updated.

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

1 Scope

This European Standard deals with metal isolating valves used for gas distribution systems with maximum operating pressure up to 16 bar, and which operate with fuel gases of the first, the second and the third family, in accordance with EN 437.

The types of isolating valves to be considered are: plug and ball valves, gate valves, globe valves and butterfly valves.

This standard does not apply to:

- valves for domestic installations;
- safety type pressure relief valves;
- wellhead valves.

In the case of power operated valves, the requirements for the power source are not covered by this European Standard.

The valves covered in this European Standard operate in the following classes of temperature:

- - 10 °C to 60 °C;
- - 20 °C to 60 °C;
- the range is stated by the purchaser for special design.

This European Standard gives additional requirements to the relevant products standards. (See Annex B.)

In case of contradictions between the standards mentioned in Annex B and this European Standard, EN 13774 prevails.

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.

EN 19, *Industrial valves — Marking of metallic valves*

EN 377, *Lubricants for applications in appliances and associated controls using combustible gases except those designed for use in industrial processes*

EN 549, *Rubber materials for seals and diaphragms for gas appliances and gas equipment*

EN 558, *Industrial valves — Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems — PN and Class designated valves*

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 736-3:2008, *Valves — Terminology — Part 3: Definition of terms*

EN 764-1:2004, *Pressure equipment — Part 1: Terminology — Pressure, temperature, volume, nominal size*

EN 1092-1, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 1: Steel flanges*

EN 1092-2, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 2: Cast iron flanges*

EN 1092-3, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 3: Copper alloy flanges*

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 1759-1, *Flanges and their joint — Circular flanges for pipes, valves, fittings and accessories, Class designated — Part 1: Steel flanges, NPS 1/2 to 24*

EN 1759-3, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, Class designated — Part 3: Copper alloy flanges*

EN 10204, *Metallic products — Types of inspection documents*

EN 10226-1, *Pipe threads where pressure tight joints are made on the threads — Part 1: Taper external threads and parallel internal threads — Dimensions, tolerances and designation*

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

EN 12266-1:2012, *Industrial valves — Testing of metallic valves — Part 1: Pressure tests, test procedures and acceptance criteria — Mandatory requirements*

EN 12516-1, *Industrial valves — Shell design strength — Part 1: Tabulation method for steel valve shells*

EN 12516-2, *Industrial valves — Shell design strength — Part 2: Calculation method for steel valve shells*

EN 12516-3, *Valves — Shell design strength — Part 3: Experimental method*

EN 12516-4, *Industrial valves — Shell design strength — Part 4: Calculation method for valve shells manufactured in metallic materials other than steel*

EN 12570, *Industrial valves — Method for sizing the operating element*

EN 12627, *Industrial valves — Butt welding ends for steel valves*

EN 12982, *Industrial valves — End-to-end and centre-to-end dimensions for butt welding end valves*

EN 13942, *Petroleum and natural gas industries — Pipeline transportation systems — Pipeline valves (ISO 14313:2007 modified)*

EN ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1)*

EN ISO 8434-1, *Metallic tube connections for fluid power and general use — Part 1: 24 degree cone connectors (ISO 8434-1)*

ISO 272, *Fasteners — Hexagon products — Widths across flats*

ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 736-1:1995, EN 736-2:1997, EN 736-3:2008 and EN 764-1:2004 and the following apply.

3.1

gas distribution system

pipeline system including piping above and below ground and all other equipment necessary to supply the gas to the consumers

3.2

external tightness

shell tightness

tightness of the gas-containing envelope with respect to the atmosphere

3.3

internal tightness

seat tightness

tightness ensured between the valve inlet and outlet by the closure device in the closed position

3.4

volume rate of flow

volume of fluid discharged by the valve per time unit

3.5

reference flow rate

rate of the air flow in cubic metres per hour, as measured at 0 °C at the absolute pressure of 1 013 mbar, discharged by the valve and creating therein a specified pressure drop, at a specified air pressure upstream of the valve

3.6

maximum allowable pressure

$p_{\max}$

maximum pressure at which any part of a valve continuously operates at a specified operating temperature

3.7

maximum operating pressure

MOP

maximum pressure in a system operated continuously under normal operating conditions

Note 1 to entry: "Normal operating conditions" means no malfunctioning of the equipment or disruption to the gas flow.

3.8

maximum strength torque

maximum torque applied to the stem or the shaft, with the obturator either totally open or totally closed, which causes no alteration to the functional capability of the valve

3.9

maximum operating torque

maximum torque applied on the stem or shaft of a valve to ensure its operation under the maximal allowable pressure ($p_{\max}$) and at any operating temperature

3.10

operating cycle

full operating from the closed position to the opened position and back to the closed position

3.11

block and bleed facility

equipment put together with the valve as to assume two functions: isolation and bleed

3.12

double-isolation-and-bleed valve

DIB

single valve with two seating surfaces, each of which, in the closed position, provides a seal against pressure from a single source, with a means of venting/bleeding the cavity between the seating surfaces

Note 1 to entry: This feature can be provided in one direction or in both directions.

4 Symbols and abbreviations

t_a	: mean ambient temperature (+ 20 °C ± 5 °C);
$t_{\max}$	: maximum value of use temperature (+ 60 °C);
$t_{\min}$	: minimum value of use temperature;
$p_{\max}$	: maximum allowable pressure.

5 Requirements, type tests and production tests

5.1 Type testing

5.1.1 Test samples

Qualification of the range shall be achieved by testing the smallest valve, the largest valve limited by DN 500 and one chosen in the middle of the range. For valves greater than DN 500, the DN 500 qualifies the range up to DN 1 000. This applies only where the materials, design and construction does not change within the range.

For resistance to wear, qualification shall be achieved by testing only the smallest of the range.

For each valve to be tested, one sample should be provided, and tested in accordance with the qualification test program.

5.1.2 Test documents

The manufacturer shall produce a technical file containing the following documents:

- detailed drawings, including dimensions, tolerances, surface conditions and relevant calculations for pressure containing parts and principle parts;
- detailed drawings of the isolating valve with sectional drawings of all important parts;

- c) general arrangement drawings showing relative positions and sizes of vents/drains, gearboxes, and other external parts, together with overall dimensions;
- d) manufacturing details including welding and testing procedures;
- e) installation, operating and maintenance procedures;
- f) description of the isolating valve with details on type, construction, materials, surface treatment and marking; detailed sectional arrangement drawings showing all parts with reference numbers and materials identified to published standards including reference to the elastomers and to the suppliers;
- g) details of technical characteristics including performance details. The manufacturer shall state the reference flow rate at full opening;
- h) material certificates in accordance with EN 10204 shall be supplied with the samples:
 - 1) Type 3.1 for the body and obturator,
 - 2) Type 2.2 for the stem or shaft.

5.1.3 Certification body

All tests shall be certified by an independent accepted body.

5.2 Materials

5.2.1 Shell

Requirements	Type tests	Production tests
<p>5.2.1.1 General</p> <p>Materials in accordance with EN 12516-1, EN 12516-2 or EN 12516-4 shall be used, except grey cast iron, taking into account the relevant standards for shell design strength.</p> <p>Other metallic materials may only be used if their mechanical characteristics, temperature stability and resistance to corrosion are at least equal to those specified in the above cited standards.</p> <p>5.2.1.2 Steel weldings ends</p> <p>For welding ends of valves, the maximum carbon equivalent CEV_{max} shall not exceed:</p> <p>$CEV_{max} = 0,45$ for grades with specified minimum yield strength not exceeding 360 N/mm^2;</p> <p>$CEV_{max} = 0,48$ for grades with specified minimum yield strength above 360 N/mm^2;</p> <p>unless otherwise agreed between purchaser and manufacturer.</p> $CEV_{max} = C\% + \frac{Mn\%}{6} + \frac{Cr\% + Mo\% + V\%}{5}$	<p>The technical data concerning the materials used shall be available from the valve manufacturer.</p>	<p>—</p>

Requirements	Type tests	Production tests
$+ \frac{Cu\% + Ni\%}{15}$ <p>where</p> <p>% is the percentage by weight of the ladle content of:</p> <p>C Carbon; Mn Manganese; Cr Chromium; Mo Molybdenum; V Vanadium; Cu Copper; Ni Nickel.</p> <p>Unless otherwise agreed between manufacturer and purchaser, the carbon content shall not exceed 0,21 %.</p> <p>The sulphur content shall not exceed 0,030 %, and the phosphorus content shall not exceed 0,035 %. The sum of sulphur and phosphorus as a total of the ladle analysis shall be smaller than or equal to 0,050 %.</p>		
<p>5.2.1.3 PE ends</p> <p>Materials in accordance with EN 1555-1 shall be used.</p>		

5.2.2 Obturator

Requirements	Type tests	Production tests
Materials in accordance with EN 12516-1, EN 12516-2 or EN 12516-4 shall be used.	The technical data concerning the materials used shall be available from the valve manufacturer.	—

5.2.3 Stem or shaft

Requirements	Type tests	Production tests
Stem or shaft shall be made from metallic materials and shall be corrosion resistant or permanently protected against corrosion.	The technical data concerning the materials used shall be available from the valve manufacturer.	—

5.2.4 Springs

Requirements	Type tests	Production tests
Springs necessary for operation and leak tightness shall be made of corrosion resistant materials or their permanent resistance to corrosion shall be made by means of design. Protection of the surface is not permissible.	The technical data concerning the materials used shall be available from the valve manufacturer.	—

5.2.5 Seals

Requirements	Type tests	Production tests
<p>Seals made of elastomers shall meet the requirements of EN 682 or EN 549.</p> <p>When seals made of thermo plastic materials, e.g. PTFE, PA are used, the part in contact with the flow shall be of non-regenerated material.</p> <p>When seals made of thermoplastic materials are used, the sealing system shall be designed in such a way to compensate a possible creep of the seal.</p> <p>Reinforcement with carbon or fibreglass is allowed.</p>	The technical data concerning the materials used shall be available from the valve manufacturer.	—

5.2.6 Lubricants

Requirements	Type tests	Production tests
Lubricants used in gas containing parts shall meet the specifications of EN 377.	The technical data concerning the materials used shall be available from the valve manufacturer.	—

5.3 Design

5.3.1 General

Requirements	Type tests	Production tests
Isolating valves shall be free from sharp edges.	A visual inspection shall be carried out to verify conformance to the requirements.	The requirement is to be verified through a visual inspection of each valve.

5.3.2 Strength design

Requirements	Type tests	Production tests
<p>The design and dimensions of the valves shall be such as to withstand safely all stresses occurring under operating conditions. The shell design shall meet the requirements of EN 12516-1 or EN 12516-2 or EN 12516-3 or EN 12516-4.</p> <p>Alternatively, by agreement, the requirements of EN 13942 shall be met.</p> <p>NOTE The tabulation method, EN 12516-1, is similar in approach to ASME B16.34 in that the designer can look up the required minimum wall thickness dimension of the valve body from a table.</p>	<p>The calculations or the elevated pressure test report shall be included in the technical file the manufacturer shall produce. See 5.1.2.</p>	—

5.3.3 Stems or shafts

Requirements	Type tests	Production tests
<p>Stems or shafts shall be of anti-blow out design. The stem seal fasteners shall not be considered as being the sole anti-blow out method.</p> <p>The stem shall be protected against water and dust ingress.</p>	<p>A visual inspection shall be carried out to verify conformance to the requirements.</p>	<p>The requirement is to be checked through a visual inspection of each valve.</p>

5.3.4 Shell tapplings

Requirements	Type tests	Production tests
<p>Shell tapplings on pressurised cavities for direct ventilation shall have:</p> <ul style="list-style-type: none"> — cylindrical threads according to EN ISO 228-1; or — conical threads according to ASME B1.20.1 NPT; or — metric fine thread made tight by metallic or metal reinforced seals or seals with metallic thrust rings. <p>They shall be provided with a relief bore and shall be able to be safely loosened for at least two revolutions under MOP.</p> <p>The materials used for the connections to the shell tapplings shall be of a similar material as the shell.</p>	<p>A visual inspection shall be carried out to verify conformance to the requirements.</p> <p>Test under pressure of relief bore shall be carried out.</p>	—

5.3.5 Bolt holes for assembly purposes

Requirements	Type tests	Production tests
Bore holes for bolts and studs used for valve assembly purposes shall not intrude into gas containing cavities.	A drawing examination as well as a visual inspection shall be carried out to verify conformance to the requirements.	—

5.3.6 Manufacturing apertures

Requirements	Type tests	Production tests
Apertures for manufacturing reasons shall be made gas tight and permanently sealed.	To be verified during external leak tightness test according to 5.10.	To be verified during external leak tightness test according to 5.10.

5.3.7 Sealing systems

Requirements	Type tests	Production tests
Sealing systems for obturators and stems or shafts shall not be adjustable by hand or commercial tools.	A visual inspection shall be carried out to verify conformance to the requirements.	—

5.3.8 Extended drain, vent and sealant lines

Requirements	Type tests	Production tests
Drain, vent and sealant lines shall be provided if specified and shall be extended by means of rigid pipework, if necessary. The lines shall be fastened to the valve and/or extensions and terminate close to the stem extension top works, by agreement.	Drawing examination.	Drawing examination. Hydraulic pressure test at 1,5 times the rated pressure of the valve. The test may be conducted as part of valve shell test or as a test of the preassembled pipe work.
Drain and vent lines shall: <ol style="list-style-type: none"> 1) have a design pressure not less than the rated pressure of the valve on which they are installed; 2) be capable of withstanding the hydrostatic shell test pressure of the valve; 3) be designed in accordance with a recognised design code; 4) be suitable for blow-down operation, where applicable. Sealant lines shall have a design pressure not less than the greater of the pipeline valve	Drawing examination.	Drawing examination. Hydraulic pressure test at 1,5 times the rated pressure of the valve. The test may be conducted as part of valve shell test or as a test of the preassembled pipework, provided that the final

Requirements	Type tests	Production tests
<p>rated pressure and the injection pressure.</p> <p>The purchaser should specify the injection pressure or the pipe for use. If not specified by the purchaser, the manufacturer shall advise the maximum injection pressure for the system. The size of the sealant lines shall be by agreement. Prior to assembly, the internal bores of sealant lines shall be clean and free from rust and any foreign particles.</p>		<p>connections to the valve are leak tested at a pressure agreed with the purchaser. No leakage is permitted.</p>
<p>Drain and vent connections on valves:</p> <p>a) they shall be fitted with at least one isolating valve;</p> <p>b) connection to the valve body shall be welded;</p> <p>c) connection to the first valve shall be welded;</p> <p>d) minimum pipe size shall be as follows:</p> <p>1) $\leq$ DN 150; DN 15 drain;</p> <p>2) $\geq$ DN 200; minimum DN 25 drain unless otherwise specified;</p> <p>Each sealant injection line:</p> <ul style="list-style-type: none"> — shall be welded to the valve body; — shall incorporate a check valve at the point of connection to the valve body; — shall incorporate an isolating valve; — shall terminate in a giant button head fitting $\varnothing$ 22 mm. <p>Prior to assembly the internal bores of sealant lines shall be chemically or mechanically cleaned.</p>		

5.4 Dimensions

5.4.1 Threaded ends

Requirements	Type tests	Production tests
<p>Isolating valves with threaded ends shall have key flats in accordance with ISO 272.</p>	<p>Dimensions shall be checked, to ensure conformance to the requirements.</p>	<p>Dimensions shall be checked, to ensure conformance to the requirements.</p>

5.4.2 End connections

Requirements	Type tests	Production tests
<p>The following end connections are accepted:</p> <ul style="list-style-type: none"> — compression fittings in accordance with EN ISO 8434-1; — flanges in accordance with EN 1092-1, EN 1092-2, EN 1092-3 or EN 1759-1, EN 1759-3; — butt welding ends in accordance with EN 12627; the thickness of matching pipe shall be indicated by the purchaser; — wafer type ends suitable for flanges in accordance with EN 1092-1, EN 1092-2, EN 1092-3, EN 1759-1 or EN 1759-3; — polyethylene pipe ends in accordance with EN 1555-2 and EN 1555-3 for polyethylene gas distribution system; — threaded ends in accordance with EN 10226-1 or ASME B1.20.1. 	Dimensions shall be checked, to ensure conformance to the requirements.	Dimensions shall be checked, to ensure conformance to the requirements.

5.4.3 End-to-end dimensions

Requirements	Type tests	Production tests
End-to-end dimensions of flanged and butt welding valves shall conform to EN 558 or EN 12982 or EN 13942. In case of EN 558 or EN 12982 the purchaser shall indicate the series to be supplied.	Dimensional check.	—

5.5 Operability and endurance

Requirements	Type tests	Production tests
<p>5.5.1 Operability</p> <p>When operating the valve, the closure direction of the operating element shall be clockwise.</p> <p>The maximum measured operating torque shall be less than the operating torque specified by the manufacturer.</p> <p>The manual forces to be applied to the operating element, as specified in EN 12570, shall be the assumed manual force which one person is capable of applying, even if the valve is power operated.</p> <p>The diameter of handwheel shall be less or equal to 600 mm.</p>	<p>—</p> <p>The test, which is achieved as to assume that the requirements are fulfilled, shall be carried out in accordance with test method 1 of Annex A (see A.2.2).</p>	—

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