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Samodejni zaporni ventili za plinske gorilnike in plinske aparate (z dopolnili do vključno A3)

Automatic shut-off valves for gas burners and gas appliances

Automatische Absperrventile für Gasbrenner und Gasgeräte

Robinets automatiques de sectionnement pour brûleurs à gaz et appareils à gaz

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Automatic shut-off valves for gas burners and gas appliances

Robinets automatiques de sectionnement pour brûleurs à gaz et appareils à gaz

Automatische Absperrventile für Gasbrenner und Gasgeräte

This European Standard was approved by CEN on 20 February 2011 and includes Amendment 2 approved by CEN on 10 June 2012 and Amendment 3 approved by CEN on 10 November 2012.

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Foreword

This document (EN 161:2011+A3:2013) has been prepared by Technical Committee CEN/TC 58 “Safety and control devices for burners and appliances burning gaseous or liquid fuels”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.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 A3⟩ EN 161:2011+A2:2012 ⟨A3.

This document includes Amendment 2, approved by CEN on 2012-06-10 and Amendment 3 approved by CEN on 2012-11-10.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A2⟩ ⟨A2 and A3⟩ ⟨A3.

This document is intended to be used in conjunction with A2⟩ EN 13611:2007+A2:2011 ⟨A2. This document refers to clauses of A2⟩ EN 13611:2007+A2:2011 ⟨A2 or adapts clauses by stating “with the following modification”, “with the following addition”, “is replaced by the following” or "is not applicable" in the corresponding clause. This European Standard adds clauses or sub-clauses to the structure of A2⟩ EN 13611:2007+A2:2011 ⟨A2 which are particular to this European Standard i.e. sub-clauses or annexes, which are additional to those in A2⟩ EN 13611:2007+A2:2011 ⟨A2, are numbered starting from 101 or are designated as Annex AA, BB, CC etc. It should be noted that these clauses and sub-clauses are not indicated as an addition.

A3⟩ At the time of publication of Amendment 2, Amendment 1 was still at the draft stage. Therefore, there will be no Amendment 1 for this project. The present document incorporates the changes of the original Amendment 1 and Amendment 2. ⟨A3

It should be noted that the following significant editorial changes compared to the previous edition have been incorporated in this European Standard:

a) alignment to A2⟩ EN 13611:2007+A2:2011 ⟨A2;

b) normative references: ISO 4400 and ISO 6952 are changed to EN 175301-803;

c) terms and definitions are aligned to A2⟩ EN 13611:2007+A2:2011 ⟨A2;

d) A3⟩ sub-clause 6.2.105, Balanced valves, has been changed;

e) sub-clause 6.2.107, Additional requirements for shut-off function, has been changed; ⟨A3

f) sub-clause 6.101 has been moved to sub-clause 8.11.102;

g) A3⟩ sub-clause 7.105.1, Sealing force requirements, has been changed; ⟨A3

h) installation and operating instructions are integrated in one sub-clause;

i) A3 addition of new Annexes AA and BB; A3

j) changes in Annex ZA regarding 1.2, 1.2.2, 1.2.3, 1.3, 3.1.1, 3.3, 3.6, 3.7, 3.8, 3.11, 3.12, 3.2.1 and in addition Annex II and III were deleted.

SIL classification according to EN 61508 cannot be claimed based upon compliance with this standard. Valves with SIL classification do not meet automatically the requirements of this standard.

A3 Primarily in industrial applications it is common practice to rate the safety of a plant based on values describing the likelihood of a dangerous failure. These values are being used to determine Safety Integrity Levels or Performance Levels when the system is being assessed in its entirety.

CEN/TC 58 standards for safety relevant controls do go beyond this approach, because for a certain life span for which the product is specified, designed and tested a dangerous failure is not allowed at all. Failure modes are described and assessed in greater detail. Measures to prevent dangerous situations occurring are defined. Field experience over many decades is reflected in the CEN/TC 58 standards. Requirements of these standards can be considered as proven in practice. The PL assessment in Annex AA is only applicable to automatic shut-off valves which are already certified to this European Standard. It cannot be presumed that any Safety Integrity Level or Performance Level assessment alone would imply that requirements of a CEN/TC 58 standard have been met.

To be able to provide parameters to allow for any formal Safety Integrity Level or Performance Level system assessment the Annexes AA and BB of this document define a methodology to derive the relevant parameters from the requirements of this standard. A3

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 specifies the safety, construction and performance requirements for automatic shut-off valves for use with gas burners, gas appliances and similar use, hereafter referred to as ‘valves’.

This European Standard is applicable to valves with declared maximum inlet pressures up to and including 500 kPa (5 bar) of nominal connection sizes up to and including DN 250 for use with one or more fuel gases in accordance with EN 437.

This European Standard is applicable to electrically operated valves and to valves actuated by fluids where the control valves for these fluids are actuated electrically, but not to any external electrical devices for switching the control signal or actuating energy.

An assessment method for valve designs is given by this European Standard.

This European Standard is also applicable to valves where the flow rate is controlled by external electrical signals, either in discrete steps or proportional to the applied signal.

This European Standard is also applicable to valves fitted with closed position indicator switches.

NOTE Provisions for final product inspection and testing by the manufacturer are not specified.

A3 This European standard establishes methodologies for the determination of a Performance Level (PL) in accordance with EN 13611:2007+A2:2011, Annexes K and L. A3

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 30 (all parts), *Domestic cooking appliances burning gas*

EN 298, *Automatic gas burner control systems for gas burners and gas burning appliances with or without fans*

A2 EN 13611:2007+A2:2011 A2, *Safety and control devices for gas burners and gas burning appliances — General requirements*

EN 13906-1, *Cylindrical helical springs made from round wire and bar — Calculation and design — Part 1: Compression springs*

EN 13906-2, *Cylindrical helical springs made from round wire and bar — Calculation and design — Part 2: Extension springs*

EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

EN 60730-1:2000, *Automatic electrical controls for household and similar use — Part 1: General requirements (IEC 60730-1:1999, modified)*

EN 61058-1, *Switches for appliances — Part 1: General requirements (IEC 61058-1:2000 modified + A1:2001 (Equivalent)*

EN 175301-803, *Detail Specification: Rectangular connectors — Flat contacts, 0,8 mm thickness, locking screw not detachable*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in [A2] EN 13611:2007+A2:2011 [A2] and the following apply.

3.101
automatic shut-off valve
valve which opens when energized and closes automatically when de-energized

3.102
actuating mechanism
part of the valve which moves the closure member

3.103
valve with step control
valve which controls the flow rate in steps

3.104
valve with modulating control
valve which controls the flow rate continuously between two limits in response to external electrical signals

3.105
closed position indicator switch
switch fitted to a valve which indicates when the closure member is in the closed position

3.106
actuating energy
required energy for the actuating mechanism to move the closure member to the open position

NOTE The actuating energy can have an external source (electrical, pneumatic or hydraulic) and can be transformed inside the valve.

3.107
opening force
force required to move the closure member to the open position

3.108
closing force
force available to close the valve, independent of any force provided by fuel gas pressure

3.109
sealing force
force acting on the valve seat when the closure member is in the closed position, independent of any force provided by fuel gas pressure

3.110
frictional force
largest force required to move the actuating mechanism and the closure member from the open position to the closed position with the closure spring removed, independent of any force provided by fuel gas pressure

3.111
actuating pressure
hydraulic or pneumatic pressure supplied to the actuating mechanism of the valve

3.112
opening time
time interval between energizing the valve and the attainment of the maximum or other defined flow rate

3.113
closing time
time interval between de-energizing the valve and the closure member attaining the closed position

3.114
delay time
time interval between energizing the valve and the start of flow

3.115
control valve
valve which controls the fluid (e. g. compressed air) supplied to the actuating mechanism

3.116
rated voltage
voltage declared by the manufacturer at which the valve may be operated

3.117
rated current
current declared by the manufacturer at which the valve may be operated

3.118
balanced valve
valve with a balanced closure member where the inlet pressure acts on the closure member in the opening and closing direction

NOTE The closure member may close more than one opening.

4 Classification

4.1 Classes of control

[A2] EN 13611:2007+A2:2011 [A2] is replaced by the following:

— Class A, B and C valves

Valves where the sealing force is not decreased by the gas inlet pressure. They are classified A, B or C according to the sealing force requirements of 7.105. Balanced valves according to this standard are class A valves.

— Class D valves

Valves which are not subject for requirements for the sealing force and fixed closing time.

NOTE Class D valves are intended to be used for control functions only.

— Class J valves

Disc-on-seat valves where the sealing force is not decreased by the gas inlet pressure and which meet the requirements of 7.105.

4.2 Groups of control

Shall be according to [A2] EN 13611:2007+A2:2011 [A2], 4.2.

4.3 Classes of control functions

Shall be according to [A2] EN 13611:2007+A2:2011 [A2], 4.3.

5 Units of measurement and test conditions

Shall be according to [A2] EN 13611:2007+A2:2011 [A2], Clause 5.

6 Construction requirements

6.1 General

Shall be according to [A2] EN 13611:2007+A2:2011 [A2], 6.1.

6.2 Mechanical parts of the control

6.2.1 Appearance

Shall be according to [A2] EN 13611:2007+A2:2011 [A2], 6.2.1.

6.2.2 Holes

Shall be according to [A2] EN 13611:2007+A2:2011 [A2], 6.2.2.

6.2.3 Breather holes

Shall be according to [A2] EN 13611:2007+A2:2011 [A2], 6.2.3.

6.2.4 Test for leakage of breather holes

Shall be according to [A2] EN 13611:2007+A2:2011 [A2], 6.2.4.

6.2.5 Screwed fastenings

Shall be according to [A2] EN 13611:2007+A2:2011 [A2], 6.2.5.

6.2.6 Jointing

Shall be according to [A2] EN 13611:2007+A2:2011 [A2], 6.2.6.

6.2.7 Moving parts

Shall be according to [A2] EN 13611:2007+A2:2011 [A2], 6.2.7.

6.2.8 Sealing caps

Shall be according to [A2] EN 13611:2007+A2:2011 [A2], 6.2.8.

6.2.9 Dismantling and reassembly

Shall be according to [A2] EN 13611:2007+A2:2011 [A2], 6.2.9.

6.2.101 Design

There shall be no exposed shafts or operating levers which could adversely affect the ability of valves to close.

6.2.102 Closed position indicator switch

Closed position indicator switches, where fitted, shall not impair the correct operation of valves. Adjusters shall be sealed to indicate interference. Any drift of the switch and actuating mechanism from its setting shall not impair correct valve operation.

6.2.103 Valve with modulating control

Flow rates of valves with modulating control shall be adjustable over the full range declared by the manufacturer. If the adjustment of one flow rate affects the setting of any other flow rate, this shall be clearly indicated in the manufacturer's instructions for setting up. The setting of any flow rate shall require the use of mechanical or electrical tools and shall be designed to discourage unauthorized adjustment.

NOTE For air-gas ratio controls see EN 12067-1 and -2.

6.2.104 Controls assembled to a valve

Other controls assembled to a valve shall not interfere with its shut-off function.

6.2.105 Balanced valves

[A2]

[A3] *deleted text* [A3]

The closure member of a balanced valve shall have a resulting force in the closing direction where the sealing force is not decreased by the gas inlet pressure.

For a balanced valve with one port a resulting force in the closing direction shall remain, if the balancing force is removed, and the closure member shall have the same closing direction as the flow direction through the valve. [A2].

6.2.106 Closing and sealing

6.2.106.1 Closing and/or sealing by means of springs

If springs are used for closing and/or sealing the valve, they shall be designed according to EN 13906-1 or EN 13906-2 for static and dynamic loading.

6.2.106.2 Other means for closing and/or sealing

6.2.106.2.1 General

This clause defines a method for the assessment of other means for closing and sealing in automatic shut-off valves.

By this clause the term “class of control function A, B or C” is **not** related to the sealing force classes but to the class of control function as described in 4.3.

Sealing force of valves shall be classified according to 4.1.

The basic risks of fire and explosion in a gas appliance as a result of uncontrolled gas flow requires a control function class C system for the gas shut-off function. This is based on a comparison, made between automatic burner controller and gas shut-off function, the class of control function of each of them being considered equal.

Although this European Standard is not based on a fault assessment approach as specified in ▌A2⟩ EN 13611:2007+A2:2011 ⟨A2▌, 6.6, the combination of two automatic shut-off valves is considered equal to a control function class C. This assumption is based on the construction and performance requirements of this European Standard.

6.2.106.2.2 New designs for closing and/or sealing

New designs for closing and/or sealing shall fulfil at least the requirements of a control function class B. In all cases the gas shut-off function shall be a control function class C.

NOTE For further information see EN 14459.

During the testing, the valve shall fulfil the performance requirements of Clause 7.

New designs may consist of a combination of closure members, electronic controller, sensing elements, actuators, lockout and reset.

The manufacturer shall declare the other means for closing and/or sealing.

For the assessment of the new design the requirements of this European Standard shall be used in combination with ▌A2⟩ EN 13611:2007+A2:2011 ⟨A2▌, 6.6. If this leads to aspects that are not described in this European Standard, the manufacturer shall supply a failure mode analysis on the new design.

This analysis shall describe the specific failure modes for the type of technology used in relation to the following basic safety requirements:

a) closing function at power interruption;

b) leak tightness;

c) sealing force (ability to withstand backpressure, to be checked by testing or calculation);

d) closing force > friction force;

e) closing time including the influence to the Burner Control (EN 298);

f) no uncontrolled opening of the automatic shut-off valve.

As a result of this failure mode analysis, additional constructional requirements shall be fulfilled and/or additional faults compared to ▌A2⟩ EN 13611:2007+A2:2011 ⟨A2▌, Annex E shall be included into the fault assessment.

The outcome of the analysis shall provide a set of conditions under which the new design can be used in an automatic shut-off valve. These conditions involve construction requirements, safety requirements, performance requirements and test methods.

The fault reaction time shall be declared by the manufacturer.

Failure of mechanical parts adversely affecting the performance requirements of this European Standard is considered as an abnormal situation and can therefore be considered as a first fault according to the test method in ▌A2⟩ EN 13611:2007+A2:2011 ⟨A2▌, 6.6.

However, if mechanical parts are designed according to the constructional requirements of Clause 6 of this European Standard, failure of these parts is not considered.

A2

6.2.107 Additional requirements for shut-off function

6.2.107.1 Diaphragms that assist the shut-off function

Shut-off functions using a diaphragm to apply (part of) the closing force to the closure member shall be designed in such a way that, when the diaphragm is damaged, the closure member closes and the maximum internal leakage rate of the valve is limited to 1 dm³/h. Conformity shall be verified by the method given in 6.2.107.2.

6.2.107.2 Leakage test

Remove or rupture the part(s) assisting the shut-off function. De-energize the valve. Measure the internal leakage rate of the valve according to 7.3. A2

6.3 Materials

6.3.1 General material requirements

Shall be according to A2 EN 13611:2007+A2:2011 A2, 6.3.1.

6.3.2 Housing

Shall be according to A2 EN 13611:2007+A2:2011 A2, 6.3.2.

6.3.3 Test for leakage of housing after removal of non-metallic parts

Shall be according to A2 EN 13611:2007+A2:2011 A2, 6.3.3.

6.3.4 Zinc alloys

Shall be according to A2 EN 13611:2007+A2:2011 A2, 6.3.4.

6.3.5 Springs providing closing and/or sealing force

Shall be according to A2 EN 13611:2007+A2:2011 A2, 6.3.5.

6.3.6 Resistance to corrosion and surface protection

Shall be according to A2 EN 13611:2007+A2:2011 A2, 6.3.6.

6.3.7 Impregnation

Shall be according to A2 EN 13611:2007+A2:2011 A2, 6.3.7.

6.3.8 Seals for glands for moving parts

Shall be according to A2 EN 13611:2007+A2:2011 A2, 6.3.8.

6.3.101 Closure members

Closure members of valves above DN 25 shall either have a mechanical support (e. g. metallic) to withstand the sealing force or shall be made of metal.

This requirement also applies to:

— all valves with a maximum inlet pressure above 15 kPa (150 mbar);

— parts transmitting the closing force.

The strength of the connection between closure members of a balanced valve shall be at least five multiplied by the maximum inlet pressure multiplied by the total opening area of the closure members.

6.4 Gas connections

6.4.1 Making connections

Shall be according to A2⟩ EN 13611:2007+A2:2011 ⟨A2, 6.4.1.

6.4.2 Connection sizes

Shall be according to A2⟩ EN 13611:2007+A2:2011 ⟨A2, 6.4.2.

6.4.3 Threads

Shall be according to A2⟩ EN 13611:2007+A2:2011 ⟨A2, 6.4.3.

6.4.4 Union joints

Shall be according to A2⟩ EN 13611:2007+A2:2011 ⟨A2, 6.4.4.

6.4.5 Flanges

Shall be according to A2⟩ EN 13611:2007+A2:2011 ⟨A2, 6.4.5.

6.4.6 Compression fittings

Shall be according to A2⟩ EN 13611:2007+A2:2011 ⟨A2, 6.4.6.

6.4.7 Nipples for pressure test

Shall be according to A2⟩ EN 13611:2007+A2:2011 ⟨A2, 6.4.7 with the following addition:

Nipples for pressure test conforming to these requirements shall be used only up to and including 500 mbar.

6.4.8 Strainers

Shall be according to A2⟩ EN 13611:2007+A2:2011 ⟨A2, 6.4.8 with the following addition:

Where an inlet strainer is fitted to class A, B, C, and D valves, the maximum strainer hole dimension shall not exceed 1,5 mm and it shall prevent the passage of a 1 mm diameter pin gauge.

Class J valves shall incorporate an inlet strainer. The maximum strainer hole dimension shall not exceed 0,28 mm and it shall prevent the passage of a 0,2 mm diameter pin gauge.