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Safety and control devices for gas burners and gas-burning appliances — Particular requirements —

Part 1: Automatic valves

Dispositifs de commande et de sécurité pour brûleurs à gaz et appareils à gaz — Exigences particulières —

Partie 1: Robinets automatiques

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 23551-1 was prepared by Technical Committee ISO/TC 161, *Control and protective devices for gas and oil burners and gas and oil burning appliances*.

ISO 23551 consists of the following parts, under the general title *Safety and control devices for gas burners and gas-burning appliances — Particular requirements*:

— *Part 1: Automatic valves*

— *Part 2: Pressure regulators*

— *Part 3: Gas/air ratio controls, pneumatic type*

— *Part 4: Valve-proving systems for automatic shut-off valves*

Introduction

This part of ISO 23551 is designed to be used in conjunction with ISO 23550:2004.

This part of ISO 23551 either references existing requirements of ISO 23550:2004 or indicates that there has been an “addition”, “modification” or “replacement” in the cited requirement of ISO 23550:2004.

Safety and control devices for gas burners and gas-burning appliances — Particular requirements —

Part 1: Automatic valves

1 Scope

This part of ISO 23551 specifies safety, constructional and performance requirements and testing of automatic valves (hereafter referred to as valves) for gas burners, gas appliances and similar use.

This part of ISO 23551 covers type testing only.

This part of ISO 23551 applies to valves with declared maximum working pressures up to and including 500 kPa, for use on burners or in appliances using fuel gases as natural gas, manufactured gas or liquefied petroleum gas (LPG).

This part of ISO 23551 applies to valves directly or indirectly operated electrically or by mechanical means.

This part of ISO 23551 applies to valves actuated by fluids e.g. pneumatic, hydraulic.

This part of ISO 23551 applies to valves where the flow rate is controlled by external electrical signals, either in discrete steps or proportional to the applied signal.

This part of ISO 23551 applies to valves fitted with closed position indicator switches.

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.

ISO 4400, *Fluid power systems and components — Three-pin electrical plug connectors with earth contact — Characteristics and requirements*

ISO 6952, *Fluid power systems and components — Two-pin electrical plug connector with earth contact — Characteristics and requirements*

ISO 23550:2004, *Safety and control devices for gas burners and gas-burning appliances — General requirements*

IEC 60529, *Degrees of protection provided by enclosures*

IEC 60730-1, *Automatic electrical controls for household and similar use — Part 1: General requirements*

IEC 61058-1:2001, *Switches for appliances — Part 1: General requirements*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 23550:2004 and the following apply.

3.1
automatic valve
device consisting essentially of a valve body, closure member, and actuator that controls the flow of gas

NOTE 1 The actuator can be actuated by electrical or mechanical means.

NOTE 2 The actuation can be done by gas pressure or electrical, hydraulic or pneumatic energy.

3.2
automatic shut-off valve
valve which opens when energized and closes automatically when de-energized

3.3
valve with step control
valve which controls the flow rate in steps

3.4
valve with modulating control
valve which controls the flow rate continuously between two limits in response to external signals

3.5
actuating mechanism
part of the valve which moves the closure member

3.6
closed position indicator switch
switch fitted to a valve which indicates when the closure member is in the closed position

3.7
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.

3.8
closing force
force available to close the valve, independent of any force provided by fuel gas pressure

3.9
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

3.10
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

3.11
actuating pressure
hydraulic or pneumatic pressure supplied to the actuating mechanism of the valve

3.12
pressure difference
difference between the inlet and outlet pressures

3.13
opening time
time interval between energizing the valve and the attainment of the maximum or other defined flow rate

3.14
closing time
time interval between de-energizing the valve and the closure member attaining the closed position

3.15
delay time
time interval between energizing the valve and the start of flow

3.16
control valve
valve which controls the fluid (e.g. compressed air) supplied to the actuating mechanism

3.17
rated voltage
voltage declared by the manufacturer at which the valve may be operated

3.18
rated current
current declared by the manufacturer at which the valve may be operated

3.19
bypass
passage, provided in the body of the device or in a gas line around the body, which permits a gas flow from the inlet to the outlet connections of the device entirely independent of the action of the valve

4 Classification

4.1 Classes of control

If valves are classified, the following classes shall be used:

— Classes A, B and C: 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 7.6.10;

— Class D: valves that are not subject to any sealing force requirements;

— Class E: valves where the sealing force is decreased by the gas inlet pressure and that meet the requirements of 7.6.10;

— Class J: disc-on-seat valves, where the sealing force is not decreased by the gas inlet pressure and that meet the requirements of 7.6.10.

NOTE In USA, Canada and Japan, valves are not classified.

4.2 Groups of controls

A valve is classified as group 1 or group 2 according to the bending stresses that it is required to withstand (see ISO 23550:2004, Table 4):

— Group 1: valves for use in an appliance and/or installation where they are not subjected to bending stresses imposed by installation pipe work (e. g. by the use of rigid adjacent supports);

— Group 2: valves for use in any situation, either internal or external to the appliance, typically without support.

NOTE A valve that meets the requirements of group 2 valves also meets the requirements of group 1 valves.

5 Test conditions

ISO 23550:2004, Clause 5, shall apply.

6 Construction

6.1 General

ISO 23550:2004, 6.1, shall apply.

6.2 Construction requirements

6.2.1 Appearance

ISO 23550:2004, 6.2.1, shall apply.

6.2.2 Holes

ISO 23550:2004, 6.2.2, shall apply.

6.2.3 Breather holes

ISO 23550:2004, 6.2.3, shall apply.

6.2.4 Screwed fastenings

ISO 23550:2004, 6.2.4, shall apply.

6.2.5 Jointing

ISO 23550:2004, 6.2.5, shall apply.

6.2.6 Moving parts

ISO 23550:2004, 6.2.6, shall apply.

6.2.7 Sealing caps

ISO 23550:2004, 6.2.7, shall apply.

6.2.8 Dismantling and reassembling for servicing and/or adjustment

ISO 23550:2004, 6.2.8, shall apply.

6.2.9 Auxiliary channels

ISO 23550:2004, 6.2.9, shall apply.

6.2.10 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.

6.2.11 Flow rates

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 tools and shall be sealed to discourage unauthorized adjustment.

6.2.12 Protection of the valve mechanism

The mechanisms of automatic valves shall be protected by substantial enclosures so as to prevent interference with the safe operation of the devices.

6.2.13 By-pass

Valves classified as classes A, B, C, D, E and J shall not incorporate a by-pass.

6.3 Materials

6.3.1 General material requirements

ISO 23550:2004, 6.3.1, shall apply.

6.3.2 Housing

6.3.2.1 Housing design

ISO 23550:2004, 6.3.2.1, shall apply with the following addition.

When a diaphragm inside a housing separates the gas-carrying compartment from atmosphere, then the gas-carrying compartment is considered to be indirectly separated.

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

Carry out the test as given in ISO 23550:2004; 6.3.2.2.

6.3.3 Springs

6.3.3.1 Closure springs

ISO 23550:2004, 6.3.3.1 shall apply.

6.3.3.2 Springs providing closing force and sealing force

ISO 23550:2004, 6.3.3.2, shall apply.

NOTE This is applicable when closing force and sealing force is provided by spring action.

6.3.4 Resistance to corrosion and surface protection

ISO 23550:2004, 6.3.4, shall apply.

6.3.5 Impregnation

ISO 23550:2004, 6.3.5, shall apply.

6.3.6 Seals for glands for moving parts

ISO 23550:2004, 6.3.6, shall apply.

6.3.7 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 requirements also applies to

— all valves with a maximum working pressure above 15 kPa;

— parts transmitting the closing force.

6.4 Gas connections

6.4.1 Making connections

ISO 23550:2004, 6.4.1, shall apply.

6.4.2 Connection sizes

ISO 23550:2004, 6.4.2, shall apply.

6.4.3 Threads

ISO 23550:2004, 6.4.3, shall apply.

6.4.4 Union joints

ISO 23550:2004, 6.4.4, shall apply.

6.4.5 Flanges

ISO 23550:2004, 6.4.5, shall apply.

6.4.6 Compression fittings

ISO 23550:2004, 6.4.6, shall apply.

6.4.7 Nipples for pressure tests

ISO 23550:2004, 6.4.7, shall apply.

6.4.8 Strainers

ISO 23550:2004, 6.4.8, shall apply with the following two additions.

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.

Strainers fitted to valves of DN 25 and above shall be accessible for cleaning or replacement without removing the valve body pipe connections from the pipe work.

6.4.9 Pneumatic and hydraulic actuating mechanisms

Pneumatically or hydraulically actuated valves shall be provided with protection to ensure that the blockage of an orifice in the control system does not adversely affect the ability of the valve to close.

6.5 Electrical material

6.5.1 Degree of protection

The degree of protection shall be declared by the manufacturer in accordance with IEC 60529.

In USA and Canada the degree of protection is declared in accordance with NEMA 250 or UL 50.

6.5.2 Switches

Switches shall conform to IEC 61058-1. The number of operating cycles shall be in accordance with IEC 61058-1:1992, Table 6.

6.5.3 Plug connector

Valves supplied with an assembled electrical plug connector in accordance with ISO 6952 or ISO 4400 shall have connections to the following pins and to earth:

a) Single-step valves:

- PE earth contact,
- Pin 1 N,
- Pin 2 L;

b) Two-step valves:

- Pin 4 (e) earth contact,
- Pin 1 N,
- Pin 2 L step 1,
- Pin 3 L step 2;

c) Closed-position indicators:

- Pin 4 (e) earth contact,
- Pin 1 common,

— Pin 2 open valve,

— Pin 3 closed valve.

6.5.4 Power-saving circuit

Valves with power-saving circuits shall be designed such that failure in the power-saving circuit does not affect the correct closing of the valve.

If the power-saving circuit has been reviewed in accordance to IEC 60730-1 on a second fault analysis, the test under 7.6.16 shall not apply.

7 Performance

7.1 General

ISO 23550:2004, 7.1, shall apply with the following three additions:

Valves shall close automatically when de-energized or in the absence of actuating energy.

The electrical control valve of pneumatic or hydraulic actuating mechanisms shall also meet these requirements.

The closing of pneumatically or hydraulically actuated valves shall be ensured over the range from 85 % to 110 % of the actuating pressure or pressure range declared by the manufacturer.

7.2 Leak-tightness

7.2.1 Criteria

ISO 23550:2004. 7.2.1. shall apply with the following modification of Table 2.

Replace “controls” with “valves”.

7.2.2 Test for leak-tightness

Carry out the test given in ISO 23550:2004, 7.2.2.

7.3 Torsion and bending

ISO 23550:2004, 7.3, shall apply.

7.4 Rated flow rate

7.4.1 Criteria

7.4.1.1 The maximum flow rate, when measured according to 7.4.2, shall be at least 0,95 times the rated flow rate.

7.4.1.2 Where the manufacturer declares opening and closing characteristics for valves with modulating control, these shall be within ± 10 % of the manufacturer’s declared value.

7.4.1.3 For valves with step control, where applicable, the manufacturer shall declare the maximum flow rate for each step as a percentage of the fully open flow rate. It shall not be possible to adjust the maximum flow rate for each step in excess of 1,1 times the declared value when tested to 7.4.2.

7.4.1.4 When the flow rate changes in response to external electrical signals, it shall not, when tested to 7.4.2, overshoot in either direction while attaining the new flow rate by more than 20 % of the flow rate at that particular set point, or as declared by the manufacturer.

7.4.2 Test for rated flow rate

ISO 23550:2004, 7.4.2, shall apply with the addition of 7.4.2.1.

7.4.2.1 Characteristics for valves with modulating control

Verify the declared opening and closing characteristics at rated voltage or current before and after the endurance test for conformity with 7.4.1.2.

7.5 Durability

ISO 23550:2004, 7.5, shall apply.

7.6 Functional requirements

7.6.1 Closing function

Valves shall close automatically on reducing the voltage or current to 15 % of the minimum rated value.

Valves with pneumatic or hydraulic actuating mechanisms shall close automatically on reducing the voltage or current to 15 % of the minimum rated voltage of the control valve. Valves shall close automatically on removal of the voltage or current of between 15 % of the minimum rated value and 110 % of the maximum rated value.

In all cases, the closing time shall be in accordance with 7.6.7.

In USA and Canada this test for residual magnetism is carried out at 0 V.

7.6.2 Test of closing function

Energize the valve at the maximum rated voltage or current and at the maximum actuating pressure, if applicable. Slowly reduce the voltage or current to 15 % of the minimum rated value. Verify that the valve has closed.

Energize the valve at the maximum rated voltage or current and at the maximum actuating pressure, if applicable. Increase the voltage or current to 110 % of the maximum rated value, keeping the actuating pressure, if any, unchanged. De-energize the valve and verify that it has closed. For a.c. valves, remove the voltage at the peak of the current waveform.

Energize the valve at the maximum rated voltage or current and at the maximum actuating pressure, if applicable. Reduce the voltage or current to a value between 15 % of the minimum rated value and 85 % of the maximum rated value, keeping the actuating pressure, if any, unchanged. De-energize the valve and verify that it has closed. Carry out this test at three different voltages or currents between 15 % of the minimum rated value and 85 % of the maximum rated value.

7.6.3 Closing force

Valves with a sealing force independent of the closing force (e.g. ball valve, gate valves, etc.) shall have a closing force of

— at least 5 times the value of the frictional force where the frictional force is up to and including 5 N;

— at least 2,5 times the value of the frictional force but at least 25 N where the frictional force is above 5 N.

The frictional force is measured in the ungreased condition.

This requirement also shall apply to disc-on-seat valves with a working pressure of 50 kPa and above.

7.6.4 Test of closing force

This measurement is carried out in the ungreased condition.

Measure the minimum closing force over the travel of the closure member from the open position to the closed position.

Remove the spring(s) providing the closing force from the valve and measure the maximum force required to move the closure member from the open position to the closed position.

7.6.5 Delay time and opening time

The delay time and the opening time shall be

— within ± 20 % of the manufacturer's declared value for times above 1 s;

— less than 1 s for declared times up to and including 1 s.

7.6.6 Test of opening time

For the opening time, measure the time interval between energizing the valve and the attainment of a flow rate equal to 80 % of the rated flow rate.

This test is also used to measure the time interval between energizing the valve and the start of the release of the closure member (delay time).

Carry out the tests under the following conditions, allowing the de-energized valve to reach thermal equilibrium before carrying out the tests:

— at 60 °C (or at the maximum ambient temperature, if higher), at the maximum working pressure, at 110 % of the maximum rated voltage or current and at the maximum actuating pressure, if applicable;

— at 0 °C (or at the minimum ambient temperature, if lower), at a working pressure of 0,6 kPa, at 85 % of the minimum rated voltage or current and at the minimum actuating pressure, if applicable.

7.6.7 Closing time

The closing time for valves of classes A, B, C and E shall not exceed 1 s.

The closing time for class D valves shall not exceed the manufacturer's declared value.

The closing time for class J valves shall not exceed 5 s or any lower value declared by the manufacturer.

7.6.8 Closing time for controlling function

The closing time for any controlling function shall be within ± 10 % of the manufacturer's declared value.

7.6.9 Test of closing time

Measure the time interval between de-energizing the valve and the closure member attaining the closed position, under the following conditions:

— at the maximum working pressure, at a pressure difference declared by the manufacturer, at 110 % of the maximum rated voltage or current and at the maximum actuating pressure, if applicable;

— at a working pressure of 0,6 kPa, at the minimum pressure difference declared by the manufacturer, at 110 % of the maximum rated voltage or current and at the maximum actuating pressure, if applicable.

7.6.10 Sealing force

Class A, B and C valves shall have a minimum sealing force over the closure member orifice area in accordance with Table 1.

Table 1 — Sealing force requirements

Valve	Test pressure kPa	Maximum leakage rate
Class A	15	for values for internal leak-tightness see ISO 23550:2004, Table 2
Class B	5	
Class C	1	

Class E valves shall have a minimum sealing force over the closure member orifice area equivalent to a pressure of 1,5 times the maximum working pressure or at least 15 kPa in excess of the maximum working pressure, whichever is the greater. The internal leakage shall not exceed the values given in ISO 23550:2004, Table 2.

Class J valves shall have a minimum sealing force of 1 N for every metre length of seal. This is calculated from the spring force in the closed position of the valve divided by the circumference or length of the seal. The spring compression shall be declared by the manufacturer.

Valves that use the inlet pressure to compensate the force to the closure member can be class A, B or C valves. Valves where the compensation area is greater than the closing member area shall be classified as an E valve.

Where the test methods of 7.6.11 are unsuitable for some designs of valves (e.g. valves with compensation of inlet pressure), the sealing force shall be verified by calculation or by a combined method of test and calculation. The minimum sealing force is calculated using pressures equal to 1,25 times the values given in Table 1, as appropriate to the class of valve.

7.6.11 Test of sealing force

7.6.11.1 Class A, B, C and E valves

7.6.11.1.1 General

Connect an air supply through a flow meter to either the inlet or the outlet of the valve such that the air pressure opposes the closing direction of the closure member. Energize and de-energize the valve twice.

7.6.11.1.2 Class A, B, and C valves

Pressurize the valve at an increasing pressure not exceeding 0,1 kPa · s^{-1} to the appropriate pressure given in Table 1 and measure the leakage rate.

7.6.11.1.3 Class E valves

Pressurize the valve at an increasing pressure not exceeding 0,1 kPa · s^{-1} to 1,5 times the maximum working pressure or 15 kPa in excess of the maximum working pressure, whichever is the greater, and measure the leakage rate.

7.6.11.2 Class J valves

Remove the spring(s) providing the sealing force and measure the spring force at a spring compression corresponding to the closed position of the valve.

7.6.12 Closed position indicator switches

When a valve is provided with a closed-position indicator switch, the switch shall indicate the closed position when either

— the flow rate is equal to or less than 10 % of the equivalent fully open flow rate at the same pressure difference; or

— the closure member is within 1 mm of its closed position.

7.6.13 Test of closed position indicator switch

Modify a single valve to enable the closure member to be moved and positioned in any partially open position. Slowly move the closure member until the switch just indicates valve closure. Measure either the flow or the opening, as appropriate, according to 7.6.12.

7.6.14 Endurance test for closure switches

Carry out the endurance test described in 7.7.2 on an unmodified valve with the maximum inductive or capacitive load declared by the manufacturer on the closed position indicator switch.

During the test, monitor the switch to show that it indicates that the valve is closed when it is de-energized and open when energized.

After the endurance test, carry out the test for indication of closure according to 7.6.13.

Where the switch has not been pretested, carry out electrical tests in accordance with the methods given in IEC 61058-1.

7.6.15 Flow characteristics

7.6.15.1 Valves with modulating control

In addition to 7.7.2, test the valve for opening to the lowest set point as declared by the manufacturer and to the mid-point in the closing direction.

7.6.15.2 Valves with step control

In addition to 7.7.2, test the valve for opening and closing to the mid-point of the adjustment range for each step.

7.6.16 Power-saving circuits

If power-saving circuits are used, energize the valve at 1,1 times the maximum rated voltage or current at maximum ambient temperature for a period of at least 24 h under no flow conditions with the power saving circuit taken out of function. Without de-energizing the valve, slowly reduce the voltage or current to 15 % of the minimum rated value. Verify that the valve has closed.

The test of power-saving circuits with electronic parts shall be carried out according to IEC 60730-1.

7.6.17 Gas cracking

7.6.17.1 Requirement

This requirement applies to thermally actuated valves employing electrical components in the gas way.

Carbon shall not be deposited within thermally actuated valves employing electrical components in the gas pathway when operated on an easily cracked gas for 48 h at elevated temperatures.

7.6.17.2 Method of test

Two sample valves shall be operated in a suitable test oven at the manufacturer's maximum specified operating temperature [but not less than 51,5 °C (125 °F)] and shall be continuously energized at 110 percent of rated voltage. Pure (99 %) isobutylene shall be passed through each valve at a rate of approximately 879 W per hour (3 000 Btu). After 48 h of operation, the sample valves shall be removed from the oven, dismantled, and examined for carbon deposit.

There shall be no visible carbon deposit within the valve bodies.

7.7 Endurance

7.7.1 Endurance requirement

After the endurance test described in 7.7.2, the valve shall conform to the requirements of 6.3.3.2, 7.6.1, 7.6.5, 7.6.7, 7.6.9, 7.6.10 and 7.6.12.

For any setting according to 7.4.1, within the manufacturer's declared adjustment range, the flow rate at the end of the endurance test described in 7.7.2 shall be within ± 10 % of the flow rate before the endurance test, when measured under the same conditions according to 7.4.2.

7.7.2 Test of endurance

Carry out tests for external leak-tightness and internal leak-tightness in accordance with 7.2.2, before the endurance test, after the test at 60 °C and after the test at 20 °C.

Install the valve in a temperature-controlled chamber according to the manufacturer's instructions.

Energize the valve at 1,1 times the maximum rated voltage or current at maximum ambient temperature for a period of at least 24 h under no flow conditions. Without de-energizing the valve, slowly reduce the voltage or current to 15 % of the minimum rated value. Verify that the valve has closed.

Connect the gas inlet to an air supply at the maximum working pressure. Do not exceed 10 % of the maximum rated flow rate.

Operate the valve for the number of cycles given in Table 2 or 3 with a cycle period of no less than that declared by the manufacturer. Ensure that the valve travels to the fully open and fully closed position during each cycle.

Carry out the part of the endurance test at maximum ambient temperature, at the maximum rated voltage or current.

For the test at 20 °C, carry out 50 % of the cycles at the maximum rated voltage or current and 50 % at the minimum rated voltage or current.

If the minimum ambient temperature is below 0 °C, carry out the following endurance test at the minimum rated voltage or current:

— for valves up to and including DN 150, carry out 25 000 cycles at − 15 °C. Reduce the number of cycles for the test at 20 °C by 25 000 cycles;

— for valves above DN 150, carry out 5 000 cycles at − 15 °C. Reduce the number of cycles for the test at 20 °C by 5 000 cycles.

Where the valve has a pneumatic or hydraulic actuating mechanism, carry out the endurance test at the maximum actuating pressure.

Check the operation of the valve throughout the endurance test, for example by recording the outlet pressure or the flow rate.

Finally, re-test the valve to 7.6.2.

Table 2 — Operating cycles

Nominal size	Number of cycles	
DN	at maximum ambient temperature or at least (60 ± 5) °C	at (20 ± 5) °C
DN ⩽ 25 Opening time ⩽ 1 s maximum working pressure ⩽ 15 kPa	100 000	400 000
DN ⩽25 Opening time ⩽ 1 s maximum working pressure >15 kPa	50 000	150 000
DN ⩽ 25 Opening time > 1 s	50 000	150 000
25 < DN ⩽ 80	25 000	75 000
80 < DN ⩽ 150	25 000	25 000
> DN 150	5 000	20 000

In USA, Canada, and Japan, the number of cycles is 100 000 cycles.

Table 3 — Operating cycles for automatic shut- off valves for cookers

Nominal size	Number of cycles	
DN	Maximum ambient temperature or at least (60 ± 5) °C	(20 ± 5) °C
DN ⩽ 25 Opening time ⩽ 1 s maximum working pressure ⩽ 15 kPa	800 000	200 000