INTERNATIONAL STANDARD

ISO 23551-1

Second edition
2012-08-15

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

Part 1: Automatic and semi-automatic valves

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

Partie 1: Robinets automatiques et semi-automatiques

Reference number
ISO 23551-1:2012(E)

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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/or oil burners and appliances*.

This second edition cancels and replaces the first edition (ISO 23551-1:2006), which has been technically revised. In particular, the following has been changed:

a) integration of non electrical requirements from IEC 60730-2-17;

b) integration of electrical requirements from IEC 60730-2-17 which are unalterable for valves;

c) introduction of further classifications for valves;

d) introduction of requirements and tests for balanced valves;

e) introduction of requirements and tests for valves containing electrical components in the gas way.

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 and semi-automatic valves*

— *Part 2: Pressure regulators*

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

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

The following parts are under preparation:

— *Part 5: Manual gas valves*

— *Part 6: Thermoelectric flame supervision devices*

— *Part 7: Pressure sensing devices*

— *Part 8: Multifunctional Controls*

Introduction

This part of ISO 23551 is designed to be used in combination with ISO 23550. This part together with ISO 23550 establishes the full requirements as they apply to the product covered by this International Standard. This part adapts ISO 23550, where needed, by stating "with the following modification", "with the following addition", "is replaced by the following" or "is not applicable," in the corresponding clause. In order to identify specific requirements that are particular to this part, that are not already covered by ISO 23550, this document may contain clauses or subclauses that are additional to the structure of ISO 23550. These clauses are numbered starting from 101 or, in the case of an Annex, are designated AA, BB, CC etc.

In an attempt to develop a full International Standard, it has been necessary to take into consideration the differing requirements resulting from practical experience and installation practices in various regions of the world and to recognize the variation in basic infrastructure associated with gas and/or oil controls and appliances, some of which are addressed in Annexes E, F and G. This International Standard intends to provide a basic framework of requirements that recognize these differences.

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

Part 1: Automatic and semi-automatic valves

1 Scope

This part of ISO 23551 specifies safety, constructional and performance requirements and testing of automatic and semi-automatic shut-off valves for gas burners, gas appliances and appliances of similar use.

It applies to

— normally closed valves,

— valves being mounted upstream to gas burners and gas appliances,

— 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),

— valves directly or indirectly actuated, electrically or by mechanical means,

— valves actuated by hydraulic or pneumatic means,

— valves where the flow rate is controlled by external electrical signals, either in discrete steps or proportional to the applied signal and

— valves fitted with closed position indicator switches.

This part of ISO 23551 covers type testing only.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 65, *Carbon steel tubes suitable for screwing in accordance with ISO 7-1*

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

ISO 262, *ISO general purpose metric screw threads — Selected sizes for screws, bolts and nuts*

ISO 301, *Zinc alloy ingots intended for castings*

ISO 1817:1985[1], *Rubber, vulcanized — Determination of the effect of liquids*

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 connectors with earth contact — Characteristics and requirements*

ISO 7005 (all parts), *Metallic flanges*

ISO 23550:2011, *Safety and control devices for gas burners and gas burning appliances — General requirements*

IEC 60079-11, *Explosive atmospheres — Part 11: Equipment protection by intrinsic safety "i"*

IEC 60529, *Degrees of protection provided by enclosures (IP-code)*

IEC 60730-1:2010 (Edition 4.0), *Automatic electrical controls for household and similar use — Part 1: General requirements*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) — Part 4-2: Testing and measurement techniques — Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) — Part 4-3: Testing and measurement techniques — Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) — Part 4-4: Testing and measurement techniques — Electrical fast transient/burst immunity test*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) — Part 4-5: Testing and measurement techniques — Surge immunity test*

IEC 61000-4-6, *Electromagnetic compatibility (EMC) — Part 4-6: Testing and measurement techniques — Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8, *Electromagnetic compatibility (EMC) — Part 4-8: Testing and measurement techniques — Power frequency magnetic field immunity test*

IEC 61000-4-11, *Electromagnetic compatibility (EMC) — Part 4-11: Testing and measurement techniques — Voltage dips, short interruptions and voltage variations immunity tests*

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

3 Terms and definitions

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

3.101
valves

3.101.1
valve
device consisting essentially of a valve body, closure member, and actuator that controls the flow of gas

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

[1] Withdrawn.

3.101.2
semi-automatic shut-off valve
valve that is opened manually and returns to the closed position upon removal of the actuating energy

3.101.3
automatic shut-off valve
valve which opens when energized and closes automatically when de-energized

3.101.4
thermoelectric valve
automatic shut-off valve that receives its electrical actuating energy by means of a thermoelectric source

3.101.5
diaphragm type valve
automatic shut-off valve where a closing member is opened by application of gas pressure upon a flexible diaphragm

3.102
valve with step control
multi stage valve
valve which controls the flow rate in steps

3.103
valve with modulating control
modulating valve
valve which controls the flow rate continuously between two limits in response to external signals

3.104
actuating mechanism
part of the valve which moves the closure member

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

3.107
closing force
force available to close the valve, independent of any force provided by fuel gas pressure

3.108
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

3.109
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

3.110
actuating pressure
hydraulic or pneumatic pressure supplied to the actuating mechanism of the valve

3.111
pressure difference
difference between the inlet and outlet pressures

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 hydraulic or pneumatic means 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
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

3.119
interlock
control or device to prove the physical state of a required condition, and to furnish proof to the automatic gas ignition system or other safety control circuit

3.120
proof-of-closure switch
electrical switch which monitors the closed position of the valve closure member and which is used as an interlock

3.121
switching device
electrical switch actuated by the valve actuator and used as an electrical output

3.122
valve actuator
electrically operated mechanism (for example an electric motor, or stepping solenoid), an electro-thermal device (for example the heating element of an energy regulator) or a mechanical storage device (for example a clockwork spring), used to effect the opening action of a valve

3.123
Commercial / industrial valve
C/I Valve
a normally closed automatic or semi-automatic shut-off valve having an operating pressure greater than 3,5 kPa

3.124
balanced valve with two ports
automatic shut-off valve with a balanced closure member, two valve discs and two valve seats where the inlet pressure acts on the closure member in the closing direction

NOTE Examples are shown in Figure 1.

3.125
balanced valve with one port
automatic shut-off valve with a balanced closure member, one valve disc and balancing means where the inlet pressure acts on the closure member in the closing direction

NOTE Example is shown in Figure 2.

4 Classification

4.1 Classes of control

Shall be according to ISO 23550:2011, 4.1 with the following addition:

4.1.101 Classification based on sealing force

If automatic shut-off valves are classified based on sealing force the following classes shall be used:

— *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 7.6.107.1. Balanced valves with two ports according to this standard are Class A valves.

— *Class D valves*
Valves which are not subject to any sealing force requirements.

— *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 7.6.107.1.

NOTE Specific regional requirements are given in Annex F and Annex G.

4.1.102 Classifications according to their purpose

— C/I valves;

— Automatic shut-off valves;

— Semi-automatic shut-off valves;

— valve with modulating control / modulating valve;

— valve with step control / multi-stage valve.

4.2 Groups of controls

Shall be according to ISO 23550:2011, 4.2.

5 Test conditions

Shall be according to ISO 23550:2011, Clause 5.

6 Construction

6.1 General

Shall be according to ISO 23550:2011, 6.1.

6.2 Construction requirements

6.2.1 Appearance

Shall be according to ISO 23550:2011, 6.2.1.

6.2.2 Holes

Shall be according to ISO 23550:2011, 6.2.2.

6.2.3 Breather holes

Shall be according to ISO 23550:2011, 6.2.3.

NOTE Specific regional requirements are given in Annex F.

6.2.4 Screwed fastenings

Shall be according to ISO 23550:2011, 6.2.4.

6.2.5 Jointing

Shall be according to ISO 23550:2011, 6.2.5.

6.2.6 Moving parts

Shall be according to ISO 23550:2011, 6.2.6 with the following addition:

— C/I valve screws and nuts:

  Means that serve to attach operating parts to movable members shall be secured to prevent loosening under the conditions of actual use.

6.2.7 Sealing caps

Shall be according to ISO 23550:2011, 6.2.7.

6.2.8 Dismantling and reassembling for servicing and/or adjustment

Shall be according to ISO 23550:2011, 6.2.8 with the following addition:

6.2.8.101 General

Factory adjustment, not intended for field adjustment, shall be secured by means providing protection against access or shall be declared as requiring such protection in the application.

NOTE For example, these means can:
a) be sealed with a material suitable for the temperature range of the valve such that tampering is apparent, or
b) be accessible only with the use of special purpose tools, or
c) be accompanied by instructions requiring the equipment manufacturer to mount the valve such that the adjustment means is inaccessible.

Compliance is checked by inspection. Where sealing is used, inspection is done before and after the endurance tests.

6.2.8.102 Maintaining of adjustments

Suitable means for maintaining all adjustments shall be provided.

NOTE Lock nuts or adjusting nuts held by springs or compression are acceptable unless their adjustment can be accidentally disturbed.

6.2.8.103 Field adjustments

Necessary field adjustments shall be capped according to 6.2.7 or otherwise protected in such a manner as to resist tampering and prevent accidental change.

6.2.9 Auxiliary channels

Shall be according to ISO 23550:2011, 6.2.9.

6.2.101 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.

If a closed position indicator switch is used as proof-of-closure switch, the switch contacts shall close only after the valve port is closed and shall open before the valve port opens. Additional movement to operate the switch after the valve port is closed shall be provided either directly by the port closure member or by additional valve actuating mechanism movement, which relies on the port closure member being in the closed position. The switch shall be factory set and sealed to prevent field adjustment.

6.2.102 C/I valve construction

A C/I valve shall not utilize fuel gas pressure or flow trough the valve or an external power source for closure.

6.2.103 Visual position indicator

If a C/I valve incorporates an integral visual position indicator which indicates when the valve is closed it shall be connected to the valve closure member.

6.2.104 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.

6.2.105 Protection of the valve mechanism

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

6.2.106 By-pass

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

NOTE Specific regional requirements are given in Annex G.

6.2.107 Semi-automatic C/I valve

A semi-automatic C/I valve that is manually open shall only allow a fully open position.

6.2.108 Diaphragm type valve

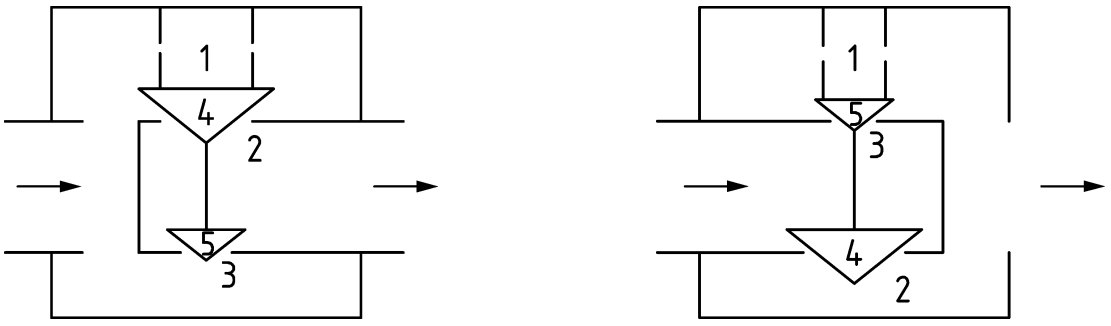
Parts of the valve coming in contact with the diaphragm shall not have sharp edges which might chafe or abrade it.

6.2.109 Balanced valves with one or two ports

The closure member of a balanced valve with one or two ports 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.

NOTE Examples are shown in Figure 1 and Figure 2.

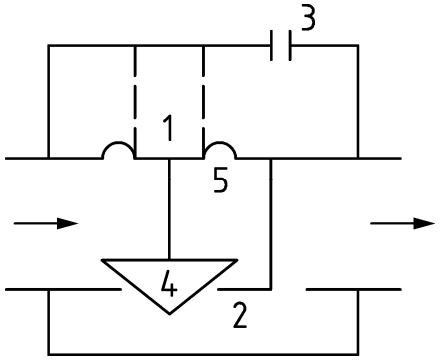


a) Example 1 **b) Example 2**

Key

1	spring	4	valve disc big
2	valve seat big	5	valve disc small
3	valve seat small		

Figure 1 — Balanced valve with two ports



Key

1	spring	4	valve disc big
2	valve seat big	5	compensating diaphragm (smaller than 2)
3	breather hole		

Breather hole as bypass to valve port is not allowed.

Figure 2 — Balanced valve with one port

6.3 Materials

6.3.1 General material requirements

Shall be according to ISO 23550:2011, 6.3.1.

6.3.2 Housing

6.3.2.1 Housing design

Shall be according to ISO 23550:2011, 6.3.2.1 with the following addition:

When a diaphragm separates parts of the housing from the gas-carrying compartment from atmosphere then this is considered to be indirectly separated. Those parts shall be made from metallic material.

For C/I valves the body and its internal parts, except the soft part of valve disk, gasket, O-rings and the like, shall be of material having melting points not less than 427 °C.

NOTE Specific regional requirements are given in Annex F.

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

Shall be according to ISO 23550:2011, 6.3.2.2.

6.3.3 Springs

6.3.3.1 Closure springs

Shall be according to ISO 23550:2011, 6.3.3.1.

6.3.3.2 Springs providing closing force and sealing force

Shall be according to ISO 23550:2011, 6.3.3.2 with the following addition:

Springs shall be protected against abrasion and guided or arranged to minimize binding, buckling, or other interference with their free movement.

6.3.4 Resistance to corrosion and surface protection

Shall be according to ISO 23550:2011, 6.3.4.

6.3.5 Impregnation

Shall be according to ISO 23550:2011, 6.3.5.

6.3.6 Seals for glands for moving parts

Shall be according to ISO 23550:2011, 6.3.6.

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 working pressure above 15 kPa;

— parts transmitting the closing force.

The strength of the connection between the

— two valve discs of a balanced valve with two ports or

— one valve disc and balancing means of a balanced valve with one port

shall be at least five multiplied by the maximum inlet pressure multiplied by the

— total opening area of the valve ports for a balanced valve with two ports or

— opening area of the valve port and the area of the balancing means of a balanced valve with one port.

6.4 Gas connections

6.4.1 Making connections

Shall be according to ISO 23550:2011, 6.4.1.

6.4.2 Connection sizes

Shall be according to ISO 23550:2011, 6.4.2.

6.4.3 Threads

Shall be according to ISO 23550:2011, 6.4.3 with the following addition:

C/I valves up to a size of DN 80 may have thread or flange connection. If threads are used they shall have female pipe threads.

NOTE Specific regional requirements are given in Annex F.

6.4.4 Union joints

Shall be according to ISO 23550:2011, 6.4.4.

6.4.5 Flanges

Shall be according to ISO 23550:2011, 6.4.5 with the following addition:

C/I valves larger than DN 80 shall incorporate flange connections.

NOTE Specific regional requirements are given in Annex F.

6.4.6 Compression fittings

Shall be according to ISO 23550:2011, 6.4.6.

6.4.7 Nipples for pressure tests

Shall be according to ISO 23550:2011, 6.4.7.

6.4.8 Strainers

Shall be according to ISO 23550:2011, 6.4.8 with the following addition:

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.

6.4.101 Hydraulic and pneumatic actuating mechanisms

Hydraulically or pneumatically 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.

7 Performance

7.1 General

Shall be according to ISO 23550:2011, 7.1 with the following addition:

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

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

For semi-automatic shut-off valves, permanent blocking of the manual actuating means shall be discouraged by suitable means.

For the following DC supplies a tolerance of 20 % to the minimum and the maximum rated voltage applies:

— stand-alone battery systems;

— battery systems for mobile vehicle applications;

— systems which are intended to be connected to DC supply networks;

For DC supplies of other types the tolerance shall be declared by the manufacturer.

7.2 Leak-tightness

7.2.1 Requirement

Shall be according to ISO 23550:2011, 7.2.1 with the following addition:

Addition:

Balanced valves with two ports shall be leak-tight when tested with rates given in Table 1.

Table 1 — Test pressure

Inlet pressure	**Test pressure *p* in flow direction kPa**	**Maximum leakage rate**
0 Pa ≤ p ≤ 50 kPa	$2 \times p_{max}$	For internal leak-tightness see values in ISO 23550:2011, Table 2.
50 kPa < p ≤ 500 kPa	$p = p_{max} \times [\, 2 - (p_{max} - 50)/900 \,]$	

7.2.2 Test for leak-tightness

Shall be according to ISO 23550:2011, 7.2.2 with the following addition:

7.2.2.101 C/I valve gas pressure surge test

A closed C/I valve shall remain closed on a sudden change of upstream pressure over a range of 0 to 150 % of the maximum rated inlet pressure.

1) The maximum leakage test pressure is applied within 0,5 s.

2) The pressure is maintained and leakage is accumulated over a 2 min test period.

3) Accumulated total leakage from above, resulting in an equivalent leakage rate per hour.

4) The test shall be repeated 5 times and the highest internal leakage for any one test shall not exceed the leakage allowed in ISO 23550:2011, 7.2.1 when tested according to ISO 23550:2011, 7.2.2.

7.2.2.102 Test of leak-tightness for balanced valves with two ports

For balanced valves with two ports pressurize the inlet to test pressures given in 7.2.1 and measure the leakage rate.

7.3 Torsion and bending

Shall be according to ISO 23550:2011, 7.3.

7.4 Rated flow rate

7.4.1 Requirement

Shall be according to ISO 23550:2011, 7.4.1 with the following addition:

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

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.

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

Shall be according to ISO 23550:2011, 7.4.2 with the following addition:

7.4.2.101 Characteristics for valves with modulating or step 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.

7.5 Durability

Shall be according to ISO 23550:2011, 7.5.

7.6 Functional requirements

Shall be according to ISO 23550:2011, 7.6 with the following addition:

7.6.101 Closing function

7.6.101.1 Requirement

Automatic shut-off valves shall close automatically on reducing the voltage or current to 15 % of the minimum rated value. Automatic shut-off valves with hydraulic or pneumatic actuating mechanisms shall close automatically on reducing the voltage or current to 15 % of the minimum rated voltage of the control valve. Automatic shut-off 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 7.6.106

NOTE Specific regional requirements are given in Annex F and Annex G.

7.6.101.2 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 3 different voltages or currents between 15 % of the minimum rated value and 85 % of the maximum rated value.

7.6.102 Open and closing function of thermoelectric valves

7.6.102.1 Requirement

For a thermoelectric valve the pull-in current, if applicable, and the drop-out current shall be within the manufacturer's specified range.

7.6.102.2 Test of thermoelectric valves

A direct current power source of appropriate voltage in series with an ammeter shall be used. Each device shall be tested 3 times under each of the following test conditions, as applicable. For automatic pull-in devices, the current shall be set below the manufacturer's specified pull-in current. The current shall be slowly increased. The current at which the device pulls in, shall not be less than the minimum or greater than the maximum value specified by the manufacturer. The current shall be set at the manufacturer's specified maximum operating current. The resetting mechanism, if provided, shall be operated in accordance with the manufacturer's instructions. The current at which the valve drops out shall not be less than the minimum or greater than the maximum value specified by the manufacturer.

7.6.103 Diaphragm assisting the shut-off function

7.6.103.1 General

Shut-off functions using a diaphragm in combination with a closure member to assist in the shut-off function shall be designed in such a way that, when the diaphragm is damaged, the internal leakage of the valve shall not be more than 1 dm^3/h at the maximum inlet pressure. Conformity shall be verified by the method given in 7.6.103.2.

7.6.103.2 Leakage test for valves

Remove or rupture the part(s) originating the balancing force. Ensure the coil of the shut-off function is de-energized. Measure the internal leakage rate of the valve according to 7.2.2.

7.6.104 Closing force

7.6.104.1 Requirement

Valves with 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 applies to disc-on-seat valves with a working pressure above 50 kPa.

7.6.104.2 Test of closing force

This measurement is performed 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.

7.6.105 Delay time and opening time

7.6.105.1 Requirement

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.

7.6.105.2 Test of delay time and opening time

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.

NOTE Specific regional requirements are given in Annex G.

7.6.106 Closing time

7.6.106.1 Requirement

The closing time for valves of classes A, B, and C shall not exceed 1 s when tested to 7.6.106.3.

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.

The closing time for C/I valves shall not exceed 2 s. The test to 7.6.106.3 shall be repeated during the period of opening of the valve.

7.6.106.2 Closing time for controlling function

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

7.6.106.3 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.

For C/I valves the following test procedure applies:

The test shall be performed at room ambient for valves with a declared minimum temperature of 0 °C or at the minimum for valves with a lower declared minimum ambient. The valve shall be mounted in the most critical position declared by the manufacturer, a means to read downstream pressure attached, and energized at rated voltage. If the valve incorporates proof-of-closure switch, it may be used to indicate when the valve is closed. The valve shall be de-energized and the closing time measured. The test shall be repeated as the valve is being energized.

7.6.107 Sealing force

7.6.107.1 Requirement

Class A, B and C valves shall have a minimum sealing force over the closure member orifice area in accordance with Table 2 when tested to 7.6.107.2.

Table 2 — Sealing force requirements

Valve	Test pressure kPa	Maximum leakage rate
Class A	15	values for internal leak-tightness see ISO 23550:2011, Table 2
Class B	5	
Class C	1	

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.

For balanced valves with two ports the force of the closing spring shall be calculated to be at least 50 % of the total opening area multiplied by 15 kPa multiplied by 1,25. The test pressure opposing the flow direction for balanced valves with two ports is 30 kPa.

Balanced valves with one port shall have a minimum sealing force over the closure member port area according the declared Class in accordance with this clause. This sealing force shall be provided only by the closing spring, and shall be tested to 7.6.107.2.

Where the test methods of 7.6.107.2 are unsuitable for some designs of valve, 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.

7.6.107.2 Test of sealing force

7.6.107.2.1 General

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

7.6.107.2.2 Class A, B, and C valves

Pressurize the valve at an increasing pressure not exceeding 0,1 kPa/s to the appropriate pressure given in 7.6.107.1 and measure the leakage rate.

7.6.107.2.3 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.

7.6.108 Closed position indicator switches

7.6.108.1 Requirement

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; or

— if a closed position indicator switch is used as a proof-of-closure switch, the valve port is considered to be closed when the flow through the valve does not exceed 0,028 m³/h air at 150 % of maximum working pressure.

7.6.108.2 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 7.6.108.1.

7.6.109 Gas cracking

7.6.109.1 Requirement

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

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

7.6.109.2 Method of gas cracking

Two sample valves shall be operated in a suitable test oven at the manufacturer's maximum specified operating temperature (but not less than 60 °C) and shall be continuously energized at 110 % of rated voltage. Pure (99 %) isobutylene shall be passed through each valve at a rate of approximately 879 W/h. 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.

7.6.110 Valves containing electrical components in the gas way

7.6.110.1 Requirement

The use of open electricity in the gas way of a gas valve represents a risk of explosion in case an explosive gas/air mixture is present in the gas way.

Such a mixture can be the result of air diffusing into the gas valve. Valves containing electrical components in the gas way shall meet the leakage requirements of 7.2.1 after the test of 7.6.110.2.

Thermoelectric valves rated less than 1 V are exempt from this test.

7.6.110.2 Test

Ignition test shall be performed by ignition trial from those points where live parts are in contact with gas, which might require a special preparation of the test sample.

The ignition test shall be done by making use of a sparking transformer with an output of at least 10 µC and 10 kV no load voltage.

Straight piping of 1,5 m shall be attached to both the inlet and outlet connections of the sample with a manual valve attached to each end of the straight piping.

Test sequence:

— The sample valve and the two manual valves shall be opened.

— A test mixture comprised of 5 % propane and 95 % air (by volume) shall be introduced into the inlet of the piping system.

— When a sufficient volume of the test mixture has been introduced to assure a uniform distribution of the test mixture throughout the piping system and the sample valve, the inlet manual valve shall be closed.

— The outlet manual valve shall be closed immediately thereafter.

— The sample valve shall remain opened, and the gas-air test mixture ignited.

— After refilling the piping system and the sample valve with the test mixture, the inlet manual valve shall be closed, and immediately thereafter the sample valve shall be closed.

— The outlet manual valve shall remain opened and the gas-air test mixture ignited.

These two tests shall be performed three times on each of two sample valves.

Valves that are operable shall be cycled five times.

After that all valves, whether operable or not, shall be tested according the leakage tests of 7.2.2.

The test shall not apply if the valves fulfil the requirements of IEC 60079-11.

7.7 Endurance

Shall be according to ISO 23550:2011, 7.7 with the following addition:

7.7.101 Requirement

7.7.101.1 Endurance requirement for valves other than C/I Valves

After the endurance test described in 7.7.102.1 the valve shall conform to the requirements of 7.2, 7.6.101, 7.6.105, 7.6.106, 7.6.107 and 7.6.108.

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 7.7.102 shall be within ± 10 % of the flow rate before the endurance test, when measured under the same conditions according to 7.4.2.

7.7.101.2 Endurance requirement for C/I Valves

After the test of 7.7.102.2 the valve shall comply with 7.2 and 7.6.104.3. Switches shall meet dielectric strength requirements. The proof-of-closure switch shall operate per 6.2.101. The auxiliary switch shall operate as intended by manufacturer.

7.7.102 Test of Endurance

7.7.102.1 Test of Endurance for valves other than C/I Valves

7.7.102.1.1 General

All leakage tests to be performed at 20 °C.

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 to the number of cycles given in Tables 3 or 4 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.

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.

Where the valve has an hydraulic or pneumatic 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 7.6.101.2.

7.7.102.1.2 Test conditions for cycling valves

Carry out tests for external leak-tightness and internal leak-tightness to 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.

Carry out the part of the endurance test at maximum ambient temperature, at the maximum 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.

Table 3 — Operating cycles

Nominal size	**Number of cycles** at:	
DN	Maximum ambient temperature according 7.1	(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

The number of cycles for semi-automatic shut-off valves is 12 000.

NOTE Specific regional requirements are given in Annex F and Annex G.

Table 4 — Operating cycles for automatic shut- off valves for cookers

Nominal size	Number of cycles at:	
DN	Maximum ambient temperature according 7.1	(20 ± 5) °C
DN ≤ 25 Opening time ≤ 1 s maximum working pressure ≤ 15 kPa	800 000	200 000

7.7.102.2 Test of Endurance for C/I Valves

One C/I valve sample shall be tested. If the manufacturer builds the same basic valve in a range of pipe sizes, this test shall be done on the largest size. An automatic C/I valve shall satisfactory complete 100 000 cycles. A semi-automatic valve shall satisfactory complete 20 000 cycles. For a C/I valve with a minimum ambient rating not less than 0 °C the valve shall be maintained at the manufacturer's maximum specified ambient temperature. For a valve with a minimum ambient rating less than 0 °C 90% of the cycles are done at the manufacturer's maximum specified ambient temperature and 10 % at the manufacturer's minimum specified ambient temperature with air or nitrogen approximating the manufacturer's specified minimum ambient temperature flowing through the valve. Air or nitrogen is maintained at the maximum rated inlet pressure to the inlet of the valve and a minimum pressure drop of 0,25 kPa maintained across the valve when the valve is in the fully open position. If the C/I valve incorporates an auxiliary switch or proof-of-closure switch, they shall be connected to an electric load, which makes and breaks their maximum electrical rating on each cycle. A C/I valve shall be cycled between six and ten cycles per minute unless the manufacturer specifies a slower rate. In no case shall the rate be less than two cycles per minute unless the inherent design of the valve results in a slower rate. If inherent design results in a rate exceeding ten cycles per minute the test may be performed at this increased rate. The C/I valve shall not exhibit any sticking or become inoperative.

7.7.102.3 Endurance test for closure switches

Carry out the endurance test described in 7.7.102 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 7.6.108.2.

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

7.7.102.4 Flow characteristics

7.7.102.4.1 Valves with modulating control

In addition to 7.7.102.1 and 7.7.102.2, test the valve for opening to the lowest set point as declared by the manufacturer and to the mid-point in the closing direction according to 7.4.2.

7.7.102.4.2 Valves with step control

In addition to 7.7.102.1 and 7.7.102.2, test the valve for opening and closing to the mid-point of the adjustment range for each step according to 7.4.2.

8 EMC/Electrical requirements

8.1 Protection against environmental influences

Shall be according to ISO 23550:2011, 8.1 with the following addition:

Under assessment Criterion 2 the valve may close, but if closed it shall stay closed.

8.2 Variations in supply voltage

ISO 23550:2011; 8.2 is not applicable.

8.3 Short-term voltage interruptions and drops

ISO 23550:2011, 8.3 is not applicable.

8.4 Variations in supply frequency

ISO 23550:2011, 8.4 is not applicable.

8.5 Surge immunity test

Shall be according to ISO 23550:2011, 8.5.

8.6 Electrical fast transient/burst

Shall be according to ISO 23550:2011, 8.6.

8.7 Immunity to conducted disturbances

Shall be according to ISO 23550:2011, 8.7.

8.8 Immunity to radiated fields

Shall be according to ISO 23550:2011, 8.8.

8.9 Electrostatic discharge immunity test

Shall be according to ISO 23550:2011, 8.9.

8.10 Test for immunity to power-frequency magnetic field

ISO 23550:2011, 8.10 is not applicable.

8.11 Electrical requirements

ISO 23550:2011, 8.11 is replaced by the following:

8.11.101 Electrical requirements for valves

Shall be according to ISO 23550:2011, 8.11 with the following modifications and additions:

Modification:
Delete Note 1.

Addition:

The electrical equipment shall comply with the relevant requirements of IEC 60730-1:2010, Clauses 8, 9, 10, 11.1, 11.2, 11.7.2, 11.8, 11.9, 11.10, 11.11.1, 11.11.2, 11.11.4, 11.11.5, 11.11.7, 11.12, 13.1, 13.2, 18.1, 18.2, 18.4, 18.9, 19, 20, 21, 24, 27.2 and 28.

8.11.102 Electrical strength for valves

The test of IEC 60730-1:2010, 13.3 is not applicable.

8.11.103 Heating

8.11.103.1 General

Shall be according to IEC 60730-1:2010, Clause 14 "Heating" with the following modification and addition:

Modification:

Replace *"switch head"* by *"valve"* in IEC 60730-1:2010, 14.6 and 14.7.

Addition:

If stalling of the motorized electric actuator drive shaft is part of normal operation, then the drive shaft of motorized actuators shall be stalled and temperatures measured after steady-state conditions are reached.

The temperatures shall comply with the limits of IEC 60730-1:2010, Table 13. In addition, if any protective device provided does not cycle under stalled conditions, then the electric actuator is also considered to comply with IEC 60730-1:2010, 27.2.3 "blocked mechanical output test (Abnormal temperature test)".

If stalling of the motorized electric actuator drive shaft is not part of normal operation, then the limits of IEC 60730-1:2010, Table 13 does not apply during stalling. The electric actuator shall comply with the requirements of IEC 60730-1:2010, 27.2.3.

The test is performed to the conditions of 8.11.103.2.

8.11.103.2 Test conditions

Instead of the test conditions according to IEC 60730-1:2010, 14.5 the test is performed under the following conditions:

– The temperature of the valve is maintained at T_{max}.

– If the valve includes switching devices or other auxiliary circuits, all such circuits shall be loaded to carry rated current during the temperature test.

– A modulating valve shall be caused to execute successive complete cycles of the modulating action for which it is designed until constant temperatures are reached. The time between successive cycles is chosen in accordance with the manufacturer's specifications.

– The temperature of the motor of a motor-operated valve, when stalled, shall not exceed the values specified in IEC 60730-1:2010, Table 13 if stalling is part of normal operation.

8.11.104 Burnout test

The requirements of IEC 60730-1:2010, 27.2 are applicable.

Only valves with openings in the bottom of the enclosure or which incorporate coil windings in a gas-confining compartment shall withstand the effects of the blocking of the valve mechanism according to IEC 60730-1:2010, 27.2.3.

8.101 Electrical components

8.101.1 Degree of protection

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

NOTE Specific regional requirements are given in Annex F.

For an independently mounted automatic shut-off valve utilizing safety extra-low-voltage, the terminals shall be physically protected if grounding or shorting of the electric circuit may result in failure of the valve to close.

8.101.2 Switches

Switches shall conform to IEC 61058-1. The number of operating cycles shall be in accordance with 7.7.102.

8.101.3 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*:*

— *Single step valves*

PE	earth contact
Pin 1	N
Pin 2	L

— *Two step valves*

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

— *Closed position indicators*

Pin 4 (e)	earth contact
Pin 1	common
Pin 2	open valve
Pin 3	closed valve

8.101.4 Power-saving circuit

8.101.4.1 Closing of the valve

Valves with power-saving circuits shall be designed such that any fault in the power-saving circuit does not affect the correct closing and the leak-tightness of the valve.

If the power-saving circuit has an independent power supply it has to fulfil IEC 60730-1:2010, H.27.1 for Class C control function.

8.101.4.2 Overheating

If the power-saving circuit meets the requirement of IEC 60730-1:2010, H.27.1 for Class C control function, the test under 8.101.4.3 does not apply.

8.101.4.3 Test of power-saving circuits

Energize the valve according to 7.1 of this standard at maximum rated voltage or current and 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. The test shall be carried out according to 7.6.101.2 and meet the requirement of 7.6.101.1. Verify that the valve has closed and remains tight.

9 Marking, installation and operating instructions

9.1 Marking

Shall be according to ISO 23550:2011, 9.1 with the following addition:

The following information, at least, shall be durably marked on the valve in a clearly visible position:

a) class of valve (if applicable);

b) ambient temperature range;

c) maximum working pressure in kPa;

d) group 1 (if applicable).

In addition, the valve shall be marked with:

e) direction of gas flow (by a cast or embossed symbol);

f) marking of the earth connection (if applicable);

g) pressure for external hydraulic or pneumatic actuator in kPa (if applicable).

Valves with electrical actuating mechanisms shall be marked according to IEC 60730-1:2010, 7.2;

h) C/I valves shall be marked with the following: 'C/I' in 2.4 mm minimum height letters and a list of gases for which the valve has been tested and approved;

i) A valve with a proof-of-closure switch or valve seal over travel interlock shall be identified with a unique model designation or bear a marking which describes the function;

j) C/I valve instructions must address the operational features including auxiliary switch, proof-of-closure switch, valve seal over travel interlock, and other design features that must be considered in order to ensure correct operation;

In addition electrically operated devices which are an integral part of the valve, shall be provided with the same information.

NOTE Specific regional requirements are given in Annex F and Annex G.

9.2 Installation and operating instructions

Shall be according to ISO 23550:2011, 9.2 with the following addition:

Instructions shall include all relevant information on use, installation, operation and servicing, in particular:

a) class of valve (A, B, C, D, or J);

b) group 1 or 2;

c) rated flow rate at a specified pressure difference in m^3/h;

d) electrical data;

e) ambient temperature range in °C;

f) mounting position(s);

g) working pressure range in kPa;

h) gas connection(s);

i) strainer details;

j) opening time in s;

k) closing time (and maximum delay time if applicable);

l) information if usable as automatic shut off valve for cookers;

m) notice for installer to consider e.g. conditions for up-stream pressure (overpressure at the inlet in case of failure of upstream components), dirt, corrosion products.

The identification of any parts which the manufacturer specifies as replacement service parts and instructions for the installation of such parts.

9.3 Warning notice

Shall be according to ISO 23550:2011, 9.3.

Annex A
(informative)

Leak-tightness test - Volumetric method

Shall be according to ISO 23550:2011, Annex A.

Annex B
(informative)

Leak-tightness test - pressure-loss method

Shall be according to ISO 23550:2011, Annex B.

Annex C
(normative)

Conversion of pressure loss into leakage rate

Shall be according to ISO 23550:2011, Annex C.

Annex D
(normative)

Test for immunity to power-frequency magnetic fields

Shall be according to ISO 23550:2011, Annex D.

Annex E
(normative)

Specific regional requirements in European countries

Shall be according to ISO 23550:2011, Annex E.

Annex F
(normative)

Specific regional requirements in Canada and the USA

Shall be according to ISO 23550:2011, Annex F with the following addition:

F.1 General

For the purposes of this International Standard, the specific regional requirements given in F.2 are applicable in Canada and the USA. Only the affected subclauses are mentioned, hence the numbering is non-consecutive.

F.2 Additional requirements and modifications

F.4.1.101 Classification based on sealing force

Modification to 4.1.101:

Valves are not classified on sealing force.

F.6.2.3 Breather holes

Addition to 6.2.3:

For liquefied petroleum gases the value is 30 dm^3/h and 70 dm^3/h for natural gas.

F.6.3.2.1 Housing

Addition to 6.3.2.1:

A separate sample is used and the tests of 7.3 are first performed and the outlet then sealed. With the valve in the open position, this sample is then subjected for 1 min to an inlet pressure five times the declared maximum working pressure. Following the test, the sample shall comply with 7.2.2 (external leakage).

For a diaphragm type valve the pressure is to be applied to both sides of the diaphragm and to be raised slowly to avoid stressing the diaphragm.

F.6.4.3 Threads

Addition for 6.4.3

Threaded connections shall be designed so that when a pipe which is threaded two threads beyond standard (for its size) is screwed into the threaded portion of the valve body, it will not adversely affect the valve operation.

F.6.4.5 Flanges

Addition to 6.4.5

C/I valves using flanges shall comply with ANSI/ASME B16.1 or ANSI/ASME B16.5

F.7.6.101.1 Closing function

Modification to 7.6.101.1:

The test is performed by removing power to the valve.

F.7.7.102.1 Test of Endurance for valves other than C/I Valves

Modification to 7.7.102.1:

The number of cycles are 100 000 cycles.

F.8.101.1 Degree of protection

Modification to 8.101.1:

The degree of protection is declared in accordance with NEMA 250 or UL 50.

F.9.1 Marking

Modification to 9.1:

Item c) is not applicable.

Valves rated at 34,47 kPa or less are rated as 3,45, 13,79 or 34,47 kPa. Valves rated greater than 34,47 kPa are rated at 34,47 kPa increments.

Annex G
(normative)

Specific regional requirements in Japan

Shall be according to ISO 23550:2011, Annex G with the following addition:

G.1 General

For the purposes of this International Standard, the specific regional requirements given in G.2 are applicable in Japan. Only the affected subclauses are mentioned, hence the numbering is non-consecutive.

G.2 Additional requirements and modifications

G.4.1.101 Classification based on sealing force

Modification to 4.1.101:

Valves are not classified on sealing force.

G.6.2.106 By-pass

Modification to 6.2.106:

All automatic and semi-automatic shut-off valves shall not incorporate a by-pass.

G.7.6.101.1 Closing function

Modification to 7.6.101.1:

For d. c. valves, the voltage is slowly reduced to 2 % of the minimum rated voltage.

G.7.6.105.2 Test of delay and opening time

Modification to 7.6.105.2:

The test at minimum temperature is performed at 90 % of the minimum rated voltage or current.

For a. c. valves, the voltage is slowly reduced to 15 % of the minimum rated voltage.

The test shall be carried out at 55 °C or higher if specified by manufacturer.

G.7.7.102.1 Test of Endurance for valves other than C/I Valves

Modification to 7.7.102.1

Replace Table 3 with Table G.1:

Table G.1 — Operating cycles

Nominal size	Number of cycles at:
DN	(20 ± 5) °C
DN ≤ 25 Opening time ≤ 1 s maximum working pressure ≤ 15 kPa	100 000
DN ≤ 25 Opening time ≤ 1 s maximum working pressure >15 kPa	100 000
DN ≤ 25 Opening time > 1 s	100 000
25 < DN ≤ 80	75 000
80 < DN ≤ 150	25 000
> DN 150	20 000

G.9.1 Marking

Replacement to 9.1:

Required marking is the following:

a) manufacturer and/or trade mark;

b) production year.

Bibliography

[1] ISO 6708:1995, *Pipework components — Definition and selection of DN (nominal size)*

[2] ISO 8655-1:2002, *Piston-operated volumetric apparatus — Part 1: Terminology, general requirements and user recommendations*

[3] ISO 23551 (all parts), *Safety and control devices for gas burners and gas-burning appliances — Particular requirements*

[4] ISO 23552-1, *Safety and control devices for gas and/or oil burners and gas and/or oil appliances — Particular requirements — Part 1: Fuel/air ratio controls, electronic type*

[5] ISO 23553-1, *Safety and control devices for oil burners and oil-burning appliances — Particular requirements — Part 1: Shut-off devices for oil burners*

[6] IEC 60335-2-102, *Household and similar electrical appliances — Safety — Part 2-102: Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections*

[7] IEC 61010 (all parts), *Safety requirements for electrical equipment for measurement, control and laboratory use*

[8] IEC 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems*

[9] ANSI/ASME B 1.1:1989, *Unified inch screw threads (UN and UNR thread form)*

[10] ANSI/ASME B 1.20.1, *Pipe threads, general purpose (inch)*

[11] ANSI/ASME B16.1, *Gray Iron Pipe Flanges and Flanged Fittings*

[12] ANSI/ASME B16.5, *Pipe Flanges and Flanged Fittings*

[13] ANSI/SAE J 512, *Automotive tube fittings*

[14] ANSI/SAE J 514, *Hydraulic tube fittings*

[15] JIS B 0202, *Parallel pipe threads*

[16] JIS B 0203, *Taper pipe threads*

[17] JIS B 2220, *Steel pipe flanges*

[18] JIS B 2239, *Cast iron pipe flanges*

[19] JIS B 2240, *Copper alloy pipe flanges*

[20] JIS B 2241, *Aluminium alloy pipe flanges*

[21] JIS B 2301, *Screwed type malleable cast iron pipe fittings*

[22] JIS B 2302, *Screwed type steel pipe fittings*

[23] JIS B 2311, *Steel butt-welding pipe fittings for ordinary use*

[24] JIS B 2312, *Steel butt-welding pipe fittings*

[25] JIS B 2316, *Steel socket-welding pipe fittings*

[26] JIS H 3401, *Pipe fittings of copper and copper alloys*

[27] NEMA 250, *Enclosures for Electrical Equipment (1000 V Maximum)*

[28] UL 50 UL, *Standard for Safety*

ICS 27.060.20

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