
**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*

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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.

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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 1817:1985¹, *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* <https://standards.iteh.ai/catalog/standards/sist/447ca48b-06c0-4e12-8a4f-ISO 23551-1:2012>
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. <https://standards.iteh.ai/catalog/standards/sist/447ca48b-06c0-4e12-8a4f-6616cad279ff/iso-23551-1-2012>

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.

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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 through 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.