International Standard

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

Part 1: Automatic and semi-automatic shut-off 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

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 161, *Controls and protective devices for gaseous and liquid fuels*.

This third edition cancels and replaces the second edition (ISO 23551-1:2012), which has been technically revised.

The main changes are as follows:

— definitions for specific valve types have been updated and a flow chart for valve types has been added (Clause 3, Table 1);

— the classification of the valve types has been restructured, including the addition of a new classification Class E and the definition of valves without safety shut-off function as general purpose valve Class D (Clause 4);

— common requirements and tests for specific valve types have been summarized in tabular form (see Tables 1 and 2);

— visual indicator (VI), closed position switch (CPS) and proof of closure switch (POC) have been summarized in 6.2.11;

— the endurance test has been restructured, with the assignment of the test cycles and tests summarized in tabular form (see Tables 4, 5 and 6);

— a hydrostatic withstand pressure test has been added;

— a resistance to permanent damage at excessive supply pressure test has been added;

— the document has been updated to align technically and with the revised format of the latest edition of ISO 23550;

— specific regional requirements that were previously contained in regional Annexes have been moved into the main body of the text;

— the document has been updated to align with the application of Electromagnetic compatibility (EMC) testing from IEC 60730-2-17 (withdrawn 2017-02-20 and replaced by ISO 23551-1);

— the document has been updated and aligned with IEC 60730-1:2022.

A list of all parts in the ISO 23551 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document is designed to be used in combination with ISO 23550. Together, they establish the full requirements as they apply to the product covered by this document.

Where needed, this document adapts ISO 23550 by stating in the corresponding clause:

— “with the following modification”;

— “with the following addition”;

— “is replaced by the following”; or

— “is not applicable”.

In order to identify specific requirements that are particular to this document and that are not already covered by ISO 23550, this document contains certain clauses or subclauses that are additional to the structure of ISO 23550. These subclauses are indicated by the introductory sentence: “Subclause (or Annex) specific to this document.”

To ensure global relevance of this document, the differing requirements resulting from practical experience and installation practices in various regions of the world have been taken into account. The variations in basic infrastructure associated with gas controls and appliances have also been recognized, some of which are addressed in Annexes A and B. This document 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 shut-off valves

1 Scope

This document specifies safety, constructional and performance requirements and testing of automatic, semi-automatic shut-off valves and general purpose valves for gas burners, gas appliances and appliances of similar use, hereinafter referred to as valves.

This document applies to normally closed valves and general purpose valves mounted upstream to gas burners and gas appliances with declared maximum operating pressures up to and including 500 kPa, for use on burners or in appliances using fuel gases such as natural gas, manufactured gas or liquefied petroleum gas (LPG). It is not applicable to corrosive and waste gases.

This document applies to:

— 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 document covers type testing only.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 23550:2018, *Safety and control devices for gas and/or oil burners and appliances — General requirements*

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

IEC 60730-1:2022, *Automatic electrical controls— Part 1: General requirements*

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.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Terms related to valves

3.1.1
valve
device consisting essentially of a valve body, closure member and *valve actuator* (3.2.18) that controls the flow of gas

Note 1 to entry: The valve actuation can be achieved by gas pressure, electrical, hydraulic, manual or pneumatic energy.

Note 2 to entry: See Figure 1.

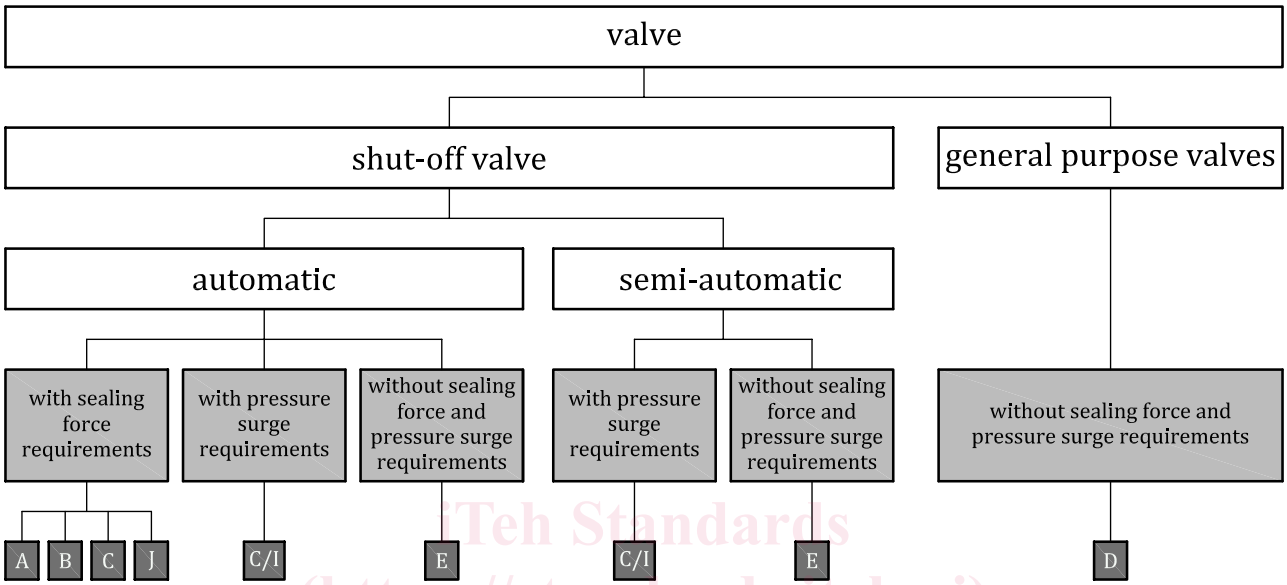

Figure 1 — Valve type flow chart

3.1.2
semi-automatic shut-off valve
valve (3.1.1) that is opened manually and closes automatically upon removal of the *actuating energy* (3.2.2)

Note 1 to entry: See Figure 1.

3.1.3
automatic shut-off valve
valve (3.1.1) which opens when energized and closes automatically when de-energized

Note 1 to entry: See Figure 1.

3.1.4
C/I valve
commercial/industrial valve
normally closed *automatic* or *semi-automatic shut-off valve* (3.1.3; 3.1.2) having an operating pressure of 3,5 kPa or greater

Note 1 to entry: See Figure 1.

3.1.5
general purpose valve
valve (3.1.1) intended to control the flow of gas that does not provide a shut-off function

Note 1 to entry: A combination of a general purpose valve and a shut-off valve is primarily considered as a shut-off valve.

Note 2 to entry: See Figure 1.

3.1.6
thermoelectric valve
semi-automatic shut-off valve (3.1.2) that receives its electrical actuating energy by means of a thermoelectric source

Note 1 to entry: Not applicable for *C/I valves* (3.1.4).

Note 2 to entry: See Figure 1.

3.1.7
diaphragm type valve
automatic shut-off valve (3.1.3) where a closing member is opened by application of gas pressure upon a flexible diaphragm

Note 1 to entry: See Figure 1.

3.1.8
valve with step control
multi-stage valve
valve (3.1.1) which controls the flow rate in steps

Note 1 to entry: See Figure 1.

3.1.9
valve with modulating control
modulating valve
valve (3.1.1) which controls the flow rate continuously between two limits in response to external signals

Note 1 to entry: See Figure 1.

3.2 General terms

3.2.1
actuating mechanism
part of the *valve* (3.1.1) which moves the closure member to the open position

3.2.2
actuating energy
required energy for the *actuating mechanism* (3.2.1) to move the closure member to the open position

Note 1 to entry: The actuating energy may have an external source (electrical, hydraulic or pneumatic) and can be transformed inside the *valve* (3.1.1).

3.2.3
closing force
force available to close the *valve* (3.1.1), independent of any force provided by gas pressure

3.2.4
sealing force
force acting on the *valve* (3.1.1) seat when the closure member is in the closed position, independent of any force provided by gas pressure

3.2.5
frictional force
largest force required to move the *actuating mechanism* (3.2.1) and the closure member from the open position to the closed position with the closure spring removed, independent of any force provided by gas pressure

3.2.6
actuating pressure
hydraulic or pneumatic pressure supplied to the *actuating mechanism* (3.2.1) of the *valve* (3.1.1)

3.2.7
opening time
time interval between energizing the *valve* (3.1.1) and the attainment of the maximum or other defined flow rate

3.2.8
closing time
time interval between de-energizing the *valve* (3.1.1) and the closure member attaining the closed position

3.2.9
delay time
time interval between energizing the *valve* (3.1.1) and the start of flow

3.2.10
control valve
valve (3.1.1) which controls the hydraulic or pneumatic means supplied to the *actuating mechanism* (3.2.1)

3.2.11
rated voltage
voltage declared by the manufacturer at which the *valve* (3.1.1) may be operated

3.2.12
rated current
current declared by the manufacturer at which the *valve* (3.1.1) may be operated

3.2.13
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* (3.1.1)

3.2.14
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

3.2.15
proof of closure switch
POC
electrical switch which monitors the closed position of the *valve* (3.1.1) closure member, and which is used as an *interlock* (3.2.14)

3.2.16
closed position switch
CPS
switch fitted to a *valve* (3.1.1) which indicates when the closure member is in the closed position, and which is used as an *interlock* (3.2.14)

Note 1 to entry: For certain applications, a CPS is also known as a closed position indicator (CPI) switch.

3.2.17
switching element
electrical switch actuated by the *valve actuator* (3.2.18) and used as an electrical output

3.2.18
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 device, used to effect the operation of a *valve* (3.1.1)