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Automatically operated valves for use with gas

Part 1: Shut-off valves



AS 4629.1:2022

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Part 1: Shut-off valves

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Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee AG-013, Components used for Gas Appliances and Equipment, to supersede in part AS 4629—2005, *Automatic shut off valves and vent valves*.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this document as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this document is to provide manufacturers, designers, regulatory authorities, testing laboratories and similar organizations with uniform minimum requirements for the safety, performance and use of automatic and semi-automatic shut-off valves.

AS 4629 has been revised and divided into two parts: AS 4629.1 covers automatically operated shut-off valves and AS 4629.2 covers automatically operated vent valves.

The terms “normative” and “informative” have been used in this Standard to define the application of the appendix to which they apply. A “normative” appendix is an integral part of a Standard, whereas an “informative” appendix is only for information and guidance.

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Automatically operated valves for use with gas

Part 1: Shut-off valves

Section 1 Scope and general

1.1 Scope

This document specifies the minimum safety and performance requirements for automatic and semi-automatic shut-off valves up to 150 mm nominal size for use on —

- (a) natural gas (NG);
- (b) simulated natural gas (SNG);
- (c) town gas (TG);
- (d) tempered liquefied petroleum (TLP) gas; and
- (e) liquefied petroleum gas (LPG) in vapour phase.

Conformance of an automatic or semi-automatic valve to this document does not imply that it is acceptable for use without supplementary tests in its intended application.

NOTE 1 For requirements relating to shut-off valves incorporated in a combination control, refer to AS 4624. For requirements relating to shut-off valves incorporated in thermoelectric flame safeguards and over-pressure and under-pressure cut off devices, refer to AS 4620 and AS 4632 respectively.

NOTE 2 Valves that do not shut off completely are not covered by specific requirements except where they are incorporated as part of an appliance or system.

NOTE 3 In the future, it is intended to limit the maximum working pressure to 2.6 MPa to align with LPG applications. For applications above such a working pressure, refer to applicable ISO Standards such as ISO 23551-11 or ISO 23555-1.

1.2 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.

NOTE Documents referenced for informative purposes are listed in the Bibliography.

AS 2136, *Method for detecting the susceptibility of copper and its alloys to stress corrosion cracking using the mercurous nitrate test*

AS/NZS 5601 (all parts), *Gas installations*

AS ISO 7.1, *Pipe threads where pressure-tight joints are made on the threads — Dimensions, tolerances and designation*

ISO 6957, *Copper alloys — Ammonia test for stress corrosion resistance*

ISO 23551-1, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 1: Automatic and semi-automatic valves*

1.3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

1.3.1**automatic shut-off valve**

See *valve* ([1.3.8](#))

1.3.2**gas**

combustible fuel gas

Note 1 to entry: A gas may be *liquefied petroleum gas* ([1.3.2.1](#)), *natural gas* ([1.3.2.2](#)), *simulated natural gas* ([1.3.2.3](#)), *tempered liquefied petroleum gas* ([1.3.2.4](#)), or *town gas* ([1.3.2.5](#)).

1.3.2.1**liquefied petroleum gas****LPG**

gas ([1.3.2](#)) comprised predominantly of any of the following hydrocarbons, or any combination of these; propane, propene (propylene), butane, butene (butylene)

1.3.2.2**natural gas****NG**

hydrocarbon *gas* ([1.3.2](#)) comprised mainly of methane

1.3.2.3**simulated natural gas****SNG**

gas ([1.3.2](#)) comprised of a mixture of *LPG* ([1.3.2.1](#)) and air in the approximate proportions of 55 % LPG and 45 % air for commercial propane

1.3.2.4**tempered liquefied petroleum gas****TLP**

gas ([1.3.2](#)) comprised of a mixture of *LPG* ([1.3.2.1](#)) and air in the approximate proportions of 27 % LPG and 73 % air for commercial propane

1.3.2.5**town gas****TG**

gas ([1.3.2](#)) manufactured from coal or petroleum feedstocks

1.3.3**may**

indicates the existence of an option

1.3.4**rated working pressure**

maximum allowable inlet pressure declared by the manufacturer

1.3.5**semi-automatic shut-off valve**

See *valve* ([1.3.8](#))

1.3.6**shall**

indicates that a statement is mandatory

1.3.7**should**

indicates a recommendation

1.3.8**valve**

device that controls or shuts off flow of gas

1.3.8.1**automatic shut-off valve**

valve (1.3.8) used to automatically shut off *gas* (1.3.2) supply to an appliance when a signal is generated indicating that a dangerous condition has developed

1.3.8.2**semi-automatic shut-off valve**

valve (1.3.8) that is opened manually and closes automatically

1.4 Classification

Shut-off valves shall be classified using the same criteria adopted for ISO 23551-1, see [Table E.1](#):

- (a) *Classes A, B and C* — Shut-off valves having requirements relating to closure against reverse flow conditions.
- (b) *Class D* — Valves with no closure requirements to closure against reverse flow conditions.
- (c) *Class J* — Disc-on-seat valves where the sealing force is not decreased by the gas inlet pressure.

NOTE See [Appendix E](#) for a table of corresponding classes of automatic shut-off valves relating to closure requirements against reverse flow conditions.

Section 2 Design and construction

2.1 Materials

2.1.1 General

The quality of materials, the dimensions used and the method of assembling the various parts shall be such that construction and performance characteristics are safe.

Performance characteristics shall not alter significantly during a reasonable lifetime when installed and used as stated in the installation and operating instructions.

2.1.2 Suitability

Materials and finishes, including dressings and lubricants, used in the construction shall be suitable for the conditions of use (e.g. corrosion, temperature, handling, and the like).

2.1.3 Contact with gas

Materials in contact with gas shall be suitable for use with all gases.

NOTE Materials in contact with the gas may include lubricants, dressings and jointing compounds.

Conformance of non-metallic materials shall be assessed by testing in accordance with [Clause C.1](#).

The valve conforms if, during the test, the —

- (a) shut-off time does not exceed —
 - (i) 1 s for Class A and Class B valves; and
 - (ii) 2 s for Class D valves; and
- (b) leakage does not exceed that specified in [Clauses 3.4.2](#) and [3.4.3](#).

2.1.4 Melting point

Metallic materials shall have a melting point not less than 430 °C.

Conformance shall be assessed by testing in accordance with [Clause C.2](#).

The valve conforms if, after the test, there is no sign of melting of the metal parts.

2.1.5 Copper-containing alloys

Components made of copper-containing alloys shall be resistant to stress-resistant cracking when tested in accordance with ISO 6957 or AS 2136.

2.2 Construction

2.2.1 General

Construction shall ensure the continued safe operation of the valve during usage, in accordance with this document and the manufacturer's specification.

2.2.2 Castings and hot pressings

All castings and hot pressings shall be clean and sound, free from laps, blow holes and pitting. All surfaces that are not machine-finished shall be clean, smooth and free from sand.

2.2.3 Sealing of porous castings or cracks

Porous castings or cracks in gas-carrying parts shall be sealed using an accepted method for the impregnation of castings, such as vacuum impregnation.

2.2.4 Assembled device to be clean

The assembled valve shall not contain dirt, casting sand, swarf or other foreign matter. There shall be no excess diaphragm dressing, lubrication or jointing compound in the control.

2.2.5 Accidental displacement of parts

All parts shall be —

- (a) secured against accidental displacement; and
- (b) constructed to maintain a fixed relationship between essential parts under normal conditions of handling and usage.

2.2.6 Prevention of accidental shift after calibration

Any provision for factory calibration shall be factory sealed to prevent accidental shifting after calibration.

2.2.7 Attachment of knobs, handles, dials and pointers

Knobs, handles, movable dials and pointers, where supplied, shall be securely attached to their spindles.

2.2.8 Springs

Springs shall be resistant to corrosion. The ends of a helical spring shall be flat and in a plane perpendicular to the axis of the spring. The coils of a cylindrical helical spring shall not overlap.

2.2.9 Securing of parts

Adhesives shall not be used for securing parts together without additional mechanical fixing means.

NOTE Adhesives may be used for affixing labels.

2.2.10 Sharp edges

Sharp edges may cause damage or injury during installation or when being adjusted.

Accessible parts shall be free from sharp edges.

2.2.11 Holes for assembly or mounting

Holes intended for the assembly of parts or for mounting shall not open into gasways. Holes shall provide a minimum wall thickness of 1 mm from gasways.

2.2.12 Permanent sealing of non-functional holes

Non-functional holes used for manufacture that form a passage between gasways and the atmosphere shall be permanently sealed by mechanical means.

2.2.13 Self-tapping screws

Self-tapping screws, other than those that form a fully swaged, machine-type thread, shall not be used to secure together the external joint of a gas-carrying component that may be removed in servicing. The application of thread-forming screws shall be limited to malleable materials. The application shall not result in deformation or cracking of the component.

2.2.14 Adjustments by the user

The tightening of a gland or any other adjustment shall not permanently affect the ability of the valve to meet the performance requirements of this document.

2.2.15 Devices that indicate position or closure

Position indicators including switches, where fitted, shall be mounted rigidly to avoid accidental displacement. The closed-position switch shall be factory set and sealed to prevent field adjustment.

The proof-of-closure switch demonstrates conformance to [Clause C.3](#) when —

- (a) the electrical operation of the switch enables correct valve operation, after cycling; and
- (b) the switch contact closes only after the valve port is closed and opens before the valve port opens.

The position-indicating switch demonstrates conformance when the switch operates as intended after cycling, and the switch position conforms to [Table 1](#).

Table 1 — Position-indicating switch

Switch position	Switch type	Condition	Test method
Closed	Closed-position indicator	Valve has travelled to within 1 mm of the closed position	Clause C.6
Closed	Closed-position indicator	Flow reduced to 10 % or less of the equivalent fully open flow for a given pressure differential	Clause C.6
Any other position		±5 % of the nominated position	Clause C.4

2.3 Design

2.3.1 Normally closed operation

Valves shall normally close under fault conditions or if the actuating medium is removed.

If the pressure of an external actuating fluid rises to the setting of an over-pressure protection system declared by the manufacturer, valves shall operate as intended or close.

2.3.2 Prevention of interference

Automatic shut-off valves shall not incorporate the means to be manually opened.

2.3.3 Manual adjustment

Means for maintaining all adjustments shall be provided and protected to resist tampering and prevent accidental change.

2.3.4 Locking device

The tightening of a locking device shall not alter its setting.

2.3.5 Connections

Connections shall conform to the AS/NZS 5601 series, except for valves supplied with special purpose fittings.

Screwed-end connections shall be provided with spanner flats. These connections shall be designed so that the assembly may be secured at one end without the necessity of turning the metal connector relative to its mating piece.

Threaded-end connections that are not part of a union and are intended for connection to a gas pipe or a gas appliance shall conform to AS ISO 7.1 or equivalent.

2.3.6 Lubricant not required for safe closure of valve

The addition of lubricant shall not be necessary for the safe closure of a valve.

2.4 Markings

2.4.1 General

Valves shall be marked with the following information:

- (a) Manufacturer's name or trademark.
- (b) Model designation.
- (c) Date of manufacture or serial number.
- (d) Rated working pressure marked in accordance with [Appendix D](#).
- (e) Direction of flow, if applicable.
- (f) Ambient temperature range.

2.4.2 Marking of electrical connections

Electrical connections shall be clearly and durably marked and identified, if applicable.

2.4.3 Durability of markings

Markings shall remain legible, durable and permanently attached throughout the life of the valve.

Conformance shall be assessed by testing in accordance with [Clause C.7](#).

2.5 Instructions

Instructions shall be available in English. Instructions shall include the following:

- (a) Model designation(s) and alternative forms.
- (b) Rated working pressure.
- (c) Flow rate in m³/h for a given pressure loss.
- (d) Temperature limitations in °C.
- (e) Mounting limitations.

- (f) Class of shut-off valve.
- (g) Wiring diagram showing external connections.
- (h) Electrical ratings, i.e. voltage, frequency, current.
- (i) Electrical switch ratings, as applicable.
- (j) Method of operation, adjustments, and applications.
- (k) Fault diagnosis and servicing.
- (l) Thread or other connection specifications.
- (m) Type of lubricant and/or sealant, as applicable.
- (n) Warning against overfilling electro-hydraulic valves, as applicable.
- (o) Specification of any external actuating fluid required
- (p) Fluid flow diagram showing all necessary components for valves operated by an external actuating fluid.

Section 3 Performance requirements

3.1 General

3.1.1 Mounting positions

Valves shall perform as intended in all mounting positions declared by the manufacturer.

3.1.2 Declared temperature range

Valves shall perform as intended at a temperature between 0 °C and 60 °C as declared by the manufacturer.

3.2 Valve operation — Opening and closing

Valves shall close within the time specified in [Table 2](#) when the holding medium is removed.

Table 2 — Closing time — Shut-off valves

Class	Maximum closing time s
A	1
B	1
C	1
D	As declared by the manufacturer
J	5

3.3 Opening pressure and operating effort

3.3.1 Valves to open up to rated working pressure

Valves shall open against all pressure differentials up to their rated working pressure when either the holding medium is applied or the valve is manually reset.

3.3.2 Semi-automatic valves

The manual torque or force required to open a semi-automatic valve shall not exceed the values specified in [Table 3](#).

Conformance shall be assessed by testing in accordance with [Clause C.8](#).

Table 3 — Manual torque or force required to open

Nominal size mm	Torque Nm	Force N
6	1.1	50
8	1.7	50
10	2.3	50
15	2.8	100
20	4.0	100
25	5.0	100
32	10.0	150
≥ 40	30.0	200

3.3.3 Breakaway effort to reset semi-automatic valves

To manually reset a semi-automatic valve, the maximum instantaneous torque or force at the initial manual operation shall be no greater than 1.5 times the values specified in [Table 3](#).

Conformance shall be assessed by testing in accordance with [Clause C.8](#).

3.4 Gas leakage

3.4.1 Hydrostatic safety test

Valves with a rated working pressure in excess of 1 050 kPa shall not show evidence of fracture, deformation, or loss of operation after subjection to a hydrostatic inlet pressure of 1.5 times the maximum working pressure declared by the manufacturer.

Conformance shall be assessed by testing in accordance with [Clause C.10](#).

3.4.2 External leakage

External leakage from the body shall not exceed 1 mL/min when tested over a pressure range of 0 to 1.5 times the rated working pressure or 14 kPa, whichever is the greater, with the valve open and closed.

Conformance shall be assessed by testing in accordance with [Clause C.9](#).

3.4.3 Internal leakage — Forward flow

In the valve's closed state with the outlet open to atmospheric pressure, the leakage rate shall not exceed the value specified in [Table 4](#) at 1.5 times the rated working pressure or 14 kPa, whichever is the greater.

Conformance shall be assessed by testing in accordance with [Clause C.11](#).

Table 4 — Permissible internal leakage for valves

Nominal size mm	Before any other test	After completion of other tests	
	All valves mL/min ^a	Class A valves mL/min ^a	Other valves mL/min ^a
DN ≤ 25	1	1	2
DN > 25	1	2	4
^a Corrected to 15 °C and 101.325 kPa.			

3.4.4 Internal leakage — Reverse flow

The leakage past the closed valve of a Class A or Class B shut-off valve shall not exceed the value specified in [Table 4](#) with the inlet open to atmospheric pressure and the outlet at the test pressure specified in [Table 5](#).

Table 5 — Reverse flow test pressure

Valve class	Nominal size mm	Test pressure kPa
Class A	DN ≤ 50	15
Class A	DN > 50	10
Class B	All	5

Conformance shall be assessed by testing in accordance with [Clause C.12](#).

3.5 Flow rate

The flow rate for a shut-off valve shall be at least the value specified in [Table 6](#).

Flow rate shall be measured at the fully open position.

Conformance shall be assessed by testing in accordance with [Table 6](#).

Table 6 — Flow rate

Nominal size mm	Pressure drop kPa	Minimum flow rate	Test method
DN ≤ 80	As declared by the manufacturer	95 % of that declared by the manufacturer	Clause C.5
DN > 80	125 Pa	95 % of that declared by the manufacturer	Clause C.5

3.6 Actuation medium

3.6.1 Voltage variation

Valves shall operate without impairment at +10 % and at -15 % of the rated supply voltage (or voltage range) declared by the manufacturer.

3.6.2 Pressure variation

Hydraulically- or pneumatically-actuated valves shall operate as intended between 85 % and 110 % of the actuating pressure or at the pressure range declared by the manufacturer.

If the pressure of an external actuating fluid exceeds the operating pressure range, the valve shall operate normally or return to the normally closed position.

3.7 Mechanical strength

3.7.1 Resistance to applied torque

Valves shall be able to withstand the torque values in [Table 7](#) without permanent deformation or leakage.

For valves with interchangeable end connections and the ability to directly connect without an interchangeable end connection, the torque is checked in both cases.

Conformance shall be assessed by testing in accordance with [Clause C.13](#).