



Over-pressure and under-pressure shut-off devices



AS 4632:2020

This Australian Standard® was prepared by AG-013, Components used for Gas Appliances and Equipment. It was approved on behalf of the Council of Standards Australia on 13 January 2020.

This Standard was published on 24 January 2020.

The following are represented on Committee AG-013:

- Association of Accredited Certification Bodies
- Australian Industry Group
- Energy Networks Australia
- Engineers Australia
- Gas Appliance Manufacturers Association of Australia
- Gas Energy Australia
- Gas Technical Regulators Committee
- Master Plumbers Association of Qld

This Standard was issued in draft form for comment as DR2 AS 4632:2019.

Keeping Standards up-to-date

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

www.standards.org.au

ISBN 978 1 76072 717 8



Over-pressure and under-pressure shut-off devices

Originated as AG 211—1976.
Republished and redesignated AS 4632—2005.
This edition 2020.

COPYRIGHT

© Standards Australia Limited 2020

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Cth).

Preface

This Standard was prepared by the Australian members of Joint Standards Australia/Standards New Zealand Committee, AG-013, Components Used for Gas Appliances and Equipment, to supersede AS 4632—2005, *Over-pressure and under-pressure cut off devices*.

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

The objective of this Standard is to provide manufacturers, designers, regulatory authorities, testing laboratories and similar organizations with uniform minimum requirements for the safety and performance of over-pressure and under-pressure shut-off devices.

This Standard should not be regarded as a design specification or as an instruction manual.

In its preparation, consideration has been given to —

- (a) continuity of satisfactory operation;
- (b) the prevention of fire hazards and explosions;
- (c) the prevention of injury to persons or property;
- (d) gas rules and regulations now in force; and
- (e) relevant International Standards.

Principal changes to this standard relate to updates with regards to industry practice and updates to the format of the standard to conform to Standards Australia policies.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

Contents

Preface	ii
Section 1 Scope and general	1
1.1 Scope	1
1.2 Normative references	1
1.3 Terms and definitions	1
Section 2 Design and construction	4
2.1 Materials	4
2.1.1 Continuity of satisfactory operation	4
2.1.2 Suitability of materials for conditions of use	4
2.1.3 Materials in contact with gas	4
2.1.4 Melting point of metallic materials	4
2.1.5 Copper containing alloy parts	4
2.2 Construction	4
2.2.1 Continuity of satisfactory operation	4
2.2.2 Castings and hot pressings	4
2.2.3 Sealing of porous castings or cracks	4
2.2.4 Assembled device to be clean	4
2.2.5 Accidental displacement of parts	5
2.2.6 Attachment of knobs, handles, dials and pointers	5
2.2.7 Springs	5
2.2.8 Securing of parts together	5
2.2.9 Sharp edges	5
2.2.10 Holes for assembly or mounting	5
2.2.11 Permanent sealing of non-functional holes	5
2.2.12 Self-tapping screws	5
2.2.13 Application of lubricant or sealant	5
2.2.14 Tightening of a gland or any other adjustments	5
2.2.15 Threaded connection with spanner flats	5
2.2.16 Threaded connections	6
2.2.17 Flange connections	6
2.2.18 Connections within an appliance	6
2.2.19 Connections above 200 kPa	6
2.3 Design	6
2.3.1 Components requiring servicing	6
2.3.2 Protection of mechanism	6
2.3.3 Venting	6
2.3.4 Safety device cannot be overridden	6
2.3.5 Accessibility for adjustment	6
2.3.6 Adjusting devices	7
2.3.7 No reduction of gas flow area	7
2.3.8 Over-pressure shut-off device as part of a pressure regulator	7
2.3.9 Manual reset — Over-pressure and under-pressure shut-off device	7
2.3.10 Components requiring servicing	7
2.4 Markings	7
2.4.1 General	7
2.4.2 Marking of electrical connections	7
2.4.3 Durability of markings	7
2.4.4 Markings for fitting of an external sensing line	8
2.5 Instructions	8
2.5.1 General	8
Section 3 Performance requirements	9
3.1 General	9
3.1.1 Commissioning and adjustment	9
3.1.2 Satisfactory performance in all mounting positions	9

3.1.3	Operation and accuracy over declared temperature range	9
3.2	Leakage	9
3.2.1	External leakage	9
3.2.2	Internal leakage	9
3.3	Flow rate for a given pressure	9
3.4	Resetting — Effort to reset and fully open device	10
3.5	Mechanical strength	10
3.5.1	Resistance to applied torque	10
3.5.2	Resistance to applied bending moments	10
3.6	Repeatability	11
3.6.1	Tripping and resetting cycles — Under-pressure shut-off devices	11
3.6.2	Tripping and resetting cycles — Over-pressure shut-off devices	11
3.6.3	Tripping pressure	11
3.6.4	Tripping pressure accuracy	11
3.7	Closing time	11
3.7.1	Time to close after tripping — Manufacturer's tripping pressure range	11
3.7.2	Time to close after tripping — Device independent of inlet pressure	12
3.8	Durability	12
3.8.1	Over-pressure shut-off device — Endurance	12
3.8.2	Under-pressure shut-off device — Endurance	12
3.8.3	Gas leakage after performance testing	12
3.8.4	Weight of diaphragm material	12
3.8.5	Weight of valve seating material	12
Appendix A (normative) Diagrams — Test apparatus		13
Appendix B (normative) Methods of test		17
Appendix C (normative) Units of pressure measurement		39
Bibliography		40

Australian Standard®

Over-pressure and under-pressure shut-off devices

Section 1 Scope and general

1.1 Scope

This Standard sets out requirements for over-pressure and under-pressure shut-off devices up to 150 mm nominal bore (DN 150) for use on natural gas (NG), simulated natural gas (SNG), town gas (TG), tempered liquefied petroleum gas (TLP) and liquefied petroleum gas (LPG), intended to be fitted in the gas supply downstream of the consumer billing meter or an LPG first stage pressure regulator.

The requirements apply to over-pressure and under-pressure shut-off devices intended for installation into consumer piping either directly or as part of a gas pressure regulator.

NOTE 1 Over-pressure shut-off devices generally serve to protect equipment downstream of regulators from being pressurized beyond its rated working pressure if the regulator fails.

This Standard does not cover devices incorporating automatic safety shut-off valves actuated by electrical pressure-sensing devices.

NOTE 2 The requirements for pressure-sensing devices are covered in AS 4628 and the requirements for automatic shut-off valves are covered in AS 4629.

Conformance to the requirements of this Standard does not imply acceptability for use without supplemental tests in an intended application.

NOTE 3 For over-pressure and under-pressure shut-off devices with flows greater than 200 m³/h for natural gas and town gas refer to EN 14382.

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 tests*

AS/NZS 5601.1, *Gas Installations, Part 1: General installations*

AS/NZS 5601.2, *Gas Installations, Part 2: LP Gas installations in caravans and boats for non-propulsive purposes*

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

1.3 Terms and definitions

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

1.3.1

consumer billing meter

measurement device that is used to measure the quantity of gas transported through the gas distribution network to a consumer (including other gas distribution network operator connections)

[SOURCE: AS/NZS 4645.1:2018]

1.3.2**gas**

combustible fuel gas which may be one of the following.

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

gas composed predominantly of any of the following hydrocarbons, or any combination of them, in the vapour phase: propane, propene (propylene), butane, butene (butylene)

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

hydrocarbon gas consisting primarily of methane

Note 1 to entry: Refer to AS 4564 for further information.

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

gas in air mixture comprising approximately 55 % commercial propane and 45 % air

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

gas in air mixture comprising approximately 27 % commercial propane and 73 % air

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

gas manufactured from coal or petroleum feedstocks

1.3.3**may**

indicates the existence of an option

1.3.4**metric standard condition****MSC**

absolute temperature of 288.15 K (15 °C) and an absolute pressure of 101.325 kPa

1.3.5**over-pressure shut-off device****OPSO**

device incorporated in the gas pipework system to shut off the supply of gas when the pressure at the sensing point rises to a set pressure

1.3.6**rated working pressure**

maximum allowable inlet pressure specified by the manufacturer

1.3.7**regulator**

device that maintains the outlet pressure constant within given limits, independently of the variation in inlet pressure and/or flow rate

1.3.8**shall**

indicates a statement is mandatory

1.3.9**should**

indicates a recommendation

1.3.10**trip pressure****set pressure**

pressure at which the device is intended to shut off the flow of gas

1.3.11**trip pressure range**

range of pressures, as specified by the manufacturer, within which the device can be adjusted to trip

1.3.12**under-pressure shut-off device****UPSO**

device incorporated in the gas pipework system to shut off the supply of gas when the pressure at the sensing point falls to a set pressure

Section 2 Design and construction

2.1 Materials

2.1.1 Continuity of satisfactory operation

Materials used in the construction shall be such that continuity of satisfactory operation can be expected during normal usage within the manufacturer's specification.

2.1.2 Suitability of materials for conditions of use

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

2.1.3 Materials in contact with gas

Materials in contact with the gas, including lubricants, dressings and jointing compounds, shall be suitable for use with all gases.

2.1.4 Melting point of metallic materials

The device body related structural components and retaining devices shall be made of metallic materials with a melting point not less than 430 °C.

Conformance shall be assessed by testing with the method in [Clause B.5](#).

2.1.5 Copper containing alloy parts

Copper containing alloy parts shall be resistant to stress-corrosion cracking when tested in accordance with ISO 6957 or AS 2136.

2.2 Construction

2.2.1 Continuity of satisfactory operation

Construction shall ensure continued safe operation during the usage stated in 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 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 by an accepted method for the impregnation of castings, such as vacuum impregnation.

2.2.4 Assembled device to be clean

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

2.2.5 Accidental displacement of parts

Every part shall be secured against accidental displacement and shall be constructed to maintain a fixed relationship between essential parts under normal and reasonable conditions of handling and usage to ensure continued conformance to this Standard.

2.2.6 Attachment of knobs, handles, dials and pointers

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

2.2.7 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 be able to overlap.

2.2.8 Securing of parts together

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

Adhesives may be used for labels.

2.2.9 Sharp edges

Any accessible part(s) shall be free from sharp edges that may cause damage or injury when installed or adjusted (if applicable).

2.2.10 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.

2.2.11 Permanent sealing of non-functional holes

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

2.2.12 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 and shall not result in deformation or cracking of the component.

2.2.13 Application of lubricant or sealant

Devices with a rated working pressure exceeding 7 kPa, which require the addition of lubricant or sealant to maintain gas tightness, shall be capable of having this added without dismantling the device.

2.2.14 Tightening of a gland or any other adjustments

The tightening of a gland or any other adjustment shall not alter the ability of the control to meet the requirements of this Standard.

2.2.15 Threaded connection with spanner flats

Threaded connections shall be provided with spanner flats.

2.2.16 Threaded connections

Thread types shall be as specified in AS/NZS 5601 series for the intended application.

2.2.17 Flange connections

Flange connections up to and including 200 kPa shall be as specified in AS/NZS 5601.1 for the intended application.

2.2.18 Connections within an appliance

A component intended to be incorporated within a gas appliance may have proprietary connections.

2.2.19 Connections above 200 kPa

Shut-off devices that incorporate threaded or flanged connections up to and including 200 kPa, connections for specific application shall —

- (a) be selected based on the intended application; and
- (b) conform to a standard.

2.3 Design

2.3.1 Components requiring servicing

Components requiring servicing during normal use shall be accessible and shall be manufactured so that parts cannot be incorrectly assembled.

2.3.2 Protection of mechanism

The mechanism of an over-pressure or under-pressure shut-off device shall be protected by an enclosure to avoid damage to or interference with operating parts.

2.3.3 Venting

The venting of the atmospheric pressure chamber of an over-pressure shut-off device or under-pressure shut-off device shall be enclosed in a housing designed to limit external leakage by incorporating either a vent limiter or provision for connection of a vent pipe or tubing intended to be vented to a safe location.

NOTE The intent of including a vent limiter is to limit the uncontrolled release of gas in the event of a failure of the diaphragm. The limiting orifice needs to be such that it allows operation of the shut-off device in accordance with the performance requirements of this Standard.

2.3.4 Safety device cannot be overridden

An over-pressure or under-pressure shut-off device shall be so constructed that it does not incorporate means to permanently bypass it or to fix the device partly or fully open when it should be shut.

A spring-loaded bypass valve to enable the downstream pressure to be equalized with the upstream pressure, before the device can be reset, may be incorporated with the device.

2.3.5 Accessibility for adjustment

Integral parts that may require adjustment shall be accessible.

2.3.6 Adjusting devices

Adjusting devices shall be designed so as to prevent any change other than the intended manual adjustment as specified in the manufacturer's instructions.

2.3.7 No reduction of gas flow area

An over-pressure or under-pressure shut-off device shall not be of a reduced bore design.

2.3.8 Over-pressure shut-off device as part of a pressure regulator

Where an over-pressure shut-off device forms part of a pressure regulator, the shut-off mechanism and the surfaces that provide the seal between the inlet and the outlet of the device shall be independent of the regulator control surfaces.

2.3.9 Manual reset — Over-pressure and under-pressure shut-off device

An over-pressure or under-pressure shut-off device shall not reset automatically after tripping. A manual action shall be necessary to reset the device.

2.3.10 Components requiring servicing

Components requiring servicing during normal use shall be accessible and shall be manufactured such that parts cannot be incorrectly assembled.

2.4 Markings

2.4.1 General

Markings shall be provided and shall include:

- (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 C](#).
- (e) Direction of flow.
- (f) Set pressure or set pressure range.
- (g) Mounting position(s), where necessary for correct operation.

2.4.2 Marking of electrical connections

Where the shut-off device incorporates electrical connections, they shall be clearly and durably marked and identified.

2.4.3 Durability of markings

Markings shall remain legible, durable and permanently attached throughout the life of the shut-off device.

Conformance shall be assessed by testing with the method in [Clause B.6](#).

2.4.4 Markings for fitting of an external sensing line

Over-pressure and under-pressure shut-off devices that require an external sensing line to be fitted shall have clear markings to this effect.

2.5 Instructions

2.5.1 General

Instructions in English shall be available, which shall include:

- (a) Model designation(s) and alternative forms.
- (b) Rated working pressure.
- (c) Flow rate in m³/h for a given pressure loss.
- (d) Bypass rate if applicable.
- (e) Temperature limitations in °C.
- (f) Mounting limitations.
- (g) Type of device.
- (h) Wiring diagram showing external connections.
- (i) Electrical ratings (i.e. voltage, frequency, current).
- (j) Method of operation, adjustments and applications.
- (k) Fault diagnosis and servicing.
- (l) Thread or flange specifications, as applicable.
- (m) Type of lubricant and/or sealant, as applicable.
- (n) Details of assembly and/or adjustments to be carried out by installer.
- (o) Method of resetting after device has been tripped.

Section 3 Performance requirements

3.1 General

3.1.1 Commissioning and adjustment

The shut-off device shall be installed, commissioned and adjusted in accordance with the manufacturer's installation and operating instructions.

3.1.2 Satisfactory performance in all mounting positions

The performance shall be satisfactory in all mounting positions declared by the manufacturer.

3.1.3 Operation and accuracy over declared temperature range

The performance shall be satisfactory over the manufacturer's declared temperature range, which shall be at least 0 °C to 60 °C.

3.2 Leakage

3.2.1 External leakage

The external leakage from the body shall not exceed 1 mL/min at all internal pressures up to 1.5 times the rated working pressure or 14.0 kPa, whichever is the greater, with the valve opened and closed.

Where the over-pressure shut-off device is an integral part of the regulator, those parts that are not subjected to full inlet pressure shall be leak tight at 90 % of the maximum set pressure for that device.

Conformance shall be assessed by testing with the method in [Clause B.7](#).

3.2.2 Internal leakage

The leakage past the closed device shall not exceed the value specified in [Table 3.1](#) at all inlet air pressures up to 1.5 times the rated working pressure or 14.0 kPa, whichever is the greater, and with the outlet open to atmospheric pressure.

Conformance shall be assessed by testing with the method in [Clause B.8](#).

Table 3.1 — Internal leakage

Permissible internal leakage in mL/min [corrected to metric standard condition (MSC)]		
Nominal size, mm	Before testing	After testing
Up to and including 25	1	2
Above 25	1	4

3.3 Flow rate for a given pressure

The flow rate through an open over-pressure or under-pressure shut-off device not forming part of a pressure regulator shall be not less than that specified by the manufacturer.

Conformance shall be assessed by testing with the method in [Clause B.9](#).