

Australian/New Zealand Standard™

Gate valves for waterworks purposes

Part 2: Resilient seated



AS/NZS 2638.2:2011

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee WS-022, Valves for Waterworks Purposes. It was approved on behalf of the Council of Standards Australia on 1 April 2011 and on behalf of the Council of Standards New Zealand on 13 May 2011.
This Standard was published on 27 May 2011.

The following are represented on Committee WS-022:

Australian Chamber of Commerce and Industry
Australian Industry Group
Australian Stainless Steel Development Association
Australian Water Association
Engineers Australia
Institute of Instrumentation, Control and Automation Australia
Local Government New Zealand
Plastics Industry Pipe Association of Australia
Plumbing Products Industry Group
Water Corporation Western Australia
Water Industry Alliance
Water New Zealand
Water Services Association of Australia

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at www.saiglobal.com or Standards New Zealand web site at www.standards.govt.nz and looking up the relevant Standard in the on-line catalogue.

For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of Standards Australia or the New Zealand Standards Executive at the address shown on the back cover.

This Standard was issued in draft form for comment as DR AS/NZS 2638.2.

Australian/New Zealand Standard™

Gate valves for waterworks purposes

Part 2: Resilient seated

Originated as AS 2638—1983.
Third edition 1991.
AS 2638—1991 revised and redesignated in part as AS 2638.2—1999.
Third edition 2006.
AS 2638.2—2006 revised and redesignated as AS/NZS 2638.2:2011.
Reissued incorporating Amendment No. 1 (August 2017).

COPYRIGHT

© Standards Australia Limited

© The Crown in right of New Zealand, administered by the New Zealand Standards Executive

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 (Australia) or the Copyright Act 1994 (New Zealand).

Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, PO Box 1473, Wellington 6140.

ISBN 978 0 7337 9868 9

PREFACE

This Standard was prepared by the Joint Standard Australia/Standards New Zealand Committee WS-022, Valves for Waterworks Purposes, to supersede AS 2638.2—2006.

This Standard incorporates Amendment No. 1 (August 2017). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The objective of this Standard is to specify requirements for PN 16 and PN 25 metal-bodied resilient-seated gate valves for waterworks purposes.

This revision includes the following changes:

- (a) Clarification of definition of ‘type test’.
- (b) Inclusion of alternative materials.
- (c) A statement that gate valves are not designed for throttling purposes.

Attention is drawn to the proposed publication of SAI/SNZ Rul PL/2, *Rulings to the Australian Standard Gate valves for waterworks purposes*. Where rulings of public significance are issued, they will be available from Standards Australia through a subscription service. When rulings are included in an amendment or revision, the specific ruling will be withdrawn at the time of publication of the amendment. Enquiries should be directed to Standards Australia.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard.

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.

CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE.....	4
1.2 APPLICATION	4
1.3 NORMATIVE REFERENCES	4
1.4 DEFINITIONS.....	6
1.5 DESIGNATION OF SIZE	8
1.6 ALLOWABLE PRESSURES	8
SECTION 2 MATERIALS AND COMPONENTS	
2.1 MATERIALS.....	9
2.2 COPPER ALLOY COMPONENTS.....	9
2.3 CONTAMINATION OF WATER.....	9
2.4 SEALS.....	9
SECTION 3 DESIGN	
3.1 GENERAL.....	10
3.2 DIMENSIONS.....	10
3.3 END CONNECTIONS	10
3.4 GATE	10
3.5 COMPONENT JOINTING.....	11
3.6 WATERWAY.....	11
3.7 SPINDLE.....	11
3.8 OPERATION.....	12
3.9 LIFTING DEVICES	12
3.10 SUPPORT FEET	12
3.11 BYPASS ARRANGEMENTS	12
SECTION 4 COATINGS	
4.1 GENERAL.....	17
4.2 DESIGN	17
SECTION 5 TESTING	
5.1 TYPE TESTS.....	18
5.2 PRODUCTION TESTS	21
SECTION 6 GEARBOXES	
6.1 DESIGN	23
6.2 COATINGS	23
6.3 MARKINGS	23
SECTION 7 MARKING AND PACKAGING	
7.1 BODY MARKING	24
7.2 VALVE KEY AND SPINDLE EXTENSION MARKING	24
7.3 DIRECTION OF CLOSURE MARKING FOR HANDWHEELS AND CAPS	24
7.4 PACKAGING.....	24
APPENDICES	
A MEANS FOR DEMONSTRATING CONFORMITY WITH THIS STANDARD	25
B PURCHASING GUIDELINES.....	29
C ALTERNATIVE MATERIAL REQUIREMENTS.....	32
D GUIDELINES FOR GEARBOX SELECTION AND APPLICATION.....	33

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard
Gate valves for waterworks purposes

Part 2: Resilient seated

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for PN 16 and PN 25 metal-bodied resilient-seated gate valves for waterworks purposes, with a maximum operating temperature of 40°C. This Standard is applicable to the following versions:

- (a) Valves of nominal sizes DN 80 to DN 750 with inside screw and non-rising spindle design, operated by a removable key, with or without a gearbox, for buried applications.
- (b) Valves of nominal size DN 80 to DN 750 with inside screw and non-rising spindle design, operated by a handwheel, with or without a gearbox, for above-ground applications.
- (c) Valves of nominal size DN 80 to DN 300 with outside screw and rising spindle design, operated by a handwheel, for above-ground applications where the position of the gate is required to be visible.
- (d) Valves of nominal sizes DN 450 to DN 750 with an integral bypass arrangement.

NOTES:

- 1 The design criteria of the valve and fasteners should be based on a minimum life expectancy of 50 years.
- 2 Purchasing guidelines are given in Appendix B.

1.2 APPLICATION

- A1 | Means for demonstrating conformity with this Standard shall be in accordance with Appendix A.

1.3 NORMATIVE REFERENCES

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

The following are the normative documents referenced in this Standard.

AS

- | | |
|--------|--|
| 681 | Elastomeric seals—Material requirements for pipe joint seals used in water and drainage applications |
| 681.1 | Part 1: Vulcanized rubber |
| 1111 | ISO metric commercial bolts and screws—Product grade C |
| 1111.1 | Part 1: Bolts |
| 1111.2 | Part 2: Screws |
| 1442 | Carbon steels and carbon-manganese steels—Hot-rolled bars and semi-finished products |
| 1565 | Copper and copper alloys—Ingots and castings |

AS	
1646	Elastomeric seals for waterworks purposes
1683	Methods of test for elastomers
1683.15.1	Part 15.1: International rubber hardness
1831	Ductile cast iron
2317	Collared eyebolts
2345	Dezincification resistance of copper alloys
3894	Site testing of protective coatings
3894.1	Part 1: Non-conductive coatings—Continuity testing—High voltage (brush) method

A1 | **‘Text deleted’**

60529 Degrees of protection provided by enclosures (IP Code)

ASME

B1.5 ACME Screw Threads

AS/NZS

1567 Copper and copper alloys—Wrought rods, bars and sections

1568 Copper and copper alloys—Forging stock and forgings

1594 Hot-rolled steel flat products

2280 Ductile iron pipes and fittings

4020 Testing of products for use in contact with drinking water

A1 | 4087 Metallic flanges for water works purposes

4158 Thermal-bonded polymeric coatings on valves and fittings for water industry purposes

A1 | **AS ISO/IEC**

17025 General requirements for the competence of testing and calibration laboratories

ISO

1083 Spheroidal graphite cast irons—Classification

4288 Geometrical Product Specifications (GPS)—Surface texture: Profile method—Rules and procedures for the assessment of surface texture

5210 Industrial valves—Multi-turn actuator attachments

ASTM

A276-10 Standard Specification for Stainless Steel Bars and Shapes

A1 | A743 Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application

D429 Standard Test Methods for Rubber Property—Adhesion to Rigid Substrates

DIN

103 ISO Metric Trapezoidal Screw Threads; Profiles (series)

EN

1982 Copper and Copper Alloys—Ingots And Castings

12164 Copper and Copper Alloys—Rod For Free Machining Purposes

12420 Copper and copper alloys, Forgings

EN

10088 Stainless steels

10088-3 Part 3: Technical Delivery Conditions For Semi-Finished Products, Bars, Rods, Wire, Sections And Bright Products Of Corrosion Resisting Steels For General Purposes

1.4 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

1.4.1 Allowable operating pressure (AOP)

The allowable internal pressure, excluding surge, that a component can safely withstand in service.

1.4.2 Allowable site test pressure (ASTP)

The maximum internal hydrostatic pressure that can be applied on site to a component in a newly installed pipeline.

1.4.3

‘Text deleted’

1.4.4 Bulkhead test

A test where the testing machine provides external restraint to make a watertight joint at each end of the valve.

1.4.5 Bypass arrangement

A smaller diameter valve coupled directly to a larger diameter valve with appropriate pipework to allow water to bypass the larger valve when closed. The bypass is utilized when filling a pipeline, to minimize risk of structural damage to its components or to reduce operating torque when opening the large valve by equalizing pressure across the gate.

1.4.6 Coating

A corrosion-inhibiting medium applied to the surface of a valve.

1.4.7 Coating defect

A detectable weakness or discontinuity in a coating, which deems it to be suspect in its ability to protect the substrate from corrosion during its normal service life.

1.4.8 Distortion

Any permanent deformation.

1.4.9 DN (nominal size)

An alphanumeric designation of size for components of a pipework system, which is used for reference purposes. It comprises the letters DN followed by a dimensionless whole number, which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections.

1.4.10 Effective length

Overall length of a valve measured along its centre-line, excluding the depth of any sockets.

1.4.11 Face to face dimensions

The distance between the two planes perpendicular to the valve axis located at the extremities of the body end ports.

A1

1.4.12 Free end test

A test where the valve ends are blanked off so that the axial hydraulic force is not externally restrained. This simulates a valve in a terminal position held rigidly at one end only.

1.4.13

‘Text deleted’

1.4.14 Maximum allowable gearbox input torque

The maximum allowable input torque that can be applied to a gearbox so that the output torque does not exceed the minimum strength test torque.

1.4.15 Maximum allowable operating pressure (MAOP)

The maximum internal pressure, including surge, that a component can safely withstand in service.

1.4.16 Maximum functional test torque

The maximum allowable torque to operate an ungeared gate valve at fully unbalanced allowable operating pressure (AOP).

1.4.17 Maximum operator input torque

The purchaser-specified maximum operator input torque required to operate the valve or gearbox.

1.4.18 Maximum possible input torque

The maximum torque that can be applied practicably by an operator, either manually or by mechanical means.

1.4.19 Maximum operating temperature

The maximum permitted temperature (40°C) of the medium being conducted through the valve.

1.4.20 Minimum strength test torque

The maximum input torque that an ungeared gate valve is designed to withstand.

1.4.21 Non-rising spindle design

A valve design where the gate is attached to the spindle with a threaded nut such that, as the gate moves from closed to open position, the spindle does not rise during operation.

1.4.22 Pressure classification (PN)

A classification of valves by a PN number based on the allowable operating pressure (AOP), expressed in hundreds of kilopascals.

1.4.23 Production batch

Schedule of products of the same type, nominal diameter and wall thickness with identical dimensional characteristics manufactured from the same material. The production batch is defined by the manufacturer.

1.4.24 Rising spindle design

A valve design where the gate is fixed to the spindle such that, as the gate moves from closed to open position, the spindle rises during operation.

1.4.25

‘Text deleted’

1.4.26 Sampling plan

A specific plan that indicates the number of units of components or assemblies to be inspected.

1.4.27 Type test

A test or series of tests directed towards approval of a design, conducted to determine if an item is capable of meeting the requirements of the product Standard and which is done once and repeated only after a change in design, materials, method or place of manufacture or as otherwise nominated in the product Standard.

1.4.28

‘Text deleted’

1.4.29

‘Text deleted’

1.4.30 Production test

A test performed by the manufacturer on a batch of components, which has to be satisfactorily completed before the batch can be released.

1.4.31 Seal retainer housing

Component that houses the spindle seal retainer to ensure it is accurately fixed in position.

1.4.32 Spindle seal retainer

Component that is in direct contact with the spindle seals to ensure they are retained.

1.5 DESIGNATION OF SIZE

Valve size shall be designated by the nominal size as follows: DN 80, DN 100, DN 150, DN 200, DN 225, DN 250, DN 300, DN 350, DN 375, DN 400, DN 450, DN 500, DN 600, DN 700 and DN 750.

1.6 ALLOWABLE PRESSURES

Allowable pressures shall be in accordance with Table 1.1. ASTP shall be applied only with the gate in the fully open position.

TABLE 1.1
ALLOWABLE PRESSURES

PN	AOP kPa	MAOP (see Note) kPa	ASTP (see Note) kPa
16	1600	1920	2000
25	2500	3000	3125

NOTE: Seat leakage may occur at MAOPs; however, structural damage should not occur.

SECTION 2 MATERIALS AND COMPONENTS

2.1 MATERIALS

A1 Table 2.1 lists the basic material requirements for the manufacture of valve components. Alternative materials are allowable, provided they are equivalent in performance and corrosion resistance.

Acceptable alternative materials are listed in Appendix C.

NOTE: For further information on material equivalence, refer to the Water Services Association of Australia (WSAA).

2.2 COPPER ALLOY COMPONENTS

Valve components of copper alloy shall be in accordance with AS 1565, AS/NZS 1567, AS/NZS 1568 or international equivalent Standards and shall be dezincification-resistant in accordance with AS 2345.

2.3 CONTAMINATION OF WATER

Valves shall comply with AS/NZS 4020. A scaling factor of 0.01 shall be applied.

2.4 SEALS

Seals shall be made of materials in accordance with AS 1646 and are not injuriously affected by the fluid, temperature or environmental conditions to which the seals will be subjected to in service.

TABLE 2.1

BASIC MATERIAL REQUIREMENTS FOR RESILIENT-SEATED VALVES

Component	Material	Standard	Minimum grade
Body	Ductile cast iron*	AS 1831	ISO 1083/JS/400-15†
Bonnet and seal retainer housing (where applicable)	Ductile cast iron*	AS 1831	ISO 1083/JS/400-15†
Bypass fittings	Ductile cast iron*	AS 1831	ISO 1083/JS/400-15†
Spindle seal retainer	Copper alloy‡	AS 1565	C83600
Gate core	Ductile cast iron or copper alloy‡	AS 1831 AS 1565	ISO 1083/JS/400-15† C83600
Gate encapsulation	Synthetic rubber	AS 1646	EPDM
Gate nut	Copper alloy‡	AS 1565	C83600
Spindle	Stainless steel‡	ASTM A276	431
Spindle cap and handwheel	Ductile cast iron*	AS 1831	ISO 1083/JS/ 400-15†
Fasteners	Carbon steel, or	AS 1111.1 and AS 1111.2	4.6
	Stainless steel‡	ASTM A276	316
Gaskets	Synthetic rubber	AS 1646 and AS 681.1	EPDM
Seals	Synthetic rubber	AS 1646 and AS 681.1	65-75 IRHD NBR

* To be coated in accordance with Section 4.

† Higher tensile strength ductile irons in accordance with AS 1831 are acceptable.

‡ Deemed corrosion resistant for the purposes of this Standard.

SECTION 3 DESIGN

3.1 GENERAL

Valves shall be designed for installation with the spindle vertical, unless otherwise specified. They shall be suitable for operation under full unbalanced allowable operating pressures (AOPs). For horizontal applications, the working life of the valve may be reduced.

Valves shall be designed to withstand all torques and pressure conditions specified in this Standard.

NOTE: Gate valves are not designed for throttling purposes.

3.2 DIMENSIONS

Valve dimensions shall be as given in Figures 3.1 to 3.4.

3.3 END CONNECTIONS

3.3.1 General

Valves shall be supplied with ends double flanged, double socketed, double spigoted, flange to socket, shouldered or grooved, as required.

3.3.2 Flanged ends

Flange dimensions shall be in accordance with Figure B5 or B6 of AS 4087—2010, as appropriate. The purchaser may specify alternative flange standards and/or dimensions.

3.3.3 Socket ends

Socket profiles and dimensions shall be provided by the manufacturer and may be designed to suit various types of pipe. For sockets intended for use with PVC pipes, minimum depth of entry shall comply with AS/NZS 2280.

3.3.4 Spigot ends

Spigots shall comply with AS/NZS 2280.

3.3.5 Shouldered or grooved ends

Dimensions for shouldered or grooved ends shall be as given in Figure 3.2 and Figure 3.3

3.4 GATE

3.4.1 Coating

A1

Gate cores manufactured from non-corrosion-resistant materials shall be fully encapsulated with thoroughly bonded rubber. For gate cores manufactured from corrosion-resistant material, all sealing surfaces shall have a thoroughly bonded rubber coating. The remainder of the gate may remain uncoated.

3.4.2 Gate guides

An integral guide system shall be provided on valves of all sizes, to ensure alignment of the gate and to carry the loads imposed without removal of rubber from the gate or coating from the internal surface.

3.4.3 Gate travel

Gate travel shall be sufficient to ensure that the gate can be raised clear of the internal diameter of the valve. When the gate is in the closed position, there shall be full engagement of the spindle and nut.

3.5 COMPONENT JOINTING

3.5.1 Connections

Surfaces forming connections between components shall provide a watertight joint. The joint shall be made with either a gasket or O-ring designed to withstand the body test pressures given in Clause 5.2.2 and shall be able to be disassembled and reassembled in the field at any time during the life of the valve.

3.5.2 Fasteners

Carbon steel fasteners and all fastener/ductile iron thread interfaces shall be completely isolated from the environment.

3.6 WATERWAY

The waterway of a valve seat shall be circular and have a waterway diameter not less than 98% of the nominal diameter.

3.7 SPINDLE

3.7.1 Spindle diameter

The spindle diameter shall be designed to withstand without distortion the minimum strength test torque specified in Table 5.1 (see Type Test A).

3.7.2 Spindle thread

The spindle shall be screwed with an Acme thread in accordance with ASME B1.5 Class 2G or trapezoidal thread in accordance with DIN 103 (series), Tolerance Grade 8c or equivalent. The diameter and lead of the screw shall be designed to ensure that the valve remains in any position under static and dynamic operating conditions.

3.7.3 Spindle sealing

A1 | Means shall be provided for sealing the spindle under dynamic working conditions and also under the test pressures specified in Section 5. The seal shall be a toroidal sealing ring (O-ring) or other pressure-actuated type of seal. All seals shall be capable of being replaced or repaired with the valve under AOP and in the fully opened position.

Sealing rings shall conform with the following:

- (a) Two or more seals shall be used.
- (b) A spindle wiper ring shall be positioned and restrained above the seals to prevent the ingress of foreign matter.

The surface roughness of all parts of the spindle in contact with the seal shall not exceed $3.2 \mu\text{m Ra}$ when measured in accordance with ISO 4288. The surface roughness of all parts of the spindle seal retainer in contact with the seal shall not exceed an average value of $6.3 \mu\text{m Ra}$ with no single measurement exceeding $8.5 \mu\text{m Ra}$.

The spindle seal design shall ensure that the spindle load bearing and thrust surfaces are not in direct contact with any ductile iron polymeric-coated surface, excluding the spindle cap.

3.7.4 Thrust collar

A1 | The design shall incorporate a thrust collar that is an integral part of the spindle, a separate ring or a multiple part assembly that incorporates bi-directional thrust-bearing components.

Thrust-bearing components shall be manufactured from corrosion-resistant materials.

3.7.5 Spindle seal retainer

- A1 | The spindle seal retainer shall be manufactured from a corrosion-resistant material that can accommodate the surface roughness and required dimensional tolerances of the seal design.
- Where a spindle seal retainer is screwed into the valve bonnet and acts to retain the thrust collar, it shall be independently secured to prevent the retainer from unscrewing from the bonnet during operation.

3.8 OPERATION

3.8.1 General

Valves shall be designed for operation by a removable key, handwheel or gearbox.

3.8.2 Spindle cap and key

Where valves are operated by a removable key, their spindles shall be provided with removable caps. The spindle cap and key shall conform to the dimensions shown in Figure 3.4. The cap shall be secured by a corrosion-resistant fastener. The fastener shall permit the cap to be removed and replaced when required.

Spindle caps, spindle extensions and valve keys shall be designed to withstand the minimum strength test torque of the largest valve in the range for which they are designated.

3.8.3 Extension spindle

Where extension spindles are to be used with valves, they shall be compatible with the dimensions shown in Figure 3.4. The extension spindle shall be secured to the spindle cap by a corrosion-resistant fastener. The fastener shall permit the extension spindle to be removed and replaced when required.

The extension spindle shall be designed and tested to withstand the minimum strength test torque (as shown in Table 5.1) for the largest valve in the range for which it has been designed.

Extension spindles shall be marked to show the maximum valve size they have been designed to operate.

3.8.4 Handwheels

Where handwheels are fitted, they shall be of a diameter suitable for the operation of the valve at the maximum torque designated by the manufacturer for the type of valve to which it relates. The handwheel shall be secured in such a manner that it cannot be taken off unless the means of securing the handwheel is removed.

3.8.5 Direction of closure

Valves may be manufactured with either clockwise or anticlockwise closure.

3.9 LIFTING DEVICES

Valves exceeding 25 kg shall be provided with a means for lifting the total mass of the valve. Where provided, eyebolts shall comply with AS 2317.

3.10 SUPPORT FEET

Support feet shall be provided for all valves.

3.11 BYPASS ARRANGEMENTS

Where DN 450 to DN 750 valves include an integral bypass arrangement, the valve body shall incorporate stubs located on each side of the wedge position. The bypass valve shall be a resilient seated gate valve complying with this Standard.