

Australian Standard[®]

Butterfly valves for waterworks purposes

Part 2: Double flanged



This Australian Standard® was prepared by Committee WS-022, Valves for Water Supply Purposes. It was approved on behalf of the Council of Standards Australia on 12 October 2011.

This Standard was published on 15 November 2011.

The following are represented on Committee WS-022:

- Australian Chamber of Commerce
 - Australian Industry Group
 - Australian Stainless Steel Development Association
 - Australian Water Association
 - Engineers Australia
 - Institute of Instrumentation, Control and Automation Australia
 - Master Plumbers Australia
 - Plastics Industry Pipe Association of Australia
 - Plumbing Products Industry Group
 - Water Corporation Western Australia
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 - Water Services Association of Australia
-

This Standard was issued in draft form for comment as DR AS 4795.2.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

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Part 2: Double flanged

Originated as AS 4795—2002.

Previous edition 2006.

AS 4795—2006 revised, in part, and published as AS 4795.2—2011.

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Published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001, Australia

ISBN 978 0 7337 9968 6

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee WS-022, Valves for Water Supply Purposes, to supersede, in part, AS 4795—2006, *Butterfly valves for waterworks purposes*.

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 material requirements and performance tests for heavy-duty butterfly valves in isolation and throttling functions, typically used in transfer pipelines and pumping stations for services including potable water, recycled water and screened wastewater, together with default compliance requirements for the use of manufacturers and certification bodies.

Support and contribution is acknowledged from the Water Services Association of Australia (WSAA) and manufacturers.

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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STANDARDS AUSTRALIA

Australian Standard
Butterfly valves for waterworks purposes

Part 2: Double flanged

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for PN 10, PN 16, PN 21 and PN 35 manually operated resilient-seated double-flanged butterfly valves for waterworks purposes, with a maximum operating temperature of 40°C. This Standard covers the following:

- (a) Manual actuators, gearboxes and standard spindle caps.
- (b) Water supply applications, including drinking water, recycled water and screened wastewater.
- (c) Valves of the following nominal sizes:
 - (i) Seal on disc DN 300 to DN 2000.
 - (ii) Seal in body DN 80 to DN 2000.
 - (iii) Seal on body DN 80 to DN 2000.
- (d) The capability of the valves to be fitted with electric, hydraulic or pneumatic actuators and operated using portable actuators.
- (e) The ability of valves to be subjected to buried and continuously immersed applications, where required, with the use of suitable options.

NOTE: For purchasing guidelines, see Appendix B.

1.2 APPLICATION

Appendix A sets out the means by which compliance with this Standard shall be demonstrated by a manufacturer for the purposes of product certification.

1.3 NORMATIVE REFERENCES

The following are the normative documents referred to in this Standard:

AS

1111	ISO metric hexagon commercial bolts and screws—Product grade C
1111.1	Part 1: Bolts
1111.2	Part 2: Screws
1112	ISO metric hexagon nuts
1112.3	Part 3: Product grade C
1210	Pressure vessels
1565	Copper and copper alloys—Ingots and castings

AS	
1627	Metal finishing—Preparation and pretreatment of surfaces
1627.0	Part 0: Method selection guide
1627.4	Part 4: Abrasive blast cleaning of steel
1646	Elastomeric seals for waterworks purposes
1683	Methods of test for elastomers
1683.15.1	Method 15.1: International rubber hardness
1830	Grey cast iron
1831	Ductile cast iron
1833	Austenitic cast iron
2062	Non-destructive testing—Penetrant testing of products and components
2074	Cast steels
2207	Non-destructive testing—Ultrasonic testing of fusion welded joints in carbon and low alloy steel
2317	Collared eyebolts
2345	Dezincification resistance of copper alloys
2938	Gears—Spur and helical—Guide to specification and rating
3894	Site testing of protective coatings
3894.1	Part 1: Non-conductive coatings—Continuity testing—High voltage ('brush') method
60529	Degrees of protection provided by enclosures (IP Code)
AS/NZS	
1554	Structural steel welding
1554.1	Part 1: Welding of steel structures
1567	Copper and copper alloys—Wrought rods, bars and sections
1568	Copper and copper alloys—Forging stock and forgings
3678	Structural steel—Hot-rolled plates, floorplates and slabs
4020	Testing of products for use in contact with drinking water
4087	Metallic flanges for waterworks purposes
4158	Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
ISO	
5211	Industrial valves—Part-turn actuator attachments
5752	Metal valves for use in flanged pipe systems—Face-to-face and centre-to-face dimensions
ASTM	
A276	Standard Specification for Stainless Steel Bars and Shapes
B164	Standard Specification for Nickel-Copper Alloy Rod, Bar, and Wire

BS 5292	Specification for jointing materials and compounds for installations using water, low-pressure steam or 1st, 2nd and 3rd family gases
EN 558	Industrial valves. Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems. PN and Class designated valves
HB 18	Conformity assessment
HB 18.28	Part 28: Guidance on a third-party certification system for products

1.4 DEFINITIONS

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 Bonded

Glued or adhered.

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 End stop

A mechanical device, integral to the gearbox, that is designed to prevent the valve disc travelling past the fully open or closed position.

1.4.6 Free-end seat test

A test where one side of the valve is pressurized with the disc in the closed position and the other side is unrestrained so that the valve liner is not externally compressed on the downstream end, which simulates a valve in a terminal position fastened at the upstream end only.

1.4.7 Input stop

An adjustable mechanical device, independent of the gearbox (located between the input spindle and the gearbox), designed and set to prevent the transmission of excessive input torque to the gearbox when the valve is in the fully open or closed positions.

1.4.8 Lot

A clearly identifiable subdivision of a batch for inspection purposes.

1.4.9 Maximum allowable operating pressure (MAOP)

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

NOTE: Seat leakage may occur at this pressure; however structural damage should not occur.

1.4.10 Nominal size (DN)

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.

1.4.11 Pitting resistance equivalent number (PREN)

- 1 For ferritic and martensitic stainless steel grades, $PREN = \%Cr + 3.3(\%Mo)$ where the concentrations are in weight (%).
- 2 For austenitic and duplex stainless steel grades, $PREN = \%Cr + 3.3(\%Mo) + x (\%N)$ where—
 - (a) $x = 16$ for duplex stainless steels; and
 - (b) $x = 30$ for austenitic stainless steels.

1.4.12 Pressure class (PN)

A classification of valves by a PN number based on the AOP expressed in hundreds of kilopascals.

1.4.13 Production batch

A clearly identifiable collection of units, manufactured consecutively or continuously under the same conditions, using material or compound to the same specification.

1.4.14 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.

1.4.15 Published maximum operating torque (PMOT)

The maximum torque at the shaft-driven end required during seating/unseating or to operate the valve under emergency flow conditions.

1.4.16 Sample

One or more units of product drawn from a batch or lot, selected at random without regard to quality.

NOTE: The number of units of product in the sample is the sample size.

1.4.17 Sampling plan

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

1.4.18 Seal in body

A seal that is either clamped or retained integrally in the body of the valve.

1.4.19 Seal on body

A seal that encapsulates the wetted part of the body which is also an integral part of the flange face, replacing the need for a gasket.

1.4.20 Seal on disc

A seal that is attached to the perimeter of the disc of the valve.

1.4.21 Torque limiting device

An adjustable mechanical device usually located between the spindle and the spindle cap designed to limit the input torque transmitted to the gearbox.

1.4.22 Type test

A test or series of tests 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 as determined in Table A1, Appendix A.

1.4.23 Vulcanize

To adhere the seal to the body by high temperature and the use of an agent.

1.5 DESIGNATION OF SIZE

Valve size shall be designated by the nominal size as follows:

- (a) *Seal on disc* DN 300, DN 350, DN 400, DN 450, DN 500, DN 600, DN 700, DN 750, DN 800, DN 900, DN 1000, DN 1200, DN 1400, DN 1600, DN 1800 and DN 2000.
- (b) *Seal in body* DN 80, DN 100, DN 125, DN 150, DN 200, DN 250, DN 300, DN 350, DN 400, DN 450, DN 500, DN 600, DN 700, DN 750, DN 800, DN 900, DN 1000, DN 1200, DN 1400, DN 1600, DN 1800 and DN 2000.
- (c) *Seal on body* DN 80, DN 100, DN 125, DN 150, DN 200, DN 250, DN 300, DN 350, DN 400, DN 450, DN 500, DN 600, DN 700, DN 750, DN 800, DN 900, DN 1000, DN 1050, DN 1200, DN 1400, DN 1500, DN 1600, DN 1800 and DN 2000.

1.6 ALLOWABLE OPERATING PRESSURES (AOPs)

Allowable operating pressures shall be as given in Table 1.1.

TABLE 1.1
CLASSIFICATION AND RATING

PN	AOP kPa	MAOP kPa	ASTP kPa	Maximum flow velocity m/s	
				Rated	Emergency
10	1 000	1 200	1 250	5	7.5
16	1 600	1 920	2 000	5	7.5
21	2 100	2 520	2 625	5	7.5
35	3 500	4 200	4 375	5	7.5

SECTION 2 MATERIALS AND COMPONENTS

2.1 GENERAL

The basic materials that shall be used for the manufacture of the valve components are listed in Table 2.1. The materials listed are the minimum acceptable standard materials.

Alternative materials may be used, provided they are equivalent or superior in performance, particularly with respect to strength, corrosion-resistance, valve operation and durability. Where alternative materials are used, they shall comply with the requirements of Appendix C.

Non-metallic materials used in the componentry of valves shall be fit for the intended purpose and shall exhibit dimensional stability after extended periods immersed in water and wastewater.

2.2 CORROSION-RESISTANT MATERIALS

For the purposes of this Standard, the following materials are deemed to be corrosion-resistant:

- (a) Copper alloys complying with AS 1565, AS/NZS 1567 or AS/NZS 1568 and complying with AS 2345.
- (b) Stainless steels with a pitting resistance equivalent number (PREN) of at least 22, complying with a recognized Standard (e.g. ASTM, EN, etc.) for the relevant product form (e.g. casting, bar, forging, etc.).

Other materials may be considered by the jurisdiction having authority, based on published corrosion-resistance data.

2.3 CONTAMINATION OF WATER

The valves shall comply with the requirements of AS/NZS 4020. A scaling factor of 0.01 shall be applied for cold water applications.

2.4 ELASTOMERIC COMPONENTS

Elastomeric components (e.g. liner, seals, O-rings, etc.) shall be made of a compound, with or without reinforcement, that is not injuriously affected by the fluid, temperature or environmental conditions to which the component will be subjected in service. Elastomeric components shall exhibit dimensional stability after extended periods immersed in drinking water and recycled water, and shall be suitable for use in chlorinated and chloraminated water.

Reinforcement shall be of the non-wicking type. Components shall be manufactured from an elastomer that complies with AS 1646 and AS 1683.15.1. The physical properties of the elastomeric material shall be selected by the valve manufacturer to suit particular applications (e.g. quick response, low-flow stability, etc.) and to optimize performance and endurance under operating conditions.

TABLE 2.1
BASIC MATERIAL REQUIREMENTS

Component	Basic material		
	Material	Standard	Grade
Body	Ductile cast iron (see Note 1)	AS 1831	ISO 1083/JS/500–7/S ISO 1083/JS/450–10/S ISO 1083/JS/400–15/S
Disc (seal in body, seal on body, seal on disc)	Ductile cast iron (see Note 1)	AS 1831	ISO 1083/JS/500–7/S ISO 1083/JS/450–10/S ISO 1083/JS/400–15/S
	Aluminium bronze	AS 1565	C95810
	Stainless steel	Relevant recognized Standard	Grade with PREN ≥22
Shaft and shaft extension	Stainless steel	Relevant recognized Standard	Grade with PREN ≥22
	Stainless steel	ASTM A276	Grade 431
	Monel™	ASTM B164	
Shaft bearings	Leaded tin bronze	AS 1565	C92710, C93500, C93700
	PTFE, steel-lined		
	Fibre wound molybdenum disulphide impregnated		
Internal seal clamp ring and body seat ring (see Note 2)	Stainless steel	Relevant recognized Standard	Grade with PREN ≥22
Clamp ring socketed or countersunk retaining screws	Stainless steel	Relevant recognized Standard	Grade with PREN ≥22
Liner, seals and O-rings	Elastomer	AS 1646, AS 1683.15.1	CR, SBR, NBR EPDM, NR, IR
Flat gasket	Reinforced elastomer	BS 5292 (see Note 3)	
Fasteners	Stainless steel	Relevant recognized Standard	Grade with PREN ≥22
Disc pins	Stainless steel	Relevant recognized Standard	Grade with PREN ≥22
External spindle tube	Hot-dip galvanized steel	AS/NZS 4680	
Eyebolts	Hot-dip galvanized steel	AS 2317	

NOTES:

- 1 To be coated in accordance with Section 4.
- 2 Refer to Clause 3.3.6(a).
- 3 Materials other than those specified in BS 5292 may be used for greater than Class 10.

SECTION 3 DESIGN

3.1 GENERAL

Valves shall be designed and sized to give satisfactory performance in meeting the specified operating conditions (see Note). All valve components and spare parts shall be interchangeable between valves of the same size, type and manufacture.

NOTE: For information that should be supplied by the purchaser, see Appendix B.

Valves shall be designed for—

- (a) installation with the shafts horizontal, for use as isolating or flow control valves in water mains and screened wastewater mains, with the disc opening in the direction of the flow from the bottom;
- (b) a minimum operating life of 50 years, including buried service applications;
- (c) operation under full unbalanced head (maximum differential head) and opening and closing against maximum specified flows, including emergency flows in either direction;
- (d) operation by hand-held portable actuators for valves larger than DN 300;
- (e) the capability to be fitted with electric, hydraulic, pneumatic actuators, input stops, torque-limiting devices, lockout devices, position indicators, spindles and accessories; and
- (f) drop-tight, full end-of-line sealing at AOP in all pressure classes.

Calculations showing the stresses and deformations of valve components occurring under the most adverse specified conditions shall be provided on request.

NOTE: For information that should be supplied by the purchaser, see Appendix B.

The head loss coefficient (k) for a fully open valve shall be not greater than 0.8 when calculated by the following equation:

$$k = \frac{\Delta H}{V^2 / 2g}$$

where

ΔH = total head loss, in metres

V = velocity of flow, in metres per second

g = acceleration due to gravity, in metres per second squared

k shall be based on hydraulic model or prototype testing. Details of the testing and calculation of the coefficient shall be provided if requested.