

Australian Standard[®]

**In-line ball valves for use in plumbing
water supply systems**

Part 2: Plastics-bodied



This Australian Standard® was prepared by Committee WS-022, Valves for Waterworks Purposes. It was approved on behalf of the Council of Standards Australia on 20 December 2011.

This Standard was published on 27 February 2012.

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
 - Master Plumbers Australia
 - Plastics Industry Pipe Association of Australia
 - Plumbing Products Industry Group
 - Water Industry Alliance
 - Water Services Association of Australia
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This Standard was issued in draft form for comment as DR AS 5830.2.

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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In-line ball valves for use in plumbing water supply systems

Part 2: Plastics-bodied

First published as ATS 5200.012—2005.
Revised and redesignated AS 5830.2—2012.

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

ISBN 978 1 74342 026 3

PREFACE

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee WS-022, Valves for Waterworks Purposes, to supersede, in part, ATS 5200.012—2005, *Technical Specification for plumbing and drainage products*, Part 012: *In-line valves for use in plumbing water supply systems—Miscellaneous types metallic and non-metallic*.

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 suitable materials and performance tests for plastics-bodied ball valves used in plumbing water supply systems together with compliance requirements for the manufacturers and conformity assessment bodies.

Where applicable, the safety and performance requirements of this Standard are based on EN 1074, *Valves for water supply—Fitness for purpose requirements and appropriate verification tests* (series).

The term ‘normative’ has been used in this Standard to define the application of the appendix to which it applies. A ‘normative’ appendix is an integral part of a Standard.

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STANDARDS AUSTRALIA

Australian Standard**In-line ball valves for use in plumbing water supply systems****Part 2: Plastics bodied**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard sets out requirements for DN 6 to DN 110 plastics-bodied in-line ball valves for use in plumbing water supply systems, which include, but are not limited to, 2 way and 3 way valves having connection ends including, but not limited to, the following connections:

- (a) Flanged.
- (b) Threaded.
- (c) Compression.
- (d) Loose nut/union.
- (e) Butt fusion.
- (f) Spigot ends for cementing or welding.
- (g) Socket for electrofusion.

The valves are designed for non-buried installations operating at temperatures up to 60°C or as specified by the manufacturer.

NOTES:

- 1 Purchasing guidelines are given in Appendix B.
- 2 The requirements for end of line 'ball' taps are set out in AS/NZS 3718.
- 3 The requirements for valves for property services including water meters are set out in AS 4796.

1.2 APPLICATION

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

1.3 NORMATIVE REFERENCES

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
- 1565 Copper and copper alloys—Ingots and castings
- 1646 Elastomeric seals for waterworks purposes
- 2129 Flanges for pipes, valves and fittings
- 2345 Dezincification resistance of copper alloys

- AS
 3688 Water supply—Metallic fittings and end connectors
 5200 Plumbing and drainage products
 5200.458 Part 458: Universal plastic-bodied transition couplings
- AS ISO
 9624 Polyethylene (PE) pipes for fluids under pressure—Mating dimensions of flange adapters and loose backing flanges (ISO 9624:1997, MOD)
- AS/NZS
 1477 PVC pipes and fittings for pressure applications
 1567 Copper and copper alloys—Wrought rods, bars and sections
 1568 Copper and copper alloys—Forging stock and forgings
 2433 Plastics—Method for exposure to ultraviolet lamps
 2537 Mechanical jointing fittings for use with polyethylene (PE-X) for pressure applications
 2537.2 Part 2: Plastics piping systems for hot and cold water installations—Crosslinked polyethylene (PE-X)—Fittings (ISO 15873-3:2003, MOD)
 2642 Polybutylene (PB) plumbing pipe systems
 2642.3 Part 3: Mechanical jointing fittings for use with polybutylene (PB) pipes for hot and cold water applications
 3500 Plumbing and drainage (series)
 3518 Acrylonitrile butadiene styrene (ABS) compounds, pipes and fittings for pressure applications
 3718 Water supply—Tapware
 4020 Testing of products for use in contact with drinking water
 4087 Metallic flanges for waterworks purposes
 4129 Fittings for polyethylene (PE) pipes for pressure applications
 4331 Metallic flanges (series)
- ISO
 497 Guide to the choice of series of preferred numbers and of series containing more rounded values of preferred numbers
 1167 Thermoplastic Pipes, Fittings and Assemblies For The Conveyance Of Fluids—Determination Of The Resistance To Internal Pressure (Series)
 7686 Plastics Pipes And Fittings—Determination Of Opacity
 9080 Plastics Piping And Ducting Systems—Determination Of The Long-term Hydrostatic Strength Of Thermoplastics Materials In Pipe Form By Extrapolation
 12162 Thermoplastics materials for pipes and fittings for pressure applications—Classification and designation and design coefficient
 15874 Plastics piping systems for hot and cold water installations—Polypropylene (PP)
 15874-3 Part 3: Fittings
 15877 Plastics piping systems for hot and cold water installations—Chlorinated poly(vinyl chloride) (PVC-C)
 15877-3 Part 3: Fittings
- HB
 18 Conformity assessment
 18.28 Part 28 Guidance on a third-party certification system for products

1.4 DEFINITIONS

For the purpose of this Standard, the definitions given in AS/NZS 3500.0, and those 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 Maximum allowable operating pressure (MAOP)

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

1.4.4 Maximum operating torque (MOT)

Higher limit fixed for the torque which, when applied at the entrance point of the mechanical energy, will operate the valve and ensure compliance with the required leakage rate.

1.4.5 Maximum required strength (MRS)

The value of σ_{LCL} , rounded down to the next smaller value of the R10 series or of the R20 series conforming to ISO 497, depending on the value of σ_{LCL} .

1.4.6 Obdurator

The element of a valve used to control the flow.

1.4.7 Production testing

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

1.4.8 Sample

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

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

1.4.9 Sampling plan

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

1.4.10 Standard dimension ratio (SDR)

A nominal ratio of the pipe outside diameter to its wall thickness.

1.4.11 Type testing

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.

1.4.12 Valve batch

Schedule of valves of the same type, identical materials, identical dimensional characteristics, all the same nominal diameter and wall thickness, from the same compound. The valve batch is defined by the manufacturer.

NOTE: Table A1 of Appendix A sets out the minimum sampling and testing frequency plan.

1.4.13 Valve or valves

Ball valve or ball valves.

1.5 DESIGNATION OF SIZE

Valve size shall be designated by the nominal size as follows: DN 6, DN 10, DN 15, DN 20, DN 25, DN 32, DN 40, DN 50, DN 65, DN 75, DN 80, DN 90, DN 100 and DN 110.

1.6 ALLOWABLE PRESSURES

Allowable pressures shall be in accordance with Table 1.1.

TABLE 1.1
ALLOWABLE PRESSURES

PN	AOP (Note 1) kPa	MAOP (Note 1) kPa	ASTP (Notes 2 and 3) kPa
6.3	630	760	800
10	1000	1200	1250
12.5	1250	1500	1550
16	1600	1920	2000

NOTES:

- 1 AOP and MAOP apply to all valves in all positions from fully closed to fully open.
- 2 ASTP only applies to valves in the open position.
- 3 Leakage may occur at MAOP; however, structural damage should not occur.

SECTION 2 MATERIALS AND COMPONENTS

2.1 GENERAL

This Section specifies requirements for materials to be used in the construction of plastics-bodied ball valves.

2.2 METALLIC MATERIALS

2.2.1 General

Metallic materials in contact with water (including the ball) shall be corrosion resistant. For the purposes of this Standard, the following materials are deemed to be corrosion resistant:

- (a) Copper, as specified in Clause 2.2.2 and Clause 2.2.3.
- (b) Stainless steels, as specified in Clause 2.2.4.

2.2.2 Copper alloy

Copper shall comply with the following:

- (a) *Castings* AS 1565 or capable of passing the requirements of Clause 2.2.3.
- (b) *Hot pressings* AS/NZS 1568.
- (c) *Rod for machined parts* AS/NZS 1567.

2.2.3 Dezincification-resistant (DR) copper alloy

Copper alloy in contact with water shall comply with AS 2345.

NOTE: Chrome or nickel plating does not negate the need for this requirement.

2.2.4 Stainless steel

The following apply:

- (a) Stainless steels in contact with water shall have a minimum pitting resistance equivalent number (PREN) of 22.
- (b) Stainless steels not in contact with water shall have a minimum pitting resistance equivalent number (PREN) of 17.

NOTES:

- 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.

2.3 PLASTICS MATERIALS

2.3.1 General

Plastics materials under hydrostatic pressure shall be capable of meeting the performance requirements of this Standard at the MAOP specified in Table 1.1 and the nominated MOT.

Acetal plastics used for structural components that are in contact with the water supply shall be copolymer.

2.3.2 Composition

2.3.2.1 General

Plastics-bodied valves shall be manufactured from compounds that meet the requirements of Clauses 2.3.2.3, 2.3.2.4 and 2.3.2.5.

2.3.2.2 Reprocessable material

Where reprocessable material is used, only clean reprocessable material that is generated from a manufacturer's own production of valves to this Standard shall be used. The material shall be derived from the same resin as used for the relevant production.

2.3.2.3 Plastics-moulded material test

The long-term behaviour of the material of the valve body shall be verified in a type test on an injection-moulded pipe specimen of the same material with an outside diameter of not less than 50 mm. The wall thickness of the specimen shall be not less than SDR21 and not more than SDR9. The free length of the specimen between the end connections shall be not less than three times the outside diameter.

When two pipe specimens are tested in accordance with ISO 1167 (series), both specimens shall meet the test requirements given in Table 2.1 without leaking or fracturing.

For materials not listed in Table 2.1, the test conditions used shall demonstrate compliance with ISO 9080, or shall be equivalent or better, for the evaluation of long-term performance of the material.

TABLE 2.1
TEST CONDITIONS FOR PLASTICS—MOULDED MATERIALS

Material	Temperature °C	Induced stress MPa	Minimum test duration h
ABS	70	4.0	1000
PE80	80	4.0	1000
PE100	80	5.0	1000
PPH (homopolymer)	95	3.5	1000
PPB (block copolymer)	95	2.6	1000
PPR (random copolymer)	95	3.5	1000
PVC-U	60	10.0	1000
NP (reinforced polyamide)	80	10.0	250

2.3.2.4 Plastics-bodied valves test

Plastics-bodied valves shall be type-tested for resistance to internal pressure in accordance with ISO 1167 (series). The valve body shall be tested under the conditions specified in Table 2.2. Special sealing plugs connected to one another by a rod allowing some longitudinal movement of the ends may be used.

No leakage or bursting of the valve body shall occur within the minimum test period. If leakage occurs at the sealing plugs, the test is not valid and shall be repeated using another test specimen.

For materials that are not listed in Table 2.2, test conditions shall be established in accordance with ISO 9080 and shall be equivalent to the conditions for the materials listed in Table 2.2 for the evaluation of the long-term performance of the material.

TABLE 2.2
TEST CONDITIONS—VALVE BODY

Material	Temperature °C	Test duration h	Test pressure MPa
ABS	20	1	$3.1 \times \text{PN}$
	70	1000	$0.5 \times \text{PN}$
PE 80 PE 100	80	1000	$0.6 \times \text{PN}$
	80	1000	$0.6 \times \text{PN}$
PPH (homopolymer)	20	1	$3.3 \times \text{PN}$
	95	1000	$0.55 \times \text{PN}$
PPB (block copolymer)	20	1	$2.5 \times \text{PN}$
	95	1000	$0.4 \times \text{PN}$
PPR (random copolymer)	20	1	$2.5 \times \text{PN}$
	95	1000	$0.55 \times \text{PN}$
PVC-U	20	1	$4.2 \times \text{PN}$
	20	1000	$3.2 \times \text{PN}$
NP (reinforced polyamide)	20	1	$4.2 \times \text{PN}$
	20	250	$3.2 \times \text{PN}$

2.3.2.5 Opacity test

Plastics-bodied valves (other than black) shall be type-tested in accordance with ISO 7686. The amount of light transmitted through the valve wall shall be less than or equal to 0.2%.

2.3.3 UV resistance

For outdoor applications, the plastics material formulation shall be stabilized by suitable ultraviolet light stabilizers.

Plastics components that are designed to be exposed to direct sunlight when installed shall not crack, craze or exhibit signs of any defect when tested in accordance with AS/NZS 2433. Following exposure to the UV conditions specified in AS/NZS 2433, plastics-bodied valves shall pass the resistance to internal pressure test specified in Clause 4.1.2.1 (Test A).

2.3.4 Elastomeric materials

The elastomeric materials used for seals or gaskets shall comply with AS 1646 and AS 681.1.

2.3.5 Resistance to chemical degradation

NOTE: Selection of elastomeric and plastics materials should take into account the chemical composition of the water, its additives and chemicals used in disinfection.

2.4 EFFECT ON WATER

When tested at the MOT, utilizing a scaling factor on 0.01, the valves shall comply with the requirements of AS/NZS 4020.