



WMTS-507:2014
Acrylonitrile Butadiene Styrene
(ABS) Piping System with Stainless
Steel Lining for Plumbing Water
Service Applications

WaterMark Technical Specification

2014





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PREFACE

This WaterMark Technical Specification was originally prepared by the Joint Standards Australia/Standards New Zealand Committee WS-031, Technical Procedures for Plumbing and Drainage Products Certification.

The objective of this WaterMark Technical Specification is to enable product certification in accordance with the requirements of the Plumbing Code of Australia (PCA).

The word 'VOID' set against a clause indicates that the clause is not used in this WaterMark Technical Specification. The inclusion of this word allows a common use clause numbering system for the WaterMark Technical Specifications.

The term 'normative' has been used in this WaterMark Technical Specification to define the application of the appendices to which they apply. A 'normative' appendix is an integral part of a WaterMark Technical Specification.

The test protocol and information in this WaterMark Technical Specification was arranged by committee members to meet the authorization requirements given in the PCA.

The WaterMark Schedule of Specifications and List of Exempt Products are dynamic lists and change on a regular basis. Based on this function, these lists have been removed from the WaterMark Certification Scheme document known as AS 5200.000 Technical Specification for Plumbing and Drainage Products and are now located on the ABCB website (www.abcb.gov.au). These lists will be version controlled with appropriate historic references.



ACKNOWLEDGEMENTS

WaterMark Technical Specification WMTS-507:2013 was prepared by Standards Australia Committee WS-031, Technical Procedures for Plumbing and Drainage Products Authorisation. It was approved by the ABCB on 8 November 2013.

The following organisations were represented on Committee WS-031 in the preparation of WMTS 507-2014:

- Australian Industry Group
- Australian Stainless Steel Development Association
- Copper Development Centre—Australia
- CSIRO Manufacturing and Infrastructure Technology
- National Plumbing Regulators Forum
- Plastics Industry Pipe Association of Australia
- Plumbing Products Industry Group
- Water Services Association of Australia
- South Australian Water Corporation
- Department of the Environment, Water, Heritage and the Arts (Federal)



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1 SCOPE

This WaterMark Technical Specification sets out requirements for an acrylonitrile butadiene styrene (ABS) piping system for the conveyance of water under pressure for above – and below - ground applications for use at continuous operating temperatures up to 70°C, allowable operating pressures up to 1600 kPa, (20°C).

The system comprises acrylonitrile butadiene styrene (ABS) pipe with an internal stainless steel lining in sizes ranging from DN 20 to DN 110 for use with acrylonitrile butadiene styrene (ABS) fittings.

These products require certification to WaterMark Level 1.

2 APPLICATION

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

3 REFERENCED DOCUMENTS

The following documents are referred to in this WaterMark Technical Specification:

ABCB	Procedures for certification of plumbing and drainage products
PCA	Plumbing Code of Australia
AS	
1646	Elastomeric seals for waterworks purposes
3688	Water supply—Metallic fittings and end connectors
3690	Installation of ABS pipe systems
5200	Technical Specification for plumbing and drainage products
AS/NZS	
1462	Methods of test for plastics pipes and fittings
1462.1	Method 1: Method for determining the dimensions of pipes and fittings
1462.6	Method 6: Thermoplastics pipes, fittings and assemblies for the transport of fluids under pressure—Resistance to internal pressure
1462.9	Method 9: Methods for hydrostatic pressure testing of PVCU pressure fittings
1462.11	Method 11: Method for high temperature stress-relief testing of fittings

2345	Dezincification resistance of copper alloys
3500	Plumbing and drainage
3500.0	Glossary of terms
3500.1	Water supply
3500.4	Heated water services
3500.5	Domestic installations
3518	Acrylonitrile butadiene styrene (ABS) compounds, pipes and fittings for pressure applications
3879	Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS and ASA pipes and fittings
4020	Testing of products for use in contact with drinking water
4176.5	Multilayer pipes for pressure application – Multilayer piping systems for hot and cold water plumbing applications
ATM	
D1002	Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal)
WSA 109	Industry standard for flange gaskets and O-rings
EN	
12293	Plastic piping systems – Thermoplastics pipes and fittings for hot and cold water - Test method for the resistance of mounted assemblies to temperature cycling

4 DEFINITIONS

For the purpose of this Specification, the definitions given in AS/NZS 3500.0 and the one below apply.

4.1 PREN (Pitting Resistance Equivalent Number)

A theoretical way of comparing the pitting corrosion resistance of various types of stainless steel, based on the chemical compositions and specifically chromium (Co), molybdenum (Mo) and nitrogen (N).

The following equation is used to calculate the PREN:

$$\text{PREN} = \%Cr + 3.3\%Mo + x\%N$$

where

x = 16 for duplex stainless steels

x = 30 for austenitic stainless steels

x = 0 for ferritic and martensite stainless steels

5 MATERIALS

5.1 General

This Clause specifies requirements for materials utilised in the construction of the product.

5.2 Acrylonitrile butadiene styrene (ABS)

ABS utilised for the manufacture of the pipes and fittings shall comply with the requirements of AS/NZS 3518 in terms of additives, stabilisation, minimum required strength (MRS) and rework material.

5.3 Copper alloy

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

5.4 Stainless steel

Stainless steel for the inner liner of the pipe and, where applicable, for the fittings shall comply with S31600 (Grade 316) or S31603 (Grade 316L), or EN equivalents and with the chemical composition and mechanical testing requirements of ASTM A269.

5.5 Adhesive

The adhesive utilised to secure the stainless steel inner liner to the ABS pipe shall have a peeling strength equal to or greater than 250 N/cm² when tested in accordance with ASTM D1002 and utilising test specimens representative of the materials of construction of the pipe.

5.6 Solvent cement

Pipes and fittings manufactured to this Specification, suitable for solvent cement jointing, shall be suitable for use with Type P solvent cements and priming fluids complying with AS/NZS 3879.

7 PACKAGING

The product shall be packaged to avoid damage during transportation and handling and in a manner that will maintain its physical and dimensional integrity.

8 DESIGN

8.1 Derating at elevated temperatures

Reference shall be made to the manufacturer for derating for temperature of operation.

8.2 Pipes

8.2.1 Dimensions

When measured in accordance with AS/NZS 1462.1, pipe dimensions shall comply with the requirements of Table 1.

**TABLE 1
PIPE DIMENSIONS**

Nominal size	Nominal wall thickness	Mean outside diameter		Wall thickness		Out of roundness mm	Tolerance on end squareness
		mm		mm			
		Min.	Max.	Inner stainless steel (min.)	ABS (min.)		
DN							
20	2.3	20	20.2	0.3	2	0.5	2
25	2.3	25	25.2	0.3	2	0.5	2
32	2.9	32	32.2	0.4	2.5	0.5	2
40	3.4	40	40.2	0.4	3	0.5	2
50	4.0	50	50.2	0.5	3.5	0.5	2
63	4.5	63	63.3	0.5	4	0.6	2
75	5.6	75	75.3	0.6	5	0.7	2
90	5.6	90	90.3	0.6	5	0.9	2
110	5.7	110	110.3	0.7	5	1.1	2

8.2.2 Length

Pipes shall be supplied in straight lengths with a tolerance of +0.10, –0 m on the nominated length when measured in accordance with AS/NZS 1462.1. All measurements shall be adjusted to an equivalent length at 20°C.

8.2.3 Pipe ends

When measured in accordance with AS/NZS 1462.1, pipe ends shall be normal to the main axis of the pipe end within the tolerances of end squareness given in Table 1.

8.2.4 Freedom from defects

Pipes shall be clean and free from any manufacturing debris. Pipes shall not have any blisters and heat marks. When grooves, wrinkles, rippling, dents or projections are present, the pipe shall comply with the dimensional requirements of Table 1. Pipes ends shall not have any chips and rough edges. Jointing surfaces shall be smooth. The stainless steel inner lining shall be pickled free of scale. When bright annealing is used, pickling is not necessary

8.3 Fittings

8.3.1 Fittings, including sockets for solvent cement jointing

Fittings, including sockets for solvent cement jointing, shall comply with the requirements of AS 3518 for jointing of series 3 pipes.

8.3.2 Adaptor end connections

End connectors for connection to either copper, copper alloy or stainless steel pipes or fittings shall comply with AS 3688. Other connection ends shall comply with the requirements of the Australian Standard or WaterMark Technical Specification relevant to the piping system.

8.3.3 Freedom from defects

Fittings shall be clean and free from any manufacturing debris. Fittings shall not have any blisters and heat marks. The ends of fittings shall not have any chips and rough edges. Jointing surfaces shall be smooth. The axis of sockets formed on the ends of fittings shall be parallel within 2° to the axis of the fitting. The jointing surfaces of sockets on fittings for solvent cement jointing shall taper uniformly from the mouth to the root of the socket. The stainless steel inner lining shall be pickled free of scale. When bright annealing is used, pickling is not necessary

9 PERFORMANCE REQUIREMENTS AND TEST METHODS

9.1 Products in contact with drinking water

Products in contact with drinking water shall comply with AS/NZS 4020.

9.2 Pipes—Pressure resistance test

When tested in accordance with AS/NZS 1462.6 the pipe and assembled joint shall withstand the pressures indicated in Table 2.

**TABLE 2
TEST PRESSURES**

Temperature	Test pressure, MPa			
	Minimum test duration			
°C	1 h	48 h	175 h	1000 h
20 ±2	2	—	—	—
60 ±2	—	0.96	—	0.6
70 ±2	—	—	0.8	—

9.3 Fittings

9.3.1 Short-term hydrostatic pressure test

ABS fittings shall be tested in accordance with AS 1462.9 at 5.12 MPa (3.2×1.6 MPa) at $20 \pm 2^\circ\text{C}$, for at least 1 hour without failure. Failure is defined as weeping, leaking or rupturing of the test specimen.

9.3.2 High temperature stress-relief test

When determined in accordance with AS/NZS 1462.11 at a temperature of $150 \pm 4^\circ\text{C}$ for 60 +3, –1 min, the high temperature stress relief properties of the unrestrained fitting shall comply with the following:

- There shall be no evidence of inclusions in the fitting.
- Not more than 5% of the total internal and external surface of the fitting shall exhibit blisters and/or surface delamination.

9.3.3 Thermal Cycling Test

When tested in accordance with EN 12293 using the test parameters of Table 5 AS 4176.5 Application Class 4 and test pressure of 1600 kPa the pipe, fitting and joint shall withstand the test without leakage or deterioration.

10 TEST SEQUENCE AND TEST SAMPLE PLAN

10.1 Test samples

10.1.1 Pipes

Independent samples covering the range of nominal sizes shall be used for testing. The dimensional and other requirements of Clause 8 shall be confirmed prior to testing of the performance requirements of Clause 9.2.

10.1.2 Fittings

Independent samples, covering the range of nominal sizes, configurations and design of fittings, shall be used for testing of the performance requirements of Clauses 9.3.1 and 9.3.2.

10.2 Test sequence

For performance tests, the pipe and fittings may be tested in any order.

11 PRODUCT DOCUMENTATION

11.1 General

Technical information relating to the piping system and correct installation methods shall be readily available to aid the user and installer. The information may be in the form of a technical manual or equivalent document and be written in plain English and supplemented by figures and diagrams as applicable. The information provided shall satisfy the requirements of a warranty as referenced in the Plumbing Code of Australia (PCA) and those requirements of the AS/NZS 3500 series of Australian / New Zealand Standards.

11.2 Product data

Product data shall be available. The data shall identify at least the following product characteristics—

- a) product range and model identification;
- b) maximum allowable operating pressure and temperature;
- c) de-rating data;



- d) hydraulic performance of the piping system; and
- e) methods of jointing and adaptation to other piping systems.

11.3 Installation instructions

Instructions that give full details of installation procedures for the piping system shall be provided and include the following:

- a) References to AS/NZS 3500.1, AS/NZS 3500.4 or AS/NZS 3500.5 and AS 3690, where applicable.
- b) Detailed step-by-step instruction.
- c) Details of any special tools or training that may be required for correct installation, including those for the assembly of the solvent welded joints.
- d) Troubleshooting guide.
- e) Contact details for after-sales service.

(Normative)

A.1 SCOPE

This Appendix sets out the means by which compliance with this WaterMark Technical Specification shall be demonstrated by a manufacturer under the WaterMark product certification scheme.

A.2 RELEVANCE

The long-term performance of plumbing systems is critical to the durability of building infrastructure, protection of public health and safety, and protection of the environment.

A.3 PRODUCT CERTIFICATION

The purpose of product certification is to provide independent assurance of the claim by the manufacturer that products comply with this WaterMark Technical Specification.

The certification scheme serves to indicate that the products consistently conform to the requirements of this WaterMark Technical Specification.

The frequency of the sampling and testing plan as detailed in Paragraph A5, shall be used by the WaterMark Conformity Assessment Body. Where a batch release testing program is required it shall be carried out by the manufacturer as detailed in Paragraph A5 and Table A2.

A.4 DEFINITIONS

A.4.1 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.

A.4.2 Sampling plan

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

A.4.3 Type test batch

Schedule of units of the same type, identical dimensional characteristics, all the same nominal diameter and wall thickness, from the same compound.

NOTE: The batch is defined by the manufacturer.

A.4.4 Type testing

Testing performed to demonstrate that the material, component, joint or assembly is capable of conforming to the requirements given in the WaterMark Technical Specification.

A.5 TESTING

A.5.1 Type testing

Table A1 sets out the requirements for type testing and frequency of reverification.

A.5.2 Batch release testing

Table A2 sets out the minimum sampling and testing frequency plan for a manufacturer to demonstrate compliance of product(s) to this WaterMark Technical Specification on an ongoing basis. However where the manufacturer can demonstrate adequate process control to the WaterMark Conformity Assessment Body, the frequency of the sampling and testing nominated by the manufacturer’s quality plan and/or documented procedures shall take precedence for the purposes of WaterMark product certification.

A.5.3 Retesting

In the event of a batch release test failure, the products within the batch may be retested at a frequency agreed to with the WaterMark Conformity Assessment Body and only those batches found to comply may be claimed and/or marked as complying with this WaterMark Technical Specification.

**TABLE A1
TYPE TESTS**

Characteristic	Clause	Requirement	Test method	Frequency
Materials	5.2	ABS	AS/NZS 3518	Any change in design/specification
	5.3	Copper Alloy	AS 2345	
	5.4	Stainless Steel	Clause 5.4	
	5.5	Adhesive	ASTM D1002	

	5.6	Solvent Cement	AS/NZS 3879	
	5.7	Elastomeric sealing elements	AS 1646	
Marking	6	Labelling/marketing	Review of documentation/physical examination	Any change in design/specification
Packaging	7	Protection from damage in transportation and handling		
Design	8.2.1	Pipes—Dimensions	AS/NZS 1462.1	Any change in design/specification
	8.2.2	Pipes—Length	AS/NZS 1462.1	
	8.2.3	Pipes—Pipe ends	AS/NZS 1462.1	
	8.2.4	Pipes—Freedom from defects	Visual inspection/qualified instructions	
	8.3.1	Fittings—Solvent cement joining	AS 3518	
	8.3.2	Fittings—Adaptor end connections	AS 3688 or relevant AS/ATS/WMTS	
	8.3.3	Fittings—Freedom from defects	Visual inspection/qualified instructions	
Performance	9.1	Products in contact with drinking water	AS/NZS 4020	At any change in materials, formulation or design, or every five years, whichever occurs first
	9.2.1	Pipes—Pressure resistance test	AS/NZS 1462.6	At any change in design or manufacturing process
	9.3.1	Fittings—Short-term hydrostatic test	AS/NZS 1462.9	
	9.3.2	Fittings—High temperature stress relief test	AS/NZS 1462.11	
	9.3.3	Thermal Cycling Test	EN 12293	

Product documentation	11	Product data and installation instructions	Documentation review	At any change factors that require a change in documentation, e.g. amendments to AS/NZS 3500 series of Standards
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TABLE A2
BATCH RELEASE TESTS

Characteristic	Clause	Requirement	Test method	Frequency
Materials	5	Composition, temper, etc.	Delivery acceptance tests or supplier's test data	Each delivery batch
Markings	6	Labelling/markings	Review of documentation/physical examination	Continuous
Design	8.1.1	Pipes—Dimensions	AS/NZS 1462.1	Once per hour
	8.1.2	Pipes—Length	AS/NZS 1462.1	Once per hour
	8.1.3	Pipes—Pipe ends	AS/NZS 1462.1	Once per hour
	8.1.4	Pipes—Freedom from defects	Visual inspection/qualified instructions	Continuous
	8.2.1	Fittings—Solvent cement joining	AS 3518	Once per batch
	8.2.2	Fittings—Adaptor end connections	AS 3688	Once per batch
	8.2.3	Fittings—Freedom from defects	Visual inspection/qualified instructions	Continuous
Performance	9.2.1	Pipes—Pressure resistance test: 1 hour at 20°C	AS/NZS 1462.6	Once per size change
	9.3.1	Fittings—Short-term hydrostatic test	AS/NZS 1462.9	
	9.3.2	Fittings—High temperature stress-relief-test	AS/NZS 1462.11	Once per hour

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