WMTS-541:2024

PVC-C pipes and fittings DN 8 to DN 100

WaterMark Technical Specification

Publication History:-

First published as WMTS-541:2024

2024

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Chief Executive Officer
Australian Building Codes Board
GPO Box 2013
Canberra ACT 2601

Phone 1300 134 631
watermark@abcb.gov.au

PREFACE

This WaterMark Technical Specification (WMTS) was prepared in accordance with the Manual for the WaterMark Certification Scheme, Appendix 4, Protocol for Developing Product Specifications.

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 to meet the authorisation requirements given in the PCA.

The WaterMark Schedule of Products and the WaterMark Schedule of Excluded Products are dynamic lists and change on a regular basis. Based on this function, these schedules 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-541:2024 was prepared by industry and was approved by the Administering Body on XX XX 2024.

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1 SCOPE

This Technical Specification sets out requirements for PVC-C piping systems (pipe, fittings, solvent cement) for use in cold water fire sprinkler systems.

The system comprises PVC-C pipe and fittings in sizes ranging from DN 8 to DN 100.

2 APPLICATION

PVC-C piping systems are intended for use in cold water fire sprinkler systems as per B1D5 of the National Construction Code 2022.

Appendix A sets out the means by which compliance with this specification shall be demonstrated by a manufacturer for the purpose of Product Certification.

3 REFERENCED DOCUMENTS

The following documents are referred to in this Technical Specification:

AS

2345 Dezincification resistance of copper alloys

2888.1 Methods of testing plastics waste fittings, Method 1: Method of determining the suitability of connection threads of BSP form

3688 Metallic Fittings Water & Gas Systems

AS/NZS

3500 Plumbing and drainage

3500.0 Part 0: Glossary of terms

3500.1 Part 1: Water services

3500.4 Part 4: Heater water services

4020 Testing of products for use in contact with drinking water

ASTM

D1784 Standard Classification System and Basis for Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

F437 Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80

F438 Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40

F439 Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80

F442 Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)

F493 Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings

ISO

7.1 Pipe threads where pressure-tight joints are made on the threads, Part 1: Dimensions, tolerances and designation

7.2 Pipe threads where pressure-tight joints are made on the threads, Part 2: Verification by means of limit gauges

NCC

PCA National Construction Code, Vol.3 Plumbing Code of Australia

4 DEFINITIONS

For the purpose of this specification, the definitions given in the WaterMark Scheme Rules, Plumbing Code of Australia, AS/NZS 3500.0 and reference standards apply.

5 MATERIALS

5.1 Chlorinated Poly (Vinyl Chloride) (CPVC, PVC-C)

PVC-C shall meet the mechanical strength, heat resistance, flammability, and chemical resistance requirements for CPVC 23447 in ASTM D1784.

5.2 PVC-C Solvent Cement

PVC-C Solvent Cement shall meet the requirements of Section 4 and Section 5 of ASTM F493.

5.3 Metallic Materials

5.3.1 Dezincification-resistant (DR) copper alloy

Copper alloy in contact with water and subjected to hydrostatic pressure shall comply with AS 2345.

6 MARKING

Markings to be placed on products or packaging shall, as a minimum, be in accordance with clause 9.6 of the Manual for the WaterMark Certification Scheme.

In addition, the following requirements shall be permanently marked as per the following.

6.1 Pipes

Each pipe shall be permanently and legibly marked, in letters of minimum 3 mm height and at intervals of not more than 1 m, with the following:

(a) Manufacturer or suppliers name, brand or trademark.

(b) Nominal size.

(c) The maximum working pressure in the form ‘PN 16’.

(d) PVC-C or CPVC

(e) The date of manufacture in the form YYMMDD.

(f) WaterMark.

(g) Licence number.

(h) The number of this WaterMark Technical Specification, i.e WMTS-541.

NOTE: Where space is limited, the number of the WaterMark Technical Specification may be an abbreviated form i.e. S541.

6.2 Fittings

Each fitting shall be permanently and legibly marked, in letters of minimum 3 mm height, with the following:

(a) Manufacturer or suppliers name, brand or trademark.

(b) Nominal size of the pipe for which the fitting is designed.

(c) The maximum working pressure.

(d) PVC-C or CPVC

(e) WaterMark.

(f) Licence number.

(g) The number of this WaterMark Technical Specification, i.e WMTS-541.

NOTE: Where space is limited, the number of the WaterMark Technical Specification may be an abbreviated form i.e. S541.

6.3 Solvent Cement

Each container of solvent cement and priming fluid shall be marked with the following:

(a) Manufacturer or suppliers name, brand or trademark.

(b) Corresponding pipe and fittings for which the product is tested with according to this WaterMark technical specification

(c) Net mass or volume

(d) The use-by date

(e) Instructions for storage and use (including the minimum recommended period before any field pressure testing).

(f) A statement on any toxic vapour or flammability hazards associated with the solvent cement or primer

(g) The following statement:
‘PRIMING FLUIDS SHALL BE USED TO PREPARE THE JOINTING SURFACE PRIOR TO SOLVENT CEMENT APPLICATION’

(h) The following (as applicable) statement:
‘NO ADDITIVES OF ANY KIND SHALL BE MIXED WITH THIS SOLVENT CEMENT/PRIMING FLUID’

(i) The number of this WaterMark Technical Specification, i.e WMTS-541

7 PACKAGING

The pipe and fittings shall be packaged in such a manner so as to avoid damage during transportation and handling and in a manner that will maintain the physical and dimensional integrity of the fittings.

8 DESIGN

8.1 Pipes

8.1.1 Dimensions

Pipe dimensions shall comply with the requirements of ASTM F442 Table 1, SDR 11 – SDR 21.

8.1.2 Length

Pipe and tubing supplied in straight lengths shall have a tolerance on any specified length of +12.5, −0 mm

8.1.3 Freedom from defects

Defects shall not affect the performance or function of the pipe in service. Pipes shall not have any blisters or heat marks. When grooves, wrinkles, rippling, dents or projections are present, the pipe shall comply with the dimensional requirements described above.

Cleanliness - Pipes shall be clean and free from any manufacturing debris.

Ends - Pipe ends shall not have any chips and rough edges. Jointing surfaces shall be smooth.

8.2 Fittings

8.2.1 Dimensions

Fitting dimensions shall comply with the requirements of the relevant Standard, as follows:

a) For Schedule 40 compatible fittings, ASTM F438, tables 1, 2 and 3, as applicable.

b) For Schedule 80 compatible fittings ASTM F439, tables 1, 2, 3, 4 and 5, as applicable

8.2.2 Threaded end connections

Sealing pipe threads shall comply with the relevant requirements of AS ISO7.1 and AS ISO 7.2.

Metallic threaded end connections shall comply with the relevant requirements of AS 3688.

8.2.3 Socket end connections

Socket end connections shall comply with the requirements of the relevant Standard, as follows:

a) For Schedule 40 compatible socket ends, ASTM F438, Table 1

b) For Schedule 80 compatible socket ends, ASTM F439, Table 1

9 PERFORMANCE CRITERIA AND TEST METHODS

9.1 Products in Contact with Drinking water

Products in contact with drinking water shall comply with AS/NZS 4020. A scaling factor of 1 shall be applied to pipes. For fittings, a scaling factor of 0.01 shall be applied.

Dried solvent cement (and priming fluids) shall comply with AS/NZS4020. A scaling factor of 0.05 shall apply. Evaluation of the primer and solvent cement may be done in one test by treating them as coatings in accordance with AS/NZS4020.

Notes: 1) Reference should be made to the manufacturer to determine the length of time a particular production requires to attain the dried condition

2) Effect on water tests should be carried out on a dried film on a primed glass plate.

9.2 Pressure tests

9.2.1 Sustained pressure

PVC-C pipe and fittings shall be capable of withstanding a sustained pressure, without any leakage, when tested in accordance with ASTM F442 clause 6.2.

9.2.2 Burst pressure

PVC-C pipe and fittings shall be capable of withstanding a burst pressure, without any leakage, when tested in accordance with the relevant Standard, as follows:

a) For SDR-PR pipe, ASTM F442 clause 6.3

b) For Schedule 40 fittings, ASTM F438 clause 6.3

c) For Schedule 80 fittings, ASTM F439 clause 6.3

9.3 PVC-C Solvent cement requirements

Solvent cement for use with PVC-C systems shall be compliant to the requirements of ASTM F493

9.4 Requirements for solvent cement joints

9.4.1 Sustained Pressure Strength

A solvent cement joint shall withstand, without any leakage, weeping or cracking, a sustained pressure strength test in accordance with ASTM F493 clause 5.6.

9.4.2 Burst Strength

A solvent cement joint shall withstand, without any leakage, weeping or cracking, a burst strength test in accordance with ASTM F493 clause 5.5.

9.5 Tightening torque test

When tested in accordance with AS 2888.1, the threaded fitting shall be capable of being tightened without damage when the torque specified in Table 3.4 is applied.

Table x.x
THREAD TIGHTENING TORQUES

Nominal size of thread mm	Thread tightening torque Nm
≤32	15
>32 ≤40	20
>40 ≤50	25
>50 ≤65	40
>65 ≤80	50
>80 ≤100	60

10 TEST SEQUENCE AND TEST SAMPLE PLAN

Independent samples covering the ranges of sizes and type shall be used for testing of the performance requirements.

11 PRODUCT DOCUMENTATION

11.1 Product data

Product data that identifies critical product characteristics such as pressure/temperature or other limitations shall be made available.

a) Installation shall be in accordance with the PCA & AS/NZS 3500.1 & 4

b) Scope of use limitations (temperature, pressure, water chemistry, size range)

c) Method of cutting and preparing pipe

d) Solvent cement type and application method

e) Pipe shall not be exposed to UV and be appropriately coated or lagged for outdoor installations

f) Allowance for thermal expansion, contraction

APPENDIX A MEANS FOR DEMONSTRATING COMPLIANCE WITH THIS SPECIFICATION

(Normative)

A.1 SCOPE

This appendix sets out the means by which compliance with this specification shall be demonstrated by a manufacturer under the WaterMark 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 specification.

The WaterMark Certification Scheme serves to indicate that the products consistently conform to the requirements of this specification.

The sampling and testing plan, as detailed in Paragraph A5 and Table A1, 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.

Annual product conformity surveillance shall be undertaken by the WaterMark Conformity Assessment Body in accordance with Paragraph A5 and Table A3. Re-evaluation testing for re-Certification, as detailed in Paragraph A5 and Table A4, shall be used by the WaterMark Conformity Assessment Body.

A.4 DEFINITIONS

A.4.1 Batch release test

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

A.4.2 Product inspection

Examination of certified product, conducted during annual product conformity surveillance, to determine its conformity with the specific requirements of its current Certification and WaterMark Licence.

A.4.3 Production batch

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

A.4.4 Re-evaluation testing

Testing carried out in conjunction with renewal of the Certification.

A.4.5 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.4.6 Sampling plan

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

A.4.7 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. The batch is defined by the manufacturer.

A.4.8 Type testing (TT)

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

A.5 TESTING AND INSPECTION

A.5.1 Type testing

Table A1 sets out the requirements for type testing and frequency of re-verification.

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 specification on an ongoing basis. However, where the manufacturer can demonstrate adequate process control to the certifying 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 specification.

A.5.4 Minimum annual inspection requirements

Table A3 sets out the minimum annual inspection requirements to be undertaken.

A.5.5 Re-evaluation testing

Table A4 sets out the requirements for re-evaluation testing.

TABLE A1
TYPE TESTS

Characteristic	Clause	Requirement	Test method	Frequency
Materials	5	Materials	Review materials parts lists and compliance certificates	At any change in materials specification
Marking	6	Marking	Review against documentation/Physical examination	At any change in design/Specifications
Packaging	7	Protect from transit and handling damage		
Design	8.1.1	Pipe dimensions	Direct measurement	At any change in the design
	8.1.2	Pipe length		
	8.1.3	Freedom from defects	Visual/Physical examination	
	8.2.1	Fitting dimensions	Direct measurement	
	8.2.2	Threaded end connections		
	8.2.3	Socket end connections		
Performance	9.1	Products in contact with water	AS/NZS 4020	At any change in materials, formulation or design, or every five years, whichever occurs first
	9.2	Pressure tests	As specified in clause 9.2	At any change in design or manufacturing process
	9.3	Solvent cement requirements	As specified in clause 9.3	
	9.4	Requirements for solvent cement joints	As specified in clause 9.4	
	9.5	Requirements for threaded end connections	AS 2888.1	
Product documentation	11	Product data/Installation and maintenance instructions	Product documentation	At any change to installation requirements

TABLE A2
BATCH RELEASE TESTS

Characteristic	Clause	Requirement	Test method	Frequency
Materials	5	Materials	Review materials parts lists and compliance certificates	Once per production shift
Marking	6	Marking	Review against documentation/Physical examination	Once per production shift
Packaging	7	Protect from transit and handling damage		
Performance	9.2.2	Burst test	As specified in clause 9.2.2	Once per production shift
Design	8.1.1	Pipe dimensions	Direct measurement	Once per hour
	8.1.2	Pipe length		
	8.1.3	Freedom from defects	Visual/Physical examination	Once per production shift
	8.2.1	Fitting dimensions	Direct measurement	Once per hour
	8.2.2	Threaded end connections		
	8.2.3	Socket end connections		

TABLE A3
MINIMUM ANNUAL INSPECTION REQUIREMENTS

Characteristic	Clause	Requirement	Test method	Frequency
Marking	6	Marking	Review against documentation/Physical examination	Sample from product family, covering all families within 5 year Certification cycle
Packaging	7	Protect from transit and handling damage		
Design	8.1.3	Freedom from defects	Visual/Physical examination	
Product documentation	11	Product data/Installation and maintenance instructions	Product documentation	

TABLE A4
RE-EVALUATION TESTING

Characteristic	Clause	Requirement	Test method	Frequency
Materials	5	Materials	Review materials parts lists and compliance certificates	Every 5 years
Marking	6	Marking	Review against documentation/Physical examination	
Packaging	7	Protect from transit and handling damage		
Design	8.1.1	Pipe dimensions	Direct measurement	
	8.1.2	Pipe length		
	8.1.3	Freedom from defects	Visual/Physical examination	
	8.2.1	Fitting dimensions	Direct measurement	
	8.2.2	Threaded end connections		
	8.2.3	Socket end connections		
Performance	9.1	Products in contact with water	AS/NZS 4020	
	9.2	Pressure test	As specified in clause 9.2	
	9.4	Requirements for solvent cement	As specified in clause 9.4	
Product documentation	11	Product data/Installation and maintenance instructions	Product documentation	