WMTS-511:2014

Epoxy barrier coating system for use in water supply applications

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ABCB

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IMPORTANT NOTICE AND DISCLAIMER

On 25 February 2013 management and administration of the WaterMark Certification Scheme transferred to the Australian Building Codes Board (ABCB). From this date all new technical specifications will be named WaterMark Technical Specifications (WMTS). The WaterMark Schedule of Specifications lists all current WMTS.

While the ABCB, the participating Governments and other groups or individuals who have endorsed or been involved in the development of the WaterMark Technical Specification (WMTS), have made every effort to ensure the information contained in this WMTS is accurate and up to date, such information does in no way constitute the provision of professional advice.

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The ABCB welcomes suggestions for improvement in the WMTS, and encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact the ABCB via phone on 1300 134 631, email at watermark@abcb.gov.au or write to the WaterMark Administering Body, ABCB, GPO Box 9839, Canberra ACT 2601.

PREFACE

This WaterMark Technical Specification was prepared by industry and reviewed by the National Plumbing Regulators Forum (NPRF) and the WaterMark Technical Advisory Committee (WMTAC).

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 authorisation 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 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 – 511:2014 was prepared by industry and reviewed by the National Plumbing Regulators Forum (NPRF) and the WaterMark Technical Advisory Committee (WMTAC). It was approved by the ABCB on 27 June 2014.

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1 SCOPE

This Technical Specification sets out requirements for an epoxy barrier coating system used for lining of metallic cold and heated water pressurised piping systems utilised for drinking water supply.

The system may be applied to metallic substrates in pipe sizes DN 15 to DN 300 in restoration of existing pipe work in the field or factory applied to new pipe and fittings.

These products require certification to WaterMark Level 1.

This product is to be installed in accordance with the Plumbing Code of Australia.

2 APPLICATION

The epoxy barrier coating system is not applicable to the lining of inline valves and devices nor mechanical joints (demountable joints) incorporating rubber seals such as press fit fittings, roll groove fittings, and union connectors.

In accordance with the Plumbing Code of Australia (PCA) WaterMark Scheme Rules the manufacturer must provide a warranty stating the product application limitations. Limitation factors to be taken into account shall include but not be limited to:-

a) Usage likely to occur;

b) Temperature and nature of water conveyed in pipework and the risk of leaching, corrosion and degradation;

c) Nature of the ground environment and the possibility of chemical attack;

d) Material and product compatibility; and

e) Material and product chemical and physical characteristics.

The warranty must be clearly visible and comprehensible to the intending purchaser, installer and user. Application and installation limitations must also be stated within the product installation instruction details.

Appendix A sets out the means by which compliance with the Specification is demonstrated by a manufacturer for the purpose of product certification.

Appendix B identifies those activities undertaken to ensure coatings are applied in the field under controlled conditions.

3 REFERENCED DOCUMENTS

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

AS

3894.3 Site testing of protective coatings - Determination of dry film thickness

3894.4 Site testing of protective coatings - Assessment of degree of cure

AS/NZS

3500 Plumbing and Drainage

3500.0 Part 0: Glossary of terms

3500.1 Part 1: Water supply

3500.4 Part 4: Heated water services

3500.5 Part 5: Housing installations

4020 Testing of products for use in contact with drinking water

ASTM

D3363 Standard test method for film hardness by pencil method

D4541 Pull-Off Strength of Coating Using Portable Adhesion Testers

AWWA

C210 Liquid-Epoxy Coating System for the Interior and Exterior of Steel Water Pipelines

4 DEFINITIONS

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

4.1 Epoxy barrier coating system

A two part epoxy resin that is applied to a metallic substrate in order to form a protective barrier for limiting corrosion. Epoxy barrier coatings are prepared for application using mechanically engineered metering and mixing methods to ensure mixing and dispensing controls to manufacturers' specifications.

5 MATERIALS

The coating material shall be based on liquid chemically cured epoxies. The curing agent may be an amine, amine adducts or polyamide. The epoxy may be modified by coal tar, phenolic or other modifiers.

6 MARKING

Each container of epoxy shall be permanently and legibly marked with the following:

a) Manufacturer's name, brand or trademark.

b) The date of manufacture or batch identification.

c) Use by date.

d) Licence number.

e) Number of the WaterMark Technical Specification, i.e., WMTS 511.

7 PACKAGING

Component materials shall be supplied in durable airtight containers.

8 DESIGN

8.1 Coating system specification

The manufacturer of the coating system shall make available a specification and application procedures that includes the items identified in Clause 11.

8.2 Colour

The final colour of the epoxy barrier coating shall be red or of a colour that is clearly distinguishable from the substrate being coated.

9 PERFORMANCE REQUIREMENTS AND TEST METHODS

9.1 Products in contact with drinking water

The coating material when applied to the pipe substrate shall comply with AS/NZS 4020.

9.2 Pull off strength test

When tested in accordance with ASTM D4541 the minimum pull off force shall be 18.2 MPa.

9.3 Immersion test

When tested in accordance with AWWA C210 physical requirements – Immersion the sample shall exhibit no blistering, peeling, or disbondment.

9.4 Cure test

When tested in accordance with ASTM D3363 or AS 3894.4 the coating shall be cured in accordance with the manufacturer's specifications.

9.5 Coating thickness test

When tested in accordance with AS 3894.3 the coating thickness shall be in accordance with the manufacturer's specifications.

10 TEST SEQUENCE AND TEST SAMPLE PLAN

10.1 Test samples

Samples for testing shall be conducted on samples of piping material as specified by the manufacturer. Each of the samples shall be coated and cured in accordance with the manufacturer's specification.

10.2 Test Sequence

Testing to clause 9.4 cure test and 9.5 thickness test shall be undertaken prior to other tests.

11 PRODUCT DOCUMENTATION

11.1 General

Technical information relating to the epoxy barrier lining 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 Standards. Refer to Section 2 for Warranty details.

11.2 Product data

Product data shall be available that identifies critical product characteristics as a minimum—

a) Application in terms of pipe size, pipe material, fittings and acceptable substrates

b) Technical data of materials utilised and Material Safety Data Sheets (MSDS)

c) Maximum and minimum coating thickness

d) Maximum and minimum temperature limitations

e) Life expectancy

11.3 Installation instructions

Instructions shall be provided that give full details of installation procedures for the coating system including:

11.3.1 Pipe preparation

a) Preliminary inspection and cleaning to remove oil, grease or other foreign material and repair of leaks, if required

b) Abrasive blast cleaning and surface preparation

c) Post cleaning and protection measures applied prior to application of the coating

d) Occupational Health and Safety

11.3.2 Coating application

a) Materials preparation

b) Process verification testing (see Appendix B)

c) Application of the epoxy coating system

d) Curing

e) Coating repair

f) Final piping system installation testing (AS/NZS 3500.1)

g) Occupational Health and Safety

APPENDIX A MEANS FOR DEMONSTRATING COMPLIANCE WITH THIS TECHNICAL SPECIFICATION

(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 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 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.

A.4 DEFINITIONS

A.4.1 Batch release test

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

A.4.2 Production batch

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

A.4.3 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.4.4 Sampling plan

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

A.4.5 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.4.6 Type testing (TT)

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

A.5 TESTING

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 Watermark Technical 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 WaterMark Technical Specification.

TABLE A1
TYPE TESTS

Characteristic	Clause	Requirement	Test method	Frequency
Materials	5	Composition	Review of product documentation	Any change in material specification
Marking	6	Labelling/marking	Review of documentation/physical examination	Any change in design/specification
Packaging	7	Airtight containers		
Design	8.1	Coating system specification	Clause 8.1	At any change in design/specification
	8.2	Colour	Clause 8.2	
Performance	9.1	Products in contact with drinking water	AS/NZS 4020	At any change in materials or formulation
	9.2	Pull off strength test	ASTM D4541	At any change in materials or formulation
	9.3	Immersion test	AWWA C210	
	9.4	Cure test	ASTM D3363 or AS 3894.4	
	9.5	Coating thickness test	AS 3894.3	
Product Documentation	11	Product data, installation instructions	Review of product documentation	At any change factors that require a change in documentation e.g. amendments to AS/NZS 3500 series of Standards

TABLE A2
BATCH RELEASE TESTS

Characteristic	Clause	Requirement	Test method	Frequency
Marking	6	Labelling/marking	Review of documentation/physical examination	Each batch
Performance	9.4	Cure test	ASTM D3363 or AS 3894.4	Each batch

APPENDIX B REQUIREMENTS FOR FIELD APPLIED LININGS

(Normative)

B.1 SCOPE

This Appendix specifies the process verification tests for an epoxy barrier coating system used for lining of cold and heated water pressurised piping systems utilised for drinking water supply. The process verification tests aim at ensuring that adequate surface preparation and coating application procedures are used in field applied coating application.

B.2 COATING APPLICATION PROCEDURES

The coating applicator shall have in place documented procedures for all stages of the processes. These procedures are adapted to suit specific installations.

B.3 COATING SYSTEM MATERIAL

Coating system materials shall comply with the type test requirements of Appendix A Table A1 and shall be applied in accordance with the coating system manufacturers' installation specifications (see Clause 11). These specifications shall be incorporated into the Coating Application Procedures.

B.4 PROCESS VERIFICATION

A sample of the coated product which has been processed in accordance with these production procedures shall be tested and meet the requirements of Clause B.6.

B.5 SAMPLES

The tests shall be carried out for each substrate material being coated with the exception of degree of cure tests which only need to be undertaken on one substrate material. Sufficient samples shall be taken in order for the process to be verified and these samples shall be retained upon completion of the project for a minimum of 5 years. Where the application processes are undertaken over a number of days or are interrupted for any reason the process verification tests would need to be undertaken on additional samples to establish conformity over these periods.

B.6 PROCESS VERIFICATION TESTS

Coated products, sections of products or sample plates as specified in the test method shall be used as samples for the tests identified below.

B.6.1 Thickness test

When samples are tested in accordance with AS 3894.3 the coating thickness shall fall within the thickness limits specified for the system.

B.6.2 Pull off test

When samples are tested in accordance with ASTM D4541 the minimum pull off force shall be 18.2MPa.

B.6.3 Cure test

When two coated samples at the points of maximum and minimum thickness limits of the specification are tested in accordance with ASTM D3363 or AS 3894.4 they shall fall within the limits of the coating manufacturer's specifications.

B.6.4 Visual appearance

Two samples of 100mm in length shall be visually examined. The coating shall be smooth and uniform in colour and shall not exhibit any evidence of blistering or excessive sagging.

B.7 REWORK

Where non-conforming products are to be reworked then this shall be done in accordance with the prequalified procedures and the coating system installation instructions.

B.8 RECORDS

Records are to be maintained by the applicator of the process verification testing and shall be maintained for a minimum of 5 years from the date of final application.

Records of the verification shall include as a minimum:-

a) Applicator company name

b) Site of application

c) General description of application processes i.e. size of pipe, coating material, substrate, total time of application, and volume of material used

d) Description of the samples used for verification testing

e) Test results

f) Person and company taking responsibility for verification process and testing

g) A physical reference sample

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