



# **WMTS-489:2016**

## **Stainless steel flexible assemblies for plumbing applications**

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**WaterMark Technical Specification**

**2016**



**ABCBC**





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**WaterMark Technical Specification**

Document formerly known as:-

ATS 5200.489 – 2009 Technical Specification for Plumbing and Drainage Products  
Stainless steel flexible assemblies for plumbing applications

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**2016**

## **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). Within two years all existing ATS will be renamed WMTS. During this initial period both terms may be used and accepted. All new and recertified Certificates of Conformity will reference WMTS. Certificates of Conformity that currently reference ATS will be re-issued referencing the equivalent WMTS during this initial period. The WaterMark Schedule of Specifications lists all current WMTS and, where appropriate, the former ATS name.

This Technical Specification supersedes Standards Australia ATS 5200.489:2009.

The rebranding of this Technical Specification has included additional information about the transition as well as changes to specific details including replacing references to Standards Australia and the National Plumbing Regulators Forum (NPRF) with the ABCB, changing the term Australian Technical Specification (ATS) to WaterMark Technical Specification (WMTS), replacing references to technical committees WS-014 and WS-031 with the WaterMark Technical Advisory Committee (WMTAC).

While the ABCB, the participating Governments and other groups or individuals who have endorsed or been involved in the development of the WMTS, have made every effort to ensure the information contained in this document 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](mailto:watermark@abcb.gov.au) or write to the WaterMark Administering Body, ABCB, GPO Box 9839, Canberra ACT 2601.

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## PREFACE

WaterMark Technical Specification WMTS-489:2016 Technical Specification for plumbing and drainage products, Stainless steel flexible assemblies for plumbing applications 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 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 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 Technical Specification to define the application of the appendices to which they apply. A 'normative' appendix is an integral part of a Technical Specification.

The test protocol and information in this 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 Technical Specification for Plumbing and Drainage Products and are now located on the ABCB website ([www.abcb.gov.au](http://www.abcb.gov.au)). These lists will be version controlled with appropriate historic references.

## **ACKNOWLEDGEMENTS**

Australian Technical Specification ATS 5200.489–2009, on which this technical specification is based, was prepared by Standards Australia Committee WS-031, Technical Procedures for Plumbing and Drainage Products Certification. It was approved on behalf of the Council of Standards Australia on 13 November 2009.

The following organisations were represented on Committee WS-031 in the preparation of Australian Technical Specification ATS 5200.489–2009.

- Australian Industry Group
- Australian Stainless Steel Development Association
- Certified Interests (Australia)
- Copper Development Centre, Australia
- CSIRO Manufacturing and Materials Technology
- Gas Appliance Manufacturers Association of Australia
- National Plumbing Regulators Forum
- Plastics Industry Pipe Association of Australia
- Plumbing Products Industry Group
- South Australian Water Corporation
- Water Services Association of Australia

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## **1 SCOPE**

This Technical Specification sets out requirements for flexible assemblies constructed from annularly corrugated stainless steel tube of up to DN 50, for use at continuous operating temperatures up to 80°C and continuous working pressures of at least 1400 kPa. They are suitable for above-ground and accessible applications only.

Stainless steel flexible assemblies require certification to WaterMark level 1.

## **2 APPLICATION**

Stainless steel flexible assemblies are intended for use in the cold water and heated water supply systems. Typical use would be on general connection of appliances and tap ware, water heaters and water treatment appliances.

This Technical Specification will be referenced on the WaterMark Certification Scheme Schedule of Specifications.

Appendix A sets out the means by which compliance with the 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

- 1565 Copper and copper alloys—Ingots and castings
- 1572 Copper and copper alloys—Seamless tubes for engineering purposes
- 1646 Elastomeric seals for waterworks purposes
- 2136 Method for detecting the susceptibility of copper and its alloys to stress corrosion cracking using the mercurous nitrate test
- 2345 Dezincification resistance of copper alloys
- 3688 Water supply—Metallic fittings and end connectors
- 4020 Testing of products for use in contact with drinking water

### ABCB

Plumbing Code of Australia (PCA)

Procedure for Certification of Plumbing & Drainage Products



## AS/NZS

- 1567 Copper and copper alloys—Wrought rods, bars and sections
- 1568 Copper and copper alloys—Forging stock and forgings
- 3500 Plumbing and drainage
  - 3500.0 Part 0: Glossary of terms
  - 3500.1 Part 1: Water services
  - 3500.4 Part 4 Heated water services
  - 3500.5 Part 5 Domestic installations
- 3718 Water supply—Tap ware

## ASME

- A112.18.6 Flexible water connectors

## 4 DEFINITIONS

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

### 4.1 Pitting resistance equivalent number (PREN)

A theoretical way of comparing the pitting corrosion resistance of various types of stainless steel, based, on the chemical compositions and specifically chromium (Cr), 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.
- = 30 for austenitic stainless steels.
- = 0 for ferritic and martensite stainless steels.

## **5 MATERIALS**

### **5.1 Metallic materials**

#### **5.1.1** *General*

Metallic materials in contact with water shall be corrosion resistant. For the purposes of this Technical Specification, the following materials are considered to be corrosion resistant:

- (a) Stainless steel, as specified in Clause 5.1.2
- (b) Copper alloy, as specified in Clause 5.1.3

#### **5.1.2** *Stainless steel*

Stainless steel (SS) utilized in the construction of the assembly and in contact with water shall have a PREN of 22 or greater.

#### **5.1.3** *Copper alloy*

Copper alloy shall comply with the following:

- (a) *Castings* AS 1565 or capable of passing the requirements of Clause 5.1.4 provided that the alloy contains not less than 58% copper and not more than 1% aluminium.
- (b) *Hot pressings* AS/NZS 1568.
- (c) *Rod for machined parts* AS/NZS 1567 or an alloy complying with AS 2345.
- (d) *Tubular components* Copper alloy tube shall comply with AS 1572 alloy designation C26130. Where bent or stamped in the fabrication process, the tube shall be sufficiently stress-relieved so that it is capable of passing the mercurous nitrate test specified in AS 2136 after all fabrication processes are complete.

#### **5.1.4** *Dezincification-resistant (DR) copper alloy*

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

### **5.2 Elastomeric materials**

The materials used for seals or gaskets shall comply with the relevant requirements of AS 1646.

## **6 MARKING**

Each flexible assembly shall be permanently and legibly marked with the following:

- (a) Manufacturer's name, brand or trademark.
- (b) WaterMark.

- (b) Certificate Number.
- (c) The number of this Technical Specification, i.e., WMTS-489.

*NOTE: Where space is limited, the number of the Technical Specification may be in abbreviated form, i.e. S489.*

- (d) Date of batch identification for product traceability.

## **7 PACKAGING**

The assembly shall be packaged in such a manner so as to avoid damage during transportation and handling.

## **8 DESIGN**

### **8.1 End connections**

#### *8.1.1 General*

Where the ends are intended to be connected to pipework, flexible assemblies shall be provided with threaded end connections or adaptors. All end connections shall be capable of making a watertight joint when connected and tightened in accordance with the manufacturer's instructions.

#### *8.1.2 Threads*

Threads, other than when intended to be used for a specific design connection, shall comply with AS 3688.

#### *8.1.3 Thread engagement*

When torqued to the manufacturer's recommended specification, the length of thread engagement on flexible assemblies shall allow a minimum of 3 full threads up to DN 20 and 4 full threads from DN 20 to DN 50. The number of full threads shall be counted when the threaded joint is assembled with washers or seals.

## **9 PERFORMANCE REQUIREMENTS AND TEST METHODS**

### **9.1 Products in contact with drinking water**

Products in contact with drinking water shall comply with AS 4020. Flexible assemblies are considered as end-of-line fittings for testing purposes.

### **9.2 Hydrostatic strength test**

When tested in accordance with the hydrostatic strength test of Appendix B, the flexible assembly shall not leak.

### **9.3 Watertightness test**

When tested in accordance with the watertightness test of AS/NZS 3718, the flexible assembly shall not leak.

### **9.4 Impulse test**

When tested in accordance with the impulse test of ASME A112.18.6, the flexible assembly shall not leak.

## **10 VOID**

## **11 PRODUCT DOCUMENTATION**

### **11.1 Product data**

Data that includes the following critical operating characteristics shall be provided with the product:

- (a) Product range and model identification.
- (b) Maximum and minimum allowable operating pressure and temperature.
- (c) Maximum and minimum bend radius.

### **11.2 Installation instructions**

Instructions shall be provided, which shall give full details of installation procedures for the flexible assembly. The instructions shall include clauses reflecting the requirements of the Plumbing Code of Australia, including any limitations on the product's use, but including as a minimum the following:

- (a) References to AS/NZS 3500.1, AS/NZS 3500.4 and AS/NZS 3500.5 where applicable.
- (b) Detailed step-by-step instruction.
- (c) The need for special tools or training.
- (d) Contact details for after-sales service.

### 11.3 Warranty

All products shall be supplied with a supplier's warranty in the form of a statement as per the requirements of the Plumbing Code of Australia. The warranty may be attached to the product, printed on the packaging or included as part of the installation instruction.

*NOTE: A material or product displaying a certification mark but without the required warranty is not an authorised product.*

## **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 Technical Specification has to 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 Technical Specification.

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

**Table A1—TYPE TESTS**

Characteristic	Clause	Requirement	Test method	Frequency
Materials	5	Relevant Standard	Review materials parts lists and data/test reports	At any change in materials specification
Marking	6	Marking	Review of documentation/physical examination	At any change in design/specification
Packaging	7	Protection from damage during transportation and handling		
Design	8.1	End connections	AS 3688	At any change in design/specification
Performance	9.1	Products in contact with drinking water	AS 4020	At any change in materials, formulation or design or every five years whichever occurs first
	9.2	Hydrostatic strength test	Appendix B	At any change in design or manufacturing process
	9.4	Impulse test	ASME A112.18.6	
Product documentation	11	Product data/installation instructions	Documentation review	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**

<b>Characteristic</b>	<b>Clause</b>	<b>Requirement</b>	<b>Test method</b>	<b>Frequency</b>
Materials	5	Relevant Standard	Delivery acceptance tests or supplier's test data	Each delivery batch
Marking	6	Marking	Visual examination	100%
Performance	9.3	Watertightness test	AS/NZS 3718	100%



## Appendix B HYDROSTATIC STRENGTH TEST

(Normative)

### B.1 SCOPE

This Appendix sets out the method for determining the ability of stainless steel flexible assemblies to withstand hydrostatic pressures.

### B.2 PRINCIPLE

The device is subjected to a hydrostatic pressure for a period of time and inspected for structural damage.

### B.3 APPARATUS

The following are required:

- (a) Water supply source sufficient to maintain the required pressure.
- (b) Temperature bath to maintain the required temperature.
- (c) Pressure gauge.

### B.4 PROCEDURE

The procedure shall be as follows:

- (a) Mount the connector and fill with water.
- (b) Submerge the connector in a temperature bath at  $80 \pm 3^{\circ}\text{C}$ .
- (c) Increase the pressure to the greater of 2800 kPa, or twice the manufacturer's maximum continuous working pressure, and maintain this pressure.
- (d) After 60 -0, + 5 min remove the connector from the temperature bath while still under pressure and inspect for leaks.
- (e) Release the pressure.
- (f) Record the test pressure, temperature and duration at this pressure.

### B.5 TEST REPORT

The following shall be reported:

- (a) Manufacturer, model, type and size of assembly.
- (b) Any leakage or structural damage.
- (c) Reference to this test method, i.e. WMTS-489, Appendix B.

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