

Australian Standard[®]

**Water supply—Valves for the control of
hot water supply temperatures**

**Part 2: Tempering valves and end-of-
line temperature-actuated devices**



This Australian Standard® was prepared by Committee WS-026, Valves Primarily for Use in Warm and Hot Water Systems. It was approved on behalf of the Council of Standards Australia on 22 August 2005.

This Standard was published on 13 December 2005.

The following are represented on Committee WS-026:

- AUSTAP
 - Australian Industry Group
 - Building Officials Institute of New Zealand
 - Business New Zealand
 - Consumers' Federation of Australia
 - Department of Health (South Australia)
 - Gas Appliance Manufacturers Association of Australia
 - Institute of Hospital Engineering Australia
 - Master Plumbers and Mechanical Services Association of Australia
 - Master Plumbers Association of NSW
 - Master Plumbers, Gasfitters and Drainlayers New Zealand
 - New Zealand Employers and Manufacturers Association
 - NSW Health Department
 - Water Corporation Western Australia
-

This Standard was issued in draft form for comment as DR 05294.

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.

Keeping Standards up-to-date

Australian Standards® are living documents that reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued.

Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting **www.standards.org.au**

Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at **mail@standards.org.au**, or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 4032.2—2005

Water supply—Valves for the control of hot water supply temperatures

Part 2: Tempering valves and end-of-line temperature-actuated devices

RECONFIRMATION NOTICE

Technical Committee WS-026 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Reconfirmed documents cannot be amended, but may be formally revised and a new edition published.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 26 May 2015.

Reconfirmed documents cannot be amended, but may be formally revised and a new edition published.

The following are represented on Technical Committee WS-026:

Australian Chamber of Commerce and Industry
Australian Industry Group
Building Officials Institute of New Zealand
Employers And Manufacturers Association
Gas Appliance Manufacturers Association of Australia
Institute of Hospital Engineering Australia
Master Plumbers and Mechanical Services Association of Australia
Master Plumbers Association of NSW
NSW Health
Plumbing Products Industry Group

NOTES

Australian Standard[®]

Water supply—Valves for the control of hot water supply temperatures

Part 2: Tempering valves and end-of- line temperature-actuated devices

Originated as AS 4032.2—2002.
Second Edition 2005.
Reissued incorporating Amendment No. 1 (October 2006).
Reissued incorporating Amendment No. 2 (June 2009).

COPYRIGHT

© Standards Australia

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published by Standards Australia GPO Box 476, Sydney, NSW 2001, Australia
ISBN 0 7337 7048 7

PREFACE

This Standard was prepared by the members of the Joint Standards Australia/Standards New Zealand Committee WS-026, Valves Primarily for Use in Warm and Hot Water Systems.

This Standard incorporates Amendment No. 1 (October 2006) and Amendment No. 2 (June 2009). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

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 manufacturers with requirements for tempering valves and end-of-line temperature-actuated devices that give reasonable protection to users against exposure to high or excessive fluctuations in mixed water temperatures caused by the following:

- (a) Maintaining an outlet temperature within specified limits, including shut-off of the cold water supply.
- (b) Closing the outlet when the mixed water temperature exceeds a specified maximum.

This Standard is Part 2 of a suite of Standards that covers valves for the control of hot water temperatures, as follows:

AS

4032 Water supply—Valves for the control of hot water supply temperatures

4032.1 Part 1: Thermostatic mixing valves—Materials, design and performance requirements

4032.2 Part 2: Tempering valves and end-of-line temperature-actuated devices (this Standard)

4032.3 Part 3: Requirements for field testing, maintenance or replacement of thermostatic mixing valves, tempering valves and end-of-line temperature control devices

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

This Standard necessarily deals with existing conditions, but is not intended to discourage innovation or to exclude materials, equipment and methods that may be developed in the future. Revisions will be made from time to time in view of such developments, and amendments to this Edition will be made only when absolutely necessary.

CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE	5
1.2 APPLICATION	5
1.3 REFERENCED DOCUMENTS	5
1.4 DEFINITIONS	7
1.5 INSTRUMENTATION	7
1.6 MARKING	7
1.7 INSTRUCTIONS	8
SECTION 2 MATERIALS	
2.1 GENERAL	9
2.2 PRODUCTS IN CONTACT WITH WATER	9
2.3 CORROSION-RESISTANT METALLIC MATERIALS	9
2.4 COPPER	9
2.5 COPPER ALLOY	9
2.6 DEZINCIFICATION-RESISTANT (DR) COPPER ALLOY	9
2.7 STAINLESS STEEL	9
2.8 PLASTIC MATERIALS	10
2.9 OTHER COMPONENT MATERIALS	10
SECTION 3 DESIGN AND CONSTRUCTION	
3.1 GENERAL	11
3.2 WRENCHING FLATS	11
3.3 STRENGTH	11
3.4 END CONNECTIONS	11
3.5 COMPONENTS AND VALVE SEATS	11
3.6 REPAIR	11
SECTION 4 TEMPERING VALVES	
4.1 GENERAL	12
4.2 INLET AND OUTLET CONNECTIONS	12
4.3 DESIGN REQUIREMENTS	12
4.4 TEMPERATURE STABILITY OF MIXED WATER	12
4.5 SEQUENCE OF TESTS	13
4.6 ENDURANCE OF THERMOSTATIC ELEMENT AND OPERATING MECHANISM	15
4.7 MARKING	15
4.8 MANUFACTURER'S INSTRUCTIONS	15
SECTION 5 END-OF-LINE TEMPERATURE-ACTUATED FLOW DEVICES	
5.1 GENERAL	16
5.2 CONNECTIONS	16
5.3 ACTUATING TEMPERATURE	16
5.4 PERFORMANCE	16
5.5 ENDURANCE	16
5.6 MARKING	16
5.7 MANUFACTURER'S INSTRUCTIONS	17

APPENDICES

A MEANS FOR DEMONSTRATING COMPLIANCE WITH THIS STANDARD 18

B INSTRUMENTATION 20

C TORQUE TEST..... 21

D DETERMINATION OF WATERTIGHTNESS..... 23

E INFORMATION ON SCALDS FROM HOT WATER 26

F TEMPERATURE STABILITY OF MIXED WATER TEST—TEMPERING VALVES 27

G ENDURANCE TEST—TEMPERING VALVES 37

H PERFORMANCE AND ENDURANCE TESTS—END-OF-LINE TEMPERATURE-ACTUATED FLOW DEVICES 39

I SAMPLING AND FREQUENCY PLANS—TEMPERING VALVES 42

J SAMPLING AND FREQUENCY PLANS—END OF LINE DEVICES 44

STANDARDS AUSTRALIA

Australian Standard

Water supply—Valves for the control of hot water supply temperatures

Part 2: Tempering valves and end-of-line temperature-actuated devices

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the design, construction, testing and performance of—

- (a) tempering valves of nominal sizes not larger than DN 32; and
- A2 | (b) end-of-line temperature-actuated devices of nominal size not larger than DN 25, for use with—
 - A2 | (i) heated water at continuous operating temperature not exceeding 85°C;
 - (ii) heated water at temperature under emergency conditions, not exceeding 99°C; and
 - (iii) continuous working pressure not exceeding 1400 kPa.

Devices complying with this Standard are intended to prevent a continuous discharge of water from the outlet in excess of 50°C under steady-state conditions.

Transient discharges of water with a temperature in excess of this figure, which comply with the specified cumulative time/temperature factors, are acceptable.

NOTE: Tempering valves, when adjusted to an outlet temperature not exceeding 50°C, and end-of-line devices may be used for temperature-limiting for ablution purposes, to minimize the risk of scalding, other than for use in health care, aged care, child care, care for people with disabilities and any other at-risk situations. Thermostatic mixing valves complying with AS 4032.1, when adjusted to an outlet temperature not exceeding 45°C, are intended for use in health care, aged care, child care, care for people with disabilities and any other at-risk situations.

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 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS	
1167	Welding and brazing—Filler metals
1167.1	Part 1: Filler metal for brazing and braze welding
1349	Bourdon tube pressure and vacuum gauges
1432	Copper tubes for plumbing, gasfitting and drainage applications
1565	Copper and copper alloys—Ingots and castings
1567	Copper and copper alloys—Wrought rods, bars and sections

A2	AS	
	1568	Copper and copper alloys—Forging stock and forgings
	1572	Copper and copper alloys—Seamless tubes for engineering purposes
	1722	Pipe threads of Whitworth form
	1722.1	Part 1: Sealing pipe threads
	1722.2	Part 2: Fastening pipe threads
	1834	Material for soldering
	1834.1	Part 1: Solder alloys
	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
	2738	Copper and copper alloys—Compositions and designations of refinery products, wrought products, ingots and castings
		‘Text deleted’
	3558	Methods of testing plastics and composite materials sanitary plumbing fixtures
	3558.5	Part 1: Determination of degradation by ultraviolet light
	3688	Water supply—Metallic fittings and threaded-end connectors
	4032	Water supply—Valves for the control of heated water supply temperatures
	4032.1	Part 1: Thermostatic mixing valves—Materials design and performance requirements
	4032.3	Part 3: Requirements for field testing, maintenance or replacement of thermostatic mixing valves, tempering valves and end of line temperature control devices
	5200	Technical Specification for plumbing and drainage products (all parts)
	AS/NZS	
	3499	Flexible tube connectors for water supply
	3500	Plumbing and drainage
	3500.0	Part 0: Glossary of terms
	4020	Testing of products for use in contact with drinking water
	NZS	
	3501	Specification for copper tubes for water, gas, and sanitation
	ASTM	
	A269	Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
	A313	Standard Specification for Stainless Steel Spring Wire
	B127	Standard Specification for Nickel—Copper Alloy (UNS N04400) Plate, Sheet, and Strip
	B163	Standard Specification for Seamless Nickel and Nickel Alloy Condenser and Heat—Exchanger Tubes
	B164	Standard Specification for Nickel—Copper Alloy Rod, Bar, and Wire
	B165	Standard Specification for Nickel—Copper Alloy (UNS N04400)* Seamless Pipe and Tube

1.4 DEFINITIONS

For the purpose of this Standard the definitions given in AS/NZS 3500.0 and those below apply:

1.4.1 Distortion

That which is obvious to the eye without resorting to dimensional checking.

1.4.2 Manufacturer's recommended commissioning temperature

The temperature to which the tempering valve is set and checked following its installation within the limits specified by the manufacturer.

1.4.3 Special tool

A specifically designed mechanism or method that would prevent the unauthorized adjustment of the temperature control.

NOTE: Screwdrivers, cross-head screwdrivers and conventional spanners are not considered special tools.

1.4.4 Steady mixed water discharge temperature

A single temperature reading taken at 30 ± 5 s following an applied change in the water supply conditions.

1.4.5 Transient mixed water discharge temperatures

The series of temperatures taken in 0.1 s intervals for the period 0 to 60 s immediately following an applied change in the water supply conditions.

1.5 INSTRUMENTATION

Instrumentation shall be in accordance with Appendix B.

1.6 MARKING

Valves and devices complying with this Standard shall be marked or supplied with the following information:

- (a) Manufacturer's name, brand or trademark.
- (b) Name or model number of the valve or device.
- (c) Requirements of AS 5200 series.
- (d) Licence number.
- (e) Identification for traceability in the form of either the—
 - (i) batch identification; or
 - (ii) individual serial number
- (f) Number of this Standard (i.e., AS 4032.2).
- (g) Identification of the inlet and outlet connections, or an arrow indicating direction of flow.

Unless otherwise specified, this information shall be permanently marked on the valve (e.g., cast, stamped, engraved or printed) or shown on a rating plate or cover affixed to the valve.

NOTES:

- 1 Manufacturers making a statement of compliance with this Australian Standard on a product, packaging, or promotional material related to that product are advised to ensure that such compliance is capable of being verified.
- 2 The intention is to achieve permanency of the marking for the life of the product, or at least 5 years under normal conditions of use.

1.7 INSTRUCTIONS

Tempering valves and end-of-line temperature-actuated devices shall be accompanied by comprehensive installation instructions in the English language.

SECTION 2 MATERIALS

2.1 GENERAL

Materials used in the construction of valves and devices shall be suitable for the conditions of use, e.g. temperature, pressure, and compatibility with any adjacent component.

2.2 PRODUCTS IN CONTACT WITH WATER

Products in contact with water shall comply with AS/NZS 4020. For tempering valves, use a scaling factor of 0.1 and a maximum holding water temperature of 50°C shall be used.

2.3 CORROSION-RESISTANT METALLIC MATERIALS

The parts of the valves in contact with water shall be made from corrosion-resistant materials. For the purpose of this Standard, the following materials are deemed to be corrosion-resistant:

- (a) Copper, as specified in Clause 2.4.
- (b) Copper alloy, as specified in Clause 2.5 and 2.6.
- (c) Stainless steel, as specified in Clause 2.7.
- (d) Other component materials, as specified in Clause 2.9.

2.4 COPPER

Copper shall comply with the following:

- (a) *Wrought products* AS 2738.
- (b) *Tubular components* Copper pipe shall comply with AS 1432 or NZS 3501.

2.5 COPPER ALLOY

Copper alloy shall comply with the following:

- (a) *Castings* AS 1565 and have a lead content of not greater than 4.5%.
- (b) *Hot pressing* AS 1568.
- (c) *Rod for machined parts* AS 1567
- (d) *Tubular components* Copper alloy pipe shall comply with AS 1572 alloy, designation C 26130. Where bent or stamped in the fabrication process, the pipe 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 completed.

2.6 DEZINCIFICATION-RESISTANT (DR) COPPER ALLOY

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

2.7 STAINLESS STEEL

Stainless steel components shall comply with ASTM A269, series 300—

- (a) in Australia not less than 316; and
- (b) in New Zealand not less than 304.

2.8 PLASTIC MATERIALS

2.8.1 General

- A1 | Plastic materials used in valves shall be of a type recommended by the polymer manufacturer as suitable and appropriate for use in the manufacture of the valve component, or otherwise shall demonstrate suitability. Characteristics to be taken into account shall include compatibility and resistance to variations in water quality and elevated temperatures.

2.8.2 Acetal

Acetal plastics used for structural components that are in contact with the water supply shall be copolymer and comply with AS/NZS 3499.

NOTES:

- 1 In view of the time involved in the preconditioning for certain tensile elongation at break tests, certified manufacturers' statements of compliance giving details of the testing body may be acceptable.
 - 2 The property of tensile elongation at break has been used as a measure of deterioration of mechanical properties and to evaluate satisfactory grades or blends of acetal copolymer for use in these applications. Specimens are conditioned in a way to simulate the long-term performance under intermittent hot water conditions and then tested. Test results have to reach minimum figures as specified.
 - 3 Manufacturers should consider the likelihood of acetal compounds being directly connected to copper alloys and the potential for breakdown. Manufacturers should provide installation instructions to prevent such conditions.
- A1 |

2.8.3 UV resistance

- A1 | Plastics components, 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 3558.5. Following exposure to the UV conditions specified in AS 3558.5, plastic-bodied valves shall pass the watertightness test specified in Clause 3.2.2.

2.9 OTHER COMPONENT MATERIALS

- (a) *Ceramics* Ceramic materials may be used.
 - (b) *Filler metals* Filler metal shall be one of the following:
 - (i) Silver brazing alloy containing not more than 0.05% cadmium, complying with AS 1167.1.
 - (ii) Copper-phosphorus brazing alloy complying with AS 1167.1 with a minimum of 1.8% silver.
 - (iii) Solder complying with the requirements of AS 1834.1 and having a maximum of 0.1% lead.
 - (c) *Material for springs* Materials for springs shall comply with one of the following:
 - (i) Stainless steel to Grade 302 or Grade 304 or Grade 316, ASTM A313.
 - (ii) Phosphor bronze to AS 2738, Alloy 518.

NOTE: Other grades may be used providing they meet the performance criteria of this standard.
 - (d) *Nickel-copper-iron* Nickel-copper-iron shall comply with ASTM B127, ASTM B163, ASTM B164 and ASTM B165.
 - (e) *Seat and diaphragm materials* Diaphragm and seat materials shall have corrosion resistant properties and where used in contact with hot water heat resistant properties. Seat materials shall also have anti-adhesion properties for the conditions of intended use.
- A2 |
- A2 |

SECTION 3 DESIGN AND CONSTRUCTION

3.1 GENERAL

The body and component parts of valves and devices shall be designed and manufactured to perform their intended functions reliably so that, in the course of handling, installation, normal operation or maintenance, damage that would prevent their continued compliance with this Standard does not occur.

3.2 WRENCHING FLATS

Unless otherwise specified, all tempering valves shall be provided with a minimum of two parallel wrench flats.

3.3 STRENGTH

3.3.1 Torque test

When tested in accordance with Appendix C, the valve under test shall be capable of withstanding, without permanent distortion or breakage, the applied torque. This test is not applied where elastomeric seals are used on connections for assembly of combination valve bodies.

3.3.2 Leakage

When valves and devices are tested in accordance with Appendix D—

- (a) there shall be no leak from the valve or device body; and
- (b) any cross-flow prevention devices fitted to the valve or device shall not leak in excess of 50 mL/min.

3.4 END CONNECTORS

End connectors for connection to the piping system shall comply with AS 3688.

3.5 COMPONENTS AND VALVE SEATS

Components and assemblies, including inserted valve seats, shall be positively secured by screw threads, riveting, or other durable mechanical means.

3.6 REPAIR

The means of field repair for a valve or device shall be limited to the replacement of a pre-set cartridge assembly that contains all the operating components and, therefore, excludes the dismantling of any operating component.

A1

SECTION 4 TEMPERING VALVES

4.1 GENERAL

Tempering valves complying with this Standard are intended to automatically limit the temperature of the water delivered from the system. Tempering valves complying with this Standard are not a substitute for thermostatic mixing valves.

They may be either a separate valve, or a valve combined with another valve or valves.

In addition to the requirements of this Section, tempering valves shall also comply with the relevant requirements of Sections 1, 2 and 3.

4.2 INLET AND OUTLET CONNECTIONS

Inlet and outlet connections shall have internal or external threads, or be of the compression type or any combination of these options (see Clause 3.3).

Capillary connections shall not be used.

4.3 DESIGN REQUIREMENTS

The following apply:

- A2
- (a) Tempering valves shall incorporate a means to discourage unauthorized adjustment. This may be achieved by, but not limited to, two or more of the following:
 - (i) A retained cap that restricts access to the outlet temperature adjustment mechanism of the valve.
 - (ii) A method of adjustment that requires a tool that is not part of the valve.
 - (iii) A lockable adjustment mechanism.
 - (b) A method of adjustment that requires a manufacturer supplied tool.
 - (c) The manufacturer's specified maximum recommended commissioning temperature may be less than but shall not exceed 50°C. The manufacturer's specified minimum recommended commissioning temperature shall be as marked on the valve and stated in the manufacturer's installation instructions.
- A1
- (d) Cross-flow prevention devices and strainers shall—
 - (i) be provided by the manufacturer of the valve;
 - (ii) comply with the relevant clauses of this Standard;
 - (iii) be provided separate from or integral with the valve; and
 - (iv) be downstream of any isolation valves where fitted and in the order strainer then cross-flow prevention device.

NOTE: Information on the effects of hot water temperature and contact time on the seriousness of scalds is given in Appendix E.

4.4 TEMPERATURE STABILITY OF MIXED WATER

When tested in accordance with Appendix F, the mixed discharge temperature shall be as follows:

- (a) The steady mixed water discharge temperature shall not deviate from the steady mixed water discharge set temperature by more than $\pm 3^{\circ}\text{C}$.