



Water supply and gas systems—Metallic fittings and end connectors



This Australian Standard® was prepared by Committee WS-001, Water Fittings. It was approved on behalf of the Council of Standards Australia on 13 June 2016. This Standard was published on 27 June 2016.

The following are represented on Committee WS-001:

- Association of Accredited Certification Bodies
 - Australian Industry Group
 - Building Officials Institute of New Zealand
 - CSIRO
 - Department of Agriculture and Water Resources (Australian Government)
 - Gas Technical Regulators Committee
 - Housing Industry Association
 - International Copper Association Australia
 - Master Plumbers and Mechanical Services Association of Australia (Victoria)
 - National Association of Testing Authorities, Australia
 - Plastics Industry Pipe Association of Australia
 - Plastics NZ
 - Plumbing Products Industry Group
 - Queensland Brassware Association
 - The Institute of Plumbing Australia
 - Water Services Association of Australia
-

This Standard was issued in draft form for comment as DR AS 3688:2015.

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Standards may also be withdrawn.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.

Australian Standard[®]

Water supply and gas systems—Metallic fittings and end connectors

Originated as AS 3688—1994.
Previous edition AS 3688—2005.
Fourth edition AS 3688:2016.

COPYRIGHT

© Standards Australia Limited

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, unless otherwise permitted under the Copyright Act 1968.

Published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001, Australia

ISBN 978 1 76035 513 5

PREFACE

This Standard was prepared by the Joint Standards Australia and Standards New Zealand Committee WS-001, Water Fittings, to supersede AS 3688—2005, *Water supply and gas systems—Metallic fittings and end connectors*.

The objective of this Standard is to provide for innovation and for a range of fittings that allow for a mixture of pipe materials to be used.

It has been expanded to include fittings of other materials and end connectors used to connect pipes and fittings of dissimilar materials.

The term ‘normative’ has been used in this Standard to define the application of the appendices to which it applies. A ‘normative’ appendix is an integral part of a Standard.

Statements expressed in mandatory terms in notes to tables are deemed to be requirements of this Standard.

CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE.....	6
1.2 APPLICATION	6
1.3 REFERENCED DOCUMENTS.....	6
1.4 DEFINITIONS.....	7
1.5 DESIGNATION OF SIZE	7
1.6 MARKING	8
1.7 PRODUCT DOCUMENTATION.....	8
SECTION 2 MATERIALS	
2.1 SCOPE OF SECTION	9
2.2 MATERIALS IN CONTACT WITH DRINKING WATER	9
2.3 METALLIC MATERIALS	9
2.4 PLASTIC COMPONENT MATERIALS.....	10
2.5 OTHER COMPONENT MATERIALS.....	10
SECTION 3 DESIGN AND DIMENSIONS	
3.1 SCOPE OF SECTION	11
3.2 TUBE STOPS	11
3.3 SLIP FITTINGS	11
3.4 SPIGOTS.....	11
3.5 FIXING DEVICE	12
3.6 WATERWAYS.....	12
3.7 THICKNESS OF METAL PARTS OF FITTINGS SPECIFIED BY DIMENSION... 12	12
3.8 PIPE THREADS	14
3.9 FABRICATED FITTINGS	14
3.10 GEOMETRY OF FITTINGS	15
3.11 PLATING AND OTHER SURFACE FINISHES	15
3.12 FINISH AND WORKMANSHIP.....	15
SECTION 4 PERFORMANCE REQUIREMENTS	
4.1 SCOPE OF SECTION	16
4.2 LEAKTIGHTNESS UNDER INTERNAL PRESSURE TEST	16
4.3 STRENGTH OF FABRICATED JOINT (TORQUE TEST).....	16
4.4 STRENGTH OF JOINT ASSEMBLY (PRESSURE CYCLING TEST).....	16
4.5 RESISTANCE TO PULL-OUT OF ASSEMBLED JOINTS	16
4.6 STRENGTH OF NUT AND ASSEMBLY (TORQUE TEST).....	16
4.7 LEAKTIGHTNESS UNDER INTERNAL PRESSURE WHILST SUBJECTED TO BENDING	16
4.8 METHOD FOR DETERMINING COMPATIBILITY OF WATER FITTINGS WITH PIPE.....	17
4.9 ROLL-GROOVED ASSEMBLY (JOINT PRESSURE RESISTANCE TEST)	17
4.10 VACUUM TEST FOR LEAKTIGHTNESS OF JOINTS WITH TUBE UNDER VACUUM	17
4.11 LEAKTIGHTNESS UNDER INTERNAL PNEUMATIC PRESSURE.....	17
4.12 RESISTANCE OF GAS PRESS FITTINGS TO TEMPERATURE CYCLING	17
4.13 RESISTANCE OF PRESS FITTING JOINTS AND TUBES TO VIBRATION.....	17
4.14 RESISTANCE OF GAS PRESS FITTINGS TO HIGH TEMPERATURE.....	17

SECTION 5	CAPILLARY FITTINGS—COPPER AND COPPER ALLOY	
5.1	SCOPE OF SECTION	18
5.2	DESIGN AND DIMENSIONS	18
5.3	PERFORMANCE REQUIREMENTS	19
SECTION 6	COMPRESSION FITTINGS	
6.1	SCOPE OF SECTION	20
6.2	DESIGN	20
6.3	PERFORMANCE REQUIREMENTS	20
SECTION 7	THREADED-END CONNECTORS	
7.1	SCOPE OF SECTION	23
7.2	DIMENSIONS.....	23
7.3	DESIGN	23
7.4	PERFORMANCE REQUIREMENTS	23
SECTION 8	UNION END CONNECTORS AND COUPLINGS	
8.1	SCOPE OF SECTION	28
8.2	DESIGN	28
SECTION 9	ROLL-GROOVED JOINTING END CONNECTORS AND COUPLING BODY	
9.1	SCOPE OF SECTION	29
9.2	MATERIALS.....	29
9.3	DESIGN	29
9.4	PERFORMANCE REQUIREMENTS AND TEST METHODS.....	31
9.5	INSTALLATION INSTRUCTIONS	31
SECTION 10	MECHANICAL JOINTING	
	PUSH-ON AND PRESS-FIT END CONNECTORS	
10.1	SCOPE OF SECTION	32
10.2	DESIGN	32
10.3	PERFORMANCE	32
10.4	INSTALLATION INSTRUCTIONS	32
10.5	MARKING FOR GAS PRESS-FIT FITTINGS	33
SECTION 11	OTHER COPPER ALLOY FITTINGS	
11.1	SCOPE OF SECTION	34
11.2	THREADED SOCKETS.....	34
11.3	REDUCING BUSHES WITH OVERLAPPING INTERNAL AND EXTERNAL THREADS.....	34
11.4	CONTINUOUSLY THREADED FITTINGS	34
11.5	PERFORMANCE REQUIREMENTS	34
APPENDICES		
A	MEANS FOR DEMONSTRATING COMPLIANCE WITH THIS STANDARD	35
B	LIST OF REFERENCED DOCUMENTS.....	41
C	SIZES AND TYPES OF FITTINGS	43
D	LEAKTIGHTNESS UNDER INTERNAL PRESSURE TEST	46
E	STRENGTH OF FABRICATED JOINT—TORQUE TEST.....	48
F	STRENGTH OF JOINT ASSEMBLY—PRESSURE CYCLING TEST.....	50
G	RESISTANCE TO PULL-OUT OF ASSEMBLED JOINTS	52
H	STRENGTH OF NUT AND ASSEMBLY—TORQUE TEST.....	55
I	METHOD FOR DETERMINING LEAKTIGHTNESS UNDER INTERNAL HYDROSTATIC PRESSURE WHILST SUBJECTED TO BENDING	57
J	METHOD FOR DETERMINING COMPATIBILITY OF FITTINGS WITH PIPE ..	59

K	ROLL-GROOVED ASSEMBLY JOINT PRESSURE RESISTANCE TEST	61
L	SIMULATED SAMPLES	63
M	VACUUM TEST FOR LEAKTIGHTNESS OF PRESS FIT JOINTS WITH TUBE UNDER VACUUM	65
N	LEAKTIGHTNESS OF GAS PRESS FITTINGS UNDER INTERNAL PNEUMATIC PRESSURE	67
O	RESISTANCE OF GAS PRESS FITTINGS TO TEMPERATURE CYCLING	69
P	RESISTANCE OF PRESS FITTING JOINTS AND TUBES TO VIBRATION	72
Q	RESISTANCE OF PRESS FITTING JOINTS AND TUBES TO HIGH TEMPERATURE	75

STANDARDS AUSTRALIA

Australian Standard**Water supply and gas systems—Metallic fittings and end connectors**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for metallic body pipe fittings and connectors for use with copper tube, stainless steel pipe, stainless steel tube and adaptor fittings for connection to other pipe materials in water supply and gas systems where the continuous working temperature—

- (a) does not exceed 95°C, and where the maximum operating pressure does not exceed 1 400 kPa; or
- (b) is the ambient supply temperature, where the maximum operating pressure does not exceed 2 100 kPa. Products designed for a temperature in excess of 95°C are included where tested to the appropriate temperature criteria.

1.2 APPLICATION

Fittings, end connectors, and couplings shall comply with Sections 1 to 11 as follows:

- (a) Capillary fittings—copper and copper alloy Section 5.
- (b) Compression fittings Section 6.
- (c) Threaded-end connectors Section 7.
- (d) Union end connectors and couplings Section 8.
- (e) Roll-grooved jointing end connectors and coupling body Section 9.
- (f) Mechanical jointing push-on and press-fit end connectors Section 10.
- (g) Other copper alloy fittings Section 11.

Fittings such as end connectors intended to join alternative pipe systems made from other materials (e.g. plastics) shall also comply with the relevant dimensional and performance requirements of the appropriate Australian, New Zealand or Joint Australian/New Zealand Standard for the alternative pipe system.

For limitations on use of fittings in gas applications, refer to the AS/NZS 5601 series and AS/NZS 4645.1.

Metallic systems, fittings, end connectors and couplings joined to alternative systems may be certified to this Standard (AS 3688).

Means for demonstrating compliance with this Standard are given in Appendix A.

Fittings used for gas applications have modified performance requirements relevant to the AS/NZS 5601 series. Fittings used exclusively for gas do not need to comply with the requirements of AS/NZS 4020.

1.3 REFERENCED DOCUMENTS

The documents referred to in this Standard are listed in Appendix B.

1.4 DEFINITIONS

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

1.4.1 Fabricated joint or fitting

A joint or fitting that includes a brazed or welded section.

1.4.2 Fastening pipe thread

A pipe thread with geometry suitable for screw fastening as detailed in AS 1722.2 or ISO 228.1.

NOTE: Where these threads are used on pipes or fittings for conveying fluids, pressure-tight joints are not made on the threads; a pressure-tight seal is effected by means other than thread interference (e.g. union couplings, compression connections and other sealing mechanisms).

1.4.3 Gas systems

Gas systems as defined in the AS/NZS 5601 series.

1.4.4 Press end

A plumbing fitting end which incorporates an elastomeric sealing element and to which a pressing tool and jaw are applied to make a mechanical and leaktight joint.

1.4.5 Press tool and jaw

A mechanical device which, by closing jaws, causes radial compression of the plumbing fitting end onto the connecting tube.

1.4.6 Push-on end connectors

A plumbing fitting end which incorporates an elastomeric sealing element and a grab ring which makes a mechanical and leaktight connection when it is pushed onto a tube.

1.4.7 Sealing pipe thread

A pipe thread with geometry suitable for sealing by interference on the thread, utilizing a thread taper, intended for connecting pipes and fittings with a pressure-tight joint used for conveying fluids as detailed in AS ISO 7.1.

1.4.8 Threaded-end connector

A connecting end on a pipe or fitting that is threaded either on an internal surface or external surface so that it can be used to make a threaded joint.

1.4.9 Union end connector

A connector end for a pipe or fitting that allows a union joint to be made.

1.4.10 Working temperature

The operating temperature of pipe work system which is influenced by either the temperature of the water being transported or the environmental conditions in gas installations.

1.5 DESIGNATION OF SIZE

The size by which a fitting is designated shall be the nominal size of the pipes or tubes with which it is to be jointed.

The method of specifying the sizes of fittings shall be in accordance with Appendix C.

NOTE: Designated sizes do not necessarily indicate exact dimensions as these details are given in the relevant tables herein.

1.6 MARKING

1.6.1 Space for mark of certifying body

Where required, provision shall be made on every fitting for the inclusion of the certification mark. The area shall be of sufficient size to accommodate the mark. Continuously threaded products shall be exempt from this requirement. Indented marks shall be applied in such a way as not to deform or otherwise damage the fitting.

NOTE: Manufacturers may agree with the certifying body regarding whether or not the mark will be applied to individual components in a fitting that passes the required tests.

1.6.2 Components

Component parts of a fitting that may be sold separately shall bear the manufacturer's identification mark as a minimum requirement. The only exception is that in the event the component is too small to be marked effectively with the manufacturer's identification mark and the other marking as defined in this Standard, then the item being offered for sale shall be suitably packaged and the packaging marked in accordance with the marking requirements nominated.

1.6.3 Marking requirements

All fittings shall be legibly marked with the following:

- (a) Manufacturer's name, brand or trademark.
- (b) For plumbing products used in Australia, the WaterMark. Where used for other applications, the mark of the certifying body.
- (c) Number of this Standard.
- (d) Maximum service temperature of water fittings (where designated less than 95°C).
- (e) DR brass fittings shall be marked as per the requirements of AS 2345.
- (f) Press fittings used for gas applications shall be colour identified as specified in Clause 10.5.

NOTE: Compliance with WaterMark is achieved in accordance with the rules of the WaterMark Certification Scheme.

1.7 PRODUCT DOCUMENTATION

Product documentation shall be available that identifies critical product characteristics such as—

- (a) application;
- (b) maximum operating pressure;
- (c) dimensions;
- (d) pressure/temperature or other limitations; and
- (e) UV degradation due to weathering.