



**American Water Works  
Association**

*Dedicated to the World's Most Important Resource®*

**ANSI/AWWA C606-15**  
(Revision of ANSI/AWWA C606-11)

**AWWA Standard**

# Grooved and Shouldered Joints

Effective date: June 1, 2015.  
First edition approved by AWWA Board of Directors Jan. 28, 1978.  
This edition approved Jan. 24, 2015.  
Approved by American National Standards Institute Feb. 20, 2015.



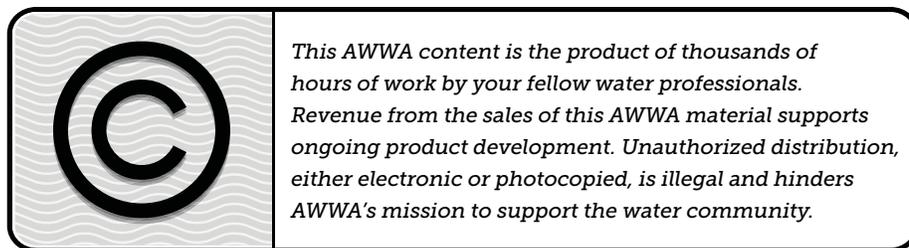
## AWWA Standard

This document is an American Water Works Association (AWWA) standard. It is not a specification. AWWA standards describe minimum requirements and do not contain all of the engineering and administrative information normally contained in specifications. The AWWA standards usually contain options that must be evaluated by the user of the standard. Until each optional feature is specified by the user, the product or service is not fully defined. AWWA publication of a standard does not constitute endorsement of any product or product type, nor does AWWA test, certify, or approve any product. The use of AWWA standards is entirely voluntary. This standard does not supersede or take precedence over or displace any applicable law, regulation, or code of any governmental authority. AWWA standards are intended to represent a consensus of the water supply industry that the product described will provide satisfactory service. When AWWA revises or withdraws this standard, an official notice of action will be placed in the Official Notice section of *Journal - American Water Works Association*. The action becomes effective on the first day of the month following the month of *Journal - American Water Works Association* publication of the official notice.

## American National Standard

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether that person has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. American National Standards are subject to periodic review, and users are cautioned to obtain the latest editions. Producers of goods made in conformity with an American National Standard are encouraged to state on their own responsibility in advertising and promotional materials or on tags or labels that the goods are produced in conformity with particular American National Standards.

CAUTION NOTICE: The American National Standards Institute (ANSI) approval date on the front cover of this standard indicates completion of the ANSI approval process. This American National Standard may be revised or withdrawn at any time. ANSI procedures require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of ANSI approval. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036; 212.642.4900; or emailing [info@ansi.org](mailto:info@ansi.org).



ISBN-13, print: 978-1-62576-098-2

eISBN-13, electronic: 978-1-61300-337-4

DOI: <http://dx.doi.org/10.12999/AWWA.C606.15>

---

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information or retrieval system, except in the form of brief excerpts or quotations for review purposes, without the written permission of the publisher.

Copyright © 2015 by American Water Works Association  
Printed in USA

## Committee Personnel

The AWWA Standards Committee on Grooved and Shouldered Joints, which reviewed and approved this standard, had the following personnel at the time of approval:

Roger L. Coffey, *Chair*

George Slaughter, *Secretary*

### *General Interest Members*

B.R. Bullert, CH2M HILL, Mendota Heights, Minn.	(AWWA)
R.L. Coffey, HDR Engineering Inc., Omaha, Neb.	(AWWA)
A. Gruber, Lockwood, Andrews & Newnam, San Antonio, Texas	(AWWA)
T.J. McCandless,* Standards Engineer Liaison, AWWA, Denver, Colo.	(AWWA)
M. Stuhr,* Standards Council Liaison, Portland Water Bureau, Portland, Ore.	(AWWA)
J. Toyoda, Camp Dresser & McKee Inc., Walnut Creek, Calif.	(AWWA)

### *Producer Members*

L.R. Dunn, U.S. Pipe & Foundry Company, Birmingham, Ala.	(DIPRA)
R.S. Johnson, American RD, Richmond, Texas	(AWWA)
C.J. Lafferty,† Victaulic Company of America, Chadds Ford, Pa.	(AWWA)
T.J. Muntz, Fab Pipe Inc., Rogers, Minn.	(AWWA)
G.E. Slaughter, Victaulic Company of America, Olathe, Kan.	(AWWA)

### *User Members*

M. Acosta, Kitson & Partners, Port Charlotte, Fla.	(AWWA)
B.E. Kennedy, Pasco County Utilities, New Port Richey, Fla.	(AWWA)
P.J. Pfister, Minneapolis Water Works, Minneapolis, Minn.	(AWWA)
K.R. Reed, City Utilities of Springfield, Springfield, Mo.	(AWWA)

---

\* Liaison, nonvoting

† Alternate

This page intentionally blank.

# Contents

*All AWWA standards follow the general format indicated subsequently. Some variations from this format may be found in a particular standard.*

SEC.	PAGE	SEC.	PAGE
<b>Foreword</b>		<b>5</b>	<b>Verification</b>
I	vii	5.1	15
I.A	vii	5.2	15
I.B	vii	5.3	19
I.C	viii	<b>6</b>	<b>Delivery</b>
II	ix	6.1	19
II.A	ix	6.2	19
III	x	<b>Appendix</b>	
III.A	x	A	Guidelines for Grooved and Shouldered Piping Spacing, Support, Anchorage, and Guidance
III.B	xi	A.1	21
IV	xi	A.2	21
V	xi	A.3	23
		A.4	27
		A.5	27
		<b>Figures</b>	
<b>1</b>	<b>General</b>	1	5
1.1	1	2	14
1.2	1	3	16
1.3	1	4	18
<b>2</b>	<b>References</b>	A.1	17
<b>3</b>	<b>Definitions</b>		
<b>4</b>	<b>Requirements</b>		
4.1	3		
4.2	3		
4.3	3		

SEC.	PAGE	SEC.	PAGE
A.2	22	6	13
Minimum Pipe Spacing Based on Coupling Orientation and Placement.....		Dimensions of Shouldered Ends for Flexible Joints .....	
<b>Tables</b>			
1	4	A.1	24
Gasket Material Grade and Physical Properties .....		Maximum Hanger Spacing for Rigid Coupling Joints on Standard Weight Steel Pipe .....	
2	6	A.2	25
Cut Grooving Dimensions for Flexible Joints—Ductile-Iron Pressure Pipe .....		Maximum Hanger Spacing for Rigid Coupling Joints on Standard Lightweight Stainless-Steel Pipe.....	
3	7	A.3	26
Cut Grooving Dimensions for Rigid Joints—Ductile-Iron Pressure Pipe .....		Maximum Hanger Spacing Where Full Linear Movement is Required for Flexible-Grooved and Shouldered Coupling Joints on Steel, Stainless-Steel, and Ductile-Iron Pipe .....	
4	9	A.4	26
Cut Grooving Dimensions—Steel, Aluminum, Brass, and Other Metallic Pipe of IPS Dimensions .....		Maximum Hanger Spacing Where Full Linear Movement is Not Required for Flexible-Grooved and Shouldered Coupling Joints on Steel, Stainless-Steel, and Ductile-Iron Pipe .....	
5	11		
Roll Grooving Dimensions—Steel, Aluminum, Brass, and Other Metallic Pipe of IPS Dimensions .....			

---

## Foreword

*This foreword is for information only and is not a part of ANSI\*/AWWA C606.*

### **I. Introduction.**

I.A. *Background.* Grooved and shouldered joints have been used since the early 1900s. To ensure continued quality of this type of joint, this standard has been developed for its manufacture.

In 1971, the AWWA Standards Council received a request to develop a standard for a type of pipe jointing that employs the principle of clamping together grooved or shouldered ends of pipe and fittings with a flexible gasket for closure. As a result of this request, the AWWA Standards Council formed an exploratory ad hoc committee “to consider grooved and shouldered type joints and fittings, and to determine how best to arrive at an appropriate AWWA standard for such joints and fittings.”

The ad hoc committee recommended “that the AWWA Standards Council establish a standards committee for the development of a standard in one document for grooved and shouldered type joints and fittings for steel, gray-iron, and ductile-iron pipe for water and other liquids as appropriate.” On June 7, 1972, the council established the AWWA Standards Committee on Grooved and Shouldered Type Joints, and the committee held its first meeting on that date.

I.B. *History.* The first edition of this standard, designated ANSI/AWWA C606-78—Grooved and Shouldered Type Joints, was published in 1978. The second edition of the standard, designated as ANSI/AWWA C606-81, was approved by AWWA on Jan. 25, 1981, by ANSI on May 12, 1981, and was accepted by the Department of Defense on Apr. 5, 1982.

The third edition, designated ANSI/AWWA C606-87, was approved by the AWWA Board of Directors on Jan. 25, 1987, and by ANSI on Apr. 15, 1987. The major revisions contained in the 1987 edition were the deletion of all information on and references to gray cast-iron pipe. Tables relating to gray cast-iron pipe were eliminated, tables showing metric dimensions were eliminated, and metric conversion factors were added as footnotes; tables were renumbered. The fourth edition was approved on June 15, 1997. Major revisions contained in the 1997 edition included the following: the format was changed to the AWWA standard style, Table 1 was added, the figure above Table 5 was revised, a requirement that field grooves be identified by

---

\* American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.

the groover's unique mark was added, definitions were revised and the term *fabricator* was retained, the applied load for the hydrostatic deflected joint test was moved from the midpoint of the coupling to the pipe on either side of the coupling, and machining of the inside diameter of the pipe was approved for the hydrostatic joint test. The fifth edition was approved on Jan. 18, 2004. Major revisions contained in the 2004 edition included the following: the definition of dimension *T* in Tables 2 and 3 was revised, nominal metric conversions were changed from soft to hard values, and the tolerance values were corrected in Table 2. The sixth edition was approved on June 11, 2006. Revisions contained in the 2006 edition included minor format changes to the foreword. The seventh edition was approved on June 12, 2011. Major revisions in the 2011 edition included expanded scope to include 30- and 36-in. pipe; nominal dimensions were converted to soft metric units, 1 in. = 25 mm; gasket material grade changes were added in Table 1; and nominal wall thickness changes were made to pipe sizes 18 in. and larger in Tables 2 and 3. This edition was approved on Jan. 24, 2015.

I.C. *Acceptance.* In May 1985, the US Environmental Protection Agency (USEPA) entered into a cooperative agreement with a consortium led by NSF International (NSF) to develop voluntary third-party consensus standards and a certification program for direct and indirect drinking water additives. Other members of the original consortium included the Water Research Foundation (formerly AwwaRF), and the Conference of State Health and Environmental Managers (COSHEM). The American Water Works Association (AWWA) and the Association of State Drinking Water Administrators (ASDWA) joined later.

In the United States, authority to regulate products for use in, or in contact with, drinking water rests with individual states.\* Local agencies may choose to impose requirements more stringent than those required by the state. To evaluate the health effects of products and drinking water additives from such products, state and local agencies may use various references, including

1. An advisory program formerly administered by USEPA, Office of Drinking Water, discontinued on Apr. 7, 1990.
2. Specific policies of the state or local agency.
3. Two standards developed under the direction of NSF<sup>†</sup>: NSF/ANSI 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.

---

\* Persons outside the United States should contact the appropriate authority having jurisdiction.

† NSF International, 789 N. Dixboro Road, Ann Arbor, MI 48113.

4. Other references, including AWWA standards, *Food Chemicals Codex*, *Water Chemicals Codex*,\* and other standards considered appropriate by the state, provincial, or local agency.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI 61. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdictions. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

Annex A, "Toxicology Review and Evaluation Procedures," to NSF/ANSI 61 does not stipulate a maximum allowable level (MAL) of a contaminant for substances not regulated by a USEPA final maximum contaminant level (MCL). The MALs of an unspecified list of "unregulated contaminants" are based on toxicity testing guidelines (noncarcinogens) and risk characterization methodology (carcinogens). Use of Annex A procedures may not always be identical, depending on the certifier.

ANSI/AWWA C606 does not address additives requirements. Users of this standard should consult the appropriate state, provincial, or local agency having jurisdiction in order to

1. Determine additives requirements, including applicable standards.
2. Determine the status of certifications by parties offering to certify products for contact with, or treatment of, drinking water.
3. Determine current information on product certification.

## **II. Special Issues.**

### *II.A. Advisory Information on Product Application.*

1. This standard includes definitions for both the manufacturer and the fabricator. For the purpose of this standard, the manufacturer is the party that produces the coupling. The fabricator is the party that grooves or fabricates special ends for the pipe, fittings, valves, or other components.

2. Care should be taken to prevent point-loading of the coupling in underground installation.

3. The selection of materials is critical for water service and distribution piping in locations where there is likelihood that the pipe will be exposed to significant concentrations of pollutants composed of low-molecular-weight petroleum products or organic solvents or their vapors. Research has documented that pipe materials, such as polyethylene, polybutylene, polyvinyl chloride, and asbestos cement, and elastomers,

---

\* Both publications available from National Academy of Sciences, 500 Fifth Street, NW, Washington, DC 20001.

such as used in jointing gaskets and packing glands, are subject to permeation by lower-molecular-weight organic solvents or petroleum products. If a water pipe must pass through such a contaminated area or an area subject to contamination, consult with the manufacturer regarding permeation of pipe walls, jointing materials, and so on, *before* selecting materials for use in that area.

**III. Use of This Standard.** It is the responsibility of the user of an AWWA standard to determine that the products described in that standard are suitable for use in the particular application being considered.

III.A. *Purchaser Options and Alternatives.* The following information should be provided by the purchaser:

1. Standard used—that is, ANSI/AWWA C606, Grooved and Shouldered Joints, of latest revision.
2. Whether compliance with NSF/ANSI 61, Drinking Water System Components—Health Effects, is required.
3. Size of pipe.
4. Pipe and coupling specification or standard, class or thickness, grade, and nominal outside diameter.
5. Kind of joint—that is, grooved, shouldered, flexible-grooved, or rigid-grooved.
6. Type of shouldered end, if shoulders are to be used.
7. The pH or temperature of water, if unusual.
8. Internal working pressure.
9. Type of protective coating, if other than the standard of the coupling and pipe manufacturer.
10. Whether drawings and descriptive data are required to be submitted for approval prior to fabrication (Sec. 4.1).
11. Whether records of the hydrostatic pressure tests, the deflected joint hydrostatic test, or both, as specified in Section 5 (also see Sec. 4.1), are to be provided.
12. Details of other federal, state or provincial, and local requirements (Sec. 4.2).
13. Type of material required for housings (Sec. 4.2.1).
14. Type of material required for bolts and nuts (Sec. 4.2.2).
15. Type of material required for gaskets (Sec. 4.2.3.1).
16. If the purchaser desires to inspect the couplings at the manufacturer's plant, or to inspect the end preparations at the fabricator's location, or both, the purchase order or governing specifications should state the conditions of time, extent of the inspection, and so forth under which such inspection(s) shall be made (Sec. 5.1.3).

17. If the production test described in Sec. 5.2.3 is to be required and the percentage or number of each size and type of coupling on which the test is to be performed, as well as whether or not records are to be provided (Sec. 5.2.3.1).

18. Requirement for manufacturer to provide an affidavit of compliance (Sec. 6.2).

III.B. *Modification to Standard.* Any modification of the provisions, definitions, or terminology in this standard must be provided by the purchaser.

**IV. Major Revisions.** Revisions made to the standard in this edition include the following:

1. Updated the Table 5 pipe outside diameter (OD) tolerances
2. Added appendix A for Installation Guidelines.

**V. Comments.** If you have any comments or questions about this standard, please contact AWWA Engineering and Technical Services at 303.794.7711, FAX at 303.795.7603; write to the department at 6666 West Quincy Avenue, Denver, CO 80235-3098; or email at [standards@awwa.org](mailto:standards@awwa.org).

This page intentionally blank.



**American Water Works  
Association**

*Dedicated to the World's Most Important Resource®*

**ANSI/AWWA C606-15**  
(Revision of ANSI/AWWA C606-11)

**AWWA Standard**

---

# Grooved and Shouldered Joints

---

## SECTION 1: GENERAL

---

### **Sec. 1.1 Scope**

This standard describes grooved and shouldered joints for ductile-iron pipe, metallic pressure pipe of iron pipe size (IPS), fittings, and other components for water service. The standard describes 4-in. through 36-in. (100-mm through 900-mm) diameter grooved ductile-iron pipe; ¾-in. through 24-in. (19-mm through 600-mm) diameter grooved steel, aluminum, brass, and other metallic pipe of IPS dimensions; and 4-in. through 64-in. (100-mm through 1,600-mm) nominal diameter shouldered ends for ductile-iron pipe and metallic pipe of IPS dimensions.

### **Sec. 1.2 Purpose**

The purpose of this standard is to provide the minimum requirements for grooved and shouldered joints, including materials, dimensions, tolerances, finishes, tests, and testing procedures.

### **Sec. 1.3 Application**

This standard can be referenced for purchasing and receiving pressure pipe, fittings, and other components composed of ductile-iron, steel, and nonferrous metals for water supply service. The stipulations of this standard apply when this document has been referenced and then only to grooved and shouldered joints for water supply service.