

ANSI/AWWA **C227-22**  
(Revision of ANSI/AWWA C227-17)

AWWA Standard

# Bolted, Split-Sleeve Couplings

**Effective date: Feb. 1, 2023.**

First edition approved by Board of Directors Jan. 21, 2007.

This edition approved Oct. 24, 2022.

Approved by American National Standards Institute Sept. 29, 2022.



American Water Works  
Association



## 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 codes of any governmental authority. AWWA standards are intended to represent a consensus of the water 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 AWWA*. The action becomes effective on the first day of the month following the month of *Journal AWWA* 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 and 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: 978-1-64717-111-7

ISBN-13, electronic: 978-1-61300-644-3

DOI: <http://10.12999/AWWA.C227.22>

---

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including scanning, recording, or any information or retrieval system. Reproduction and commercial use of this material is prohibited, except with written permission from the publisher. Please send any requests or questions to [permissions@awwa.org](mailto:permissions@awwa.org).

Copyright © 2022 by American Water Works Association  
Printed in USA

## Committee Personnel

The Steel Water Pipe Manufacturers Technical Advisory Committee (SWPMTAC) Task Group on C227, which updated this standard, had the following personnel at the time:

Bob Card, *Chair*

R.J. Card, Consultant, Sugar Hill, Ga.  
A. Collins, JCM Industries, Nash, Tex.  
T. Crail, Straub Coupling, Bonsall, Calif.  
A. Lemke, Romac Industries, Inc., Bothell, Wash.  
J.L. Luka, American SpiralWeld Pipe Company, Columbia, S.C.  
A. Thoemke, Victaulic, Atlanta, Ga.

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

John H. Bambei, Jr., *Chair*

Robert J. Card, *Vice Chair*

John L. Luka, *Secretary*

### *General Interest Members*

S.A. Arnaout (*alternate*), Stantec, Dallas, Tex.  
J.H. Bambei, Jr., Bambei Engineering Services, Arvada, Colo.  
R.J. Card, Lockwood, Andrews & Newnam, Suwanee, Ga.  
R.L. Coffey, Consultant, Bensenville, Ill.  
M. Garcia (*liaison, nonvoting*), Standards Council Liaison, AECOM, Denver, Colo.  
R.L. Gibson, Freese and Nichols Inc., Fort Worth, Tex.  
M.D. Gossett, HDR, Denver, Colo.  
M.B. Horsley (*alternate*), Horsley Engineering LLC, Overland Park, Kan.  
R. Issa, AECOM, McKinney, Tex.  
C.H. Kirby (*alternate*), Lockwood, Andrews & Newnam Inc., Houston, Tex.  
K.A. Kuffas, Norske Corrosion & Inspection Services Ltd., Surrey, B.C., Canada  
J.L. Mattson, Corrosion Control Technologies, Sandy, Utah  
D.L. McPherson (*alternate*), HDR, Charlotte, N.C.  
A. Murdock, Jacobs, Salt Lake City, Utah  
R. Ortega, Aurora Technical Services, Houston, Tex.  
E.S. Ralph (*liaison, nonvoting*), Standards Engineer Liaison, AWWA, Denver, Colo.

A.E. Romer (*alternate*), AECOM, Orange, Calif.  
J.R. Snow, Stantec, Denver, Colo.  
A.M. Stanton, Black & Veatch, Pasadena, Calif.  
W.R. Whidden, Woolpert, Winter Park, Fla.

*Producer Members*

H.H. Bardakjian, Consultant, Glendale, Calif.  
D. A. Dechant, Dechant Infrastructure Service, Aurora, Colo.  
D.W. Dunker, Thompson Pipe Group, Rialto, Calif.  
B.D. Keil, Northwest Pipe Company, Draper, Utah  
J.L. Luka, American SpiralWeld Pipe Company, Columbia, S.C.  
R. Mielke (*alternate*), Northwest Pipe Company, Raleigh, N.C.  
G.F. Ruchti (*alternate*), Consultant, Punta Gorda, Fla.  
B.P. Simpson (*alternate*), American Cast Iron Pipe Company, Birmingham, Ala.  
C.C. Sundberg, Victaulic, Issaquah, Wash.  
R. Wu, (*alternate*), Thompson Pipe Group, Grand Prairie, Tex.

*User Members*

L. Adams, US Bureau of Reclamation, Denver, Colo.  
G.A. Andersen, New York City Bureau of Water Supply, Little Neck, N.Y.  
B. Cheng, Metro Vancouver, Burnaby, B.C., Canada  
B. Fountain, San Diego County Water Authority, San Diego, Calif.  
J. Garcia (*alternate*), Metropolitan Water District, La Verne, Calif.  
J. Fox, Tampa Bay Water, Clearwater, Fla.  
S. Hattan, Tarrant Regional Water District, Fort Worth, Texas  
M. Lobik, Springfield Water & Sewer, Springfield, Mass.  
T. Peng, Metropolitan Water District, Los Angeles, Calif.  
G. Ramon (*liaison, nonvoting*), Standards Council Liaison, Little Rock Water Reclamation Authority, Little Rock, Ark.  
V. Scudlark, Los Angeles Department of Water and Power, Los Angeles, Calif.  
M. Turney (*alternate*), Denver Water, Denver, Colo.

# 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>		4.2	Materials of Construction ..... 6
I	Introduction ..... vii	4.3	Design of Couplings ..... 7
I.A	Background ..... vii	4.4	Performance ..... 9
I.B	History ..... vii	4.5	Coating ..... 11
I.C	Acceptance ..... vii	4.6	Installation ..... 11
II	Special Issues ..... viii	<b>5</b>	<b>Verification</b>
II.A	Advisory Information on Product Application ..... viii	5.1	Inspection ..... 13
II.B	Chlorine and Chloramine Degradation of Elastomers ..... viii	5.2	Tests ..... 13
II.B.1	Gasket Degradation Study ..... ix	5.3	Notice of Nonconformance ..... 14
III	Use of This Standard ..... ix	<b>6</b>	<b>Delivery</b>
III.A	Purchaser Options and Alternatives .... ix	6.1	Marking ..... 14
III.B	Modification to Standard ..... x	6.2	Packing and Shipping ..... 14
IV	Major Revisions ..... x	6.3	Affidavit of Compliance ..... 14
V	Comments ..... x	<b>Figures</b>	
<b>Standard</b>		1	Typical Bolted, Split-sleeve Couplings ..... 4
<b>1</b>	<b>General</b>	2	Typical Nonrestrained Bolted, Split-sleeve Coupling Cross Sections ..... 5
1.1	Scope ..... 1	3	Typical Restrained Bolted, Split-sleeve Coupling Cross Sections ..... 5
1.2	Purpose ..... 1	<b>Tables</b>	
1.3	Application ..... 1	1	Minimum Physical Properties of Gasket Material ..... 7
<b>2</b>	<b>References</b> ..... 2	2	Maximum Allowable Angular Deflection ..... 9
<b>3</b>	<b>Definitions</b> ..... 3	3	Recommended Centerline Gaps for Nonrestrained Couplings ..... 10
<b>4</b>	<b>Requirements</b>	4	Pipe-end Diameter Tolerances ..... 11
4.1	Permeation ..... 6		

This page intentionally blank.

Currently in preview, click buy full version

# Foreword

*This foreword is for information only and is not a part of ANSI/AWWA C227.*

## **I. Introduction.**

I.A. *Background.* This standard describes bolted, split-sleeve couplings used to join pipe. It also includes materials of construction, inspection, and testing. These couplings have been used on water pipe since 1981.

I.B. *History.* In October 1999, the AWWA Standards Council authorized the AWWA Standards Committee for Steel Pipe to develop a new standard for the use of bolted, split-sleeve couplings for plain-end pipe. The first edition of that standard was approved by the AWWA Board of Directors on Jan. 21, 2007. Subsequent editions were approved on Jan. 23, 2011, and June 11, 2017. This edition was approved on October 24, 2022.

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. Specific policies of the state or local agency.

Four standards developed under the direction of NSF<sup>†</sup>: NSF/ANSI/<sup>‡</sup> CAN 60, Drinking Water Treatment Chemicals—Health Effects; NSF/ANSI/<sup>‡</sup> CAN 61, Drinking Water System Components—Health Effects; NSF/ANSI/<sup>§</sup>

---

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

<sup>†</sup> NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.

<sup>‡</sup> American National Standards Institute, 25 West 43<sup>rd</sup> Street, Fourth Floor, New York, NY 10036.

<sup>§</sup> Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.

CAN 372, Drinking Water System Components—Lead Content; and NSF/ANSI/CAN 600, Health Effects Evaluation and Criteria for Chemicals in Drinking Water.

3. Other references, including AWWA standards, *Food Chemicals Codex*, *Water Chemicals Codex*,<sup>4</sup> and other standards considered appropriate by the state or local agency.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI/CAN 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.

NSF/ANSI/CAN 600 (which formerly appeared in NSF/ANSI/CAN 60 and 61, as Annex A, “Toxicology Review and Evaluation Procedures,”) 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 NSF/ANSI/CAN 600 procedures may not always be identical, depending on the context.

ANSI/AWWA C227 does not address additives requirements. Thus, users of this standard should consult the appropriate state 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.* Although details differ, all couplings of this type work in a similar fashion and have similar components as depicted in the standard. Coupling manufacturers should be contacted for detailed design information regarding the capabilities of the couplings supplied and proper methods of field installation.

II.B. *Chlorine and Chloramine Degradation of Elastomers.* The selection of materials is critical for water service and distribution piping in locations where there is a possibility that elastomers will be in contact with chlorine or chloramines. Documented research has shown that elastomers such as gaskets, seals, valve seats, and encapsulations may be degraded when exposed to chlorine or chloramines. The impact

---

<sup>4</sup> Both publications available from National Academy of Sciences, 500 Fifth Street, NW, Washington, DC 20001.

of degradation is a function of the type of elastomeric material, chemical concentration, contact surface area, elastomer cross section, and environmental conditions as well as temperature. Careful selection of and specifications for elastomeric materials and the specifics of their application for each water system component should be considered to provide long-term usefulness and minimum degradation (swelling, loss of elasticity, or softening) of the elastomer specified.

II.B.1. *Gasket Degradation Study.* A pipe gasket, having the hardness of a compressed elastomer with a large mass relative to the small, exposed surface area, experiences minimal degradation. This was validated in a research paper reported in *Journal AWWA*,\* in which the pipe gasket degradation in a 110 mg/L chloramine solution was found to degrade just the exposed surface.

**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 C207, Flanged, Split-Sleeve Couplings, of latest revision.
2. Quantity.
3. Nominal pipe size(s)
4. Flange specification for flanged coupling adaptors, if used.
5. Whether compliance with NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects, is required.
6. Details of federal, state, provincial, territorial and local requirements (Sec. 4.2.1).
7. Standard classification of rubber gaskets (Sec. 4.2.5).
8. Special service conditions and operating temperature range (Sec. 4.2.5 and Sec. 4.2.6).
9. Anticipated angular deflection of pipes (Sec. 4.4 and Table 2).
10. Special requirements, such as coatings (Sec. 4.5.1 and Sec. 4.5.2), linings (Sec. 4.5.1 and Sec. 4.5.2), gasket material (Table 1), gaskets for electrical insulation (Sec. 4.2.7), and special types of bolting (Sec. 4.2.9.1).
11. Actual outside diameter(s) (OD) of pipe ends, including coating (Sec. 4.6.2).
12. Purchaser's pipe-end preparation requirements (Sec. 4.6.2).

---

\* R.W. Bonds. 2004. Effect of Chloramines on Ductile-Iron Pipe Gaskets of Various Elastomer Compounds. *Jour. AWWA*, 96(4):153–160.

13. Type of pipe(s), including specification to which it is made, or specifications and tolerance of pipe ends (Sec. 4.6.2.1).
14. Additional nondestructive weld evaluation (Sec. 5.1.1.2).
15. Material certifications to be provided by the manufacturer (Sec. 5.1.1.4).
16. Purchaser's inspection requirements (Sec. 5.1.2).
17. Rated pressure, including transient pressure and test pressure (Sec. 5.2.1).
18. Hydrostatic test data report (Sec. 5.2.2.2).
19. Purchaser's proof test requirements (Sec. 5.2.3).
20. Affidavit of compliance (Sec. 6.3).

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.** Major changes made to the standard in this revision include the following:

1. Updated Sec. I.C. Acceptance in the foreword with the latest Standards Council language reflecting the addition of reference to NSF/ANSI/CAN 372 and 600.
2. Deleted definition for axial sealing element as the term is not used in the body of the standard in Sec. 3.
3. Updated Sec. 4.1 and Sec. 4.2.1 with the latest Standards Council boilerplate language.
4. Changed metric conversions in Tables 2 and 3 to conversion (formally known as hard conversions) from substitution (formally known as soft conversion).
5. Added a note to Sec. 5.2 regarding maximum coating thickness.

**V. Comments.** If you have any comments or questions about this standard, please call 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.



**American Water Works  
Association**

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

**ANSI/AWWA C227-22**  
(Revision of ANSI/AWWA C227-17)

**AWWA Standard**

---

# Bolted, Split-Sleeve Couplings

---

## SECTION 1: GENERAL

---

### **Sec. 1.1 Scope**

This standard describes bolted, split-sleeve couplings (couplings) used to join pipe of similar outside diameter. Couplings may be manufactured from carbon steel or stainless steel and are intended for use in systems conveying potable water, wastewater, reclaimed water, or air used in water treatment. This standard covers nominal coupling sizes  $\frac{3}{4}$  in. (20 mm) and larger.

### **Sec. 1.2 Purpose**

The purpose of this standard is to provide the minimum requirements for bolted, split-sleeve couplings for pipe, including requirements for materials, design, testing and inspection, installation, marking, and shipping.

### **Sec. 1.3 Application**

This standard can be referenced in purchaser's documents for bolted, split-sleeve couplings for pipe. The stipulations of this standard apply when this document has been referenced and then only to bolted, split-sleeve couplings for pipe.