



**American Water Works
Association**

Erratum to
ANSI/AWWA C226-06
Standard
For

Stainless-Steel Fittings for Waterworks Service, Sizes ½ In. Through 72 In. (13 mm Through 1,800 mm)

(February 2008)

1. Change Section 4.2.3.6, page 11, to read:

Fitting wall thickness. Fabricated fitting wall thickness will be determined by the appropriate formulae in the latest AWWA Manual M11, with consideration that the designer shall review formulae, methods of design, yield strength, modulus of elasticity, etc., for proper application of stainless-steel fittings. The formulae for determining pipe-wall thickness based on internal and external loadings are applicable. Cylinder thickness based on internal pressure is determined using the Barlow hoop-stress formula. The modified Iowa formula shall be used for calculating the deflection of buried pipe. The maximum allowable calculated deflection shall be 5 percent. Equation 9-2 in AWWA Manual M11 shall be used for the determination of wall thickness for mitered stainless-steel elbows. In the reinforcement of stainless-steel fittings, wrappers, collars, and crotch plates shall use the carbon-steel formulae in AWWA Manual M11, with a minimum yield of 25 ksi, or 30 ksi if dual-certified stainless steel is used. As with carbon steel, a 6,000 PDV or greater will indicate the requirement for a crotch plate.



American Water Works
Association

ANSI/AWWA C226-06
(First Edition)

The Authoritative Resource on Safe Water®

AWWA Standard

Stainless-Steel Fittings for Waterworks Service, Sizes 1/2 In. Through 72 In. (13 mm Through 1,800 mm)



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AWWA Standard

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Contents

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

SEC.		PAGE
<i>Forward</i>		
I	Introduction.....	vii
I.A	Background.....	vii
I.B	History.....	vii
I.C	Acceptance.....	vii
II	Special Issues.....	viii
II.A	Basis of Design.....	viii
III	Use of This Standard.....	ix
III.A	Purchaser Options and Alternatives.....	ix
III.B	Modification to Standard.....	x
IV	Comments.....	x
<i>Standard</i>		
1	General	
1.1	Scope.....	1
1.2	Purpose.....	2
1.3	Application.....	2
2	References	2
3	Definitions	3
4	Requirements	
4.1	Materials.....	5
4.2	Fabrication.....	7
5	Verification	
5.1	Inspection.....	11
5.2	Quality Assurance.....	12
5.3	Access and Facilities.....	12
5.4	Rejection.....	13
6	Delivery	
6.1	Marking.....	13
6.2	Certification.....	14
6.3	Packaging.....	14
<i>Tables</i>		
1	Austenitic Stainless-Steel Nominal Chemical Compositions.....	6
2	Mechanical Properties for Cast and Wrought Stainless Steel.....	7
3	Dimensions for Shop-Fabricated Stainless-Steel Fittings.....	8
<i>Figures</i>		
1	Recommended Dimensions for Fabricated Pipe Fittings.....	9

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C226.

I. Introduction.

I.A. *Background.* Stainless steel is a standard material used to construct fittings. It offers very low corrosion rates, which makes it suitable for the handling of potable water while maintaining purity and quality.

I.B. *History.* In 1999, the AWWA Standards Council directed the Standards Committee on Steel Pipe to develop a standard for stainless-steel fittings used in water treatment and conveying facilities. The standard for steel pipe was subsequently split into two committees, one for steel pipe and the other for stainless-steel pipe. This standard was approved by the latter and is the first AWWA standard for stainless-steel fittings used in water treatment and conveying facilities. This first edition of the standard was approved by the AWWA Board of Directors on Feb. 12, 2006.

I.C. *Acceptance.* In May 1985, the US Environmental Protection Agency (USEPA) entered into a cooperative agreement with the consortium led by NSF International (NSF) to develop voluntary third-party consensus standards and a certification program for all direct and indirect drinking water additives. Other members of the original consortium included the American Water Works Association Research Foundation (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, the authority to regulate products for use in, or 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 April 7, 1990.
2. Specific policies of the state or local agency.

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

3. Two standards developed under the direction of NSF: NSF*/ANSI† 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.
4. Other references, including AWWA standards, *Food Chemicals Codex*, *Water Chemicals Codex*,‡ 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 61. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdiction. 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 C226 does not address additive requirements. Users of this standard should consult the appropriate state or local agency having jurisdiction in order to

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

II. Special Issues.

II.A. *Basis of Design.* ANSI/AWWA C226 pertains to the manufacture and testing of stainless-steel fittings. ANSI/AWWA C226 includes all types and classes of stainless-steel fittings typically used in the water industry, regardless of manufacturing source.

The wall thickness of stainless-steel fittings is determined by (1) internal working pressures; (2) external pressures, including live loads; (3) special physical loading, such as continuous-beam loading with saddle supports or ring girders, vacuum conditions, types of

* NSF International, 789 N. Dixboro Road, Ann Arbor, MI 48106.

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

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

§ Appendix C of NSF/ANSI 61 defines those materials that are “Mechanical Devices Acceptable Materials,” which conform to NSF/ANSI 61 requirements.

joints used, and variations in operating temperature; and (4) practical considerations for handling, shipping, lining and coating, or similar operations.

II.A.1. *Application.* The provisions of this standard cover the requirements for stainless-steel fittings for the use in water treatment plants, water transmission and distribution systems, and other water facilities. The purchaser is responsible for determining if any circumstance related to the project requires additional provisions that are not included in the standard. Such special conditions might affect design, manufacture, quality control, corrosion protection, or handling requirements.

II.A.2. *Testing of special sections.* Sec. 5.2.3 provides for nondestructive testing of special sections.

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 the use in the particular application being considered.

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

1. Standard used—that is, ANSI/AWWA C226, *Stainless-Steel Fittings for Waterworks Service, Sizes ½ In. Through 72 In. (13 mm Through 1,800 mm)*, of latest revision.
2. Whether compliance with NSF/ANSI 61, *Drinking Water System Components—Health Effects*, is required, in addition to the requirements of the Safe Drinking Water Act.
3. Internal design pressure.
4. Design stress in the fitting wall at specified internal design pressure (as a percentage of minimum yield point of stainless steel).
5. Minimum wall thickness required by considerations other than internal design pressure.
6. The type of stainless steel (Sec. 4.1).
7. Details of other federal, state, local, and provincial requirements (Sec. 4.1.1).
8. Standard specification of fitting, or plate, sheet, or strip, including material type (Sec. 4.1.6).
9. A description or drawings detailing the total quantity of fittings required for the length and diameter of fittings (see Table 3) (Sec. 4.2.1.5).
10. Welding (Sec. 4.2.1.6, Sec. 4.2.3.3, and Sec. 4.2.3.4).

11. Drawings and calculations to be provided by the manufacturer, when required (Sec. 4.2.1.8 and Sec. 4.2.3.6).
12. Coatings, if necessary (Sec. 4.2.1.9).
13. Type of ends for fittings—description or drawings (Sec. 4.2.2).
14. Qualification code for welding operators, if different from Sec. 4.2.3.1 or Sec. 5.2.1.
15. Special sections, indicating dimensions (Sec. 4.2.3.5) and the grade of material (Sec. 4.1.6).
16. Requirements for cleaning, descaling, and passivating (Sec. 4.2.4).
17. Method of nondestructive testing (Sec. 5.2.3).
18. Pressure for hydrostatic testing of fittings, if required (Sec. 5.2.3.3).
19. Instructions regarding inspection at place of manufacture (Sec. 5.3).
20. Requirements for marking, line diagrams, or laying schedules (Sec. 6.1).
21. Certification of compliance, if required (Sec. 6.2).
22. Handling requirements (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. Comments. If you have any comments or questions about this standard, please call the AWWA Volunteer & Technical Support Department, 303.794.7711, FAX 303.795.7603, write to the group at 6666 West Quincy Avenue, Denver, CO 80235-3098, or e-mail standards@awwa.org.



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AWWA Standard

Stainless-Steel Fittings for Waterworks Service, Sizes 1/2 In. Through 72 In. (13 mm Through 1,800 mm)

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard pertains to the various classes and types of stainless-steel fittings that are intended for use in facilities of water distribution systems.

1.1.1 *Classes.* This standard covers three classes of materials; wrought austenitic stainless-steel fittings; cast austenitic stainless-steel fittings; and welded or weld-fabricated austenitic stainless-steel fittings, in diameters ranging from 1/2 in. (13 mm) to 72 in. (1,800 mm).

1.1.2 *Large fittings.* Fittings larger than 72 in. (1,800 mm) in diameter may be manufactured with special consideration given to the specific nature of the application.

1.1.3 *Appurtenances not covered by this standard.* Mechanical grooved-end fittings, compression fittings, grooved-end couplings, tapping sleeves, sleeve-type couplings and split-sleeve couplings are covered by other ANSI/AWWA standards.