



**American Water Works
Association**

ANSI/AWWA C220-12
(Revision of AWWA C220-07)

The Authoritative Resource on Safe Water®

AWWA Standard

Stainless-Steel Pipe, 1/2 In. (13 mm) and Larger



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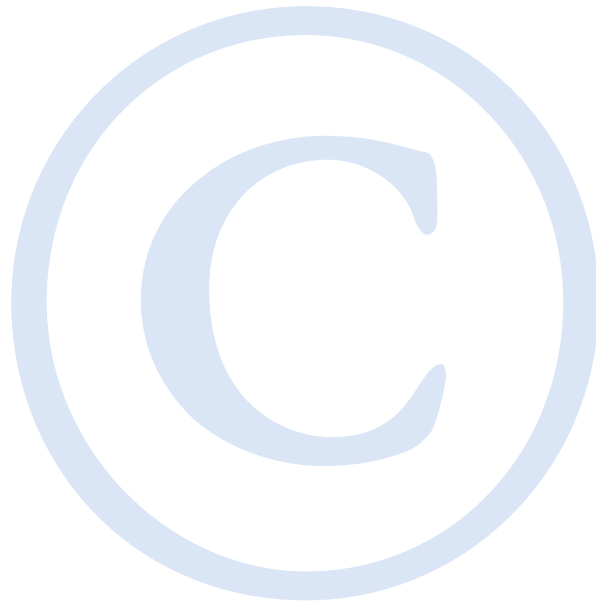
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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C220.*

I. Introduction.

I.A. *Background.* Stainless steel is a standard material used to construct pipe. It offers low corrosion rates, which makes it suitable for the handling of potable water while maintaining water purity and quality. In 1996, stainless steel was approved as a material suitable to meet the NSF[†]/ANSI 61, Drinking Water Treatment Components—Health Effects, Addendum C requirement.

I.B. *History.* In 1987, the AWWA Standards Council directed the Standards Committee on Steel Pipe to develop a standard for stainless-steel pipe used in water treatment or conveying facilities. The first edition of ANSI/AWWA C220, Standard for Stainless-Steel Pipe, 4 in. (100 mm) and Larger was approved by the AWWA Board of Directors on June 18, 1992. The second edition was approved Jan. 25, 1998. The third edition was approved on Jan. 16, 2005. This fourth edition was approved on Jan. 22, 2012.

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 and the Association of State Drinking Water Administrators (ASDWA) joined later.

In the United States,[‡] 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 Apr. 7, 1990.
2. Specific policies of the state or local agency.

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

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

‡ 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 Chemical—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.

4. Other references, including AWWA standards, *Food Chemical 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 C220 does not address additives requirements. 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. *Basis of Design.* ANSI/AWWA C220 pertains to the manufacture and testing of the stainless-steel pipe cylinder. ANSI/AWWA C220 includes all types and classes of stainless-steel pipe, ½ in. (13 mm) in diameter and larger, typically used in the water industry, regardless of pipe-manufacturing source.

The wall thickness of stainless-steel pipe is determined by (1) internal pressures; (2) external pressure; (3) special physical loading, such as continuous-beam loading with saddle supports or ring girders, vacuum conditions, type of joint used, and variations in operating temperature; and (4) practical considerations for handling, shipping, or similar operations.

* Both publications available from National Academy of Sciences, 500 Fifth Street N.W., Washington, DC 20418.

The design techniques described in AWWA Manual M11, *Steel Pipe—A Guide for Design and Installation*, are used to determine the minimum wall thicknesses of steel pipe. The purchaser shall establish and specify the wall thickness determined to be satisfactory for design conditions. The purchaser should consider the properties of the lining and coating materials, if specified, when selecting design stresses and deflection limits. Alternatively, the purchaser shall establish and specify the minimum wall thickness that will satisfy conditions of external pressure, trench loadings, and special physical loadings. The manufacturer may select materials and manufacturing processes within the limitations of this standard to produce pipe of the wall thickness required to additionally satisfy specified internal pressure. The purchaser shall specify the internal design pressure and show the depth of cover over the pipe together with installation conditions and details associated with any special physical loading conditions. The manufacturer shall select and furnish pipe that has a wall thickness that meets the requirements of the internal design pressure and external load design. This thickness shall govern if it exceeds the minimum thickness specified by the purchaser. Pipe-wall thickness to meet the design requirements will be determined by the appropriate formulas in AWWA Manual M11 using stainless steel material properties.

II.A.1 Application. The provisions of this standard cover the requirements for stainless-steel pipe for use in water treatment plants, water transmission and distribution systems, and other water facilities. The purchaser is responsible for determining whether any unusual circumstances related to the project require 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. 5.2.2.1 describes test methods that may be necessary if, in the opinion of the purchaser, unusually severe conditions exist, such as surge or transient pressures that cause stresses exceeding 75 percent of yield. The requirement for this special testing should be specified at the time of purchase.

II.A.3 Roundness of pipe. The roundness of pipe during handling, shipping, joint makeup, and backfilling should be specified by the purchaser. Pipe may have to be studded to remain round during transportation, installation, and backfilling.

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, AWWA C220, Stainless-Steel Pipe, ½ in. (13 mm) and Larger, of latest revision.
2. Whether compliance with NSF/ANSI 61, Drinking Water System Components—Health Effects, is required.
3. A description of drawings detailing the total quantity of pipe required for each diameter.
4. Internal design pressure, if the manufacturer is required to design the pipe.
5. Design stress in the pipe wall at specified internal design pressure (as a percentage of minimum yield point of the stainless steel), if the manufacturer is required to design the pipe.
6. Minimum wall thickness required by considerations other than internal design pressure, if the manufacturer is required to design the pipe.
7. Details of other federal, state, or provincial, and local requirements (Sec. 4.2.1).
8. Specification of pipe standard or stainless-steel grade, if there is a preference (Sec. 4.2.2).
9. Drawings and calculations to be furnished by the manufacturer, when required (Sec. 4.3.1 and Sec. 4.3.2), if the manufacturer is required to design the pipe.
10. Protective lining and coating, if required (Sec. 4.3.3).
11. Welding (Sec. 4.4.2 and 4.4.3).
12. Qualification code for welding operators, if different from Sec. 4.4.3.4.1.
13. Length of pipe sections; random or specified lengths (Sec. 4.5.4).
14. Type of pipe ends; description or drawings (Sec. 4.6).
15. Drawing of butt straps and instructions as to whether or not butt straps are to be supplied separately or attached to the pipe (Sec. 4.6.5).
16. Requirements for cleaning and descaling (Sec. 4.8).
17. Special sections, indicating for each component part the dimensions or standard designation (Sec. 4.9.1) and the grade of material required (Sec. 4.9.2).
18. Type of flange, pressure rating, class, and inside diameter (ID) (Sec. 4.9.2.1).
19. Instructions regarding inspection at the place of manufacture (Sec. 5.1).
20. Minimum hydrostatic test pressure, if required and different from Sec. 5.2.1.
21. Method of nondestructive testing to be used for special sections (Sec. 5.2.2.1) or, in the case of severe service conditions, the requirements for hydrostatic testing of special sections (Sec. 5.2.2.2).
22. Requirements of marking, line diagrams, or laying schedules (Sec. 6.1).
23. Special handling and capping requirements (Sec. 6.2).
24. Certification of compliance, if required (Sec. 6.3).

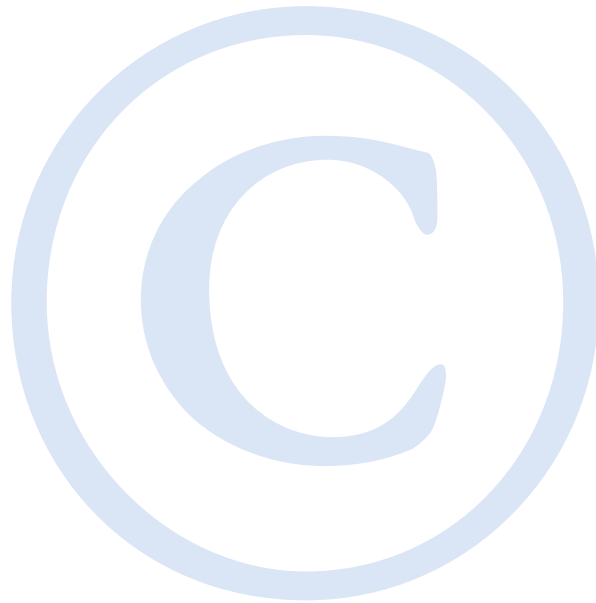
III.B. *Modification to Standard.* Any modification of the provisions, definitions, or terminology in this standard must be provided by the purchaser.

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

1. Updated scope to include wastewater and reclaimed water (Sec. 1.1)
2. Updated the reference documents in Section 2.
3. Added new definitions for nominal weight per unit length, supplier, potable water, reclaimed water, wastewater, and UNS: Unified Numbering System to Section 3.
4. Revised the definitions for butt joint, coupon, and working pressure and deleted the definitions for duplex stainless steel, order to chemistry, and specified lengths.
5. Added duplex stainless steels to the materials allowed in the standard.
6. Deleted old Table 1 and added new Table 1, Mechanical properties for austenitic or duplex stainless steel.
7. The sections on material chemistry and thickness tolerances under Sec. 4.2.3 Fabricated pipe have been deleted.
8. Sec. 4.4.2.1 Welded butt joints was revised and the offset requirements were revised to be consistent with changes made in ANSI/AWWA C200. A new Figure 1, Repair method by offset value and wall thickness, and new Table 2, Repair requirements based on offset value and wall thickness, were added.
9. Sec. 4.4.3.7 Frequency of production weld test has been revised.
10. Sec. 4.4.3.8 Retests has been revised.
11. Sec. 4.5.3 Straightness was revised.
12. A new Sec. 4.5.4.2 on random lengths was added.
13. Sec. 4.5.4.3 Girth welds has been revised.
14. A new Sec. 4.5.5 on out-of-roundness was added.
15. Sec. 4.6.4 Beveled ends for field butt welding was rewritten.
16. A requirement for butt strap thickness and overlap was added to Sec. 4.6.5.
17. Old Sec. 4.6.7 on bell and spigot ends was deleted.
18. Old Sec. 4.6.8 Plain ends fitted with flanges and Sec. 4.6.8.1 Out-of-roundness have been deleted.
19. A new Sec. 4.6.7 Manufacturing tolerances at ends has been added.
20. Sec. 4.6.7.1 on diameter and circumference tolerance has been revised.
21. A new Sec. 4.6.7.1.2 on tolerances for mechanical couplings has been added.
22. Sec. 5.2.1 Hydrostatic testing has been revised and new requirements have been added for liquid dye penetrant test, eddy current test, and ultrasonic or visual tests.

- 23. A new Sec. 5.2.1.5 has been added on seamless pipe.
- 24. Old Sec. 5.2.1.2 Drain after hydrotesting, was deleted.

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 e-mail at standards@awwa.org.





**American Water Works
Association**

AWWA Standard

Stainless-Steel Pipe, ½ In. (13 mm) and Larger

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard pertains to stainless-steel pipe that is seamless, longitudinal-seam, or spiral-seam welded, ½ in. (13 mm) in nominal diameter and larger, intended for the transmission and distribution of potable water, wastewater, reclaimed water and for use in other water-supply system facilities.

Sec. 1.2 Purpose

The purpose of this standard is to provide the minimum requirements for stainless-steel pipe, ½ in. (13 mm) and larger, including materials and quality of work, fabrication of pipe, specials and fittings, and testing and inspection.

Sec. 1.3 Application

This standard can be referenced in documents for purchasing and receiving stainless-steel pipe, ½ in. (13 mm) and larger. This standard can be used as a guide for manufacturing this type of stainless-steel pipe. The stipulations of this standard apply when this document has been referenced and then only to stainless-steel pipe, ½ in. (13 mm) and larger.