



American Water Works Association
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AWWA C220a-99
Addendum to
ANSI/AWWA C220-98
Standard
for
Stainless-Steel Pipe, 4 In. (100 mm) and Larger

(Approved by the AWWA Board of Directors on June 20, 1999.)

P. 3, Sec. 3, definition 9: Change the title from *Internal design pressure* to *Working pressure*.

P. 4, Sec. 3, definition 31: Delete definition 31., *Welded butt joints*.

P. 7, Sec. 4.4.3.4.1: Change this section to read: Welders and welding operators shall be qualified under . . .

P. 7, Sec. 4.4.3.5: Change the title of this section to read: Welder and welding operator tests. Also, in the first sentence of this section delete "welding operator" and in its place insert "welder or welding operator."

P. 12, Sec. 4.6.8.1: Delete Sec. 4.6.8.1 in its entirety and in its place insert the following:

Sec. 4.6.8.1 Circumference. The out-of-roundness of pipe ends shall be consistent with the diameter and wall thickness of the pipe supplied and the type of joint. Any out-of-roundness shall be limited to a smooth oval that may be jacked back to a circular shape.

P. 13, Sec. 4.6.10: Revise the title of Sec. 4.6.10 to read as follows: 4.6.10 *Squareness of ends for welded butt joints*.

American Water Works Association

ANSI/AWWA C220-98

(Revision of ANSI/AWWA C220-92)



AWWA STANDARD
FOR
STAINLESS-STEEL PIPE,
4 IN. (100 mm) AND LARGER



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AMERICAN WATER WORKS ASSOCIATION

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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. 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 on the first page of the classified advertising 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.

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Foreword

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

I. Introduction.

I.A. *Background.* Stainless steel is a standard material used to construct pipe. It offers very 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 ANSI* / NSF[†] Standard 61, 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, and had an effective date of Apr. 1, 1993. This is the second edition of this standard.

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 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,[‡] 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.
3. Two standards developed under the direction of NSF, ANSI/NSF 60, Drinking Water Treatment Chemicals—Health Effects, and ANSI/NSF 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 ANSI/NSF 61. Individual states or local agencies have authority to

*American National Standards Institute, 11 W. 42nd St., New York, NY 10036.

†NSF International, 3475 Plymouth Rd., Ann Arbor, MI 48106.

‡Persons in Canada, Mexico, and non-North American countries should contact the appropriate authority having jurisdiction.

§Both publications available from National Academy of Sciences, 2102 Constitution Ave. N.W., Washington, DC 20418.

accept or accredit certification organizations within their jurisdiction. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

Appendix A, "Toxicology Review and Evaluation Procedures," to ANSI/NSF 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 Appendix A procedures may not always be identical, depending on the certifier.*

AWWA C220-98 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 all 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, 4 in. (100 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, including static and transient pressures; (2) external pressures, including trench loading and earth fill; (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, lining and coating, or similar operations.

The design techniques described in AWWA Manual M11, *Steel Pipe—A Guide for Design and Installation*, are used to determine minimum wall thicknesses of steel pipe. The purchaser shall establish and specify the wall thickness determined to be satisfactory for all conditions, including internal pressure. The purchaser should consider the properties of the lining and coating materials if used when selecting design stresses and deflection limits. Alternatively, the purchaser shall establish and specify the minimum wall thickness that will satisfy all conditions of external pressure and 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. 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.

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

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

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 Rubber-Gasket Joints. The purchaser should be aware that a rubber gasket manufactured of natural rubber or 100-percent synthetic polyisoprene, if improperly installed, may revert to its uncured state through hysteresis. This condition may occur if a fish-mouthed gasket (that is, where a portion of the gasket is not contained within the gasket groove) is subjected to heat generated by excessive vibration. The excessive vibration is caused by leakage past the gasket when the pipeline is pressurized.

II.A.3 Testing of Special Sections. Section 5.2.2.1 provides for nondestructive testing of the seams of specials. Section 5.2.2.2 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.4 Roundness of Pipe. The roundness of pipe during handling, shipping, joint makeup, and backfilling should be covered in the purchaser's specifications. Pipe may have to be studded, so it will remain round during transportation, installation, and backfilling.

III. Use of This Standard. AWWA has no responsibility for the suitability or compatibility of the provisions of this standard to any intended application by any user. Accordingly, each user of this standard is responsible for determining that the standard's provisions are suitable for and compatible with that user's intended application.

III.A. Purchaser Options and Alternatives. The following items should be covered in the purchaser's specifications:

1. Standard used—that is, ANSI/AWWA C220, Standard for Stainless-Steel Pipe, 4 In. (100 mm) and Larger, of latest revision.
2. A description or drawings detailing the total quantity of pipe required for each diameter.
3. Internal design pressure if the manufacturer is required to design the pipe.
4. 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.
5. Minimum wall thickness required by considerations other than internal design pressure if the manufacturer is required to design the pipe.
6. Instructions regarding inspection at place of manufacture (Sec. 5.1).
7. Drawings and calculations to be furnished by the manufacturer, when required (Sec. 4.2.1 and 4.3.2), if the manufacturer is required to design the pipe.
8. Protective lining and coating if required (Sec. 4.3.3).
9. Requirement for marking, line diagrams, or laying schedules (Sec. 6.1).
10. Special handling requirements (Sec. 6.2).
11. Certification of compliance if required (Sec. 6.3).
12. Specification of pipe standard or stainless-steel grade if there is a preference (Sec. 4.2.2), or desired physical properties for "ordering to chemistry only" (Sec. 3[3], 4.2.3.2, and 4.2.4).
13. Welding (Sec. 4.4.3).
14. Qualification code for welding operators if different from Sec. 4.4.3.4.1.
15. Minimum hydrostatic test pressure if required and different from Sec. 5.2.1.