ANSI/AWWA **C220-23**

(Revision of ANSI/AWWA C220-17)

AWWA Standard

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

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American Water Works Association

Approved American National Standard ANSI

STANDARD Since 1881

AWWA Standard

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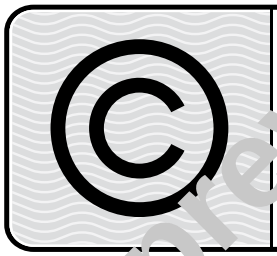

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Committee Personnel

The Steel Water Pipe Manufacturers Technical Advisory Committee (SWPMTAC) Task Group on updating AWWA C220 had the following personnel at the time:

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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.

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†/CAN‡ 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. Subsequent editions were approved on Jan. 25, 1998; Jan. 16, 2005; Jan. 22, 2012; and June 11, 2017. This edition was approved on June 9, 2023.

I.C. *Acceptance*. In May 1985, the U.S. 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). 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. Specific policies of the state or local agency.

* NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.

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

‡ Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.

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

2. Four standards developed under the direction of NSF: NSF/ANSI/CAN 60, Drinking Water Treatment Chemicals—Health Effects; NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects; NSF/ANSI/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 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/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 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

[¶] Both publications available from National Academies Press, 500 Fifth Street, NW, Washington, DC 20001.

in operating temperature; and (4) practical considerations for handling, shipping, or similar operations.

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. Pipe-wall thickness to meet the design requirements will be determined by the appropriate formulas in AWWA Manual M11 using stainless-steel material properties per Table 1 herein. The purchaser shall establish and specify the minimum wall thickness determined to be satisfactory for the service conditions of the pipe. Alternatively, the purchaser may provide the performance criteria for the pipeline and request the manufacturer to design the pipe for purchaser acceptance. The purchaser should consider the properties of the lining and coating materials, if specified, when selecting design stresses and deflection limits. The manufacturer may select materials and manufacturing processes within the limitations of this standard to produce pipe of the minimum wall thickness as specified or approved by the purchaser.

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 nondestructive testing methods for weld seams of special sections that may be necessary by request of the purchaser. 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 stulled (i.e., cross braced) to remain round.

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/CAN 61, Drinking Water System Components—Health Effects, is required.

3. A description and/or drawings detailing the total quantity of pipe required for each diameter.

4. Internal design pressure and other service conditions, 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 specified minimum yield strength of the stainless steel), if the manufacturer is required to design the pipe.

6. Details of federal, state, provincial, territorial, and local requirements (Sec. 4.2.1).

7. Specification of pipe standard and stainless-steel grade, if there is a preference (Sec. 4.2.2).

8. Drawings and calculations to be furnished by the manufacturer (Sec. 4.3.1 and Sec. 4.3.2), if the manufacturer is required to design the pipe.

9. Protective lining and coating, if required (Sec. 4.3.3).

10. Welding requirements (Sec. 4.4.2 and Sec. 4.4.3).

11. Qualification code for welding operators, if different from Sec. 4.4.4.4.1.

12. Length of pipe sections; random or specified lengths (Sec. 4.5.4).

13. Type of pipe ends; description or drawing (Sec. 4.6).

14. Drawing of butt straps and instructions as to whether butt straps are to be supplied separately or attached to the pipe (Sec. 4.6.5).

15. Requirements for cleaning and descaling (Sec. 4.8).

16. 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).

17. Type of flange, pressure rating, class, and inside diameter (ID) (Sec. 4.9.2.1).

18. Instructions regarding inspection at the place of manufacture (Sec. 5.l).

19. Minimum hydrostatic test pressure, if required and different from Sec. 5.2.1.1.

20. 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).

21. Requirements of marking, line diagrams, or laying schedules (Sec. 6.1).

22. Special handling and capping requirements (Sec. 6.2).

23. Affidavit 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 Sec. I.C. Acceptance in the Foreword with the latest Standards Council language reflecting the addition of reference to NSF/ANSI/CAN 372 and NSF/ANSI/CAN 600.

2. Sec. 1.1 Scope was updated to recognize the synonymous use of the terms pipe and tube within the standard.

3. In Section 2 References, several ASTM and AWS standards were added as follows:

- ASTM A249/A249M and ASTM A269/A269M for welded tubes;
- ASTM A1119 for partially corrugated stainless-steel tubing for water service lines;
- AWS D10.4 for welding austenitic stainless pipe and tubing; and
- AWS D10.18 for welding duplex stainless-steel pipe and tubing.

4. In Sec. 3, the definitions for *coil splice*, *lap-joint*, *tube*, and *partially corrugated tube* were added.

5. In Sec. 3, the definitions for *passivation* and *pickling* were modified to be more explicit.

6. Updated Sec. 4.1 Permeation and Sec. 4.2 Materials with the latest Standards Council boilerplate language.

7. In Sec. 4, Table 1, a note was added to define the applications for types 201 and 201LN.

8. In Sec. 4.4.1 General Requirements, reference to the added ASTM and AWS standards was made and a note on bright annealing was added.

9. In Sec. 4.4.2 Manufacture, fabrication, and handling, instructions were updated regarding contamination (previously included in Sec. 4.4.2.2).

10. Sec. 4.4.3.3 Marking was updated and made a requirement of the standard.

11. In Sec. 4.4.4.6.4, verification of complete joint penetration was revised and the requirement was revised from one to two macroetch tests.

12. In Sec. 4.6.5 Ends fitted with butt straps for field welding, a requirement for butt strap fit-up gap between faying surfaces was added.

13. A new Sec. 4.6.6, Ends for lap joints for field welding, was added.

14. A new Sec. 4.6.8.1.3 was added for lap-joint pipe prepared for welding.

15. Sec. 4.8 Cleaning and Descaling was slightly revised, and a note on bright annealing was added.

16. In Sec. 5.3.2 Defects, undercut and excessive spatter were added.

17. Sec. 6.1 Marking was revised to include adhesive labels.

V. Comments. If you have any comments or questions about this standard, please call AWWA Engineering and Technical Services at 303.794.7711; write to the department at 6666 West Quincy Avenue, Denver, CO 80235-3098; or email at standards@awwa.org.

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(Revision of ANSI/AWWA C220-17)

American Water Works Association
Dedicated to the World's Most Vital Resource®

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 or tube that is seamless, longitudinal-seam, or spiral-seam welded; ½ in. (13 mm) in nominal diameter and larger; and intended for the transmission and distribution of potable water, wastewater, and reclaimed water, and for use in other water supply system facilities. For the purpose of this standard, the term pipe and tube may be used interchangeably.

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, special sections and fittings, testing and inspection, and marking requirements.

Sec. 1.3 Application

This standard can be referenced in documents for purchasing and receiving, as well as serving as a guide for manufacturing, stainless-steel pipe, ½ in. (13 mm) and larger. 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.