ANSI/AWWA **C604-24**

(Revision of ANSI/AWWA C604-17)

AWWA Standard

Installation of Buried Steel Water Pipe—4 In. (100 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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Committee Personnel

The Steel Water Pipe Manufacturers Technical Advisory Committee (SWPMTAC) Task Force for Development and Maintenance of ANSI/AWWA C604, which revised this standard, had the following personnel at the time:

Brent Keil, *Chair*

H.H. Bardakjian, Consultant, Glendale, Calif.
R.J. Card, Manufacturing Consultant, Sugar Hill, Ga.
D. Dechant, Manufacturing Consultant, Aurora, Colo.
D.W. Dunker, Thompson Pipe Group, Rialto, Calif.
J. Forni, Jifco Inc., Livermore, Calif.
B. Hansen, National Welding Corporation, Midvale, Utah
B.D. Keil, Northwest Pipe Company, Salt Lake City, Utah
D. Libby, Chase Corporation, Westwood, Mass.
J.L. Luka, American SpiralWeld Pipe Company, Columbia, S.C.
R.D. Mielke, Northwest Pipe Company, Raleigh, N.C.

The 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*
Bob 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 Inc., Sugar Hill, Ga.
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, Kans.
R. Issa, AECOM, McKinney, Tex.
C.H. Kirby (*alternate*), Lockwood, Andrews & Newnam Inc., Houston, Tex.
R.A. Kufaas, Norske Corrosion & Inspection Services Ltd., Abbotsford, B.C.
A.S. Maughn (*alternate*), Freese and Nichols Inc., Dallas, Tex.

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D.L. McPherson (*alternate*), HDR, Charlotte, N.C.
A. Murdock, Jacobs, Holladay, Utah
R. Ortega, Aurora Technical Services, Houston, Tex.
E.S. Ralph (*liaison, nonvoting*), Standards Engineer Liaison, AWWA, Denver, Colo.
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. Dechant, Dechant Infrastructure Service, Aurora, Colo.
D.W. Dunker, Thompson Pipe Group, Rialto, Calif.
B.D. Keil, Northwest Pipe Company, Salt Lake City, Utah
J.L. Luka, American SpiralWeld Pipe Company, Columbia, S.C.
R.D. Mielke (*alternate*), Northwest Pipe Company, Raleigh, N.C.
L. Prinsloo, Victaulic, Easton, Pa.
B.E. Ripley (*alternate*), Victaulic, Lexington, S.C.
G.F. Ruchti (*alternate*), Consultant, Punta Gorda, Fla.
B. Simpson (*alternate*), American Cast Iron Pipe Company, Birmingham, Ala.
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. Fox, Tampa Bay Water, Clearwater, Fla.
J. Garcia (*alternate*), Metropolitan Water District, La Verne, Calif.
S. Hattan, Tarrant Regional Water District, Ft. Worth, Tex.
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. Scutelnicu, Los Angeles Department of Water and Power, Los Angeles, Calif.
J. Shieh (*alternate*), Los Angeles Department of Water and Power, Los Angeles, Calif.
M. Turney (*alternate*), Denver Water, Denver, Colo.

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C604.*

I. Introduction.

I.A. *History.* This standard pertains to the in-ground installation of steel pipelines for use in the distribution and transmission of water, air, and other products in water system facilities. It has been prepared by the AWWA Standards Committee on Steel Pipe, initially formed as Committee A7A in 1939. At that time, the Steel Water Pipe Manufacturers Technical Advisory Committee was organized as a subsidiary group to function as a source of technical information for the parent committee. Committee A7A and its successors, Committee 8310D and the AWWA Standards Committee on Steel Pipe, have assumed responsibility for all AWWA standards and manuals pertaining to steel pipe, fittings, linings and coatings, field installations, and related items.

In 1996 the AWWA Standards Council directed the Standards Committee on Steel Pipe to develop a standard for the installation of steel pipelines and their appurtenances used in water treatment or conveying facilities. The first edition of AWWA C604 was approved by the AWWA Board of Directors on Feb. 12, 2006. Subsequent editions were approved on Jan. 23, 2011, and Jan. 14, 2017. This edition was approved on Oct. 14, 2024.

I.B. *Discussion.* ANSI/AWWA C604 addresses the installation of steel pipe 4 in. (100 mm) in diameter and larger typically used in the water industry. ANSI/AWWA C604 anticipates the use of pipe produced in a fabricator's shop or pipe mill that meets the stringent design, quality control, and testing requirements of AWWA Manual M11, ANSI/AWWA C200, and the applicable AWWA steel pipe lining and coating standards.

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 National Standards Institute, 1180 Avenue of the Americas, 10th Floor, New York, NY 10036.

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

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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.

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 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/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 C604 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.

[‡] Persons outside the United States should contact the appropriate authority having jurisdiction.

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

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

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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. *Application.* ANSI/AWWA C604, Installation of Buried Steel Water Pipe—4 In. (100 mm) and Larger, can be used as a reference when making extensions to existing distribution or transmission systems or when constructing new distribution or transmission systems using steel pipe. It is not the intent for this standard to be used as a contract document, but it may be used as a reference in contract documents. It is based on a consensus of the committee on the minimum practice consistent with sound, economical service under normal conditions, and its applicability under any circumstances must be reviewed by a responsible engineer. The standard is not intended to preclude the manufacture, marketing, purchase, or use of any product, process, or procedure.

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 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, thus experiences minimal degradation. This was validated in a research paper (Bonds 2004) 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.

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

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III.A. *Purchaser Options and Alternatives.* Considerable supplemental information is required in conjunction with the use of this standard including, but not limited to, purchaser's documents consisting of detailed plans and specifications. The purchaser's documents should cover, as a minimum, detailed instructions pertaining to all references in this standard to "as specified" and "in accordance with the purchaser's documents." In addition, the purchaser shall provide specific supplementary information to the purchaser's documents regarding the following:

1. Standard used—that is, ANSI/AWWA C604, Installation of Buried Steel Water Pipe–4 In. (100 mm) and Larger, of latest revision.

2. Whether compliance with NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects, is required.

3. Pipe design criteria and type of pipe ends.

4. Pipeline plan and profile drawings including appurtenances, vaults, valves, and existing utilities.

5. Pipe bedding specification and drawing details.

6. Inspection for pipe joints, protective coatings and linings, and pipe zone compaction.

7. Surface restoration.

8. Special handling requirements.

9. Details of federal, state, provincial, territorial, and local requirements (Sec. 4.2).

10. Whether proof testing of the weld-after-backfill method is required for the project-specific conditions, including testing protocols (Sec. 6.2.2). NOTE: The exterior protective joint coating, backfill material, pipe wall thickness, and welding procedures should be considered when using this process.

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 the 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. Added a new Figure 1, Pipe details.

3. Section 3 Definitions was updated: the definitions for sidefill, lap joint, potable water, raw water, reclaimed water, and wastewater were added; the definitions for final backfill and critical haunch were updated; and the definitions for bevel, fillet

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weld, initial backfill, nominal diameter or size, pipe embedment, and random lengths were deleted.

4. Sec. 4.1 Permeation and Sec. 4.2 Materials were updated with the latest Standards Council boilerplate language.

5. In Sec. 5.1.1 Prior investigation, a sentence on tie-in points was added.

6. Sec. 5.2.6 Pipe bedding was revised, and a sentence addressing uncompacted pipe bedding was added.

7. Sec. 5.2.10 Blasting was deleted.

8. The previous Figure 3 Joint deflection was deleted.

9. In Sec. 6.2.4.10 Torque, a reference to the AWWA torque calculator was added.

10. Sec. 6.2.12 Thermal stress control joints was revised, and a sentence on the use of weld-after-backfill was added.

11. In 6.2.14 Protective linings and coatings at field joints, the sections on field repairs of linings and coatings were removed to prevent conflicts with applicable standards.

12. In Sec. 6.3 Thrust restraint, a sentence regarding the use of thrust blocks was added.

13. Sec. 6.4 Backfilling was revised for clarity.

14. A new Sec. 6.4.1.5 was added on flowable fill.

15. Figure 7 Trench cross section was updated.

16. A new Sec. 6.4.4 Pipe deflection measurement was added.

17. Sec. 8.1.3 Internal bracing was revised.

18. In Appendix A, Secs. A.2.1 Flanges, A.2.3.3 Dimensions, and A.2.6.2 Gasket Thickness were revised.

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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American Water Works Association

ANSI/AWWA C604-24
(Revision of ANSI/AWWA C604-17)

AWWA Standard

Installation of Buried Steel Water Pipe—4 In. (100 mm) and Larger

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard provides the field installation guidelines for buried steel water pipe, 4 in. (100 mm)* and larger.

The information contained in this standard is intended to be used as a guide to assist in the installation of steel water pipe.

1.1.1 *Conditions that may require additional considerations.* Installations that require special attention, techniques, and materials are not covered by this standard. Some of these installations are

1. Piping through rigid walls or structures.
2. Connections to appurtenances.
3. Piping on supports or on piles aboveground or belowground.
4. Piping subject to significant thermal stresses.
5. Treatment plant or pump-station piping.
6. Industrial piping.
7. Piping in seismic areas.
8. Piping in high-density stray-current environments.

* Metric conversions given in this standard are direct conversions of US customary units and are not those specified in the International Organization for Standardization (ISO) standards.

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