ANSI/AWWA C604-17
(Revision of ANSI/AWWA C604-11)

American Water Works Association
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AWWA Standard

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

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AWWA Standard

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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. The second edition was approved on Jan. 23, 2011. The present edition of C604 was approved on Jan. 14. 2017.

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, 25 West 43rd Street, Fourth Floor, New York, NY 10036.
† NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.

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. 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.
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 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.

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 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.
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.

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

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

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 reported in the *Journal AWWA*,* where 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.

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

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

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 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 other federal, state or provincial, 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. Sec. I.B in the foreword, which provides a discussion on ANSI/AWWA C604, was updated.
2. An advisory statement was added in the foreword (Sec. II.B) regarding chlorine and chloramine degradation of elastomers per the AWWA Standards Council directive.
3. Section 2, References, has been updated.
4. *Weld-after-backfill* was added to Section 3, Definitions.
5. The section numbering and subtitles were revised to streamline the document.
6. Additional information on pipe ends was added to Sec. 6.2.2, Pipe Placement for welded lap joints.

7. Sec. 6.2.4, Bolted Flange Joints, was significantly updated and expanded.

8. New Figure 5, Flat-Face Slip-on Ring Flange With Fillet Weld Detail, and Figure 6, Gasket Types, were added.

9. Old Figure 5, Bolt Torque Sequence, was deleted and is now covered in appendix A.

10. Sec. 6.2.10.4, Welded Joint Testing, was updated.

11. Sec. 6.2.12, Thermal Stress Control Joints, was revised.

12. Sec. 6.2.14.1, Tape Wrapping of Field Joints, was revised for clarity.

13. Sec. 6.2.14.3, Heat-Shrink Sleeves on Field Joints, was revised.

14. Additional information was added to Sec. 8.1.3, Internal Bracing.

15. A new appendix A was added to include flange assembly detail information.

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 email at standards@awwa.org.

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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.

* 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.