

ANSI/AWWA **C600-23**
(Revision of *ANSI/AWWA C600-17*)

AWWA Standard

Installation of Ductile-Iron Mains and Their Appurtenances

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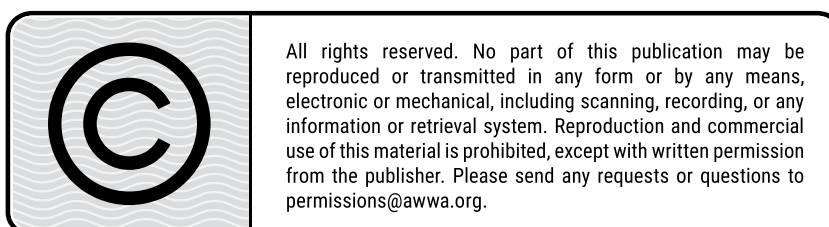
AWWA Standard

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Committee Personnel

The AWWA A21 Subcommittee on the Installation of Ductile-Iron Pipe, which reviewed and approved this standard, had the following personnel at the time of approval:

J. Hal Eddings, *Chair*

General Interest Members

J.A. Hrdlicka (*liaison, nonvoting*), Standards Engineer Liaison, AWWA, Denver, Colo.

J.R. Plattsmier, HDR Engineering Inc., Denver, Colo.

P.A. Selig, Consultant, Birmingham, Ala.

J.M. Vellano, Vellano Brothers Inc., Latham, N.Y.

Producer Members

L.R. Dunn (*alternate*), U.S. Pipe & Foundry Company, Birmingham, Ala.

J.H. Eddings, McWane Ductile, Phillipsburg, N.J.

J.A. Fancher II (*alternate*), American Cast Iron Pipe Company, Birmingham, Ala.

M.D. Gaston, American Cast Iron Pipe Company, Birmingham, Ala.

L.G. Horn, Ductile Iron Pipe Research Association, Birmingham, Ala.

D.A. Hughes, U.S. Pipe & Foundry Company, Birmingham, Ala.

User Members

R.Y. Matsui, Honolulu, Hawaii

M.L. McLaughlin, Independence Water Department, Independence, Mo.

C.J. Patla, Connecticut Water Service Inc., Clinton, Conn.

J.M. Ross, Denver Water, Denver, Colo.

R.L. Worden, COMCD, Norman, Okla.

The AWWA Standards Committee on Ductile-Iron Pipe and Fittings, which reviewed and approved this standard, had the following personnel at the time of approval:

John R. Plattsmier, *Chair*

Maury D. Gaston, *Vice-Chair*

General Interest Members

M. Dunn, Crist Engineers Inc., Little Rock, Ark.

J. Hebenstreit, UL LLC, Northbrook, Ill.

M.B. Horsley, Horsley Engineering LLC, Overland Park, Kans.
J.A. Hrdlicka (*liaison, nonvoting*), Standards Engineer Liaison, AWWA, Denver, Colo.
D.H. Kroon, Aegion, Montgomery, Tex.
D.D. Lary (*alternate*), Wright-Pierce, Topsham, Maine
C.R. Laucamp, AECOM, Chicago, Ill.
P.J. Mourt, HDR Engineering, Plymouth Meeting, Pa.
J.R. Plattsmier, Plattsmier Engineering PLLC, New Port Richey, Fla.
S. Pool (*alternate*), HDR, Denver, Colo.
G. Ramon (*liaison, nonvoting*), Standards Council Liaison, Little Rock Water Reclamation Authority, Little Rock, Ark.
T.M. Stinson, Kleinfelder Inc., Hollbrook, Mass.

Producer Members

C. Corcoran (*alternate*), U.S. Pipe and Foundry, Hoover, Ala.
L.R. Dunn (*alternate*), U.S. Pipe & Foundry, Bessemer, Ala.
J.H. Eddings, McWane Ductile, Phillipsburg, N.J.
J.A. Fancher (*alternate*), ACIPCO, Birmingham, Ala.
M.D. Gaston, American Ductile Iron Pipe, Birmingham, Ala.
L.G. Horn, Ductile Iron Pipe Research Association, Birmingham, Ala.
D.A. Hughes, U.S. Pipe & Foundry, Pelham, Ala.
J.C. Jones, Georg Fischer Piping Systems, Dallas, Tex.
J.S. Palombo, EJ Prescott, Gardiner, Maine
A. Rich (*alternate*), G.A. Rich & Sons, Deer Creek, Ill.
R.D. Swalley, Electrosteel USA LLC, Birmingham, Ala.
M.A. Vess (*alternate*), Tyler Union Waterworks, Anniston, Ala.

User Members

M.J. Britch, Tualatin Valley Water District, Beaverton, Ore.
J. Fox, Tampa Bay Water, Clearwater, Fla.
M.L. McLaughlin, Independence Water Department, Independence, Mo.
C.J. Patla, Connecticut Water Company, Clinton, Conn.
J.M. Ross, Denver Water, Denver, Colo.
P.A. Shively, Kansas City Water, City of Kansas City, Mo.
J.R. Waugh, United States Bureau of Reclamation, Denver, Colo.
J.T. Wilson, Cobb County-Marietta Water Authority, Marietta, Ga.
R.L. Worden, COMCD, Norman, Okla.

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C600.

I. Introduction.

I.A. Background. The provisions of this standard are intended to act as a guide for installing extensions to existing distribution systems and in preparing contract documents for the construction of new systems or extensions. The standard is to be used as a guide for installing bell-and-spigot ductile-iron pipe (that includes push-on joint, mechanical joint, and restrained joint) and does not cover the provision and delivery of material, any other type of pipe, or any other type of joint. The standard includes information to be used as a part of the purchaser's documents.

I.B. History. The first edition of this AWWA standard, titled "Standard Specifications for Laying Cast-Iron Pipe" ([7D.1-1938](#)), was adopted in April 1938. The standard was published in the February 1938 edition of *Journal AWWA*. The standard was revised in 1949, including a change of title to "Standard Specifications for Installation of Cast-Iron Water Mains" ([7D.1-T-1949](#) and [C600-49T](#)). The standard was expanded by adding numerous tables and installation guidelines. The model addendum was also expanded. The revised standard was published in the December 1949 edition of *Journal AWWA*. Section 9b, Joining of Mechanical-Joint Pipe, was added in May 1954. Section 9c, Joining of Push-on Joint Pipe, was added in 1964.

In 1975, the AWWA Standards Council formed the present C600 committee to revise ANSI/AWWA C600 to reflect current practices and to add ductile iron as a pipe material. To do this, the committee decided to completely change the character of the standard, removing the model addendum and making the standard consistent with the style of other AWWA standards.

In 1980, an addendum to the standard that revised parts of Sec. 3.4 regarding mechanical-joint assembly was approved.

The revisions made in the 1982 edition included the elimination of references to gray cast-iron pipe as a material for new pipeline installation because it was no longer manufactured for water utility service. Also, metric conversions were included in the 1982 revision; these were direct conversions of customary US inch–pound units, rather than those shown in International Organization for Standardization (ISO) standards.

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

The revisions made in 1987 included new references, a caveat against prolonged exposure of polyethylene film to sunlight, revised sections on thrust restraint and hydrostatic testing, and a discussion on making service taps on polyethylene-encased iron mains.

Revisions made in the 1993 edition included the addition of 60-in. (1,500-mm) and 64-in. (1,600-mm) pipe, revisions to the hydrant installation section, a new section on subaqueous crossings, and a recommended procedure for tapping through polyethylene encasement.

For the 1999 revision, there were no major changes to the standard. Review responsibility was transferred to the A21 committee, but there were no changes to the alphanumeric designation of the standard.

Revisions made in the 2005 edition included restrictions on filling the void between carrier and casing pipe for highway and railroad crossings, the introduction of trenchless applications, and a modification of the hydrostatic testing allowance formula.

Revisions made in the 2010 edition included additional instructions for the selection and installation of polyethylene encasement, including subaqueous installations, and a reference to high-pressure water cleaning in the flushing section.

Revisions made in the 2017 edition included clarification of backfill material definitions, inclusion of recommended direct tap sizes for ductile-iron pipe for various diameters, and clarification of testing allowance used in acceptance of installation testing. The 2017 edition was approved on January 14, 2017.

Revisions made in the 2023 edition include updated information for deflection angles of ductile-iron pipe. This edition was approved on October 23, 2023.

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). 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

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

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

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/CAN[§] 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI/CAN 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/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.

Annex A, “Toxicology Review and Evaluation Procedures,” to NSF/ANSI/CAN 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 C600 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 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. *Use as a Reference.* ANSI/AWWA C600, Installation of Ductile-Iron Mains and Their Appurtenances, can be used as a reference when making extensions to existing distribution or transmission systems or when constructing new distribution or transmission systems using ductile-iron mains with either mechanical or push-on joints. It is not intended for this standard to be used as a purchase document, but it may be used as a reference in purchaser’s documents. It is based on a consensus of the committee on the minimum practice consistent with sound, economical service under

[§] 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.

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.

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 items should be provided by the purchaser:

1. Standard used—that is, ANSI/AWWA C600, Installation of Ductile-Iron Mains and Their Appurtenances, of latest revision.
2. Whether compliance with NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects, is required.
3. Details of federal, state, provincial, territorial, and local requirements (Sec. 4.2).

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 to this edition of the standard include the following:

1. Clarifications to purchaser's document requirements and references throughout the standard.
2. Revisions to joint deflection angles in Sec. 4.3.4.4.

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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ANSI/AWWA C600-23
(Revision of [ANSI/AWWA C600-17](#))

AWWA Standard

Installation of Ductile-Iron Mains and Their Appurtenances

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes installation procedures for ductile-iron mains and their appurtenances for potable water, wastewater, reclaimed water, and raw water.

1.1.1 *Conditions not discussed.* Installations that require special attention, techniques, and materials are not discussed. Each of these installations requires special considerations based on many influencing factors that cannot be discussed adequately in a single standard. These installations may require design by a competent engineer and consultation with representatives of the material manufacturing industry. Some of these special installations include the following:

1. Piping through rigid walls.
2. Piping on supports aboveground or belowground.
3. Piping requiring insulation.
4. Treatment plant or pump-station piping.
5. Flanged-joint piping.
6. Ball-and-socket piping.
7. Grooved and shouldered piping.
8. Restrained joint piping.
9. Industrial piping.

10. Piping through geologically hazardous areas.
11. Piping in high-density, stray-current environments.
12. Piping through unstable soil.

Sec. 1.2 Purpose

The purpose of this standard is to provide the minimum requirements for the installation of ductile-iron potable water, wastewater, reclaimed water, and raw water mains and their appurtenances, including materials, dimensions, tolerances, and testing procedures.

Sec. 1.3 Application

This standard can be referenced in purchase documents for installing ductile-iron mains and their appurtenances. The stipulations of this standard apply when this document has been referenced and then only to the installation of ductile-iron mains and their appurtenances.

SECTION 2: REFERENCES

This standard references the following documents. In their latest editions, they form a part of this standard to the extent specified within this standard. In any case of conflict, the requirements of this standard shall prevail.

AASHTO* T99—Standard Method of Test for the Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop.

[ANSI†/AWWA C105/A21.5](#)—Polyethylene Encasement for Ductile-Iron Pipe Systems.

[ANSI/AWWA C111/A21.11](#)—Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

[ANSI/AWWA C150/A21.50](#)—Thickness Design of Ductile-Iron Pipe.

[ANSI/AWWA C151/A21.51](#)—Ductile-Iron Pipe, Centrifugally Cast.

[ANSI/AWWA C500](#)—Metal-Seated Gate Valves for Water Service.

[ANSI/AWWA C504](#)—Rubber-Seated Butterfly Valves.

[ANSI/AWWA C515](#)—Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.

[ANSI/AWWA C509](#)—Resilient-Seated Gate Valves for Water Supply Service.

* American Association of State Highway and Transportation Officials, 555 12th Street NW, Suite 1000, Washington, D.C. 20004.

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

[ANSI/AWWA C651](#)—Disinfecting Water Mains.

[AWWA M17](#)—*Installation, Field Testing, and Maintenance of Fire Hydrants.*

[AWWA M27](#)—*External Corrosion Control for Infrastructure Sustainability.*

[AWWA M41](#)—*Ductile-Iron Pipe and Fittings.*

SECTION 3: DEFINITIONS

The following definitions shall apply in this standard:

1. **Constructor:** The party that provides the work for placement or installation. Materials may be provided by the constructor or other parties.

2. **Ductile iron:** Cast ferrous material in which a major part of the carbon content occurs as free graphite in a substantially nodular or spheroidal form.

3. **Manufacturer:** The party that manufactures, fabricates, or produces materials or products.

4. **Mechanical joint:** The gasketed and bolted joint as detailed in [ANSI/AWWA C111/A21.11](#).

5. **Plans:** Drawings normally prepared by an engineer employed or retained by the ultimate system-operating company showing the location and details of the construction of the pipeline and appurtenances.

6. **Potable water:** Water that is safe and satisfactory for drinking and cooking.

7. **Purchaser:** The person, company, or organization that purchases any materials or work to be performed.

8. **Purchaser's documents:** The package consisting of the plans, specifications, and the contract under which the products are being purchased and installed.

9. **Push-on joint:** The single rubber-gasket joint as described in [ANSI/AWWA C111/A21.11](#).

10. **Raw water:** Water from supply source before treatment.

11. **Reclaimed water:** Wastewater that becomes suitable for beneficial use as a result of treatment.

12. **Restrained joint:** A pipe joint designed to resist forces that act to separate a joint, such as thrust caused by internal pressure, external pulling forces, and so on.

13. **Supplier:** The party that supplies material or services. A supplier may or may not be the manufacturer.

14. *Surge pressure:* The increased internal hydrostatic pressure that the pipeline is subjected to because of pressure waves created by the conveying fluid's velocity change.

15. *Test pressure:* The internal hydrostatic pressure specified in the contract documents to which the pipeline shall be subjected during the hydrostatic pressure test and the testing allowance test.

16. *Wastewater:* A combination of the liquid and water-carried waste from residences, commercial buildings, industrial plants, and institutions, together with any groundwater, surface water, and stormwater that may be present.

17. *Working pressure:* The internal hydrostatic pressure that the pipeline is subjected to under normal conditions, not including transient events.

SECTION 4: REQUIREMENTS

Sec. 4.1 Permeation

The selection of materials is critical for potable water, wastewater, and reclaimed water service, as well as distribution piping systems in locations where there is likelihood the piping system will be exposed to significant concentrations of pollutants composed of low-molecular-weight petroleum products or organic solvents or their vapors. Documented research has shown that piping system materials, such as polyethylene, polyvinyl chloride, and elastomers used in gaskets and packing glands, are subject to permeation by lower-molecular-weight organic solvents or petroleum products. If a potable water, wastewater, or reclaimed water piping system must pass through such a contaminated area or an area subject to contamination, consult the manufacturer regarding permeation of pipe walls, valve components, jointing materials, and other piping system components *before* selecting materials for use in that area.

Sec. 4.2 Materials

Materials shall comply with the requirements of the Safe Drinking Water Act and applicable federal, state, provincial, territorial, or other authoritative regulations for potable water, wastewater, or reclaimed water systems.

Sec. 4.3 Installing Ductile-Iron Mains

4.3.1 *Alignment and grade.* The water mains shall be laid and maintained on lines and grades established by the purchaser's documents for the project. Fittings, valves, tapped or bossed outlets, and hydrants shall be installed at the