



**American Water Works
Association**

The Authoritative Resource on Safe Water®

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(Revision of ANSI/AWWA C206-03)

AWWA Standard

Field Welding of Steel Water Pipe



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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 C206.

I. Introduction.

I.A. *Background.* The provisions of this standard describe the requirements for welding steel water pipe joints in water transmission and distribution lines. The purchaser for each project is responsible for determining if any unusual circumstances related to the project require additional provisions that are not included in the standard.

The design of field-welded joints is not discussed in this standard. Useful information on this subject may be found in AWWA Manual M11, *Steel Pipe—A Guide for Design and Installation*,[†] and in *Useful Information on the Design of Plate Structures*.[‡]

After the welded field joint has been completed, if the pipe has been coated or lined, the joint shall be coated and lined with a coating system compatible with that on the body of the pipe, in accordance with the requirements for field repairs stated in the appropriate AWWA coating or lining standard.

For lap-welded pipe with an inside diameter equal to or exceeding 48 in. (1,200 mm) and where the purchaser deems single welding to be acceptable, inside welding is recommended. Safety precautions shall be utilized in all pipe sizes, although when pipe with inside diameters less than 48 in. (1,200 mm) down to 27 in. (675 mm) are welded from the inside, additional safety precautions shall be observed. Interior welding on pipe diameters less than 27 in. (675 mm) is not recommended.

Pipe requiring inside welds with limited access should be supplied with 3-in. (75-mm) diameter weld lead pass holes at approximately 400-ft (122-m) centers to allow passage of welding leads to the joint location. Shorter distances between pass holes may be required, depending on actual project conditions. Pass holes in the pipe will permit shorter welding leads and thus avoid erratic voltage drops caused by excessively long welding leads. The pass hole is fabricated using a weldable-grade, inside-threaded pipe half coupling welded to a hole cut through the pipe wall. After using the pass hole, a weldable grade plug shall be threaded into the opening and seal-welded to secure.

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

† *Steel Pipe—A Guide for Design and Installation*, AWWA Manual M11, AWWA, Denver, Colo. (2004).

‡ *Useful Information on the Design of Plate Structures*, Steel Plate Engineering Data, Vol. 2, American Iron and Steel Institute, 1101 17th St. NW, Ste. 1300, Washington, DC 20036.

I.B. *History.* This standard was first approved as tentative by AWWA in January 1946 and by the American Welding Society (AWS) in October 1945. It was advanced to standard status by AWWA in 1950 and by AWS in 1951. The joint AWWA–AWS activity continued through revisions in 1957 (AWWA C206-57, AWS D7.0-57) and 1962 (AWWA C206-62, AWS D7.0-62a). The joint committee was dissolved in 1971, and the standard was assigned to the AWWA Standards Committee on Steel Pipe. Subsequent editions of the standard were published in 1975, 1982, 1988, 1991, 1997, and 2003. This edition was approved by the AWWA Board of Directors on Jan. 23, 2011.

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 American Water Works Association Research Foundation (AwwaRF, now Water Research Foundation†) 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 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. 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, NSF/ANSI 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 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.

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

† Water Research Foundation, 6666 W. Quincy Avenue, Denver, CO 80235.

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

§ Both publications available from National Academy of Sciences, 500 Fifth St. NW, Washington, DC 20418.

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 jurisdiction. 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 C206 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. This standard has no applicable information for this section.

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, ANSI/AWWA C206, Field Welding of Steel Water Pipe, of latest revision.
2. Whether compliance with NSF/ANSI 61, Drinking Water Treatment Chemicals—Health Effects is required.
3. Details of other federal, state or provincial, and local requirements (Sec. 4.1.1).
4. Provisions for alleviation of thermal stresses (Sec. 4.2.6).
5. Type of joint (Sec. 4.3).
6. Lap joint (Sec. 4.3.2).
7. Butt joint (Sec. 4.3.3).
8. Option regarding backing rings (Sec. 4.3.3.1).
9. Seal weld of butt straps to facilitate an air test (Sec. 4.3.4).
10. Notch tough weld criteria, if required, temperature of test, and test values (Sec. 4.6.10).
11. Weld inspection, if required (Sec. 5.1.3).

12. Testing methods, if required (Sec. 5.2).
13. Nondestructive testing of welded joints if substituted for hydrostatic tests (Sec. 5.2.2).
14. Affidavit of compliance (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 changes made to the standard in this revision include the following:

1. Information on inside welding of pipe with limited access was added to the foreword (Sec. I.A).
2. Definitions for procedure qualification record (PQR), weld-after-backfill, welding procedure specification (WPS), and welder qualification record were added (Section 2).
3. Deleted the permeation section since it is not applicable for welded steel pipe.
4. Added requirement for materials to comply with the Safe Drinking Water Act and other federal regulations (Sec. 4.1.1).
5. Added a section on double-welded lap joints and single-welded lap joints with air testing (Sec. 4.3.2.2 and Sec. 4.3.2.3)
6. Added a paragraph on butt joints without a backing ring (Sec. 4.3.3.1)
7. Revisions were made to Sec. 4.3.4, Butt-strap joints.
8. Revisions were made to Sec. 4.4, Qualification of Welding Procedures, Welders, and Welding Operators, including the addition of qualifications for tack welders.
9. The clearance between faying surfaces of lap joints was revised (Sec. 4.6.3).
10. A requirement for the fillet weld size was added (Sec. 4.6.3).
11. A new section on weld-after-backfill was added (Sec. 4.6.4).
12. The permissible metal temperature of the pipe wall during welding was lowered. (Sec. 4.6.5)
13. A requirement for repair of arc-strikes was added (Sec. 4.6.8.4).
14. A requirement for Charpy V-notch specimens was added (Sec. 4.6.10).
15. A section on visual inspection was added (Sec. 5.1.4)
16. The section on Ultrasonic testing without backing rings was deleted (old Sec. 5.2.2.2) and incorporated into a revised Sec. 5.2.2.1, Testing of field-butt joints with or without backing rings.
17. The testing section on lap joints was renamed to Testing field fillet weld joints, and was revised (new Sec. 5.2.2.2).
18. Information on marking of pipe segments was added to Sec. 6.1.

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 e-mail at standards@awwa.org.

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**American Water Works
Association**

AWWA Standard

Field Welding of Steel Water Pipe

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes manual, semiautomatic, and automatic field welding by the metal arc-welding processes for steel water pipe manufactured in accordance with ANSI*/AWWA C200, Standard for Steel Water Pipe—6 In. (150 mm) and Larger. This standard describes field-performed, full circumferential welding of three types of pipe joints: (1) lap joints; (2) butt joints; and (3) butt-strap joints. This standard also applies to other welding required in field fabrication and installation of specials and appurtenances. However, when possible, fabrications should be performed by the manufacturer at a manufacturing facility. The design of field-welded joints is not covered within this standard.

This standard recognizes AWS[†] D1.1 as the supporting document.

Welding of gasketed joints may require modification to the parameters of this welding standard.

Sec. 1.2 Purpose

The purpose of this standard is to provide minimum requirements for field welding and inspection of steel water pipe, including requirements and inspection.

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

† American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126.