



American Water Works
Association

ANSI/AWWA C900-07
(Revision of ANSI/AWWA C900-97)

The Authoritative Resource on Safe Water®

AWWA Standard

Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution



Effective date: Sept. 1, 2007

First edition approved by AWWA Board of Directors June 8, 1975.

This edition approved June 24, 2007.

Approved by American National Standards Institute May 3, 2007.

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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 C900.

I. Introduction.

I.A. *Background.* This standard pertains to 4-in. through 12-in. (100-mm through 300-mm) polyvinyl chloride (PVC) pressure pipe and fabricated fittings with cast-iron-pipe-equivalent (CIP) outside diameter (OD) dimensions and with wall-thickness dimension ratios (DRs) of 14, 18, and 25. Design considerations are provided in AWWA M23, *PVC Pipe—Design and Installation*, which provides detailed information on PVC pipe covered by ANSI/AWWA C900. The manual includes chapters on general properties of PVC pipe; manufacturing, testing, and inspection; pressure capacity; design factors for external forces; hydraulics; receiving, storage, and handling; testing and maintenance; and service connections (tapping). Recommended installation guidance is provided in ANSI/AWWA C605, *Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water*.

In addition, ANSI/AWWA C907, *Standard for Injection-Molded Polyvinyl Chloride (PVC) Pressure Fittings, 4 In. Through 12 In. (100 mm Through 300 mm)*, for Water Distribution, provides information on injection-molded fittings for use with the PVC pipes covered by ANSI/AWWA C900.

For PVC pipe and fittings diameters greater than 12 in. (300 mm), refer to ANSI/AWWA C905, *Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In. (350 mm Through 1,200 mm)*, for Water Transmission and Distribution.

I.B. *History.* This is the fifth edition of ANSI/AWWA C900.

In 1966, AWWA appointed Committee 8350-D to study and report on the adaptability of plastic pipe for use within the water industry. The committee presented its report on June 6, 1967, at AWWA's annual conference. The report included a recommendation that a task group be appointed to prepare standards for the use of plastic materials. The AWWA Standards Committee on Thermoplastic Pressure Pipe was established in 1968. The four editions of this standard were approved by the AWWA Board of Directors in June 1975, Jan. 1981, Jan. 1989, and June 1997, respectively.

In June 1988, the Thermoplastic Pressure Pipe Committee was divided into two separate committees: the Polyvinyl Chloride Pressure Pipe and Fittings Standards Committee and the Polyolefin Pressure Pipe and Fittings Standards Committee. This edition of ANSI/AWWA C900 was approved on June 24, 2007.

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) 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.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI 61. Individual states or local agencies have authority to

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

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

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

§Both publications available from National Academy of Sciences, 500 Fifth Street, N.W., Washington, DC 20001.

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 C900 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.

II. Special Issues. The material presented in this standard will be addressed in a revision to Manual AWWA M23 that is currently in progress. The material is published here to ensure that the users of this standard will have continuous access to the most up-to-date design information. AWWA M23 and this standard will not be compatible until AWWA M23 is revised. Where AWWA M23 does not match the standard, the intent of the standard takes precedence, and design matters in AWWA M23 that are inconsistent with this standard should be discussed with the manufacturer.

II.A. Pipe Selection.

II.A.1 Selection of pressure class. The minimum pressure class of the pipe or tubing selected should be equal to or greater than the system working pressure. The sum of the system working pressure and occasional surge pressure should not exceed 1.60 times the pressure class of the pipe. The system working pressure and recurring surge pressure should be analyzed using the method in appendix B. If surge pressures govern the selection of the pressure class, consideration should be given to removal of the cause of surge pressures or to the incorporation of surge suppressors in the system.

II.A.2 Recurring surge pressures. Recurring surge pressures, while present in water distribution systems, are of such low amplitude that they typically do not

govern the pipe selection. When analysis is deemed necessary, the method is found in appendix B.

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 C900, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution, of latest revision.

2. Whether compliance with NSF/ANSI 61, Drinking Water System Components—Health Effects, is required, in addition to the requirements of the Safe Drinking Water Act.

3. Details of other federal, state, or provincial, and local requirements (Sec. 4.2.1).

4. Pipe and fabricated fittings.

a. Nominal size (for example, 4 in.).

b. Working, occasional, and recurring surge pressures (Section 3).

c. Pressure class or DR (see Table 1).

d. Linear feet of each pressure class or DR for each nominal pipe size to be furnished.

e. Number, nominal size, pressure class or DR, and configuration for fittings and couplings (for example, 20, nominal 10-in., DR 18, tees).*

5. When desired, requirements such as the following should be specified in the purchase contract:

a. Standard lengths (Sec. 4.3.2.3).

b. Shipping and delivery (Sec. 6.2).

c. Affidavit of compliance (Sec. 6.3).

6. Plant inspection. If plant inspections are desired, provisions must be specified in the purchase contract (Sec. 5.3):

*NOTE: Purchase documents may allow or require the use of fittings other than those described in ANSI/AWWA C900. Some examples of compatible fittings include those covered in ANSI/AWWA Standards C907, C153, and C110.

a. Production notice. The manufacturer should be required to give adequate advance notice of when and where production of ordered materials will start.

b. Inspection aids. The manufacturer should be required to make available to the purchaser, without charge, such tools and assistance as are necessary for the inspection and handling of materials.

c. Inspection limitations. To exclude inspection of proprietary manufacturing processes, the manufacturer should be required to give advance notice to the purchaser.

III.B. *Modification to Standard.* Any modification to 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 edition include the following:

1. The factor of safety was revised from 2.5 to 2.0.
2. The built-in surge allowance was eliminated.
3. The pressure classes were revised from 100, 150, and 200 psi (690, 950, and 1,380 kPa) to 165, 235, and 305 psi (1,140, 1,620, and 2,100 kPa), respectively.
4. Treatment of surge pressures was expanded to include occasional (emergency) surge and recurring (cyclic) surge.
5. Appendix B, Recurring (Cyclic) Surge—Figures and Design Example, was added.

V. **Comments.** If you have any comments or questions about this standard, please call the AWWA Volunteer and Technical Support Group at 303.794.7711, FAX 303.795.7603, write to the group at 6666 West Quincy Avenue, Denver, CO 80235-3098, or e-mail standards@awwa.org.

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AWWA Standard

Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution

SECTION 1: GENERAL

Sec. 1.1 Scope

The pipe is primarily intended for use in transporting potable water in buried installations. The standard describes dimension ratios (DRs) 14, 18, and 25 for nominal pipe sizes ranging from 4 in. (100 mm) through 12 in. (300 mm). Pipe outside diameters (ODs) conform to those established for CI-equivalent ODs (CIOD). Pressure classes range from 165 psi (1,140 kPa) to 305 psi (2,100 kPa).

Sec. 1.2 Purpose

The purpose of this standard is to provide purchasers, manufacturers, and suppliers with the minimum requirements for PVC pressure pipe and fabricated fittings, 4 in. (100 mm) through 12 in. (300 mm), for water distribution and transmission.

Sec. 1.3 Application

This standard can be referenced in documents for purchasing and receiving PVC pressure pipe and fabricated fittings, 4 in. through 12 in. (100 mm through 300 mm), for water distribution and transmission. The stipulations of this standard apply when this document has been referenced and then only to PVC pressure pipe and fabricated fittings, 4 in. through 12 in. (100 mm through 300 mm), for water distribution and transmission.

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 the standard. In any case of conflict, the requirements of this standard shall prevail.

ASTM* D1598—Standard Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.

ASTM D1599—Standard Test Method for Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings.

ASTM D1784—Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.

ASTM D2122—Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.

ASTM D2152—Standard Test Method for Adequacy of Fusion of Extruded Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion.

ASTM D2241—Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

ASTM D2412—Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.

ASTM D2564—Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.

ASTM D2837—Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.

ASTM D2855—Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.

*ASTM International, 100 Barr Harbor Dr., West Conshohocken, PA 19428.