ANSI/AWWA **C901-25**

(Revision of ANSI/AWWA C901-20)

AWWA Standard

Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, ¾ In. (19 mm) Through 3 In. (76 mm), for Water Service

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American Water Works Association

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STANDARD Since 1881

AWWA Standard

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Contents

All AWWA standards follow the general format indicated subsequently. Some variations from this format may be found in a particular standard.

SEC.		PAGE
Foreword		
I	Introduction	vii
I.A	Background	vii
I.B	History	vii
I.C	Acceptance	vii
II.	Special Issues	ix
II.A	Considerations for Oxidative Resistance	ix
II.B	Chlorine and Chloramine Degradation of Elastomers	ix
II.C	Lead Service Line (LSL) Replacement	x
III	Use of This Standard	x
III.A	Purchaser Options and Alternatives	x
III.B	Modification to Standard	xi
IV	Major Revisions	xi
V	Comments	xi
Standard		
1	**General**	
1.1	Scope	1
1.2	Purpose	2
1.3	Application	2
2	**References**	2
3	**Definitions**	4
4	**Requirements**	
4.1	Permeation	6
4.2	Materials	7
4.3	Pipe and Tubing	8
4.4	Fittings Requirements	12
4.5	Pressure Class	13
5	**Verification**	
5.1	General	14
5.2	Tests for Qualification of Materials and Processes	14
5.3	Tests for Product Quality Control	14
5.4	Fitting Testing Requirements	15
5.5	Action After Failure to Meet Requirements	16
5.6	Quality-Control Records	16
5.7	Plant Inspection by Purchaser	16
6	**Delivery**	
6.1	Marking	17
6.2	Shipping	19
6.3	Affidavit of Compliance	19
Appendixes		
A	Internal Surge Pressure and Corresponding Sudden Water Flow Velocity Change	21
B	Bibliography of Sources for Additional Information Regarding Permeation of Polyolefin Pipes	23

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SEC. PAGE

C Bibliography of Additional Information Regarding Polyolefin Pipe, Tubing, and Fittings 25

D US Environmental Protection Agency–Regulated Per- and Polyfluoroalkyl Substances Chemicals and High-density Polyethylene 27

Figure

1 Bend-Back Test 12

Tables

1 ASTM D3350 Cell Classification and Property Values for Materials 9

SEC. PAGE

2 Elevated-Temperature Sustained-Pressure Test Requirements 10

3 Iron Pipe Size (IPS) Polyethylene Pipe—Outside Diameter–Controlled: Diameter, Standard Dimension Ratio (SDR), and Wall Thickness 10

4 Copper Tube-Size (CTS) Polyethylene Tubing—Outside Diameter–Controlled: Diameter, Standard Dimension Ratio (SDR), and Wall Thickness 11

5 Minimum Short-Term Burst Pressure for Pipe and Tubing at 73°F (23°C) 11

6 Polyethylene Pipe and Tubing: Pressure Class 13

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C901.*

I. Introduction

I.A. *Background*. This standard describes polyethylene (PE) pressure pipe and tubing for use primarily as service lines in the construction of underground water distribution systems.

This standard describes standard dimension ratios (SDRs) for pipe and tubing made from PE material with standard PE code designation PE4710 in a pressure class of 250 psi (1,700 kPa) for water at 80°F (27°C) and lower temperatures. Maximum working pressure ratings are reduced for higher service temperatures; refer to AWWA Manual M55, *PE Pipe—Design and Installation*, for information about the use of PE tubes at higher service temperatures. Pipe ranging in nominal size from ¾ in. (19 mm) through 3 in. (76 mm) conforms to the outside-diameter (OD) dimensions of iron pipe size (IPS). Tubing ranging in size from ¾ in. (19 mm) through 2 in. (51 mm) conforms to the OD dimensions of copper tube size (CTS).

I.B. *History*. On Jan. 28, 1978, the first edition of ANSI/AWWA C901 was approved by the AWWA Board of Directors. On Aug. 9, 1982, a subcommittee of the AWWA Standards Committee on Thermoplastic Pressure Pipe was formed to review and revise the standard based on experience and advances in the state of the art since the adoption of the standard. To this end, AWWA conducted two surveys of its members to ascertain their experience with ANSI/AWWA C901 products. This information was incorporated into the second edition of ANSI/AWWA C901, approved on Jan. 24, 1988.

In June 1988, the Thermoplastic Pressure Pipe Committee was divided into two committees to accommodate both polyolefin and polyvinyl chloride (PVC) pipe. Thus the Polyvinyl Chloride Pressure Pipe and Fittings Committee and the Polyolefin Pressure Pipe and Fittings Committee were formed. Subsequent editions of C901 were approved June 27, 1996; June 16, 2002; June 8, 2008; June 11, 2017; and Oct. 26, 2020. This edition was approved on Jan. 23, 2025.

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

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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 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 jurisdiction. 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.

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

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

[§] 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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ANSI/AWWA C901 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

II.A *Considerations for Oxidative Resistance.* Consistent with the practice of other pipe and material standards, strength ratings in this standard are not reduced for potential in-service degradation mechanisms such as internal or external corrosion and oxidation.

ASTM** F2263 assesses long-term internal oxidative stability of PE materials in potable water applications based on accelerated testing and modeling. ASTM F2263 was updated in 2014 to reflect how testing is currently being performed. ASTM F2263 results are useful for projecting the relative performance of various PE pipe compounds in chlorinated water applications. ASTM F2263 is a test method and does not include performance criteria for PE tubes. ASTM D3350 was updated in 2014 to provide for the classification of PE resin performance under oxidative conditions. The materials requirements incorporating ASTM F2263 and ASTM D3350 have been added in Section 4.

For potable water applications, the standard specifies PE compounds with oxidative resistance classification CC3 and limits the pipe size (i.e., dimension ratio) to SDR9, which ensures adequate design life under the vast majority of disinfectant applications where chlorine and chloramine are used as secondary disinfectants and as shown in PPI TN-49. (NOTE: This standard does not include consideration of chlorine dioxide as a secondary disinfectant, which is estimated to be used in less than 1 percent of North American utilities. Seek additional guidance from the pipe supplier if chlorine dioxide is the planned disinfectant practice.) (See Jana Laboratories, *Usage and Effects of Chlorine Dioxide on PEX Plumbing and Water Distribution Systems in North America*, prepared for the Plastics Pipe Institute, July 2010, https://plasticpipe.org/JANA2009-ClDioxide.)

II.B. *Chlorine and Chloramine Degradation of Elastomers.* The selection of materials is critical for water service and distribution piping in locations where

** ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428.

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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, 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.C *Lead Service Line (LSL) Replacement*. High-density polyethylene (HDPE) pipes and fittings are not permitted to contain lead as an intentional ingredient and are considered lead-free per US Safe Drinking Water Act when certified to NSF/ANSI/CAN 61, NSF/ANSI/CAN 372, or NSF/ANSI 14 pw (for potable water end use). Existing LSL can be replaced with HDPE using open cut and a variety of trenchless installation methods. Refer to ANSI/AWWA C810 for additional information.

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. Refer to AWWA Manual M55 for details.

III.A. *Purchaser Options and Alternatives*. The following items should be covered by the purchaser:

1. Standard used—that is, ANSI/AWWA C901, Polyethylene (PE) Pressure Pipe and Tubing, ¾ In. (19 mm) Through 3 In. (76 mm), for Water Service, 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).
4. Pipe
    a. Standard code designation of the PE material.
    b. Nominal size, pressure class, dimension ratio and diameter basis (SDR), form (straight or coiled), length of individual pieces, and total linear feet (linear meters) for each different item to be provided.
5. Tubing
    a. Standard code designation of the PE material.

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b. Nominal size, pressure class, dimension ratio, form (straight or coiled), length of individual pieces, and total linear feet (linear meters) for each different item to be provided.

6. The following requirements should be specified:
   a. Special quality-control tests (Section 5).
   b. Plant inspection (Sec. 5.6).
   c. Special marking (Sec. 6.1.3).
   d. Special preparation for shipment (Sec. 6.2).
   e. Affidavit of compliance (Sec. 6.3).

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 revision include the following:

1. The standard has been expanded to include fittings, and "fittings" has been added to the title, scope, and throughout the standard.
2. A note about Lead Service Line Replacement was added to the special issues section of the Foreword (Sec. II.C).
3. A definition of *production run* has been added (Sec. 3).
4. A column for Property Values has been added to Table 1 (Sec. 4.3.4).
5. Detailed requirements for fittings have been added, including materials, workmanship, dimensions and tolerances, and physical requirements (Sec. 4.4).
6. Testing requirements for fittings have been added, including workmanship and dimensions, 5-s pressure testing (Sec. 5.4).
7. Marking requirements for fittings have been added (Sec. 6.1.6).
8. An appendix with information on USEPA-regulated per- and polyfluoroalkyl substances chemicals and HDPE has been added (Appendix D).

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 e-mail at standards@awwa.org.

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ANSI/AWWA C901-25
(Revision of ANSI/AWWA C901-20)

AWWA Standard

Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, ¾ In. (19 mm) Through 3 In. (76 mm), for Water Service

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes polyethylene (PE) pressure pipe, tubing, and fittings, made from material having standard PE code designation PE4710* and intended for use in potable water, reclaimed water, and wastewater service. PE pipe ranges in nominal size from ¾ in. (19 mm)† through 3 in. (76 mm) and conforms to the outside-diameter (OD) dimensions of iron pipe size (IPS). PE tubing ranges in nominal size from ¾ in. (19 mm) through 2 in. (51 mm) and conforms to the OD dimensions of copper tube size (CTS). Fittings are produced in both pipe and tubing sizes under this standard. Included in this standard are criteria for classifying PE plastic pipe materials, a system of nomenclature for PE plastic pipe, and requirements and test methods for materials, pipe, tubing, and fittings. Methods of marking are also given. For larger sizes up to 65 in. (1,650 mm), refer to ANSI/AWWA C906.

* Earlier editions of ANSI/AWWA C901 included other PE material designations. For removed designations, refer to previous editions of ANSI/AWWA C901, ASTM D3350, PPI (Plastics Pipe Institute) TR-3, and PPI TR-4.

† Metric conversions given in this standard are direct conversions of US customary units and are not those specified in International Organization for Standardization standards.

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