ANSI/AWWA **C302-22**

(Revision of ANSI/AWWA C302-16)

AWWA Standard

Reinforced Concrete Pressure Pipe, Noncylinder Type

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American Water Works Association

Approved American National Standard ANSI

STANDARD Since 1881

AWWA Standard

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Committee Personnel

The AWWA Standards Subcommittee on ANSI/AWWA C302, which reviewed and developed this standard, had the following personnel at the time:

Henry H. Bardakjian, *Chair*

S.A. Arnaout, Stantec, Dallas, Tex.
K.R. Baas, Thompson Pipe Group—Pressure, Hattiesburg, Miss.
H.H. Bardakjian, Consulting Engineer, Glendale, Calif.
N.D. Faber, San Diego County Water Authority, San Diego, Calif.
B.D. Keil, Northwest Pipe Company, Salt Lake City, Utah
M.R. McReynolds, Brown and Caldwell, Oakton, Va.

The AWWA Standards Committee on Concrete Pressure Pipe, which reviewed and approved this standard, had the following personnel at the time of approval:

Wylie C. Duke, *Chair*
Kevin M. Brown, *Secretary*

User Members

W.C. Duke, Bureau of Reclamation, Denver, Colo.
N.D. Faber, San Diego County Water Authority, San Diego, Calif.
J.K. Johnson, Tarrant Regional Water District, Fort Worth, Tex.
T. Peng, Metropolitan Water District of Southern California, Los Angeles, Calif.
F. Sy Su, Los Angeles Dept. of Water & Power, Los Angeles, Calif.
A.F. Williams, Louisville Water Company, Louisville, Ky.

General Interest Members

S.A. Arnaout, Stantec, Dallas, Tex.
H.H. Bardakjian, Consulting Engineer, Glendale, Calif.
W.P. Brunzell, Brunzell Associates Ltd., Wilmette, Ill.
B.C. Coltharp, Freese and Nichols Inc., Fort Worth, Tex.
D. Faber (*liaison, nonvoting*), Standards Council Liaison, Faber & Associates, Terra Alta, W.Va.
W.C. Hagenburger, Crossland Heavy Contractors, Lowell, Ark.
F.S. Kurtz (*liaison, nonvoting*), Standards Engineer Liaison, AWWA, Denver, Colo.
A.S. Maughn (*alternate*), Freese and Nichols Inc., Dallas, Tex.

R. Ortega, Aurora Technical Services LLC, Houston, Tex.
A. Rodriguez, HDR Engineering, San Antonio, Tex.
J.J. Roller, CTLGroup, Skokie, Ill.
A.E. Romer (*alternate*), AECOM, Orange, Calif.
R.F. Williams, AECOM, Miami, Fla.
M.S. Zarghamee, Simpson Gumpertz & Heger Inc., Waltham, Mass.

Producer Members

K.R. Baas, Thompson Pipe Group—Pressure, Hattiesburg, Miss.
G. Bizien, Forterra Pressure Pipe, St. Eustache, Que.
K.M. Brown, American Concrete Pressure Pipe Association, Rockledge, Fla.
M. DeFranco (*alternate*), DECAST Ltd., Utopia, Ont.
B.D. Keil, Northwest Pipe Company, Salt Lake City, Utah
Y. Lan, DECAST Ltd., Utopia, Ont.
R.D. Mielke (*alternate*), Northwest Pipe Company, Raleigh, N.C.
B. Tanguay (*alternate*), Forterra Pressure Pipe, St. Eustache, Que.

Contents

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

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C302.*

I. Introduction

I.A. *Background.* Reinforced concrete pressure pipe of the noncylinder type has been used extensively since the early 20th century. This type of pipe is made with one or more cages of steel reinforcing bars or wire encased in concrete. The concrete is usually placed by vertical or centrifugal casting methods. Rubber-gasketed joints may have either steel or concrete bell and spigot surfaces. The pipe is manufactured in sizes ranging from 12 in. (300 mm) to more than 144 in. (3,660 mm) in diameter and is generally made in 8-ft (2.5-m) through 24-ft (7.5-m) laying lengths.

Reinforced concrete pressure pipe, noncylinder type, is designed for the specific combination of internal pressure and external load required for a project, in accordance with the procedures outlined in AWWA Manual M9, *Concrete Pressure Pipe.* This pipe is normally limited in working pressure to a maximum of 55 psi (380 kPa) and is used for low-pressure transmission lines in irrigation, industrial, and domestic water supply systems, and other applications.

Design criteria and examples along with installation recommendations and other related data pertaining to this pipe are covered in AWWA Manual M9.

I.B. *History.* In April 1943, the AWWA Board of Directors authorized the preparation of "Tentative Emergency Specifications for Concrete Pressure Pipe." These tentative specifications, which covered several types of pipe in a single document, served a useful purpose during World War II but are now obsolete and have been withdrawn.

The first edition of this standard was approved as tentative on Sept. 4, 1951, and made a standard on May 5, 1953. The second edition was made a standard on July 19, 1957. Substantial changes, including the addition of limiting stresses for combined loading design, were incorporated into the third edition, which was made a standard on Jan. 27, 1964.

Subsequent editions were approved on Jan. 28, 1974; June 14, 1987; Jan. 22, 1995; Jan. 23, 2011; and June 19, 2016. This edition was approved by the AWWA Board of Directors on Jan. 13, 2022.

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

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

certification program for all 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.

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

[¶] Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.

[**] Both publications available from The National Academies Press, 500 Fifth Street NW, Keck 360, Washington, DC 20001.

ANSI/AWWA C302 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. Special issues are addressed in AWWA Manual M9, *Concrete Pressure Pipe.*

II.A. *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, environmental conditions, and 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 information should be provided by the purchaser:

1. Standard used, that is, ANSI/AWWA C302, Standard for Reinforced Concrete Pressure Pipe, Noncylinder Type, of latest revision.
2. Whether compliance with NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects, is required.
3. If submission of manufacturer's design calculations for approval before manufacturing any pipe will be required.
4. Details of federal, state, and local requirements (Sec. 4).
5. The working pressure, surge pressure, field-test pressure, depth and weight of earth cover, trench bedding condition, and live load for which the pipe is to be designed (Sec. 4.2).
6. If the manufacturer is not permitted to supply pipe from inventory (Sec. 4.3.1).

7. If detailed drawings and schedules are to be submitted for review (Sec. 4.3.1).

8. If a tabulated layout schedule will be required (Sec. 4.3.2).

9. Type of cement required, if there is a preference (Sec. 4.4.1.1).

10. If submission of the type and amount of admixtures will be required (Sec. 4.4.5).

11. If either steel or concrete bell-and-spigot joint, or double spigot-and-sleeve joint of steel and concrete will be required (Sec. 4.5.3.1).

12. If submission for approval of welder qualification (Sec. 4.6.2) and welding procedure specifications (Sec. 4.6.3) will be required.

13. Fittings details (Sec. 4.7.1).

14. If the purchaser desires to inspect the material, pipe, and fittings at the manufacturer's plant (Sec. 5.1.1).

15. If any material or manufacturing test reports will be required (Sec. 5.2.2).

16. If steel test specimens will be required (Sec. 5.2.3).

17. If welds in reinforcements will be required (Sec. 5.2.5).

18. If hydrostatic pressure testing of pipe at the manufacturer's yard will be required (Sec. 5.3.1).

19. If an affidavit of compliance will be required (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 revisions made to the standard in this edition include the following:

1. Provisions for slag cement as a replacement for portland cement (up to 20 percent) have been added (Sec. 4.4.1).

2. The minimum specified yield strength for cylinder steel used for fittings has changed to 36,000 psi (248.3 MPa) (Sec. 4.4.6). The minimum specified yield strength for steel used for bell rings has changed to 36,000 psi (248.3 MPa) (Sec. 4.4.8).

3. Rubber gasket testing requirements have been added for ozone resistance (Sec. 4.4.10.8) and water immersion (Sec. 4.4.10.9).

4. The maximum allowable circumferential steel stress used in the design of fittings has changed to 18,000 psi (124.2 MPa).

5. Provisions for a quality assurance program have been added (Sec. 5.4).

6. Updates to material requirements meeting ASTM standards have been made as appropriate throughout the standard.

V. Comments. If you have any comments or questions about this standard, please call AWWA Engineering and Technical Services at 303.794.7711, FAX 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

Dedicated to the World's Most Important Resource®

AWWA Standard

Reinforced Concrete Pressure Pipe, Noncylinder Type

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes the manufacture of circumferentially reinforced concrete pressure pipe, without a steel cylinder and not prestressed, in sizes from 12–144 in. (300–3,660 mm) inclusive and for working pressures not exceeding 55 psi (380 kPa) and working plus surge pressures not exceeding a total pressure of 65 psi (450 kPa). This type of pipe is designed for the internal pressure, external loads, and bedding conditions designated by the purchaser. Pipe of diameters larger than 144 in. (3,660 mm) has been manufactured based on the concepts of this standard. This standard does not include requirements for design, handling, delivery, laying, field testing, or disinfection of pipe. See AWWA Manual M9, *Concrete Pressure Pipe,* for information on these topics.

1.1.1 *Essential requirements.* The pipe shall have the following principal features: a reinforcing cage or cages of steel bars, wire, or welded wire reinforcement; a concrete cover on each side of each reinforcing cage; and a joint with a preformed rubber gasket(s) of circular cross section, designed so that the joint will be watertight under the conditions of service specified by the purchaser.