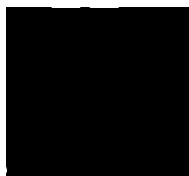


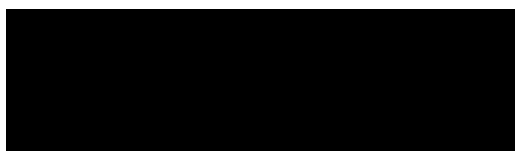
American Water Works Association

ANSI/AWWA C602-00

(Revision of ANSI/AWWA C602-95)



AWWA STANDARD
FOR
CEMENT-MORTAR LINING
OF WATER PIPELINES IN PLACE—
4 IN. (100 mm) AND LARGER



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AMERICAN WATER WORKS ASSOCIATION

6666 West Quincy Avenue, Denver, Colorado 80235

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Committee Personnel

The Steel Water Pipe-Manufacturers Technical Advisory Committee (SWPMTAC) Task Group for C602, which developed this standard, had the following personnel at the time:

Bruce J. Britton, *Chair*

H.H. Bardakjian, Ameron Concrete & Steel Pipe, Rancho Cucamonga, Calif.	(AWWA)
B.J. Britton, W. Walsh Company, Attleboro, Mass.	(AWWA)
R.J. Card, Brico Industries Inc., Atlanta, Ga.	(AWWA)
J.R. Davenport, Northwest Pipe Company, Riverside, Calif.	(AWWA)
B.H. Ebner, Heitkamp Inc., Watertown, Conn.	(AWWA)
J.E. Hohider, Heitkamp Inc., Watertown, Conn.	(AWWA)
Rob Lauterborn, J. Fletcher Creamer & Son Inc., Van Nuys, Calif.	(AWWA)
Bernie Monette, Doty Brothers, Norwalk, Calif.	(AWWA)

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

George J. Tupac, *Chair*

John H. Bambei Jr., *Vice-Chair*

Dennis Dechant, *Secretary*

Consumer Members

G.A. Andersen, NYC Bureau of Water Supply, Corona, N.Y.	(AWWA)
J.H. Bambei Jr., Denver Water Department, Denver, Colo.	(AWWA)
B.R. Bullert,* Council Liaison, Saint Paul Regional Water Services, St. Paul, Minn.	(AWWA)
R.V. Frisz, US Bureau of Reclamation, Denver, Colo.	(USBR)

*Liaison, nonvoting

T.J. Jordan, Metropolitan Water District of Southern California, La Verne, Calif.	(AWWA)
W.M. Kremkau, Washington Suburban Sanitary Commission, Laurel, Md.	(AWWA)
T.A. Larson, Tacoma Water Division, Tacoma, Wash.	(AWWA)
A.L. Linard, Los Angeles Department of Water & Power, Los Angeles, Calif.	(AWWA)
G.P. Stine, San Diego County Water Authority, San Diego, Calif.	(AWWA)
J.V. Young, EPCOR Water Services Inc., Richmond, B.C.	(AWWA)

General Interest Members

Ergun Bakall, AKM Consulting, Irvine, Calif.	(AWWA)
W.R. Brunzell, Brunzell Associates Ltd., Skokie, Ill.	(AWWA)
R.L. Coffey, Kirkham Michael Consulting Engineers, Omaha, Neb.	(AWWA)
H.E. Dunham, * Montgomery Watson, Bellevue, Wash.	(AWWA)
L.J. Farr, CH2M Hill Inc., Redding, Calif.	(AWWA)
K.G. Ferguson, Montgomery Watson, Las Vegas, Nev.	(AWWA)
S.N. Foellmi, Black & Veatch LLP, Irvine, Calif.	(AWWA)
J.W. Green, Alvord Burdick & Howson, Lisle, Ill.	(AWWA)
K.D. Henrichsen, HDR Engineering Inc., Denver, Colo.	(AWWA)
M.B. Horsley, * Black & Veatch LLP, Kansas City, Mo.	(AWWA)
J.K. Jeyapalan, Engineering Consultant, New Milford, Conn.	(AWWA)
R.Y. Konyalian, Engineering Consultant, Huntington Beach, Calif.	(AWWA)
Rafael Ortega, Lockwood Andrews & Newman Inc., Houston, Texas	(AWWA)
A.E. Romer, Boyle Engineering Corp., Newport Beach, Calif.	(AWWA)
H.R. Stoner, Consultant, North Plainfield, N.J.	(AWWA)
C.C. Sundberg, * CH2M Hill Inc., Bellevue, Wash.	(AWWA)
G.J. Tupac, G.J. Tupac & Associates, Pittsburgh, Pa.	(AWWA)
J.S. Wailes, † Standards Engineer Liaison, AWWA, Denver, Colo.	(AWWA)
L.W. Warren, Tetra Tech, Seattle, Wash.	(AWWA)
W.R. Whidden, Post Buckley Schuh & Jernigan, Winter Park, Fla.	(AWWA)

*Alternate

†Liaison, nonvoting

Producer Members

H.H. Bardakjian, American Concrete & Steel Pipe, Rancho Cucamonga, Calif.	(AWWA)
T.R. Brown, Sensus Technologies Inc., Uniontown, Pa.	(AWWA)
R.J. Card, Brico Industries, Atlanta, Ga.	(AWWA)
Dennis Dechant, Northwest Pipe & Casing Company, Denver, Colo.	(AWWA)
F.C. Pausic, American Steel Pipe Company, Birmingham, Ala.	(MSS)
J.C. Taylor, North American Pipe Company, Saginaw, Texas	(SPFA)
Bruce Vanderploeg,* Northwest Pipe & Casing Company, Portland, Ore.	(AWWA)
J.A. Wise, Canus Industries Ltd., Port Coquitlam, B.C.	(AWWA)

*Alternate

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Foreword

This foreword is for information only and is not part of AWWA C602.

I. Introduction.

I.A. *Background.* Cement–mortar lining provides the interior of a ferrous-metal pipe with a smooth finish that protects it from corrosion and tuberculation. The lining can significantly retard the recurrence of these problems in previously used pipe if the pipe has been properly cleaned and repaired before application of the lining. Furthermore, the lining can increase the pipeline’s carrying capacity because of the reduction in friction resulting from streamlining surface irregularities.

The use of cement mortar as a protective lining for water mains was reported by the French Academy of Science in 1836. Fourteen years later, cement-lined, coated, sheet-metal pipe was introduced in the United States. Some of the early pipelines were in use for the better part of a century, but it was not until the 1930s that a practical method was developed for lining pipe in place.

The first field trial of in-place cement–mortar lining (of pipe that had been in service) was conducted in Jersey City, N.J., in 1933. The pipe was a short section 72 in. (1,830 mm) in diameter. The favorable outcome of the trial led to the cleaning and lining of more than 27,000 ft (8,230 m) of aged, 48-in. (1,220-mm) riveted-steel pipe supplying Newark, N.J. The lining stopped all leakage and, as a result of streamlining the surface over large rivets, also increased the Hazen–Williams flow coefficient by 14 points (estimated by the engineer).

For many years, the smallest-diameter pipe that could be reconditioned by the centrifugal process was 24 in. (600 mm), because a man was required to ride the lining machine through the pipe. In 1950, a remote-control centrifugal-lining machine was introduced that made in-place lining of progressively smaller-diameter pipe possible. Presently, pipelines ranging from 4 in. (100 mm) to 28 ft (9.2 m) in diameter can be cleaned and cement–mortar lined in place.

I.B. *History.* The first American Water Works Association (AWWA) standard for cement–mortar lining of pipe in place was published in 1939 as part of AWWA C205-41 (formerly 7A-7-41), Standard for Cement–Mortar Protective Lining and Coating for Steel Water Pipe. That standard was primarily concerned with in-plant lining and coating, a completely different process from in-place lining. Therefore, in 1951, the in-place lining portion was withdrawn and expanded into a separate

standard under the direction of the late H.A. Price, who authored most of the new document. That standard, AWWA C602, Standard for Cement–Mortar Lining of Water Pipelines in Place—Sizes 16 In. and Larger, was approved as tentative in 1954 and made standard in 1955.

In 1962, Price suggested to the AWWA Steel Water Pipe Manufacturers Technical Advisory Committee (SWPMTAC) that AWWA C602-55 should be revised in view of the extended competence of the centrifugal-lining process, which at that time included pipe as small as 4 in. (100 mm) in diameter. The assignment was given to SWPMTAC Subcommittee 8 and resulted in the revision of the standard adopted and published in 1967.

In 1972, the standard was again considered for revision to reflect the state of the art of in-place cement–mortar lining. The more frequent use of in-place cement–mortar lining in new, large-diameter steel pipelines prompted the committee to note some of the standard procedures used in this application. This edition was approved on Jan. 25, 1976. The standard was revised in 1983, 1988, and 1995. This edition was approved on June 11, 2000.

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 all 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.

*Persons in Canada, Mexico, and non-North American countries should contact the appropriate authority having jurisdiction.

3. Two standards developed under the direction of NSF: ANSI*NSF[†] 60, Drinking Water Treatment Chemicals—Health Effects, and ANSI/NSF 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 ANSI/NSF 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 ANSI/NSF 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.

AWWA C602-00 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 all 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. AWWA has no responsibility for the suitability or compatibility of the provisions of this standard to any intended application by any user. Accordingly, each user of this standard is responsible for determining that the standard’s provisions are suitable for and compatible with that user’s application.

*American National Standards Institute, 11 W. 42nd St., New York, NY 10036.

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

‡Both publications available from National Academy of Sciences, 2102 Constitution Ave. N.W., Washington, DC 20418.