

American Water Works Association

ANSI/AWWA C224-01

(1st Edition)



AWWA STANDARD
FOR
TWO-LAYER NYLON-11-BASED POLYAMIDE
COATING SYSTEM FOR THE INTERIOR AND
EXTERIOR OF STEEL WATER PIPE, CONNECTIONS,
FITTINGS, AND SPECIAL SECTIONS



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AMERICAN WATER WORKS ASSOCIATION

6666 West Quincy Avenue, Denver, Colorado 80235

www.awwa.org

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Committee Personnel

The Steel Water Pipe Manufacturers Technical Advisory Committee Task Group (SWPMTAC) on C224, which developed this edition, had the following personnel at the time:

Page McAndrew, *Chair*

Mike Bauer, Tnemec Company Inc., Kansas City, Kan.	(AWWA)
Page McAndrew, Autofina Chemicals, King of Prussia, Penn.	(AWWA)
Mike Sangalli, Smith-Blair Inc., Texarkana, Texas	(AWWA)
M.C. Siminski, Morton Powder Coatings, Reading, Penn.	(AWWA)
H.R. Stoner, Consultant, North Plainfield, N.J.	(AWWA)
Martin Topps, Glynwed Pipe Systems, Hixson, Tenn.	(AWWA)
J.A. Wise, Canus Industries Inc., Port Coquitlam, B.C.	(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. Bambie Jr., *Vice-Chair*

Dennis A. Dechant, *Secretary*

Consumer Members

G.A. Andersen, New York City Bureau of Water Supply, Corona, New York	(AWWA)
J.H. Bambei Jr., Denver Water, Denver, Colo.	(AWWA)
D.W. Coppes, Massachusetts Water Resources Authority, Boston, Mass.	(AWWA)
R.V. Frisz, US Bureau of Reclamation, Denver, Colo.	(AWWA)
T.J. Jordan, Metropolitan Water District of Southern California, La Verne, Calif.	(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 Engineers, 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, Overland Park, Kan. (AWWA)
J.K. Jeyapalan, Engineering Consultant, New Milford, Conn. (AWWA)
Rafael Ortega, Lockwood Andrews & Newnam Inc., Houston, Texas (AWWA)
A.E. Romer, Boyle Engineering Corporation, 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 Inc., Pittsburgh, Pa. (AWWA)
J.S. Wailes,† AWWA, Standards Engineer Liaison, Denver, Colo. (AWWA)
L.W. Warren, Tetra Tech Inc., Seattle, Wash. (AWWA)
W.R. Whidden, Post Buckley Schuh & Jernigan, Orlando, Fla. (AWWA)

Producer Members

H.H. Bardakjian, Ameron Concrete & Steel Pipe, Rancho Cucamonga, Calif. (AWWA)
R.J. Card, Brico Industries Inc., Atlanta, Ga. (AWWA)
R.R. Carpenter, American Cast Iron Pipe Company, Birmingham, Ala. (MSS)
D.A. Dechant, Northwest Pipe Company, Denver, Colo. (AWWA)
J.E. Hagelskamp,† American Cast Iron Pipe Company, Maitland, Fla. (AWWA)
B.D. Keil, Continental Pipe Manufacturing Inc., Pleasant Grove, Utah (SPFA)
Bruce Vanderploeg,* Northwest Pipe Company, Portland, Ore. (AWWA)
J.A. Wise, Canus Industries Inc., Port Coquitlam, B.C. (AWWA)

*Alternate

†Liaison, nonvoting

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Foreword

This foreword is for information only and is not a part of AWWA C224.

I. Introduction.

I.A. *Background.* Polyamide (Nylon-11-based) coatings are thermoplastic coatings. Typically, they are placed by applying dry polyamide powder (ordinarily in a controlled plant environment, by any of several techniques, e.g., electrostatic spray, immersion in a fluidized bed, spray onto preheated article, rotocoating) onto steel surfaces previously primed with a thin layer of epoxy primer (note that other primers may be used, as appropriate). When treated at the appropriate temperature, the dry polyamide powder melts to form a uniform, continuous polyamide coating on the steel surface. Simultaneously during this thermal treatment, chemical reactions occur between the steel surface and epoxy and between epoxy and polyamide. These chemical reactions provide for bonding between the polyamide coating and steel surface.

The first commercial use of polyamide coatings for the protection (from corrosion) of steel used in water-handling applications was in West Germany in 1970. Regarding the United States, it is believed that its first use was in 1985. However, prior to this, polyamide coatings had been used in 1983 for the protection of the interior of steel piping used in the petroleum industry. Today, the use of polyamide coatings to protect steel has grown to include many types of articles (both interiors and exteriors) in a variety of industries, such as oil and natural gas exploration/production, and water and wastewater handling. Polyamide coatings also can be used to protect accessory steel articles, such as pumps, valves, couplers, and flowmeters.

I.B. *History.* This standard is the first specifically concerning two-layer polyamide coating systems. However, it is noted that polyamide-based coatings have been used according to ANSI/AWWA Standard C550.

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.
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 60 (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.

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

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

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

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

AWWA C224-01 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.

II.A. *Advisory Information on Material Application.* This standard defines the use of two-layer polyamide coatings for the interiors and exteriors of steel articles used for water handling in the following environments: aboveground, belowground, or underwater—under normal conditions. Also, this standard describes the quality of polyamide coatings needed to produce best, long-term coating performance—in particular, long-term corrosion protection. Normal conditions are defined as those conditions, specified by the coating manufacturer (see Sec. 3), that are known beforehand not to adversely affect polyamide coatings.

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 intended application.

III.A. *Purchaser's Options and Alternatives.* The following points should be covered in the purchaser's specifications:

1. Standard used, that is, ANSI/AWWA C224, Standard for Two-Layer Nylon-11-Based Polyamide Coating System for the Interior and Exterior of Steel Water Pipe, Connections, Fittings, and Special Sections, of the latest revision.
2. Any exceptions to the standard.
3. Diameter, length, thickness, design, and location of coated steel articles.
4. Temperature, pH, and composition of water to be handled (Sec. 1.1.2).
5. Requirement(s) for coating application at pipe ends (Sec. 4.5.3.2).
6. Requirement(s) for coating thickness (Sec. 4.5.3.3).
7. Requirement(s) for field-welded joint coatings (Sec. 4.5.5).
8. Requirement(s) for pipe beddings and trench backfills (Sec. 4.6.3).
9. Requirement(s) for inspections and testing (Sec. 5.1 and 5.3).
10. Requirement(s) for adhesion testing (Sec. 5.3.2).