

ANSI/AWWA

C224-24

(Revision of ANSI/AWWA C224-17)

AWWA Standard

Nylon-11-Based Polyamide Coatings and Linings for Steel Water Pipe and Fittings

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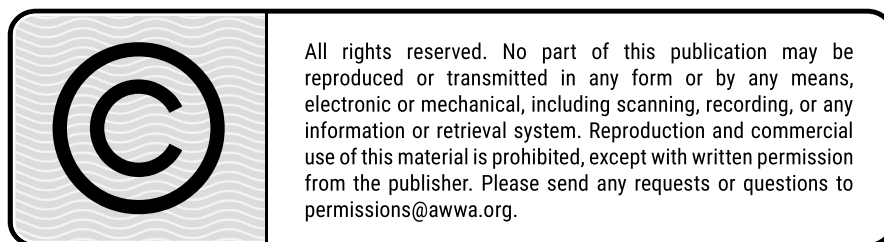
AWWA Standard

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Foreword

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

I. Introduction.

I.A. *Background.* Polyamide (Nylon-11-based) coatings and linings are thermoplastics. 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, thermal spray, or 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 layer 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 and steel surface.

The first commercial use of polyamide systems 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 first use was in 1985. However, prior to this, polyamide systems had been used in 1983 for the protection of the interior of steel piping used in the petroleum industry. Currently, the use of polyamides 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 and production and water and wastewater handling. Polyamide systems also can be used to protect accessory steel articles, such as pumps, valves, couplers, and flowmeters.

I.B. *History.* ANSI/AWWA C224-01 was the first standard specifically concerning polyamide coating and lining systems. However, it is noted that polyamide-based systems have been used according to ANSI/AWWA C550-01. Subsequent editions were approved by the AWWA Board of Directors on Feb. 12, 2006; June 12, 2011; and Jan. 14, 2017. This edition was approved on March 13, 2024.

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

* American National Standards Institute, 1180 Avenue of the Americas, 10th Floor, New York, NY 10036.

the original consortium included the Water Research Foundation (formerly 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. 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 jurisdictions. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

NSF/ANSI/CAN 600 (which formerly appeared in NSF/ANSI/CAN 60 and NSF/ANSI/CAN 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.

ANSI/AWWA C224 does not address additives requirements. Thus, users of this standard should consult the appropriate state or local agency having jurisdiction in order to

[†] 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 Academy of Sciences, 500 Fifth Street, NW, Washington, DC 20001.

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. *Advisory Information on Material Application.* This standard defines the use of polyamide systems for the lining and coating 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 systems needed to produce long-term performance—in particular, long-term corrosion protection. Normal conditions are defined as those conditions specified by the polyamide system manufacturer (see Sec. 3) that are known beforehand not to adversely affect polyamide systems.

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 C224, Nylon-11-Based Polyamide Coatings and Linings for Steel Water Pipe and Fittings, of latest revision.
2. Any required exceptions to the standard.
3. Diameter, length, thickness, design, and location of coated steel articles.
4. For applications other than potable water, whether compliance with NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects, is required.
5. Temperature (Sec. 1.1.2), pH, and composition of water to be handled.
6. Details of federal, state, provincial, territorial, and local requirements (Sec. 4.2).
7. Weld treatment (Sec. 4.4.2).
8. Polyamide holdback at pipe ends (Sec. 4.5.4).
9. Polyamide thickness (Sec. 4.5.5).
10. Field-welded joint coating and lining (Sec. 4.8.1).
11. Pipe bedding and trench backfill (Sec. 4.9).
12. Inspection (Sec. 5.4).
13. Number of adhesion tests (Sec. 5.5.5).
14. Delivery (Sec. 6).