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Association**

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ANSI/AWWA C210-15
(Revision of ANSI/AWWA C210-07)

AWWA Standard

Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings

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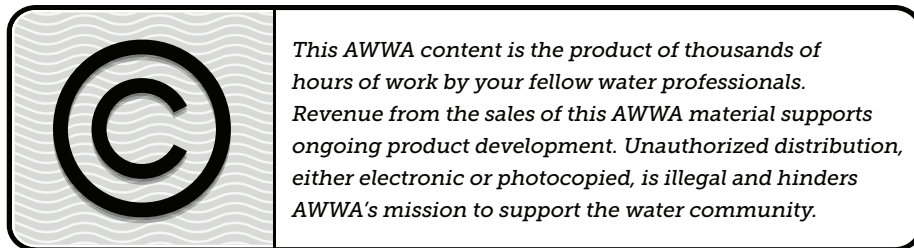
AWWA Standard

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C210.*

I. Introduction.

I.A. *Background.* This standard was developed to provide information for the use of liquid-epoxy coatings for the exterior coating and interior lining of steel water pipe. The standard has been revised periodically to meet increasingly demanding environmental and health-effects regulations and to modify procedures based on technological advances.

I.B. *History.* The first edition of ANSI/AWWA C210 was approved for issue in May 1978 under the title “Coal-Tar Epoxy Coating System for the Interior and Exterior of Steel Water Pipe.” The second and third editions were approved on June 10, 1984, and June 18, 1992, respectively, and published under the title “Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.” The fourth edition of ANSI/AWWA C210 was approved by the AWWA Board of Directors on June 15, 1997. The fifth edition was approved on Jan. 19, 2003. The sixth edition was approved on June 24, 2007. This edition was approved on June 7, 2015.

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 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. An advisory program formerly administered by USEPA, Office of Drinking Water, discontinued on Apr. 7, 1990.

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

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

2. Specific policies of the state or local agency.
3. Two standards developed under the direction of NSF*: NSF/ANSI 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 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 NSF/ANSI 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.

Annex A, “Toxicology Review and Evaluation Procedures,” to NSF/ANSI 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.

ANSI/AWWA C210 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. This standard provides guidance in selecting and evaluating liquid-epoxy coatings and sets minimum requirements for linings and coatings used on steel water pipe in the water-supply industry.

Users of this standard are advised to consider additional lining thickness for pipe that handles water containing higher than normal levels of particulates or that operates at higher than normal velocities. A penstock carrying stream or lake water with high particulate levels and high velocities would be a viable example. The required finished coating thickness shall be specified by the purchaser. The specified thickness should not exceed the maximum recommended by the coating manufacturer.

* NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.

† Both publications available from National Academy of Sciences, 500 Fifth Street, NW, Washington, DC 20001.

Soluble salts and other inorganic contaminants on a prepared steel surface have been known to influence coating performance. Procedures for determining the presence of these contaminants as well as the method of quantifying them are currently being evaluated by technical organizations serving the coating and lining industry.

If an extended period of aboveground storage of the coated pipe is anticipated, consideration should be given to the ability of the coating to resist degradation by ultraviolet light and other atmospheric and environmental conditions. The purchaser should consult the manufacturer for specific conditions and limitations.

This standard does not describe materials and procedures that may be required for difficult conditions, such as those encountered in construction of some submarine lines, casing pipe, river crossings, and rocky areas.

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 C210, Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings, of latest revision.
2. Details of other federal, state or provincial, and local requirements and regulations (Sec. 4.2).
3. For applications other than potable water, whether compliance with NSF/ANSI 61 Drinking Water System Components—Health Effects is required (Sec. 4.2.3).
4. Visual comparative standard for surface preparation (Sec. 4.4.2.3).
5. Holdback for field welds (Sec. 4.4.3.2).
6. The minimum and maximum dry film thicknesses (DFT) of the lining or coating (Sec. 4.4.3.7).
7. Requirements for field joint coating if other than epoxy (Sec. 4.6).
8. Coating requirements for special connections and appurtenances (Sec. 4.7.3).
9. Epoxy materials prequalification (Sec. 5.1).
10. Quality assurance records (Sec. 5.3).
11. Requirements for material inspection and rejection (Sec. 5.4, 5.5, and 5.6).
12. Requirements for adhesion testing of coating (Sec. 5.5.5).
13. Whether adhesion testing is required on fittings, specials, and appurtenances (Sec. 5.5.5.1).
14. Affidavit of compliance, if required (Sec. 6.3).

III.B. *Modification to Standard.* Any modification of 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 title of the standard was changed to be consistent with other AWWA steel pipe coating standards.

2. Sec. III.A, Purchaser Options and Alternatives, was updated to reflect changes in the standard.

3. Section 2, References, was updated.

4. The definition for potable water was added to Section 3, Definitions.

5. A new Sec. 4.2.3 was added to address certification to NSF/ANSI 61 if the lining system is in contact with potable water.

6. Old Sec. 4.3, Coating System, was renamed Epoxy System and revised to be consistent with other AWWA steel pipe coating and lining standards, and the epoxy thickness information was moved to the new Sec. 4.4.3.7, Epoxy thickness, for better readability.

7. Old Sec. 4.3.3, Applied, Cured Coating Requirements, was moved to Sec. 5.5.2, Cure, to reduce redundancy and improve continuity of the standard.

8. Table 1 was revised to reflect prequalification requirements and a minimum dielectric strength requirement was added.

9. Table 2 was revised to reflect quality control requirements and requirements for appearance and cure were added and the ASTM D3359 adhesion method A was deleted to be consistent with industry practice.

10. Old Sec. 4.4, Coating Application, was renamed Epoxy Application and slightly revised for consistency.

11. A new Sec. 4.4.3.3 on field coating of holdback areas was added.

12. Sec. 4.6.1.1, Preparation, for welded field joints was revised and a surface profile depth for abrasive blast cleaning was added.

13. Old Sec. 4.6.3, Electrical Inspection, was deleted and combined with Sec. 5.5.4, Electrical continuity inspection, to reduce redundancy and improve continuity.

14. Old Sec. 4.7.3.3, Cure, was deleted and combined with Sec. 5.5.2, Cure, to reduce redundancy and improve continuity.

15. Old Sec. 4.7.3.4, Electrical Inspection for Continuity, was deleted and combined with Sec. 5.5.4, Electrical continuity inspection, to reduce redundancy and improve continuity.

16. Sec. 4.8 was modified to be consistent with other AWWA steel pipe coating and lining standards and now references AWWA C604.

17. Section 5, Verification, was revised and the heading titles and format were updated to be consistent with the new language and format being used in AWWA steel pipe coating and lining standards.

18. Sec. 5.2.1.2, Cathodic disbondment, was updated with more detail.

19. A new Sec. 5.2.1.3 on dielectric strength was added.

20. A new Sec. 5.3, Quality Assurance and Records, was added.

21. A new quality control requirement for appearance was added (Sec. 5.5.1).

22. The quality control requirements for cure (Sec. 5.5.2), dry film thickness (Sec. 5.5.3), electrical continuity inspection (Sec. 5.5.4), and adhesion (Sec. 5.5.5) were updated.

23. Sec. 5.5.5, Adhesion, was revised and new sections on frequency of testing (Sec. 5.5.5.1) and rejection of pipe (Sec. 5.5.5.2) were added.

24. Sec. 5.6, Rejection, was updated and expanded.

25. Section 6, Delivery, was modified to be consistent with other AWWA steel pipe coating and lining standards.

26. Sec. 6.3, Affidavit of Compliance, was revised to be consistent with the AWWA boilerplate language used in other AWWA standards.

V. Comments. If you have any comments or questions about this standard, please call the AWWA Engineering and Technical Services at 303.794.7711, FAX at 303.795.7603; write to the department at 6666 West Quincy Avenue, Denver, CO 80235-3098; or email at standards@awwa.org.



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AWWA Standard

Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes the material and application of shop- and field-applied liquid-epoxy coatings and linings used in the water-supply industry for steel water pipelines installed underground or underwater, under normal construction conditions.

1.1.1 *Conditions not described in this standard.* The coating systems described in this standard are not intended for use on pipe that will be bent after the coating or lining system has been applied.

1.1.2 *Coating and lining systems.* The coating and lining systems may consist of any of the following three types: (1) a two-part chemically cured epoxy primer and one or more coats of a different two-part chemically cured epoxy top-coat; (2) two or more coats of the same two-part chemically cured epoxy, in which case the first coat shall be considered as the prime coat; or (3) a single coat of a two-part chemically cured epoxy.

1.1.2.1 *Maximum temperature.* AWWA steel pipe coating and lining standards are based on the maximum service temperature of potable water. Consult the epoxy manufacturer for conditions and limitations.