ANSI/AWWA **C213-22**

(Revision of ANSI/AWWA 213-15)

AWWA Standard

Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings

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American Water Works Association

AWWA Standard

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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 C213.*

I. Introduction.

I.A. *Background.* Fusion-bonded epoxy coatings are one-part dry-powder thermosetting epoxies that, when heat activated, produce a chemical reaction to the steel pipe surface while maintaining the performance of its properties. The first known applications for corrosion protection in the United States occurred in 1960 on the external surfaces of small-diameter pipe for gas distribution. Since then, applications have expanded to larger pipe sizes as internal and external coatings for gas, oil, water, and wastewater applications. Custom application to accessory fittings, pumps, valves, couplers, flowmeters, and a variety of other parts is also possible. Materials are applied by electrostatic spray, air spray (flocking), or fluid bed, usually in a controlled plant environment. However, equipment is available that allows for internal or external application to pipe joints in the field.

I.B. *History.* The first edition of this standard was approved in 1979. The 1985 revision incorporated changes reflecting fusion-bonded epoxy technology, which was current at that time. The primer provision was deleted in the 1985 revision. The 2001 and 2007 revisions incorporated the latest technology and requirements at that time. The last edition was approved on Jan. 24, 2015. This edition was approved 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 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). 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

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

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

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

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. Two standards developed under the direction of NSF: NSF/ANSI/CAN[§] 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects.

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.

Annex A, "Toxicology Review and Evaluation Procedures," to NSF/ANSI/CAN 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 C213 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.

II.A. *Advisory Information on Material Application*. This standard defines the quality of fusion-bonded epoxy to establish the characteristics desired for long-term corrosion protection. It is intended for interior linings and exterior coatings for steel water pipelines for underground and underwater installation under normal conditions.

[§] 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.

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 specified by the purchaser:

1. Standard used—that is, ANSI/AWWA C213, Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings, of latest revision.
2. Any exceptions to the standard.
3. Diameter, length, and location of pipeline.
4. Temperature of conveyed water (Sec. 1.1.2).
5. Details of federal, state provincial, territorial and local requirements (Sec. 4.2.1).
6. For applications other than potable water, whether compliance with NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects, is required (Sec. 4.2.2).
7. Requirements for epoxy application at pipe ends (Sec. 4.5.2.2).
8. Optional epoxy performance testing (Sec. 4.5.2.7, Sec. 5.5.5).
9. Requirements for field-welded joint coating (Sec. 4.8).
10. Whether additional layers or thickness of material is required (Sec. 4.5.2.3).
11. Coating requirements for thread systems, special connections, and appurtenances (Sec. 4.6.3.2).
12. Requirements for cure of epoxy (Sec. 4.5.2.5 and Sec. 4.6.3.4).
13. Provision for field procedures (Sec. 4.9).
14. Requirements of inspection and laboratory testing (Section 5).
15. Requirements for adhesion testing of coating (Sec. 5.2.2.4 and Sec. 5.5.3).
16. Requirement for epoxy thickness (Sec. 5.5.4).
17. Additional optional epoxy testing (Sec. 5.5.5).
18. Rejection of pipe (Sec. 5.6).
19. Affidavit of compliance, if 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. Revisions made to this standard in this edition include the following:

1. Section 2 References was updated.
2. The definition for applicator was added to Section 3 Definitions.

3. Section 4 was updated with standardized wording and headings to be consistent with other coating and lining standards.

4. Sec. 4.2.1 Materials was updated with the latest Standards Council approved language.

5. A new Sec. 4.2.3 Safety was added to be consistent with other AWWA steel pipe coating and lining standards.

6. Sec. 4.4 Surface Preparation was modified to be consistent with other coating and lining standards.

7. The tables were moved to the sections in which they are referenced.

8. The minimum blast profile was increased (Sec. 4.4.4.1).

9. The maximum preheat temperature was increased (Sec. 4.5.2.1).

10. The thicknesses related to electrical continuity inspection levels were further defined in Sec. 5.5.2.

11. The minimum adhesion to the pipe was further defined in Sec. 5.5.3 and Table 3.

12. Sec. 5.5.4 Thickness was revised for consistency with other coating and lining standards.

13. Sec. 5.6.3 and Sec. 5.6.4 were modified to be consistent with language from other coating and lining standards.

14. Sec. 6.3 was modified to include affidavits from both the epoxy manufacturer and the applicator.

V. Comments. If you have any comments or questions about this standard, please call 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

Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes the material and application requirements for fusion-bonded epoxy coatings and linings for steel water pipe, special sections, welded joints, connections, fittings, and appurtenances for steel water pipelines installed underground or underwater. Fusion-bonded epoxies are heat-activated chemically cured systems.

1.1.1 *Minimum pipe diameter*. The minimum pipe diameter for application of epoxy lining that can be inspected and repaired by entering the pipe shall be 24 in. (600 mm).* Pipe diameters less than 24 in. (600 mm) that can be electrically inspected internally may be included, provided the work complies with applicable provisions of this standard.

1.1.2 *Maximum temperatures*. AWWA pipe coating standards are written for and based on the service temperature of potable water. Consult the epoxy manufacturer for conditions and limitations.

* Metric conversions given in this standard are direct conversions of US customary units and are not those specified in International Organization for Standardization (ISO) standards.