

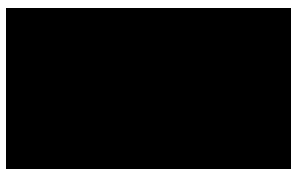
American Water Works Association

ANSI/AWWA D102-97

(Revision of ANSI/AWWA D102-78)



AWWA STANDARD
FOR
COATING STEEL WATER-STORAGE TANKS



Effective date: Aug. 1, 1997.

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AMERICAN WATER WORKS ASSOCIATION

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Foreword

This foreword is for information only and is not a part of AWWA D102.

I. Introduction.

I.A. *Background.* Upon completion and final balloting of AWWA D102-78, the Steel Tank Committee appointed a new chair and a new Revision Task Force was formed, consisting of a mix of new and previous members. This task force submitted several drafts of the proposed standard, but none were approved by the balloting process. A new chair and task force were appointed in 1986, with instructions to complete the standard within the shortest possible time interval. The first draft was submitted for ballot on March 1, 1988, with the final draft submitted for ballot in April 1996.

I.B. *History.* The first edition of this standard was prepared by a joint committee of AWWA and NEWWA and was approved as tentative on May 9, 1952. Revisions were made on June 2, 1953, May 24, 1954, and Aug. 5, 1955. The second edition was approved as tentative on Jan. 23, 1962, and was approved by the AWWA Board of Directors on Feb. 11, 1964. The third edition of this standard was approved on Jan. 28, 1978, and subsequently withdrawn on June 23, 1991. ANSI/AWWA D102 was reissued and subsequently approved by the AWWA Board of Directors on Feb. 2, 1997.

The objective of the first edition of this standard was to provide an outline of methods that should be followed when coating or recoating steel tanks for water storage.

The original edition included contractual arrangements and procedures. This information was moved to the foreword in the second edition. In the 1978 edition, the discussion of contractual arrangements, cathodic protection, methods of disinfection, and the outside coating systems previously designated in the 1964 edition as No. 3 (long oil red-lead) and No. 4 (flame-sprayed aluminum) were eliminated. Also eliminated was the text on inside wax-type coatings systems. Requirements for safety precautions, testing, and first anniversary inspection were added to the 1978 edition.

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.

*Persons in Canada, Mexico, and non-North American countries 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, 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.

Appendix 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 Appendix A procedures may not always be identical, depending on the certifier.

AWWA D102-97 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. *Wax Coatings.* Wax-type coating systems were omitted from the 1978 edition of AWWA D102. Currently, some state or provincial jurisdictions have taken a position against the use of wax coatings on new potable water tanks and discourage their use for repairing coatings of existing tanks. Purchasers are advised to check the regulatory requirements in their area before specifying a wax-type coating.

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 Options and Alternatives.* The following items should be covered in the purchaser’s specifications:

1. Standard used—that is, AWWA D102, Standard for Coating Steel Water-Storage Tanks, of latest revision.
2. Approximate shape, outside diameter, and height of the tank or tanks.
3. The location of the tank or tanks.

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

[†]NSF International, 3475 Plymouth Rd., Ann Arbor, MI 48106.

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

4. Electrical service (phase, frequency, voltage) available or temporary service to be made available for the constructor's use. If temporary, indication of when the electrical service will be available.

5. Affidavit of compliance, if required (Sec. 6.3).

6. Description of lettering or symbols to be painted on the tank or tanks, including color(s), size, and location.

7. Coating the underside of flat bottom tanks, if required. Also, the coating or coating system to be used (Sec. B.4 of appendix B).

8. Coating system for inside of elevated tank pedestals (Sec. B.5 of appendix B).

9. Surface preparation (Sec. B.6 of appendix B and Sec. 4.5) and coating system (Sec. B.2 of appendix B and Sec. 4.2) to be used on the outside surfaces.

10. Surface preparation (Sec. B.6 of appendix B and Sec. 4.5) and coating systems (Sec. B.3 of appendix B and Sec. 4.3) for inside surfaces.

11. Special requirements, if any, for surface preparation (Sec. 4.5.1, Sec. 4.5.2, and Sec. 4.5.3).

12. Whether tanks located in coastal areas or industrial environments are to have outside surfaces cleaned to SSPC SP10, Near-White Blast Cleaning (Sec. 4.5.2.1 and 4.5.2.2, and Sec. B.6.4 of appendix B).

13. For recoating exterior surfaces where existing coating is not removed, whether removal of contaminants by washing is required (see Sec. 4.5.2.2).

14. First anniversary inspection (Sec. 5.2 and Sec. B.10 of appendix B).

15. The local and federal regulations regarding environmental concerns (appendix C).

16. If a coating inspection service will be retained and, if so, which one (Sec. B.9 of appendix B).

17. Data to be furnished by the constructor (Sec. 4.1).

III.B. *Modification to Standard.* Any modification to the provisions, definitions, or terminology in this standard should be provided in the purchaser's specifications.

IV. Major Revisions. The major revisions to the standard in this edition from the previously withdrawn 1978 edition include the following:

1. All coating systems included in this standard have been selected to eliminate products that contain "red-lead" or zinc-chromate. Occupational Health and Safety Administration (OSHA) Regulation 29-CFR-1910 and 29-CFR-1926 have set highly restrictive limits on the fabricator-applicator with respect to inhalation, ingestion, or absorption through the skin of lead and chromate-bearing pigments.

2. A new alphanumeric identification system has been used in this standard for both inside and outside coating systems to distinguish the coating systems in this revised standard from those in the previous edition. In this standard, the interior and exterior systems are referred to as "coating systems" instead of "painting systems." In addition, some of the previous systems have been rearranged so that similar coating systems are adjacent to each other.

3. Several changes have been made to the inside and outside coating systems. There are many coating systems that are suitable for coating the interior and exterior of tanks, but this standard includes only those systems that are widely used.

4. Outside Coating Systems No. 5 (epoxy-urethane) and No. 6 (zinc-rich epoxy-urethane) have been included in this standard.

5. Former Inside Paint Systems No. 2 (five-coat vinyl) and No. 3 (chlorinated rubber) and former Outside Paint System No. 5 (chlorinated rubber-alkyd) have not been included in this standard.

6. Former Inside Paint System No. 7 (metallic-sprayed zinc coating) has not been included in this standard. AWWA is developing a new standard to include this and other similar systems.

7. Former Inside Paint System No. 1 (two- or three-coat epoxy) has been changed to only a two-coat system and identified as Inside Coating System No. 1. Inside Coating System No. 2, three-coat two-component epoxy, and No. 3, zinc-rich primer with intermediate and finish coats of two-component epoxy, have been included in this standard.

V. Comments. If you have any comments or questions about this standard, please call the AWWA Standards Department, (303) 794-7711 ext. 6283, FAX (303) 795-1440, or write to the department at 6666 W. Quincy Ave., Denver, CO 80235.



AWWA STANDARD FOR COATING STEEL WATER-STORAGE TANKS

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard covers coating systems for coating and recoating the inside and outside surfaces of steel tanks used for potable water storage in water supply service. Coating systems for new bolted steel tanks are not covered by this standard (see ANSI/AWWA D103).

Sec. 1.2 Purpose

The purpose of this standard is to provide the minimum requirements for coating steel water-storage tanks, including materials, coating systems, surface preparation, application, and inspection and testing.

Sec. 1.3 Application

This standard can be referenced in specifications for coating steel water-storage tanks. The stipulations of this standard apply when this document has been referenced and then only to painting steel water-storage tanks.

SECTION 2: REFERENCES

This standard references the following documents. In their latest editions, these documents form a part of this standard to the extent specified within the standard. In any case of conflict, the requirements of this standard shall prevail.

ANSI/AWWA C203—Standard for Coal-Tar Protective Coatings and Linings for Steel Water Pipelines—Enamel and Tape—Hot Applied.

ANSI/AWWA C210—Standard for Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.

ANSI/AWWA D103—Standard for Factory-Coated Bolted Steel Tanks for Water Storage.

NACE RP0188*—Discontinuity (Holiday) Testing of Protective Coatings.

NACE 6A192—Dehumidification Equipment in Lining Application.

NFPA † 70—National Electrical Code.

SSPC ‡ PA1—Shop, Field, and Maintenance Painting.

SSPC PA2—Measurement of Dry Paint Thickness with Magnetic Gages.

SSPC PA3—Guide to Safety in Paint Application.

SSPC Paint 21—White or Colored Silicone Alkyd Paint Type I, High Gloss Type II, Medium Gloss.

SSPC Paint 25—Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments).

SSPC Paint 104—White or Tinted Alkyd Paint.

SSPC PS Guide 12.00—Painting System Guide No. 12.00, Guide for Selecting Zinc-Rich Coating Systems.

SSPC PS Guide 17.00—Painting System Guide No. 17.00, Guide for Selecting Urethane Painting Systems.

SSPC SP6—Joint Surface Preparation Standard Commercial Blast Cleaning.

SSPC SP7—Joint Surface Preparation Standard Brush-Off Blast Cleaning.

SSPC SP10—Joint Surface Preparation Standard Near-White Blast Cleaning.

SSPC SP11—Power Tool Cleaning to Bare Metal.

SSPC SP COM—Surface Preparation Specifications Surface Preparation Commentary.

Fed. Spec. § TT-E-489—Enamel, Alkyd, Gloss (for exterior and interior surfaces).

Fed. Spec. TT-E-529—Enamel, Alkyd, Semi-Gloss (for exterior and interior surfaces).

Fed. Spec. TT-P-320—Pigment, Aluminum: Powder and Paste for Paint.

Fed. Spec. TT-V-81—Varnish: Mixing for Aluminum Paint.

USBR** VR-3—Vinyl Resin Paint.

DOD†† C-24654—Coatings, Epoxy, Potable Water Tanks.

MIL-P-24441—Paint, Epoxy-Polyamide, General Specification.

SECTION 3: DEFINITIONS

The following definitions shall apply in this standard:

1. *Coating*: Liquid, powder, or mastic composition that has been converted to a solid, durable, and functional adherent film after application as a thin layer.

*NACE International, P.O. Box 218340, Houston, TX 77218.

†National Fire Protection Association, One Batterymarch Park, Quincy, MA 02269.

‡Steel Structures Painting Council, 40 24th St., Ste. 301, Pittsburgh, PA 15222.

§Federal and Military Specifications, Naval Publications and Forms Center, 5801 Tabor Ave., Philadelphia, PA 19120.

**US Bureau of Reclamation, Denver, CO 80235.

††Department of Defense, Philadelphia, PA 19111-5094.

2. *Constructor*: The party that furnishes the work and materials for placement or installation.
3. *Manufacturer*: The party that manufactures, fabricates, or produces materials or products.
4. *Purchaser*: The person, company, or organization that purchases any materials or work to be performed.
5. *Tank*: As used in this standard, tank includes **steel** standpipes, reservoirs, and elevated tanks.

SECTION 4: REQUIREMENTS

Sec. 4.1 Data to Be Furnished by the Constructor

- 4.1.1 *Coatings manufacturer*. The name of the company that manufactures the coating to be applied.
- 4.1.2 *Application method*. The application method for inside and outside coatings; that is, brushing, rolling, or spraying.
- 4.1.3 *Materials*. The identification of each coating material intended for use on the project and the affidavit of compliance when requested by the purchaser.
- 4.1.4 *Material safety data sheets*. Current material safety data sheets (MSDS) for each product to be used.

Sec. 4.2 Outside Coating Systems

4.2.1 *General*. This section covers coating systems for coating the exterior, weather-exposed surfaces of steel tanks. When coating materials are referenced to federal or military specifications or other referenced standards, the reference shall define the general type and quality required, but shall not limit acceptable materials to an exact formulation. Proprietary formulations will be acceptable when (1) the manufacturer certifies that the coating is of the same generic type and (2) the performance of the formulation offered meets or exceeds the performance of the formulation defined in the referenced coating standard and is suitable for the anticipated service conditions. If required, documentation consisting of test data or field service data shall be provided.

4.2.2 *Outside Coating System No. 1*. This is a three-coat alkyd system consisting of a prime coat of rust-inhibitive pigmented alkyd primer followed by two coats of alkyd enamel. The following coating systems are included:

System Designation	Intermediate and Finish Coats
OCS-1-A	Aluminum
OCS-1-C	Checkerboard (International orange and white)
OCS-1-M	Metallic color
OCS-1-W	White
OCS-1-S	Special color selected by purchaser

4.2.2.1 **Materials.** The prime coat shall be red iron oxide, zinc oxide, oil and alkyd primer without lead, and chromate pigments, in accordance with Primer 1—SSPC Paint 25.

For System OCS-1-A, the finish coats shall be Paint 1, ready-mixed aluminum coating consisting of aluminum paste in accordance with Fed. Spec. TT-P-320, Type II, Class 2; and mixing varnish in accordance with Fed. Spec. TT-V-81, Type II, and mixed in the proportion of 2 lb of aluminum paste per gallon (0.23 kg/L) of mixing varnish.

For System OCS-1-C, the coating for white panels shall be gloss alkyd enamel in accordance with Type I of SSPC Paint 104, and the coating for orange panels shall be gloss alkyd enamel in accordance with Fed. Spec. TT-E-489, color 12197.

For System OCS-1-M, the finish coats shall be a non-leafing aluminum pigmented alkyd coating tinted with phthalocyanine blue or green.

For System OCS-1-W, the intermediate and finish coats shall be white gloss alkyd enamel in accordance with Type I of SSPC Paint 104.

For System OCS-1-S, the intermediate and finish coats shall be gloss alkyd enamel in accordance with Fed. Spec. TT-E-489.

4.2.2.2 **Thickness.** Minimum dry film thickness, in mils, of the system shall be as follows:

System	Primer	Intermediate Coat	Finish Coat	Total System
OCS-1-A	2.0	1.0	1.0	4.0
OCS-1-C	2.0	1.5	1.5	5.0
OCS-1-M	2.0	1.0	1.0	4.0
OCS-1-W	2.0	1.5	1.5	5.0
OCS-1-S	2.0	1.5	1.5	5.0

NOTE: Consult the coating manufacturer for coating thickness limitations.

4.2.3 **Outside Coating System No. 2.** This is a four-coat alkyd system, consisting of two prime coats of rust-inhibitive pigmented alkyd primer followed by two coats of alkyd enamel. The following systems are included:

System Designation	Intermediate and Finish Coats
OCS-2-A	Aluminum
OCS-2-C	Checkerboard (international orange and white)
OCS-2-M	Metallic color
OCS-2-W	White
OCS-2-S	Special color selected by purchaser

4.2.3.1 **Materials.** The prime coats shall be red iron oxide, zinc oxide, oil and alkyd primer without lead, and chromate pigments in accordance with Primer 1—SSPC Paint 25. The second prime coat shall be a contrasting color from the first prime coat.

For System OCS-2-A, the finish coats shall be Paint 1, ready-mixed aluminum coating consisting of aluminum paste in accordance with Fed. Spec. TT-P-320, Type II, Class 2; and mixing varnish in accordance with Fed. Spec. TT-V-81, Type II,