American Water Works Association

ANSI/AWWA C214a-10
Addenda to
ANSI/AWWA C214-07
Standard
for

# Tape Coating Systems for the Exterior of Steel Water Pipelines

Approved by AWWA Board of Directors Jan. 17, 2010.
Approved by American National Standards Institute Jan. 14, 2010.

1. **Page 2, Sec. 2, add the following references:**

ASTM C771—Standard Test Method for Weight Loss After Heat Aging of Preformed Tape Sealants.

ASTM C792—Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.

ASTM D3236—Standard Test Method for Apparent Viscosity of Hot Melt Adhesives and Coating Materials.

2. **Page 4, Sec. 4.3.1, revise to read:**

4.3.1 System components. The prefabricated polyolefin tape coating system shall be at least three layers consisting of the following:

1. A liquid adhesive layer.
2. An inner-layer tape for corrosion protection.
3. An outer-layer tape for mechanical protection.

The inner-layer corrosion protection and outer-layer mechanical protection shall be in the form of prefabricated material in rolls. The properties of the entire

system shall conform to the appropriate values listed in Tables 1 or 1A, 2, 3, 4, and 5.

**3. Page 4, add new Table 1A:**

**Table 1A Physical properties of 100 percent solids liquid adhesive***

| Property | Requirement | | Test Method |
|---|---|---|---|
| | Minimum | Maximum | |
| Solids | 99 % | - | Sec. 5.3.13 |
| Density | - | 1.2 g/cm³ | Sec. 5.3.14 |
| Viscosity at 300°F | - | 15,000 cps | Sec. 5.3.15 |

* Test methods are all for tests performed in laboratories. If field tests for any property are required, consult with the manufacturer.

**4. Page 5, Sec. 4.3.1.1, revise to read:**

4.3.1.1 Liquid adhesive. The liquid adhesive layer shall be one of the following:

1) A solvent-based liquid adhesive, which shall consist of a mixture of suitable rubber, synthetic compounds, and a solvent, or

2) A 100 percent solids adhesive, which may be used as an equivalent alternate and shall consist of a mixture of suitable rubber and synthetic compounds with no solvent.

Either adhesive shall be applied to a properly prepared pipe surface as described in Sec. 4.4.2. The function of either adhesive is to provide a bonding medium between the pipe surface and the inner-layer tape.

**5. Page 7, Sec. 4.3.2.1, revise to read:**

4.3.2.1 Liquid adhesive. The liquid adhesive shall be supplied by the manufacturer that supplies the inner-layer tape. The liquid adhesive shall comply with all code and regulatory requirements in effect at the point of application. The components of the solvent-based liquid adhesive shall not settle in the container to form a cake or sludge that cannot be easily incorporated by hand or mechanical agitation, and it shall have good machine-application properties.

**6. Page 11, Sec. 4.4.3.1, revise to read:**

4.4.3.1 Liquid adhesive application. The liquid adhesive shall be applied in a uniform thin film at the coverage rate recommended by the manufacturer. The liquid adhesive shall be thoroughly and continuously mixed and agitated during

application to prevent settling. The liquid adhesive may be applied to the entire exterior surface of the pipe by spray-type or rug-type methods or other suitable means to cover the entire exterior surface of the pipe. The liquid adhesive coat shall be uniform and free from floods, runs, sags, drips, or bare spots. The 100 percent solids adhesive shall be applied to the entire pipe surface using suitable application methods in accordance with the manufacturer's recommendations. The liquid-adhesive-coated pipe surface shall be free of foreign substances such as sand, grease, oil, grit, rust particles, and dirt. Before applying the inner-layer tape, the liquid adhesive layer shall be allowed to dry in accordance with the manufacturer's recommendations.

7. **Page 16, Sec. 5.3, add the following new sections:**

5.3.13 Solids content. The 100 percent solids adhesive shall be tested for percent solids content in accordance with ASTM C771. An average value outside the limits stated in Table 1A shall constitute failure to meet this requirement.

5.3.14 Density. The 100 percent solids adhesive shall be tested for specific gravity in accordance with ASTM D792. An average value outside the limits stated in Table 1A shall constitute failure to meet this requirement.

5.3.15 Viscosity. The 100 percent solids adhesive shall be tested for viscosity at 300°F in accordance with ASTM D3236 using a Brookfield Model RTV viscometer SC 4-27 spindle. An average value outside the limits stated in Table 1A shall constitute failure to meet this requirement.

ANSI/AWWA C214-07
(Revision of ANSI/AWWA C214-00)

American Water Works Association

The Authoritative Resource on Safe Water®

*AWWA Standard*

# Tape Coating Systems for the Exterior of Steel Water Pipelines



Effective date: Dec. 1, 2007.
First edition approved by AWWA Board of Directors Jan. 30, 1983.
This edition approved: Jan. 21, 2007.
Approved by American National Standards Institute: Sept. 19, 2007.

6666 West Quincy Avenue
Denver, CO 80235-3098
**T** 800.926.7337
www.awwa.org

## AWWA Standard

This document is an American Water Works Association (AWWA) standard. It is not a specification. AWWA standards describe minimum requirements and do not contain all of the engineering and administrative information normally contained in specifications. The AWWA standards usually contain options that must be evaluated by the user of the standard. Until each optional feature is specified by the user, the product or service is not fully defined. AWWA publication of a standard does not constitute endorsement of any product or product type, nor does AWWA test, certify, or approve any product. The use of AWWA standards is entirely voluntary. AWWA standards are intended to represent a consensus of the water supply industry that the product described will provide satisfactory service. When AWWA revises or withdraws this standard, an official notice of action will be placed on the first page of the classified advertising section of *Journal AWWA*. The action becomes effective on the first day of the month following the month of *Journal AWWA* publication of the official notice.

## American National Standard

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether that person has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. American National Standards are subject to periodic review, and users are cautioned to obtain the latest editions. Producers of goods made in conformity with an American National Standard are encouraged to state on their own responsibility in advertising and promotional materials or on tags or labels that the goods are produced in conformity with particular American National Standards.

CAUTION NOTICE: The American National Standards Institute (ANSI) approval date on the front cover of this standard indicates completion of the ANSI approval process. This American National Standard may be revised or withdrawn at any time. ANSI procedures require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of publication. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036; (212) 642-4900.

## Science and Technology

AWWA unites the entire water community by developing and distributing authoritative scientific and technological knowledge. Through its members, AWWA develops industry standards for products and processes that advance public health and safety. AWWA also provides quality improvement programs for water and wastewater utilities.

# Committee Personnel

The Steel Water Pipe-Manufacturers Technical Advisory Committee (SWPMTAC) Task Group for AWWA C214, which developed this standard, had the following personnel at the time:

Richard W. Geary, *Chair*

| | |
|---|---|
| R.M. Buchanan, Canusa CPS, Toronto, Ont. | (AWWA) |
| D. Dechant, Northwest Pipe Company, Denver, Colo. | (AWWA) |
| B.H. Ellis, Hanson Pipe & Products Inc., Dallas, Texas | (AWWA) |
| R.W. Geary, Tek-Rap Inc., Houston, Texas | (AWWA) |
| B. Hayes, Tyco Adhesives Polyken/Raychem, Lafayette, Calif. | (AWWA) |
| D. Hoff, Hoff Company Inc., Englewood, Colo. | (AWWA) |
| D. Kathrein, Tapecoat Company, Evanston, Ill. | (AWWA) |
| B.D. Keil, Continental Pipe Manufacturing Company, Pleasant Grove, Utah | (AWWA) |
| L. McKinney, Womble Company Inc., Houston, Texas | (AWWA) |
| M.P. Murphy, Ameron International, Rancho Cucamonga, Calif. | (AWWA) |
| S.P. Scarpone, Reilly Industries Inc., Indianapolis, Ind. | (AWWA) |
| D.A. Scott, Scapa North America, Calgary, Alta. | (AWWA) |
| J.A. Wise, Canus International Sales Inc., Surrey, 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:

John H. Bambei Jr., *Chair*
George J. Tupac, *Vice-Chair*
Dennis Dechant, *Secretary*

*General Interest Members*

| | |
|---|---|
| W.R. Brunzell, Brunzell Associates Ltd., Skokie, Ill. | (AWWA) |
| R.L. Coffey, HDR Engineering Inc., Omaha, Neb. | (AWWA) |
| H.E. Dunham, MWH Inc., Bothell, Wash. | (AWWA) |
| S.N. Foellmi, Black & Veatch Corporation, Irvine, Calif. | (AWWA) |

J.W. Green, McDonough Associates Inc., Chicago, Ill. (AWWA)
M.B. Horsley,* Black & Veatch Corporation, Kansas City, Mo. (AWWA)
J.K. Jeyapalan, Consultant, New Milford, Conn. (AWWA)
W.J. Moncrief,* HDR Engineering Inc., San Diego, Calif. (AWWA)
R. Ortega, Lockwood Andrews & Newnam, 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., Issaquah, Wash. (AWWA)
G.J. Tupac, G.J. Tupac & Associates, Pittsburgh, Pa. (AWWA)
J.S. Wailes,† Standards Engineer Liaison, AWWA, Denver, Colo. (AWWA)
W.R. Whidden, Post Buckley Schuh & Jernigan, Orlando, Fla. (AWWA)
M.C. Young,† Standards Council Liaison, Bucher Willis & Ratliff Corporation, Kansas City, Mo. (AWWA)

*Producer Members*

S.A. Arnaout, Hanson Pipe & Products Inc., Dallas, Texas (AWWA)
H.R. Bardakjian, Ameron International, Rancho Cucamonga, Calif. (AWWA)
M. Bauer, Tnemec Company Inc., North Kansas City, Mo. (AWWA)
R.J. Card, Victaulic Depend-O-Lok Inc., Atlanta, Ga. (AWWA)
R.R. Carpenter, American Cast Iron Pipe Company, Birmingham, Ala. (MSS)
D. Dechant, Northwest Pipe Company, Denver, Colo. (AWWA)
B.D. Keil, Continental Pipe Manufacturing Company, Pleasant Grove, Utah (SPFA)
J.L. Luka,* American SpiralWeld Pipe Company, Columbia, S.C. (AWWA)
B. Vanderploeg,* Northwest Pipe Company, Portland, Ore. (AWWA)
J.A. Wise, Canus International Sales Inc., Surrey, B.C. (AWWA)

*Alternate

†Liaison, nonvoting

*User Members*

G.A. Andersen, New York City Bureau of Water Supply, Little Neck, N.Y. (AWWA)

J.H. Bambei Jr., Denver Water Department, Denver, Colo. (AWWA)

D.W. Coppes, Massachusetts Water Resources Authority, Southborough, Mass. (NEWWA)

R.V. Frisz, US Bureau of Reclamation, Denver, Colo. (USBR)

G. George, Tacoma Public Utilities, Tacoma, Wash. (AWWA)

T.J. Jordan, Metropolitan Water District of Southern California, La Verne, Calif. (AWWA)

M. McReynolds,* Metropolitan Water District of Southern California, La Mirada, Calif. (AWWA)

G. Oljaca, Greater Vancouver Regional District, Burnaby, B.C. (AWWA)

V. Soto, 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, City of Richmond, Richmond, B.C. (AWWA)

*Alternate

This page intentionally blank.

# Contents

*All AWWA standards follow the general format indicated subsequently. Some variations from this format may be found in a particular standard.*

This page intentionally blank.

# Foreword

*This foreword is for information only and is not part of ANSI/AWWA C214.*

**I. Introduction.**

I.A. *Background.* This standard describes the minimum material and application requirements for prefabricated plastic tape to be plant applied to the exterior of steel water pipe to protect the pipe against underground corrosion. Currently, the only plastic tape coatings for which significant performance experience in this application has been accumulated are based on polyethylene. However, this standard can also be used to qualify tapes that are based on other polyolefin materials.

I.B. *History.* The first edition of this standard was approved by the AWWA Board of Directors on Jan. 30, 1983. The second edition was approved on June 22, 1989, and had an effective date of Jan. 1, 1990. The third edition was approved June 17, 1995, and had an effective date of Dec. 1, 1996. Major revisions in the second edition included deleting references to ANSI/AWWA C209. In the third edition, the references to ANSI/AWWA C209 were reinstated and remain in this fifth edition. The second edition also deleted numerical reference to the maximum operating temperature of steel water pipelines; added a statement of applicability to the "exterior of steel water pipelines in the potable-water supply industry" in Sec. 1.1, Scope; and added item 21, "Maximum internal operating pressure of the pipeline," to the foreword. Addendum C214a-91, approved on June 23, 1991, added additional physical property requirements, limiting the amount of nonpolyolefinic material in inner-layer tape to a minimum of 1.0 percent and a maximum of 3.5 percent and limiting the amount of nonpolyolefinic material in outer-layer tape to a minimum of 3.0 percent and a maximum of 7.0 percent. The tape manufacturer was also required to certify that the tape met these criteria. Addendum C214a-91 also revised Sec. 5.3.11 (previously Sec. 4.2.11), deleting the phrase "and 140°F (60°C)" from that section. The fourth edition of ANSI/AWWA C214 was approved on Jan. 23, 2000. This fifth edition was approved on Jan. 21, 2007.

**II. Special Issues.**

II.A. *Advisory Information on Product Application.* This standard defines the performance of prefabricated plastic tape coatings establishing the quality desired for long-term protection and prevention of corrosion. It is intended for the exterior coating of steel water pipelines for underground or underwater installation under normal conditions. It is based on the best-known experience but is not designed for

unqualified use under all conditions. The advisability of its use for any installation must be reviewed by the purchaser. If an extended period of aboveground storage of coated pipe is anticipated, the ability of the outer wrap to resist degradation from ultraviolet light and other atmospheric and environmental conditions should be considered.

Future air emission regulations may restrict the use of liquid adhesives described in this standard. If this occurs, consult the manufacturer for equivalent alternatives.

**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 C214, Tape Coating Systems for the Exterior of Steel Water Pipelines, of latest revision.
2. Any required exceptions to the standard.
3. Diameter, length, and location of pipeline.
4. Location of coating application with reference to environmental considerations.
5. Operating temperature range (Sec. 1.1.1).
6. Determining nonpolyolefinic material (Tables 2 and 3, Sec. 4.3.1.2 and 4.3.1.3).
7. Outdoor storage (Sec. 4.3.1.3).
8. Coating system thickness (Tables 2, 3, and 4, and Sec. 4.3.1.4).
9. Tape dimensions (Sec. 4.3.2.2.2).
10. Inspecting and testing (Sec. 4.3.3 and Section 5).
11. Visual standards (Sec. 4.4.2.3).
12. Weld treatment (Sec. 4.4.2.7).
13. Hard rubber roller use (Sec. 4.4.3.2).
14. Roll temperature (Sec. 4.4.3.2 and 4.4.3.3).
15. Cutback at pipe ends (Sec. 4.4.3.4).
16. Coating repair (Sec. 4.4.4).
17. Welded field-joint coating (Sec. 4.4.5).
18. Conditions not discussed (Sec. 4.4.7).
19. Pipe bedding and trench backfill (Sec. 4.5.3).
20. Compaction of bedding and backfill (Sec. 4.5.3.3).
21. Coating materials acceptance testing (Sec. 5.1). NOTE: With reference to

Sec. 5.1 (option 2), when submission of samples of proposed materials for testing by the purchaser is specified, the purchaser should address the assignment of testing costs. According to commonly accepted industry practice, the purchaser pays for the cost of initial testing of coating material samples originally offered by the constructor. If any initial samples fail to conform to the standard, additional samples may be tested. Costs of testing additional samples are borne by the constructor.

22. Optional inspection (Sec. 5.2.1).
23. Adhesive removal (Sec. 5.3.2).
24. Coating-system thickness test frequency (Sec. 5.4.1).
25. Holiday detector use (Sec. 5.4.2).
26. Nonconforming pipe (Sec. 5.5).
27. Delivery (Section 6).
28. Packaging (Sec. 6.2.1).
29. 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.** The major revisions made to the standard in this edition include the following:

1. Changes were made in Sec. 4.4, describing the pipe surface preparation procedure using abrasive-blast-cleaning methods, along with consistent terminology for abrasive blast cleaning, abrasive mix, and visual comparative standards.
2. A new section, Sec. 4.4.2.8, on weld height limits was added.
3. Provisions for the use of heat-applied repair patches in accordance with ANSI/AWWA C216 were added in Sec. 4.4.4.
4. Provisions for the use of an electronic-magnetic thickness gauge were added in Sec. 5.3.2.

**V. Comments.** If you have any comments or questions about this standard, please call the AWWA Volunteer and Technical Support Group at 303.794.7711, FAX at 303.795.7603, write to the group at 6666 West Quincy Avenue, Denver, CO 80235-3098, or e-mail at standards@awwa.org.

This page intentionally blank.

American Water Works Association

ANSI/AWWA C214-07
(Revision of ANSI/AWWA C214-00)

*AWWA Standard*

# Tape Coating Systems for the Exterior of Steel Water Pipelines

## SECTION 1: GENERAL

### Sec. 1.1 Scope

This standard describes the materials and application of tape coating systems in coating plants at fixed sites using coating techniques and equipment as recommended by the tape coating manufacturer. For normal construction considerations, prefabricated polyolefin tapes are applied as a three-layer system consisting of (1) liquid adhesive, (2) corrosion-preventive tape (inner layer), and (3) mechanical-protective tape (outer layer). This standard establishes the minimum requirements for tape coating systems used on the exterior of steel water pipelines in the potable-water supply industry. Continuous monitoring of all application procedures for the tape coating systems shall be performed by the constructor.

1.1.1 *Maximum temperatures.* AWWA pipe coating standards are written for and based on the service temperature of potable water. These coating systems have performed at higher temperatures. Consult the coating manufacturer for conditions and limitations.

1.1.2 *Conditions not described in this standard.* This standard does not describe the additional materials and procedures that may be required for difficult