American Water Works Association

Erratum to
ANSI/AWWA C116/A21.16-09
Standard
for

Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings

(January 2010)

1. **Add the following sentence to the end of Sec. 1.3 Application:**

For applications other than potable water, consult the pipe manufacturer for the suitable lining.

ANSI/AWWA C116/A21.16-09
(Revision of ANSI/AWWA C116/A21.16-03)

American Water Works Association

The Authoritative Resource on Safe Water®

AWWA Standard

Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings

Effective date: Sept. 1, 2009.
First edition approved by AWWA Board of Directors June 21, 1998.
This edition approved Jan. 25, 2009.
Approved by American National Standards Institute July 10, 2009.

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

Advocacy
Communications
Conferences
Education and Training
Science and Technology
Sections

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. This standard does not supersede or take precedence over or displace any applicable law, regulation, or codes of any governmental authority. 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.

Committee Personnel

Subcommittee 4, Coatings and Linings, which reviewed and developed this revision, had the following personnel at the time:

Richard W. Bonds, *Chair*

General Interest Members

D.R. Kroon, Corrpro Companies Inc., Houston, Texas	(AWWA)
T.J. McCandless,* Standards Engineer Liaison, AWWA, Denver, Colo.	(AWWA)
P.I. McGrath Jr., Consultant, Birmingham, Ala.	(AWWA)
J.R. Plattsmier, HDR Engineering Inc., Denver, Colo.	(AWWA)
D.W. Russom, Russom Technical Services LLC, Vilonia, Ark.	(AWWA)
C.R. Schwenker, Malcolm Pirnie Inc., Arlington, Va.	(AWWA)
P.A. Selig, Consultant, Birmingham, Ala.	(AWWA)
W.H. Smith, W.H. Smith & Associates Inc., Flora, Ill.	(AWWA)
K.E. Wilson, Post Buckley Schuh Jernigan Inc., Tampa, Fla.	(AWWA)

Producer Members

R.W. Bonds, Ductile Iron Pipe Research Association, Birmingham, Ala.	(AWWA)
D.R. Charko, McWane Inc., Birmingham, Ala.	(AWWA)
C. Comins, Custom Fab Inc., Orlando, Fla.	(AWWA)
M.D. Gaston, American Cast Iron Pipe Company, Birmingham, Ala.	(AWWA)
A.M. Horton, US Pipe & Foundry Company, Birmingham, Ala.	(AWWA)
H. Kennedy Jr., Harold Kennedy & Associates, Cary, N.C.	(AWWA)
M. Lundstrom, EBAA Iron Inc., Eastland, Texas	(AWWA)
P.L. Robertson, Specification Rubber Products, Alabaster, Ala.	(AWWA)
W.A. Stout, Griffin Pipe Products Company, Downers Grove, Ill.	(AWWA)

User Members

D.T. Bradley, Oak Lodge Water District, Portland, Ore.	(AWWA)
R.R. Goold, City of Kansas City, Kansas City, Mo.	(AWWA)
T.C. Moreno, Bexar Metropolitan Water District, San Antonio, Texas	(AWWA)
R.L. Worden, Guadalupe–Blanco River Authority, Seguin, Texas	(AWWA)

* Liaison, nonvoting

AWWA Standards Committee A21, Ductile-Iron Pipe and Fittings, which reviewed and approved this standard, had the following personnel at the time of approval:

John R. Plattsmier, *Chair*

General Interest Members

H.E. Holcomb, Consultant, Loganville, Ga.	(AWWA)
M.B. Horsley, Black & Veatch, Kansas City, Mo.	(AWWA)
D.H. Kroon, Corrpro Companies Inc., Houston, Texas	(AWWA)
D.D. Lary,* Wright-Pierce, Topsham, Maine	(NEWWA)
G.E. Laverick, Underwriters Laboratories Inc., Northbrook, Ill.	(AWWA)
T.J. McCandless,† Standards Engineer Liaison, AWWA, Denver, Colo.	(AWWA)
P.I. McGrath, Consultant, Birmingham, Ala.	(AWWA)
C.L. McLain,† Standards Council Liaison, Moorhead Public Service, Moorhead, Minn.	(AWWA)
P.J. Mourt, Hatch Mott MacDonald, Milburn, N.J.	(AWWA)
J.R. Plattsmier, HDR Engineering Inc., Denver, Colo.	(AWWA)
C.R. Schwenker, Malcolm Pirnie Inc., Arlington, Va.	(AWWA)
W.H. Smith, W.H. Smith & Associates Inc., Flora, Ill.	(AWWA)
T.M. Stinson, SEA Consultants Inc., Cambridge, Mass.	(NEWWA)
L.C. Yates, McGoodwin Williams & Yates, Fayetteville, Ark.	(AWWA)
K. Zastrow,* Underwriters Laboratories Inc., Northbrook, Ill.	(AWWA)

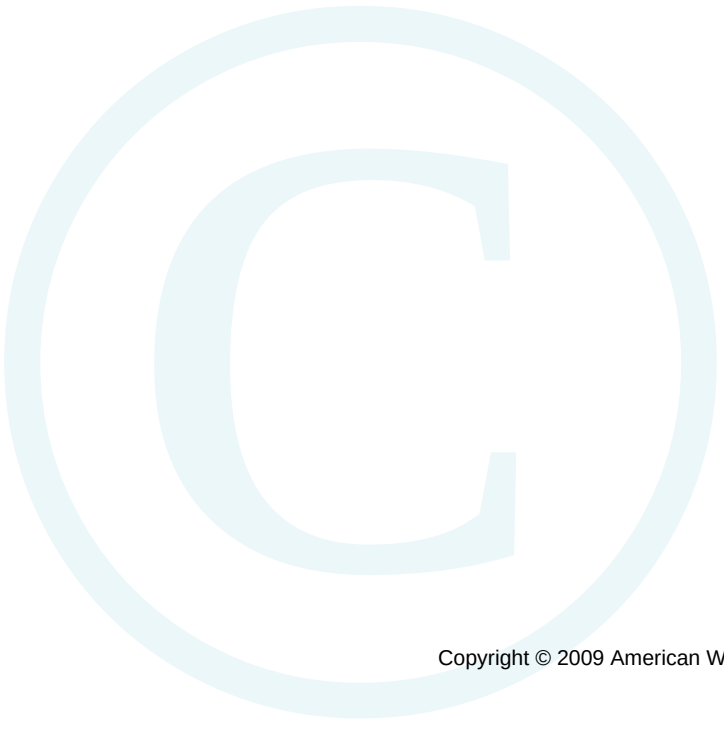
Producer Members

R.W. Bonds, Ductile Iron Pipe Research Association, Birmingham, Ala.	(AWWA)
L.R. Dunn, US Pipe & Foundry Company, Birmingham, Ala.	(DIPRA)
J.H. Eddings, McWane Cast Iron Pipe Company, Birmingham, Ala.	(AWWA)
M.D. Gaston, American Cast Iron Pipe Company, Birmingham, Ala.	(AWWA)
J.C. Jones, S&B Technical Products, Fort Worth, Texas	(AWWA)
H. Kennedy Jr., Harold Kennedy & Associates, Cary, N.C.	(AWWA)
T.J. Muntz, Fab Pipe Inc., Rogers, Minn.	(AWWA)
G. Oliver,* American Cast Iron Pipe Company, Birmingham, Ala.	(AWWA)
W.A. Stout, Griffin Pipe Products Company, Downers Grove, Ill.	(AWWA)

* Alternate
† Liaison, nonvoting

User Members

D.T. Bradley, Oak Lodge Water District, Portland, Ore. (AWWA)
T.E. Coughran, City of Santa Ana, Santa Ana, Calif. (AWWA)
A.J. DeBoy, Indiana American Water, Greenwood, Ind. (AWWA)
R.R. Goold, City of Kansas City, Kansas City, Mo. (AWWA)
J.M. Kennedy, Tampa Bay Water, Clearwater, Fla. (AWWA)
D.D. Montgomery, Independence Water Department, Independence, Mo. (AWWA)
C.J. Patla, Connecticut Water Service Inc., Clinton, Conn. (AWWA)
R.L. Worden, Guadalupe–Blanco River Authority, Seguin, Texas (AWWA)



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 a part of ANSI/AWWA C116/A21.16.*

I. Introduction.

I.A. *Background.* Ductile-iron and gray-iron fittings used for water service are normally furnished with a cement–mortar lining in accordance with ANSI/AWWA C104/A21.4, Cement–Mortar Lining for Ductile-Iron Pipe and Fittings, for internal corrosion protection. Additionally, polyethylene encasement in accordance with ANSI/AWWA C105/A21.5, Polyethylene Encasement for Ductile-Iron Pipe Systems, is normally used for external corrosion protection of ductile-iron and gray-iron fittings for buried applications in corrosive environments.

The purpose of this standard is to provide purchasers and manufacturers with the minimum requirements for protective fusion-bonded epoxy coatings and linings for the interior and exterior surfaces of ductile-iron and gray-iron fittings used for water service. The standard describes the material, application, and performance requirements for these coatings and linings and can be referenced in specifications for purchasing fittings with an interior and exterior fusion-bonded epoxy coating.

I.B. *History.* American National Standards Committee A21 on Cast-Iron Pipe and Fittings was organized in 1926 under the sponsorship of the American Gas Association (AGA), the American Society for Testing and Materials (ASTM), the American Water Works Association (AWWA), and the New England Water Works Association (NEWWA). Between 1972 and 1984, the cosecretariats were AGA, AWWA, and NEWWA, with AWWA serving as administrative secretariat. In 1984, the committee became an AWWA committee called AWWA Standards Committee A21 on Ductile-Iron Pipe and Fittings.

The present scope of Committee A21 activity is to develop standards and manuals that address ductile-iron pressure pipe for water supply service and ductile-iron and gray-iron fittings for use with such pipe. These standards and manuals include design, dimensions, materials, coatings, linings, joints, accessories, and methods of inspection and testing.

The work of Committee A21 is conducted by subcommittees. The scope of Subcommittee 4, Coatings and Linings, includes the periodic review of current A21 standards for interior and exterior protection of ductile-iron pipe and ductile-iron

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

and gray-iron fittings, the preparation of revisions and new standards when needed, and the examination of other matters pertaining to standards for interior and exterior protection of pipe and fittings.

In 1994, the AWWA Standards Council approved the development of an AWWA standard for protective fusion-bonded epoxy coatings for the interior and exterior surfaces of ductile-iron and gray-iron fittings for water service and assigned this project to Committee A21. Consequently, Subcommittee 4 submitted a proposed standard for fusion-bonded coatings to Committee A21 in 1997. The first edition of the standard was adopted in 1998. The second edition was adopted in 2003. This third edition of C116 was approved by the AWWA Board of Directors on Jan. 25, 2009.

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 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.
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.

* NSF International, 789 N. Dixboro Road, Ann Arbor, MI 48113.

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

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

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 jurisdiction. 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 C116 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. Holiday testing requires special handling and treatment of fittings and is not a routine production test. If experience indicates that severe service conditions exist that justify the added expense, the purchaser documents shall request a coating tested in accordance with ASTM G62 method A or method B at the discretion of the applicator (low voltage, wet sponge).

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 covered by the purchaser:

1. Standard used—that is, ANSI/AWWA C116/A21.16, Standard for Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings, of latest edition.
2. Whether compliance with NSF/ANSI 61, Drinking Water System Components—Health Effects, is required.
3. Details of other federal, state or provincial, and local requirements (Sec. 4.1.1).
4. Holiday testing, if required (Sec. 5.3).
5. Inspection by purchaser (Sec. 5.4).

6. Affidavit or certificate 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. Major revisions made to the standard in this edition include the following:

1. The scope of the standard was expanded to include wastewater and reclaimed water.
2. Addition of materials requirements (Sec. 4.1.1).

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 the group at standards@awwa.org.

AWWA C116/A21.16-09
(Revision of ANSI/AWWA C116/A21.16-03)

American Water Works Association

AWWA Standard

Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes protective fusion-bonded epoxy coatings for the interior and exterior surfaces of ductile-iron and gray-iron fittings used for water, wastewater, and reclaimed water systems. The standard describes the material, application, and performance requirements for these coatings.

This standard does not describe coatings agreed on between the purchaser and the manufacturer for special service conditions, such as saltwater, sewers, acid, high temperature, and so forth.

Sec. 1.2 Purpose

The purpose of this standard is to provide purchasers, manufacturers, and applicators with the minimum requirements for fusion-bonded epoxy coatings and linings for the interior and exterior of fittings.