

ANSI/AWWA

C116/A21.16-22

(Revision of ANSI/AWWA C116/A21.16-15)

AWWA Standard

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

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American Water Works
Association



AWWA Standard

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Committee Personnel

The AWWA A21 Standards Subcommittee 4, Coatings and Linings, which reviewed and approved this standard, had the following personnel at the time of approval:

Gregg Horn, *Chair*

General Interest Members

J.A. Hrdlicka (*liaison, nonvoting*), Standards Engineer Liaison, AWWA, Denver, Colo.

D.H. Kroon, Aegion, Houston, Tex.

J.R. Plattsmier, Consultant, New Port Richey, Fla.

P.A. Selig, Consultant, Birmingham, Ala.

Producer Members

J.H. Eddings, McWane Inc., Phillipsburg, N.J.

J.A. Fancher (*alternate*), American Cast Iron Pipe Company, Birmingham, Ala.

M.D. Gaston, American Cast Iron Pipe Company, Birmingham, Ala.

L.G. Horn, Ductile Iron Pipe Research Association, Birmingham, Ala.

A.M. Horton, US Pipe & Foundry Company, Birmingham, Ala.

K.J. Kempf, Kempf Holdings, LLC, Foundry Services Co., Omaha, Neb.

H. Kennedy, Jr., Harold Kennedy & Associates, Fuquay Varina, N.C.

V. O’Dea, Tnemec Company, Kansas City, Mo.

D. Swalley, Electrosteel USA, Birmingham, Ala.

User Members

M.J. Britch, Tualatin Valley Water District, Beaverton, Ore.

B. Matejcek, Orange County Utilities, Orlando, Fla.

J.R. Waugh, Bureau of Reclamation, Denver, Colo.

R.L. Worden, COMCD, Norman, Okla.

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*
Maury D. Gaston, *Vice-Chair*

General Interest Members

M. Dunn, Crist Engineers, Inc., Little Rock, Ark.
J. Hebenstreit, Underwriters Laboratories Inc., Northbrook, Ill.
M.B. Horsley, Horsley Engineering LLC, Overland Park, Kan.
J.A. Hrdlicka (*liaison, nonvoting*), Standards Engineer Liaison, AWWA, Denver, Colo.
D.H. Kroon, Aegion, Houston, Tex.
D.D. Lary (*alternate*), Wright-Pierce, Topsham, Maine
C.R. Laucamp, AECOM, Chicago, Ill.
P.J. Mourt, Mott MacDonald, Philadelphia, Penn.
J.R. Plattsmier, Consultant, New Port Richey, Fla.
S. Pool (*alternate*), HDR Engineering, Denver, Colo.
T.M. Stinson, Kleinfelder SEA Company, Holbrook, Mass.

Producer Members

L.R. Dunn (*alternate*), US Pipe & Foundry Company, Birmingham, Ala.
J.H. Eddings, McWane Inc., Phillipsburg, N.J.
J.A. Fancher (*alternate*), American Cast Iron Pipe Company, Birmingham, Ala.
M.D. Gaston, American Cast Iron Pipe Company, Birmingham, Ala.
L.G. Horn, Ductile Iron Pipe Research Association, Birmingham, Ala.
D. Hughes, US Pipe & Foundry Company, Birmingham, Ala.
J.C. Jones, Georg Fischer, Dallas, Tex.
H. Kennedy, Jr., Harold Kennedy & Associates, Fuquay Varina, N.C.
J.S. Palombo, Everett J. Prescott, Inc., Gardiner, Maine
A. Rich (*alternate*), G.A. Rich and Sons, Deer Creek, Ill.
D. Smalley, Electrosteel, Birmingham, Ala.

User Members

M.J. Britch, Tualatin Valley Water District, Beaverton, Ore.

J. Fox, Tampa Bay Water, Clearwater, Fla.

D.D. Montgomery, Independence Water Department, Independence, Mo.

C.J. Patla, Connecticut Water Service Inc., Clinton, Conn.

G. Ramon (*liaison, nonvoting*), Standards Council Liaison, Little Rock Water Reclamation Authority, Little Rock, Ark.

J.M. Ross, Denver Water, Denver, Colo.

P.A. Shively, City of Kansas City, Kansas City, Mo.

J.R. Waugh, Bureau of Reclamation, Denver, Colo.

J.T. Wilson, Cobb County Marietta Water Authority, Marietta, Ga.

R.L. Worden, COMCD, Norman, Okla.

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C116/A21.16-15.*

I. Introduction.

I.A. *Background.* Prior to the development of this standard, ductile-iron and gray-iron fittings used for water service were 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 coating 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 or polyolefin 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 secretariats 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 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. Subsequent revisions to ANSI/AWWA C116/A21.16 were approved by the AWWA Board of Directors in 2003, 2009, and 2015. This edition of C116 was approved on Oct. 24, 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). 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. 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.

[†] NSF International, 789 North 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/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 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).

II.A. *Chlorine and Chloramine Degradation of Elastomers.* The selection of materials is critical for water service and distribution piping in locations where there is a possibility that elastomers will be in contact with chlorine or chloramines. Documented research has shown that elastomers such as gaskets, seals, valve seats, and encapsulations may be degraded when exposed to chlorine or chloramines. The impact of degradation is a function of the type of elastomeric material, chemical concentration, contact surface area, elastomer cross section, environmental conditions, as well as temperature. Careful selection of and specifications for elastomeric materials and the specifics of their application for each water system component should be considered to provide long-term usefulness and minimum degradation (swelling, loss of elasticity, or softening) of the elastomer specified.

NOTE: A pipe gasket having the compressed hardness of an elastomer with a large mass relative to the exposed surface area experiences minimal degradation. This was validated in a research paper reported in *Journal AWWA* (Volume 96, Number 4, April

2004, pp. 153–160) where the pipe gasket degradation in a 110-mg/L chloramine solution was found to be negligible.

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 determined by the purchaser:

1. Standard used—that is, ANSI/AWWA C116/A21.16, Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings, of latest revision.

2. Details of federal, state, and local requirements (Sec. 4.1.1).

3. For applications other than potable water, whether compliance with NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects, is required (Sec. 4.1.3).

4. Holiday testing, if required (Sec. 5.3).

5. Inspection by purchaser (Sec. 5.4).

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

1. Clarification to maximum thickness in joint areas in Sec. 4.3.2.

2. Clarification of qualification testing through expansion of Sec. 5.1.1.

3. Clarification to minimum thickness in Sec. 5.2.3.

4. Clarification to purchaser requirements as a basis for rejection in Sec. 5.5.

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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Protective Fusion-Bonded 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 coatings for the interior and exterior surfaces of ductile-iron and gray-iron fittings used for raw water, potable water, reclaimed water systems, and nonaggressive wastewaters. The standard describes the material, application, and performance requirements for these coatings.

Sec. 1.2 Purpose

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

Sec. 1.3 Application

This standard, or sections of this standard, can be referenced in the purchaser's documents for fittings with an interior and exterior fusion-bonded coating. For applications involving potentially aggressive wastewaters, consult the pipe manufacturer for the suitable lining.