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(Revision of ANSI/AWWA C150/A21.50-14)

AWWA Standard

Thickness Design of Ductile-Iron Pipe

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American Water Works Association

AWWA Standard

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Committee Personnel

Subcommittee No. 1, Pipe, which reviewed this standard, had the following personnel at the time:

Maury D. Gaston, *Chair*

General Interest Members

M.B. Horsley, Horsley Engineering LLC, Overland Park, Kans.
J.R. Plattsmier, HDR Engineering Inc., Denver, Colo.
P.A. Selig, Consultant, Vestavia, Ala.

Producer Members

S. Rao Bandi, Sigma Corporation, Cream Ridge, N.J.
S. Box, Sigma Corp., Cropwell, Ala.
L.R. Dunn (*alternate*), US Pipe & Foundry Company, Birmingham, Ala.
J.H. Eddings, McWane Ductile, Phillipsburg, N.J.
J.A. Fancher (*alternate*), ACIPCO, Birmingham, Ala.
M.D. Gaston, American Ductile Iron Pipe Company, Birmingham, Ala.
L.G. Horn, Ductile Iron Pipe Research Association, Birmingham, Ala.
D.A. Hughes, US Pipe & Foundry Company, Birmingham, Ala.
K.J. Kempf (*alternate*), Kempf Holdings, LLC, Omaha, Neb.
H. Kennedy Jr., Harold Kennedy & Associates, Fuquay Varina, N.C.
T.J. Muntz, Fab Pipe Inc., Rogers, Minn.
D. Swalley, Electrosteel USA, LLC, Birmingham, Ala.

User Members

M.J. Britch, Tualatin Valley Water District, Beaverton, Ore.
S. DuChez (*alternate*), Washington Suburban Sanitary Commission, Laurel, Md.
B. Jimma, Washington Suburban Sanitary Commission, Laurel, Md.

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.
M.B. Horsley, Horsley Engineering LLC, Overland Park, Kans.
D.H. Kroon, Corrpro Companies Inc., Houston, Tex.
D.D. Lary (*alternate*), Wright-Pierce, Topsham, Maine
C.R. Laucamp, AECOM, Chicago, Ill.
J. Hebenstreit, UL LLC, Northbrook, Ill.
P.J. Mourt, Hatch Mott MacDonald, Milburn, N.J.
J.A. Hrdlicka (*liaison, nonvoting*), Standards Engineer Liaison, AWWA, Denver, Colo.
J.R. Plattsmier, New Port Richey, Fla.
S. Pool (*alternate*), HDR, Denver, Colo.
T.M. Stinson, Kleinfelder Inc., Boston, Mass.

Producer Members

L.R. Dunn (*alternate*), US Pipe & Foundry Company, Birmingham, Ala.
J.H. Eddings, McWane Ductile, Phillipsburg, N.J.
J.A. Fancher (*alternate*), ACIPCO, Birmingham, Ala.
M.D. Gaston, American Ductile Iron Pipe Company, Birmingham, Ala.
L.G. Horn, Ductile Iron Pipe Research Association, Birmingham, Ala.
D.A. Hughes, US Pipe & Foundry Company, Birmingham, Ala.
J.C. Jones, RCT, Los Angeles, Calif.
H. Kennedy Jr., Harold Kennedy & Associates, Fuquay Varina, N.C.
T.J. Muntz (*alternate*), Fab Pipe Inc., Rogers, Minn.
J.S. Palombo, EJ Prescott, Gardiner, Maine
R.D. Swaby, Electrosteel USA, Savannah, Ga.

User Members

M.J. Britch, Tualatin Valley Water District, Beaverton, Ore.
J.M. Kennedy, Tampa Bay Water, Clearwater, Fla.
D.D. Montgomery, City of Independence, Independence, Mo.
C.J. Patla, Connecticut Water Company, Clinton, Conn.
J.M. Ross, Denver Water, Denver, Colo.
P.A. Shively, City of Kansas City, Mo.
J.R. Waugh, United States Bureau of Reclamation, Denver, Colo.
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 C150/A21.50.*

I. Introduction.

I.A. *Background.* The purpose of this standard is to provide pipeline designers with a recommended design procedure and associated tabular data necessary to establish the wall thickness(es) required for buried ductile-iron pipe based on the type of pipe embedment, depths of trench cover, live load conditions, internal working pressure and surge conditions appropriate for the specific pipeline project. Once the required wall thickness(es) are established, the ductile-iron pipe should be specified to be manufactured in accordance with ANSI/AWWA C151/A21.51. ANSI/AWWA C151/A21.51 contains options that must be addressed by the purchaser in response to site-specific project requirements.

Although ANSI/AWWA C150/A21.50 is commonly used for designing ductile-iron pipe for services other than water, users are also directed to ASTM† A746, Standard Specification for Ductile Iron Gravity Sewer Pipe, and ASTM A716, Standard Specification for Ductile Iron Culvert Pipe.

I.B. *History.* American National Standards Committee A21, Cast-Iron Pipe and Fittings, was organized in 1926 under the sponsorship of the American Gas Association (AGA), ASTM International (ASTM), AWWA, and New England Water Works Association (NEWWA). Between 1972 and 1984, the co-secretariats were AGA, AWWA, and NEWWA with AWWA serving as administrative secretariat. In 1984, the committee became an AWWA committee with the name of American Water Works Association Standards Committee A21 on Ductile-Iron Pipe and Fittings. In 1988, NEWWA withdrew as a separate secretariat; however, it continues to maintain its representation on the AWWA Committee A21.

The present scope of AWWA Committee A21 activity is the development of standards and manuals addressing ductile-iron pressure pipe for water and other liquids, and ductile-iron and gray-iron fittings for use with this pipe. These standards and manuals include design, dimensions, materials, coatings, linings, joints, accessories, and methods of inspection and testing.

The work of AWWA Committee A21 is conducted by subcommittees. The scope of Subcommittee 1, Pipe, includes the periodic review of current A21 standards for

* American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.
† ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

pipe, the preparation of revisions and new standards when needed, as well as other matters pertaining to pipe standards.

The first edition of C150/A21.50, American National Standard for the Thickness Design of Ductile-Iron Pipe, was issued in 1965, and revisions were issued in 1971, 1976, 1981, 1991, 1996, 2002, 2008, and 2014. This edition was approved by the AWWA Board of Directors on Oct. 25, 2021.

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 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 jurisdiction. 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

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

[§] NSF International, 789 North Dixboro Road, Ann Arbor, MI 48113.

[¶] Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.

** Both publications available from The National Academies Press, 500 Fifth Street NW, Keck 360, Washington, DC 20001.

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 C150 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.

In order to meet a project's schedule, at the manufacturer's option and with the purchaser's agreement, pipe may be shipped whose class is heavier than required or ordered.

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 C150/A21.50, Thickness Design of Ductile-Iron Pipe, of latest revision.
2. As noted in Sec. I.A of the Foreword, ANSI/AWWA C151/A21.51 contains options that must be addressed by the purchaser in response to site-specific requirements for ductile-iron pipe.

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. Option for shipping heavier pipe with agreement of the purchaser was moved from Section 4 to Section II, Special Issues, in the Foreword.

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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American Water Works Association

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AWWA Standard

Thickness Design of Ductile-Iron Pipe

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes the thickness design of ductile-iron pipe complying with the requirements of ANSI*/AWWA C151/A21.51, Ductile-Iron Pipe, Centrifugally Cast. Sec. 4.1 outlines the design procedure, and Sec. 4.2 gives a design example. Sec. 4.3 explains the basis of design. As opposed to using procedures in Sec. 4.1 or Sec. 4.3, the designer may reference Tables 12 through 14 directly.

Table 12 lists thicknesses for standard laying conditions and certain depths of cover. Table 13 lists thicknesses for 150-psi through 350-psi (1,034-kPa through 2,413-kPa)† water working pressure.

The greater thickness from Table 12 or Table 13 for given trench load or internal pressure should be used.

Table 14 lists working pressures and maximum depths of cover for standard laying conditions and standard pressure classes. Table 15 lists special thickness classes of ductile-iron pipe.

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

† Metric identifiers in this standard are nominal sizes and are not those specified in International Organization for Standardization (ISO) standards.