



**American Water Works
Association**

ANSI/AWWA C115/A21.15-05
(Revision of ANSI/AWWA C115/A21.15-99)

The Authoritative Resource on Safe WaterSM

AWWA Standard

Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges



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AWWA Standard

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Committee Personnel

Subcommittee 1, Pipe, which developed this standard, had the following personnel at the time:

Philip A. Selig, *Chair*

Troy F. Stroud, *Vice-Chair*

General Interest Members

M.B. Horsley, Black & Veatch, Kansas City, Mo.	(AWWA)
P.I. McGrath Jr., Consultant, Birmingham, Ala.	(AWWA)
E.W. Misichko, Underwriters Laboratories, Northbrook, Ill.	(UL)
J.R. Plattsmier, MWH Americas Inc., Denver, Colo.	(AWWA)
W.H. Smith, Consultant, Flora, Ill.	(AWWA)
K.E. Wilson, Post Buckley Schuh & Jernigan, Tampa, Fla.	(AWWA)
L.C. Yates, McGoodwin Williams & Yates, Fayetteville, Ark.	(AWWA)

Producer Members

D.R. Charko, McWane Inc., Birmingham, Ala.	(AWWA)
L.R. Dunn, U.S. Pipe & Foundry Company, Birmingham, Ala.	(DIPRA)
Harold Kennedy Jr., Harold Kennedy & Associates, Cary, N.C.	(AWWA)
C.W. McCauley Jr., Griffin Pipe Products Company, Lynchburg, Va.	(DIPRA)
T.J. Muntz, Fab Pipe Inc., Rogers, Minn.	(AWWA)
P.A. Selig, American Cast Iron Pipe Company, Birmingham, Ala.	(DIPRA)
T.F. Stroud, Ductile Iron Pipe Research Association, Birmingham, Ala.	(DIPRA)
T.B. Wright, National Association of Pipe Fabricators, Edmond, Okla.	(DIPRA)

User Members

T.E. Coughran, City of Santa Ana, Santa Ana, Calif.	(AWWA)
A.J. DeBoy, American Water—Central Region, St. Louis, Mo.	(AWWA)
G.L. Meyer, City of Sioux Falls, Sioux Falls, S.D.	(AWWA)
C.R. Schwenker, Fairfax County Water Authority, Fairfax, Va.	(AWWA)

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*
Charles W. McCauley Jr., *Vice-Chair*

General Interest Members

K.W. Henderson, Malcolm Pirnie Inc., White Plains, N.Y.	(AWWA)
H.E. Holcomb, Jordan Jones & Goulding Inc., Norcross, Ga.	(AWWA)
M.B. Horsley, Black & Veatch, Kansas City, Mo.	(AWWA)
D.H. Kroon, Corrpro Companies Inc., Houston, Texas	(AWWA)
G.E. Laverick, Underwriters Laboratories, Northbrook, Ill.	(UL)
T.J. McCandless,* Standards Engineer Liaison, AWWA, Denver, Colo.	(AWWA)
P.I. McGrath Jr., Consultant, Birmingham, Ala.	(AWWA)
J.R. Plattsmier, MWH Americas Inc., Denver, Colo.	(AWWA)
W.H. Smith, Consultant, Flora, Ill.	(AWWA)
L.C. Yates, McGoodwin Williams & Yates, Fayetteville, Ark.	(AWWA)
Ken Zastrow,† Underwriters Laboratories Inc., Northbrook, Ill.	(UL)

Producer Members

John Critchlow, Pacific States Cast Iron Pipe Company, Provo, Utah	(AWWA)
L.R. Dunn, U.S. Pipe & Foundry Company, Birmingham, Ala.	(DIPRA)
Harold Kennedy Jr., Harold Kennedy & Associates, Cary, N.C.	(AWWA)
Michael Lundstrom, Eastland, Texas	(AWWA)
C.W. McCauley Jr., Griffin Pipe Products Company, Lynchburg, Va.	(DIPRA)
T.J. Muntz, Fab Pipe Inc., Rogers, Minn.	(AWWA)
Gene Oliver,† American Cast Iron Pipe Company, Birmingham, Ala.	(DIPRA)
P.A. Selig, American Cast Iron Pipe Company, Birmingham, Ala.	(DIPRA)
J.E. Shea,† McWane Cast Iron Pipe Company, Birmingham, Ala.	(AWWA)
E.J. Shields Jr., Waterworks Supply Corporation, Malden, Mass.	(AWWA)
T.F. Stroud, Ductile Iron Pipe Research Association, Birmingham, Ala.	(DIPRA)
T.B. Wright,† National Association of Pipe Fabricators, Edmond, Okla.	(DIPRA)

* Liaison, nonvoting

† Alternate

User Members

D.T. Bradley, Oak Lodge Water District, Milwaukie, Ore.	(AWWA)
T.E. Coughran, City of Santa Ana, Santa Ana, Calif.	(AWWA)
A.J. DeBoy, American Water—Central Region, St. Louis, Mo.	(AWWA)
R.R. Goold, Kansas City Water Services Department, Kansas City, Mo.	(AWWA)
G.L. Meyer, City of Sioux Falls, Sioux Falls, S.D.	(AWWA)
D.D. Montgomery, Independence Water Department, Independence, Mo.	(AWWA)
T.C. Moreno, Bexar Metro Water District, San Antonio, Texas	(AWWA)
C.J. Patla, Connecticut Water Company, Clinton, Conn.	(AWWA)
C.R. Schwenker, Fairfax County Water Authority, Fairfax, Va.	(AWWA)
R.L. Worden, Guadalupe–Blanco River Authority, Seguin, Texas	(AWWA)
R.D. Zwygart, Tampa Water Department, Tampa, Fla.	(AWWA)

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Foreword

This Foreword is for information only and is not part of ANSI/AWWA C115/A21.15.

I. Introduction.

I.A. *Background.* American National Standards Institute (ANSI) Committee A21 on Cast-Iron Pipe and Fittings was organized in 1926 and sponsored by 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 co-secretariats were AGA, AWWA, and NEWWA, with AWWA serving as administrative secretariat. In 1984, the committee became an AWWA committee with the name AWWA 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 A21 Committee. In 1997, AGA withdrew as co-secretariat.

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

The work of Committee A21 is conducted by subcommittees. The scope of Subcommittee 1, Pipe, includes the periodic review of all current Committee A21 standards for pipe, the preparation of revisions and new standards, and other matters pertaining to pipe standards.

I.B. *History.* Flanged fittings, sizes 3 in. through 48 in. (76 mm through 1,219 mm), are described in ANSI/AWWA C110/A21.10, American National Standard for Ductile-Iron and Gray-Iron Fittings for Water. Flanged fittings, sizes 54 in. through 64 in. (1,400 mm through 1,600 mm), are covered in ANSI/AWWA C153/A21.53, American National Standard for Ductile-Iron Compact Fittings for Water Service. The flanged pipe used with these fittings has been purchased for many years in accordance with users', manufacturers', and fabricators' standards. An ANSI standard was needed for flanged pipe. Consequently, Subcommittee 1 submitted a proposed standard for flanged pipe to Committee A21 in 1974. The first edition of the standard was adopted in 1975. Subsequent revisions to ANSI/AWWA C115/A21.15 were approved by the AWWA Board of Directors in 1983, 1988, 1994, and

1999. Subcommittee 1 reviewed the 1999 edition and submitted a proposed revision to Committee A21 in 2003. This sixth edition of ANSI/AWWA C115/A21.15 was approved by the AWWA Board of Directors on June 12, 2005.

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.

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.

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

†NSF International, 789 N. Dixboro Road, Ann Arbor, MI 48105.

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

§Both publications available from National Academy of Sciences, 500 Fifth Street, N.W., Washington, DC 20418.

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 C115/A21.15 does not address additives requirements. 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. *Flange Material Properties.* Because this standard requires the material properties of gray-iron and ductile-iron flanges to comply with ANSI/AWWA C110/A21.10, the following material properties specified in ANSI/AWWA C110/A21.10 are listed for information purposes.

1. Gray-iron flanges, in accordance with ANSI/AWWA C110/A21.10, shall be manufactured of the following minimum tensile-strength iron listed in Table F.1.

Table F.1 Gray-iron flange minimum tensile strength

Nominal Size * <i>in.</i> †	Minimum Tensile Strength	
	<i>psi</i>	<i>(kPa)</i>
3–12	25,000	(172,000)
14–24	30,000	(207,000)

* Purchasers of gray-iron flanges greater than 24 in. should contact the manufacturer or fabricator for strength requirements.

† To convert inches to millimeters, multiply by 25.4.

2. Ductile-iron flanges made in accordance with ANSI/AWWA C110/A21.10 shall be manufactured of grades of ductile iron with the following minimum physical properties:

- 70,000 psi (483,000 kPa) tensile strength,
- 50,000 psi (345,000 kPa) yield strength, and
- 5 percent elongation;

or

60,000 psi (414,000 kPa) tensile strength,
42,000 psi (290,000 kPa) yield strength, and
10 percent elongation.

II.B. *Special Service Requirements.* Special service conditions, such as elevated temperatures, the conveyance of acids or chemicals, and the application of a glass lining, may require special thread compounds. Special service requirements must be specified by the purchaser.

Please note the apparent conflict between this standard and ASME B16.1* with regard to pressure ratings for pipe flanges.

All flanges provided in accordance with ANSI/AWWA C115/A21.15 are rated[†] for water service of 250 psi (1,720 kPa) or greater working pressure. These flanges have facing and drilling identical to ASME B16.1, class 125 flanges. ASME B16.1, class 125 B16.1 flanges for service at temperatures ranging from 20°F to 150°F (−6.7°C to 65.6°C) are pressure–temperature rated for 150 psi to 200 psi (1,030 kPa to 1,380 kPa), depending on the flange size, class or grade of iron, and fluid temperature. ANSI B16.1 covers both flanges and flanged fittings for service at both ambient and elevated temperatures.

ASME B16.1 also describes class 250 flanges that are heavier, have a larger bolt circle, and use larger bolts than class 125 flanges or the flanges described in ANSI/AWWA C115/A21.15 and ANSI/AWWA C110/A21.10. Class 250 flanges will not bolt to ASME B16.1, class 125, ANSI/AWWA C115/A21.15, or ANSI/AWWA C110/A21.10 flanges. (See the example illustrated in Figure F.1.)

Dimensions of ANSI/AWWA C115/A21.15 flanges correspond to those of ANSI/AWWA C207, class E flanges. They also have the same outside diameter (OD); bolt circle diameter; and number of bolts as ANSI/AWWA C207, class B and

*ASME B16.1, Cast-Iron Pipe Flanges and Flanged Fittings. Available from ASME International, Three Park Avenue, New York, NY 10016.

†The 250 psi joint rating is dependent on gaskets, installation, and other factors beyond the scope of this standard and has evolved over an extended period of time of satisfactory performance. This rating was developed prior to the use of ductile-iron flanges. Ductile-iron pipe with ductile-iron, screwed-on flanges can now be rated for a working pressure of 350 psi for 24-in. and smaller sizes, and 250 psi for 30-in. to 64-in. sizes. A surge allowance of 100 psi may be added to these working pressures. Refer to ANSI/AWWA C150/A21.50 for calculation methods for pipe barrels. Special gaskets are required for flanged joints with working pressures above 250 psi. Note that the strength of all ductile-iron flanges will be greater than that of gray-iron flanges.

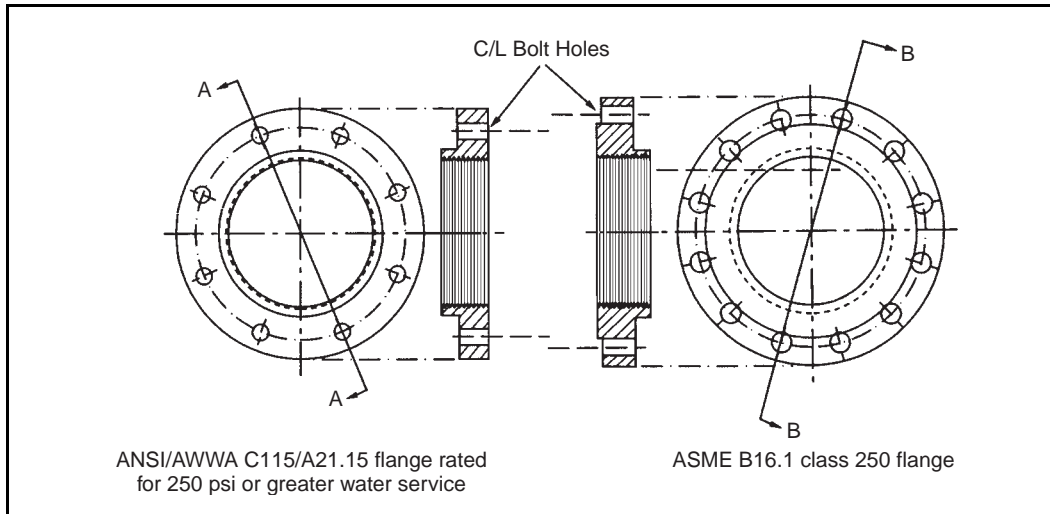


Figure F.1 Comparison of flange dimensions

D flanges, but bolt sizes and holes or flange thicknesses are different. Also, they will not match ANSI/AWWA C207, class F flanges.

II.C. *Advisory Information.* Purchasers of pipe conforming to this standard are advised that the purchaser's specification or purchase order should address delivery instructions and acceptance. Normally, the purchaser examines the pipe at the point of delivery to verify conformance with the specification or purchase order and inspects for damage. The purchaser should carefully document any nonconformance or damage and promptly notify the appropriate parties (manufacturer, fabricator, supplier, carrier, etc.), because these parties may not be liable if nonconformance or damage is discovered later. The purchaser should also require the carrier's agent to record shortages or damage on the delivery receipt prior to leaving the point of delivery.

This standard defines both manufacturer and fabricator. A manufacturer may manufacture the pipe or the flange and fabricate the finished product and, therefore, be identified by both terms. A fabricator may procure the pipe and flanges and fabricate the finished product and, therefore, would not be labeled a manufacturer for the purposes of this standard.

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. Required information
 - a. Size.
 - b. Finished length.
 - c. Linings
 1. Cement–mortar lining (Sec. 4.5.2). Experience has indicated that asphaltic inside coating is not complete protection against loss in pipe capacity because of tuberculation. Cement–mortar linings are recommended for most waters.
 2. Asphaltic lining (Sec. 4.5.3).
 3. Special linings (Sec. 4.5.5).
 4. No lining.
 - d. Working pressure, if higher than 250 psi.
 - e. Details of other federal, state, local, and provincial requirements (Sec. 4.1).
 - f. Whether compliance with NSF/ANSI 61, *Drinking Water System Components—Health Effects*, is required, in addition to the requirements of the Safe Drinking Water Act.
2. Optional information
 - a. Pipe wall thickness, if greater than shown in Table 1 of the standard (Sec. 1.1).
 - b. Solid or hollow-back flange (Sec. 4.3.1).
 - c. Type of material to be used in the flanges (Sec. 4.3.3).
 - d. Flanges tapped for studs and stud bolt dimensions (Sec. 4.3.4).
 - e. Bolt-hole alignment (Sec. 4.4.4).
 - f. Outside coating (Sec. 4.5.1).
 - g. Special coatings (Sec. 4.5.5).
 - h. Inspection by purchaser (Sec. 5.2.1). If the purchaser wishes to inspect flanged pipe at the manufacturer's or fabricator's plant, the purchaser shall specify the conditions (such as time and the extent of inspection) under which the inspection shall be made.
 - i. Affidavit of compliance (Sec. 5.3). If required by the purchaser, the manufacturer or fabricator shall provide an affidavit of compliance that the flanged pipe complies with the requirements of this standard.

III.B. *Modification of Standard.* Any modification of the provisions, definitions, or terminology in this standard must be provided by the purchaser.

IV. **Major Revisions.** Major revisions made in this edition of ANSI/AWWA C115/A21.5 are as follows:

1. In the footnote to II.B, Special Service Requirements, in Sec. 1.1, Scope, and in a footnote to Table 1, the size range of flanged joints that may be rated for a maximum working pressure of 350 psi (2,413 kPa) with the use of special gaskets was changed from 12 in. and smaller to 24 in. and smaller.

2. Sec. 4.4.2, Pipe threads, is new.

3. In Sec. 4.5.5, Special coatings and linings, a recommendation for using uncoated or unlined pipe in certain situations was added.

4. In Sec. 4.6, Marking, the requirement for “size” was added and the requirement for “country where cast” was removed. Also in that same section, the location for the fabricator’s mark was stipulated.

5. Sec. 5.3, Affidavit of Compliance, is new.

6. Language was added to Sec. A.2, Gaskets, clarifying pressure ratings when special gaskets are used.

7. In Sec. A.3, Installation, notes 3 and 5 were added pertaining to preventing strains on flanges and the use of impact wrenches, respectively.

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

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American Water Works
Association

ANSI/AWWA C115/A21.15-05
(Revision of ANSI/AWWA C115/A21.15-99)

AWWA Standard

Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes 3-in. through 64-in. flanged ductile-iron pipe with ductile-iron or gray-iron threaded flanges for water supply service. Flanged pipe and flanges are rated for a maximum working pressure of 250 psi (1,720 kPa). However, 24-in. and smaller flanged joints with ductile-iron flanges may be rated for a maximum working pressure of 350 psi (2,413 kPa), as noted in the footnote of Table 1.

Sec. 1.2 Purpose

The purpose of this standard is to provide the minimum requirements for flanged ductile-iron pipe with ductile-iron or gray-iron threaded flanges.

Sec. 1.3 Application

This standard or sections of this standard can be referenced in specifications for purchasing and receiving flanged ductile-iron pipe. This standard can be used as a guide for casting, fabricating, and inspecting flanged ductile-iron pipe. The