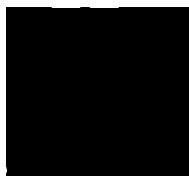


American Water Works Association
ANSI/AWWA C153/A21.53-00
(Revision of ANSI/AWWA C153/A21.53-94)



AMERICAN NATIONAL STANDARD
FOR
DUCTILE-IRON COMPACT FITTINGS
FOR WATER SERVICE



Administrative Secretariat
AMERICAN WATER WORKS ASSOCIATION

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AMERICAN WATER WORKS ASSOCIATION

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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.

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C153/A21.53.

I. Introduction.

I.A. *Background.* The earliest record of an AWWA standard for cast-iron pipe appears in the 1890 AWWA annual conference proceedings. In 1902, the New England Water Works Association (NEWWA) adopted a more detailed standard titled, "Standard Specification for Cast-Iron Pipe and Special Castings." The next AWWA standard for pipe and fittings, 7C.1-1908, was approved May 12, 1908, and was followed by AWWA C100-52T, Tentative Standard Specifications for Cast Iron Pressure Fittings, which was approved Dec. 31, 1952. A complete listing and description of subsequent cast-iron-fittings standards is presented in the Foreword of ANSI/AWWA C110/A21.10, American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (75 mm Through 1,200 mm), For Water.

In 1926 the American Standards Association (ASA), now the American National Standards Institute (ANSI), Committee A21 on Cast-Iron Pipe and Fittings was organized under the sponsorship of the American Gas Association (AGA), the American Society for Testing and Materials (ASTM), AWWA, and 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 named 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 3, Fittings, includes the periodic review of all current A21 standards for ductile-iron and gray-iron fittings; preparation of revisions and new standards when needed; and examination of other matters pertaining to standards for fittings.

I.B. *History.* At the meeting of Standards Committee A21 in 1981, Subcommittee 3 was directed to prepare a standard for 3-in. through 12-in. (75-mm through 300-mm) compact fittings designed to use the attendant strength of ductile iron. The

subcommittee was directed to present this standard to the committee for action in 1983. The first edition of this standard, designated ANSI/AWWA C153/A21.53-84, American National Standard for Ductile-Iron Compact Fittings, 3 In. Through 12 In. (75 mm Through 300 mm), for Water and Other Liquids, was approved by the AWWA Board of Directors on Jan. 30, 1984, and by ANSI on Feb. 4, 1985.

The second edition of this standard, designated ANSI/AWWA C153/A21.53-88, American National Standard for Ductile-Iron Compact Fittings, 3 In. Through 16 In., for Water and Other Liquids, was approved by the AWWA Board of Directors on June 19, 1988, and by ANSI on July 5, 1988. Major revisions included expansion of the sizes covered to include 14-in. and 16-in. sizes, addition of “long” laying length sleeves, changes in acceptance testing, and new sections on rejection of fittings and determination of rejection. The third edition was approved by the AWWA Board of Directors on Jan. 30, 1994, and by ANSI on Aug. 18, 1994. This edition was approved by the AWWA Board of Directors on Jan. 23, 2000.

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 all 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.

*Persons in Canada, Mexico, and non-North American countries should contact the appropriate authority having jurisdiction.

3. Two standards developed under the direction of NSF, ANSI^{*}/NSF[†] 60, Drinking Water Treatment Chemicals—Health Effects, and ANSI/NSF 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 ANSI/NSF 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 ANSI/NSF 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 C153/A21.53-00 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 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. *Special Service Application.* The fittings described in this standard are normally used for pressurized water supply systems. Fittings used in other types of service may require special consideration by the user of this standard (see Sec. III).

II.B. *Orientation of Bolt Holes.* Although this standard does not specify the orientation of bolt holes in the bell flanges of the mechanical joint, it is at times convenient or necessary to have the bolt holes oriented. The normal, but not

^{*}American National Standards Institute, 11 W. 42nd St., New York, NY 10036.

[†]NSF International, 789 N. Dixboro Rd., Ann Arbor, MI 48105.

[‡]Both publications available from National Academy of Sciences, 2102 Constitution Ave. N.W., Washington, DC 20418.

universal, practice is to have the bolt holes straddle the vertical centerline of the fittings, valves, and hydrants. (The vertical centerline of a fitting is determined when the fitting is in the position to change the direction of fluid flowing in a horizontal plane.) If orientation is necessary, this requirement should be specified.

II.C. *Connecting Mechanical Joint Fittings and Aged Gray-Iron Pipe.* The following note in the 1998 edition of ANSI/AWWA C110/A21.10 cautioned about using mechanical-joint fittings with aged existing pipe:

NOTE: Mechanical-joint fittings should be connected carefully to aged existing cast-iron pipe. The outside diameter of aged pipe should be measured prior to cutting because some older pipe was manufactured to a larger diameter than is presently specified in AWWA standards. Mechanical-joint sleeves or bell-and-spigot (caulked-joint) sleeves are available to provide transition from existing cast-iron pipe; however, they must be specified on the purchase order. The following standards contain reference dimensions useful in classifying existing cast-iron pipe:

AWWA 7C.1-1908 (AWWA C100-55)—Standard Specifications for Cast-Iron Pressure Fittings; Table 1.

ASA A21.2-1953 (AWWA C102-53)—American Standard for Cast-Iron Pit Cast Pipe for Water or Other Liquids; Tables 2.1 and 2.2.

ANSI A21.6-1975 (AWWA C106-75)—American National Standard for Cast-Iron Pipe Centrifugally Cast in Metal Molds for Water or Other Liquids; Tables 6.4, 6.5, and 6.6.

ANSI A21.8-1975 (AWWA C108-75)—American National Standard for Cast-Iron Pipe Centrifugally Cast in Sand-Lined Molds for Water or Other Liquids; Tables 8.4, 8.5, and 8.6.

II.D. *Advisory Information on Product Testing.* The standard acceptance test for static castings is a tensile test from a coupon cast from the same iron. This is typically done with a separately cast ASTM A536 keel block, a modified keel block, or a Y-block. This standard provides an exception allowing the manufacturer to cut a test coupon from the casting or its runner system as a method of qualifying fittings when separately cast coupons are not available. The mechanical properties of iron castings are influenced by a variety of factors including the cooling rate, iron chemistry, casting geometry, location of gates and risers, etc. These various factors cause an imprecise relationship between the mechanical properties in various locations of the same casting or between the casting and the separately cast coupon.

III. Use of This Standard. AWWA has no responsibility for the suitability or compatibility of the provisions of this standard to any intended application by any user. Accordingly, each user of this standard is responsible for determining that the standard's provisions are suitable for and compatible with that user's intended application.

III.A. *Purchaser Options and Alternatives.* The following items should be included in the purchaser's specifications:

1. Standard used—that is, ANSI/AWWA C153/A21.53, of latest edition.
2. Size (Sec. 1.1).
3. Configuration (Fig. 2 through 12, and Fig. 14 through 16).
4. Joint type (Sec. 4.2).

Optional information

1. Drawings of the joint and gasket (Sec. 4.2.1.2).
2. Availability of accessories (Sec. 4.2.2).
3. Type of mechanical-joint gland (Sec. 4.2.2.1).
4. Certification by manufacturer (Sec. 5.1.1.3).
5. Inspection by purchaser (Sec. 5.1.2.1).
6. Outside coating (Sec. 4.3.1, 4.3.2, and 4.3.4).
7. Cement-mortar lining (Sec. 4.3.3, 4.3.4, and 4.3.5).
8. Inside coating* (Sec. 4.3.1 and 4.3.3).
9. Special coatings and linings (Sec. 4.3.6).
10. Special tests (Sec. 5.4).

III.B. *Modification to Standard.* Any modification to the provisions, definitions, or terminology in this standard must be provided in the purchaser's specifications.

IV. Major Revisions. The major revision in this edition of ANSI/AWWA C153/A21.53 is as follows:

1. The acceptance clause (Sec. I.C) has been revised to approved wording.

V. Comments. If you have any comments or questions about this standard, please call the AWWA Volunteer and Technical Support Group, (303) 794-7711 ext. 6283, FAX (303) 795-7603, or write to the group at 6666 W. Quincy Ave., Denver, CO 80235.

*The petroleum asphaltic inside coating does not offer complete protection against loss in pipe capacity caused by tuberculation. Cement linings are recommended for most waters.





AMERICAN NATIONAL STANDARD FOR DUCTILE-IRON COMPACT FITTINGS FOR WATER SERVICE

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard covers 3-in. through 64-in. (76-mm through 1,600-mm)* ductile-iron compact fittings to be used with ductile-iron pipe or pipe made of other materials with similar outside diameters for conveying water. Minimum working pressures by size range are as follows: 3-in. through 24-in. (76-mm through 610-mm): 350-psi (2,413-kPa); 30-in. through 48-in. (762-mm through 1,219-mm): 250-psi (1,724-kPa); and 54-in. through 64-in. (1,400-mm through 1,600-mm): 150-psi (1,034-kPa). Fittings are adequate for the rated working pressure plus a surge allowance of 100 psi or a surge allowance of half the rated working pressure, whichever is less.

Fittings with mechanical joints are listed in this standard for the 3-in. through 48-in. (76-mm through 1,219-mm) sizes. The standard also may be used for fittings of these sizes with push-on joints or other joints as agreed on at the time of purchase.

Fittings with push-on joints and flanged joints are listed in this standard for the 54-in. through 64-in. (1,400-mm through 1,600-mm) sizes. Fittings with flange joints are not discussed in this standard for sizes 3 in. through 48 in. (76 mm through 1,219 mm)

*Metric conversions given in this standard are direct conversions of US customary units and are not those specified in International Organization for Standardization (ISO) standards.