

**ANSI A21.8-1975
(AWWA C108-75)**

Revision of
A21.8-1970
(AWWA C108-70)

AMERICAN NATIONAL STANDARD
for
CAST-IRON PIPE CENTRIFUGALLY CAST
IN SAND-LINED MOLDS, FOR WATER
OR OTHER LIQUIDS

ADMINISTRATIVE SECRETARIAT
AMERICAN WATER WORKS ASSOCIATION

CO-SECRETARIATS
AMERICAN GAS ASSOCIATION
NEW ENGLAND WATER WORKS ASSOCIATION

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Foreword

This foreword is provided for information only and is not a part of ANSI A21.8-1975 (AWWA C108-75).

I—History of Standard

On Sep. 10, 1902, NEWWA adopted a "Standard Specification for Cast-Iron Pipe and Special Castings," covering bell-and-spigot pit-cast pipe and fittings of ten thickness classes. The thickness classes were based on allowable internal pressures varying by increments of 50 ft of head.

On May 12, 1908, AWWA adopted a "Standard Specification for Cast-Iron Pipe and Special Castings," covering bell-and-spigot pit-cast pipe and fittings of eight classes, A through H, with allowable working pressures varying by increments of 100 ft of head from 100 to 800 ft. Dimensions and weights were given for pipe and fittings.

In 1926, ASA Sectional Committee (now American National Standards Committee) A21 on Cast-Iron Pipe and Fittings was organized under the sponsorship of A.G.A., ASTM, AWWA, and NEWWA and was assigned the following scope:

Unification of specifications for cast-iron pipe, including materials; dimensions; pressure ratings; methods of manufacture (including such new developments as centrifugal casting) insofar as they may be necessary to secure satisfactory specifications; elimination of unnecessary sizes and varieties; consideration of the possibility of developing a coordinated scheme of metallic pipe and fittings applicable to all common mediums; and methods of making up joints insofar as they are determining as to the dimensional design of cast-iron pipe.

The types of cast-iron pipe [are] to include bell-and-spigot pipe, flanged pipe, flanged and bell mouth fittings and wall castings, pipe elbows, tees, wyes, return bends, and other fittings not now included in standard lists; cast-iron pipe threaded for flanges or couplings. The standardization is not to include methods of installing pipe and similar matters, except as to the making up of joints in its relationship to the dimensional standardization of pipe and fittings, as noted above.

Sectional Committee A21 sponsored many tests of pipe and fittings; these included subsection of pipe to combined earth load and internal pressures (which form the basis of pipe thickness design), corrosion tests, measurement of hydraulic friction loss in fittings, and tests of bursting strengths of pipe and fittings. After exhaustive study of the test results and other research, the committee in 1939 issued A21.1, "American Standard Practice Manual for the Computation of Strength and Thickness of Cast Iron Pipe." The manual included nomograms and thickness tables for pit-cast pipe with 11/31* iron strength. As stated in the preface to that manual, however, the design method was applicable to pipe of any iron strength.

Discussions and interpretations of the method of design of cast-iron pipe were published in 1939 and presented

* The first figure designates the bursting tensile strength in units of 1 000 psi and the second figure designates the ring modulus of rupture in units of 1 000 psi.

to AWWA and A.G.A. As a result of these publications and because of the general acceptance of A21.1, a substantial volume of cast-iron pipe was designed by the new method and furnished to manufacturers' standards between 1939 and 1953. A standard (A21.2) for pit-cast pipe with 11/31 iron strength also was issued in 1939. Work on standards for centrifugally cast pipe with 18/40 iron strength was started after the design was completed in 1939, but, owing to the intervention of World War II and other causes, they were not formally issued until 1953.

In 1957, a revision of A21.1 was issued. In that revision, designated ASA A21.1-1957 (AWWA H1-57) the major change was the addition of a method for computing earth loads on pipe laid under embankments and of nomograms and thickness tables for centrifugally cast pipe with 18/40 iron strength.

In 1958, Sectional Committee A21 was reorganized. Subcommittees were established to study each group of standards in accordance with the review and revision policy of ASA (now ANSI). The subcommittee on pipe (Subcommittee No. 1) was organized with the following assignment:

The scope of the committee activity shall include an examination of all present A21 standards for pipe to determine what is needed to bring these up to date. The examination shall include A21.1, A21.2, A21.3, A21.6, A21.7, A21.8, and A21.9, as well as any other matters pertaining to pipe standards.

As a result of the work of Subcommittee No. 1 on this assignment, revisions of the cast-iron pipe standards A21.6 (AWWA C106), A21.7, A21.8 (AWWA C108) and A21.9 were issued in 1962. A revision of A21.1-1957 (AWWA H1-57) was issued in

1967 and reaffirmed without revision in 1972. Revisions of the 1962 cast-iron pipe standards were issued in 1970. The major revisions of A21.8-1970 were: pipe with push-on joints were added; laying conditions C and D were deleted and condition F was added; the tables were revised to include the pipe lengths then being produced.

In 1974, Subcommittee 1 reviewed the 1970 edition and recommended minor editorial changes. Therefore, this edition is unchanged from the 1970 edition except for minor editorial changes and the updating of this foreword.

The tables and strength test requirements in this standard are for pipe with 18/40 iron strength. Advances in production technology have enabled the manufacturers to furnish pipe with greater strength. Pipe with 21/45 iron strength has been furnished for many years. Design details and standard thicknesses for pipe with 21/45 iron strength are shown in A21.1-1967 (AWWA C101-67) reaffirmed in 1972.

II—Acceptance Tests

Acceptance tests were established as routine control measures to assure the design burst and ring strengths. The acceptance tests specified in this standard are the Talbot strip test for 3-24 in. pipe and either the test bar test or the Talbot strip test for 30-48 in. pipe. In establishing the acceptance values for the Talbot strip test and the test bar test, A21 Committee in the 1940s reviewed detailed data, including burst, ring, and Talbot strip tests, on more than 400 pipe centrifugally cast in sand-lined molds. Of these, 216 were 30-48 in. pipe for which test bar test data were also included. Correlations of the data showed that the Talbot

strip modulus of rupture and secant modulus of elasticity values and the test bar load and deflection values specified in this standard represent acceptable pipe which meet the design burst and ring strengths.

A hardness test is not specified in this standard. The characteristic pearlitic matrix microstructure of this pipe is formed in the sand-lined mold. This metal structure is readily machinable. Long service experience with pearlitic cast irons did not in the 1940s indicate to the A21 Committee a need for hardness tests on pipe cast in sand-lined molds and subsequent experience has confirmed this. Also, the specified acceptance values for the Talbot strip and test bar tests provide effective control of the microstructure to assure satisfactory machinability.

III—Options

This standard includes certain options which, if desired, must be specified in the invitation for bids and on the purchase order. Also, a number of

items must be specified to describe completely the pipe required. The following summarizes these details and available options and lists the sections of the standard where they can be found:

1. Size, joint type, thickness or class, and laying lengths (Tables)
2. Special joints (Sec. 8-1)
3. Certification by manufacturer (Sec. 8-4)
4. Inspection by purchaser (Sec. 8-5)
5. Cement lining (Sec. 8-8.2) Experience has indicated that bituminous inside coating is not complete protection against loss in pipe capacity caused by tuberculation. Cement linings are recommended for most waters.
6. Special coatings and linings (Sec. 8-8.4)
7. Special marking on pipe (Sec. 8-10)
8. Written transcripts of foundry records (Sec. 8-15)
9. Special tests (Sec. 8-16).

American National Standard for

**Cast-Iron Pipe Centrifugally Cast
in Sand-Lined Molds, for Water
or Other Liquids**

Sec. 8-1—Scope

This standard covers 3-in. through 48-in. cast-iron pipe centrifugally cast in sand-lined molds for water or other liquids. Characteristics of such pipe with push-on joints, mechanical joints, and bell-and-spigot joints are given in the tables. This standard may be used for pipe with such other types of joints as may be agreed upon at the time of purchase. The thicknesses, weights, and strength test requirements shown in this standard are for pipe with 18/40 iron strength (18 000 psi minimum bursting tensile and 40 000 psi minimum ring modulus of rupture).

Sec. 8-2—Definitions

Under this standard, the following definitions shall apply:

8-2.1. *Purchaser.* The party entering into a contract or agreement to purchase pipe according to this standard.

8-2.2. *Manufacturer.* The party that produces the pipe.

8-2.3. *Inspector.* The representative of the purchaser, authorized to inspect in behalf of the purchaser to determine whether or not the pipe meet this standard.

8-2.4. *Cast iron.* The unqualified term *cast iron* shall apply to gray cast iron which is a cast ferrous material in which a major part of the carbon content occurs as free carbon in the form of flakes interspersed through the metal.

8-2.5. *Push-on joint.* The single rubber-gasket joint as described in ANSI A21.11 (AWWA C111) of latest revision.

8-2.6. *Mechanical joint.* The gasketed and bolted joint as detailed in ANSI A21.11 (AWWA C111) of latest revision.

8-2.7. *Bell-and-spigot joint.* The poured or caulked joint as detailed in Table 8.6.

Sec. 8-3—General Requirements

8-3.1. Pipe with push-on joints, mechanical joints, and bell-and-spigot joints shall conform to the applicable dimensions and weights shown in the tables in this standard and to the applicable requirements of ANSI A21.11 (AWWA C111) of latest revision. Pipe with other types of joints shall comply with the joint dimensions and weights agreed upon at the time of purchase, but in all other respects shall fulfill the requirements of this standard.