PLAINTIFF'S EXHIBIT
CT-1262

ANSI A21.6–1975
(AWWA C106–75)

Revision of
A21.6–1970
(AWWA C106–70)

AMERICAN NATIONAL STANDARD

for

CAST-IRON PIPE CENTRIFUGALLY CAST IN METAL 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 A21.6–1975 (AWWA C106–75).

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 subjection 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

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* 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.

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were published in 1939 and presented 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 subcommitteee on pipe (Subcommittee No. 1) was organized with the following assignment:

> The scope of the committee actitivy 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 A21.6-1970 were: pipe with push-on joints were added; laying conditions C and D were deleted and condition F was added; and, 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 A21.1-1957 (AWWA C101-67), reaffirmed in 1972.

II—Acceptance Tests

Acceptance tests were established as routine control measures to ensure the design burst and ring strengths. The acceptance tests specified in this standard are the Talbot strip test and the hardness test. In establishing the acceptance values for the Talbot strip test, A21 Committee in the 1940s reviewed detailed data, including burst, ring, and Talbot strip tests on more than 400 pipe centrifugally cast in metal molds. Correlations of the data showed that the Talbot strip modulus of rupture and secant modulus of elasticity values specified in this standard represent acceptable pipe which meet the design burst and ring strengths.

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The hardness test was specified as a means of assuring the ferritic matrix which is characteristic of the microstructure of pipe cast in metal molds. The specified acceptance values for the Talbot strip test provide additional control of the microstructure to ensure 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. 6–1)
3. Certification by manufacturer (Sec. 6–4)
4. Inspection by purchaser (Sec. 6–5)
5. Cement lining (Sec. 6–8.2) 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. 6–8.4)
7. Special marking on pipe (Sec. 6–10)
8. Written transcripts of foundry records (Sec. 6–15)
9 Special tests (Sec 6–16).

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Committee Personnel

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

EDWARD C. SEARS, *Chairman*
WALTER AMORY, *Vice-Chairman*

User Members	*Producer Members*
ROBERT S. BRYANT	W. D. GOODE
FRANK E. DOLSON	CARL A. HENRIKSON
GEORGE F. KEENAN	THOMAS D. HOLMES
LEONARD ORLANDO JR.	SIDNEY P. TEAGUE
JOHN E. PERRY	

Standards Committee A21, Cast-Iron Pipe and Fittings, which reviewed and approved this standard, had the following personnel at the time of approval:

LLOYD W. WELLER, *Chairman*
CARL A. HENRIKSON, *Vice-Chairman*
JAMES B. RAMSEY, *Secretary*

Organization Represented	*Name of Representative*
American Gas Association	LEONARD ORLANDO JR.
American Society of Civil Engineers	KENNETH W. HENDERSON
American Society of Mechanical Engineers	JAMES S. VANICK
American Society for Testing and Materials	ALBERT H. SMITH JR.
American Water Works Association	ARNOLD M. TINKEY
	LLOYD W. WELLER
Cast Iron Pipe Research Association	CARL A. HENRIKSON
	EDWARD C. SEARS
	W. HARRY SMITH
Individual Producer	ALFRED F. CASE
Manufacturers' Standardization Society of the Valve and Fittings Industry	ABRAHAM FENSTER
New England Water Works Association	WALTER AMORY
Naval Facilities Engineering Command	STANLEY C. BAKER
Underwriters' Laboratories, Inc.	JOHN E. PERRY
Canadian Standards Association	W. F. SEMENCHUK*

* Liaison representative without vote

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ANSI A21.6–1975
(AWWA C106–75)

Revision of
A21.6–1970
(AWWA C106–70)

American National Standard for

Cast-Iron Pipe Centrifugally Cast in Metal Molds, for Water or Other Liquids

Sec. 6–1—Scope

This standard covers 3-in. through 24-in. cast-iron pipe centrifugally cast in metal 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. 6–2—Definitions

Under this standard, the following definitions shall apply:

6–2.1. *Purchaser.* The party entering into a contract or agreement to purchase pipe according to this standard.

6–2.2 *Manufacturer.* The party that produces the pipe.

6–2.3. *Inspector.* The representative of the purchaser, authorized to inspect in behalf of the purchaser to determine whether or not the pipe meet this standard.

6–2.4. *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.

6–2.5. *Push-on joint.* The single rubber-gasket joint as described in ANSI A21.11 (AWWA C111) of latest revision.

6–2.6. *Mechanical joint.* The gasketed and bolted joint as detailed in ANSI A21.11 (AWWA C111) of latest revision.

6–2.7. *Bell-and-spigot joint.* The poured or caulked joint as detailed in Table 6.6.

Sec. 6–3—General Requirements

6–3.1. 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.

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6–3.2. The nominal laying length of the pipe shall be as shown in the tables. A maximum of 10 per cent of the total number of pipe of each size specified in an order may be furnished by as much as 24 in. shorter than the nominal laying length, and an additional 10 per cent may be furnished by as much as 3 in. shorter than nominal laying length.

Sec. 6–4—Inspection and Certification by Manufacturer

6–4.1. The manufacturer shall establish the necessary quality control and inspection practice to assure compliance with this standard.

6–4.2. The manufacturer shall, if required on the purchase order, furnish a sworn statement that the inspection and all of the specified tests have been made and the results thereof comply with the requirements of this standard.

6–4.3. All pipe shall be clean and sound without defects which will impair their service. Repairing of defects by welding or other method shall not be allowed if such repairs will adversely affect the serviceability of the pipe or its capability to meet strength requirements of this standard.

Sec. 6–5—Inspection by Purchaser

6–5.1. If the purchaser desires to inspect pipe at the manufacturer's plant, the purchaser shall so specify on the purchase order, stating the conditions (such as time, and the extent of inspection) under which the inspection shall be made.

6–5.2. The inspector shall have free access to those parts of the manufacturer's plant that are necessary to assure compliance with this standard. The manufacturer shall make available for the inspector's use such gages as are necessary for inspection. The manufacturer shall provide the inspector with assistance as necessary for the handling of pipe.

Sec. 6–6—Delivery and Acceptance

All pipe and accessories shall comply with this standard. Pipe and accessories not complying with this standard shall be replaced by the manufacturer at the agreed point of delivery. The manufacturer shall not be liable for shortages or damaged pipe after acceptance at the agreed point of delivery except as recorded on the delivery receipt or similar document by the carrier's agent.

Sec. 6–7—Tolerances or Permitted Variations

6–7.1. *Dimensions.* The spigot end, bell, and socket of the pipe and the accessories shall be gaged with suitable gages at sufficiently frequent intervals to ensure that the dimensions comply with the requirements of this standard. The smallest inside diameter of the sockets and the outside of the spigot ends shall be tested with circular gages. Other socket dimensions shall be gaged as appropriate.

6–7.2. *Thickness.* Minus thickness tolerances of pipe and bell shall not exceed those shown below:

Pipe Size *in.*	Minus Tolerance *in.*
3–8	0.05
10–12	0.06
14–24	0.08

NOTE: An additional tolerance of 0.02 in. shall be permitted over areas not exceeding 8 in. in any direction.

6–7.3. *Weight.* The weight of any single pipe shall not be less than the tabulated weight by more than 5 per cent for pipe 12 in. or smaller in diameter, nor by more than 4 per cent for pipe larger than 12 in. in diameter

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Sec. 6–8—Coatings and Linings

6–8.1. *Outside coating.* The outside coating for use under normal conditions shall be a bituminous coating approximately 1 mil thick. The coating shall be applied to the outside of all pipe, unless otherwise specified. The finished coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun and shall be strongly adherent to the pipe.

6–8.2. *Cement-mortar linings.* Cement linings shall be in accordance with ANSI A21.4 (AWWA C104) of latest revision. If desired, cement linings shall be specified in the invitation for bids and on the purchase order.

6–8.3. *Inside coating.* Unless otherwise specified, the inside coating for pipe not cement lined shall be a bituminous material as thick as practicable (at least 1 mil) and conforming to all appropriate requirements for seal coat in ANSI A21.4 of latest revision.

6–8.4. *Special coatings and linings.* For special conditions, other types of coatings and linings may be available. Such special coatings and linings shall be specified in the invitation for bids and on the purchase order.

Sec. 6–9—Hydrostatic Test

Each pipe shall be subjected to a hydrostatic test of not less than 500 psi. This test may be made either before or after the outside coating and the inside coating have been applied, but shall be made before the application of cement lining or of a special lining.

The pipe shall be under the full test pressure for at least 10 s. Suitable controls and recording devices shall be provided so that the test pressure and duration may be adequately ascertained. Any pipe that leaks or does not withstand the test pressure shall be rejected.

In addition to the hydrostatic test before application of a cement lining or special lining, the pipe may be retested, at the manufacturer's option, after application of such lining.

Sec. 6–10—Marking Pipe

The weight, class or nominal thickness, and sampling period shall be shown on each pipe. The manufacturer's mark and the year in which the pipe was produced shall be cast or stamped on the pipe. When specified on the purchase order, initials not exceeding four in number shall be cast or stamped on the pipe. All required markings shall be clear and legible and all cast marks shall be on or near the bell. All letters and numerals on pipe sizes 8 in. and larger shall be not less than $\frac{1}{2}$ in. in height.

Sec. 6–11—Weighing Pipe

Each pipe shall be weighed before the application of any lining or coating other than the bituminous coating and the weight shall be shown on the outside or inside of the bell or spigot end.

Sec. 6–12—Acceptance Tests

The standard acceptance tests for the physical characteristics of the pipe shall be as follows:

6–12.1. *Talbot strip tests.* Talbot strip tests shall be used to determine the acceptability of 3–24 in. pipe for modulus of rupture and secant modulus of elasticity.

6–12.1.1. *Sampling.* At least one sample shall be taken during each period of approximately 3 hr. The sample for the first period shall be taken during the first hour, or if casting is direct from the melting unit, from the first ladle. Samples shall be

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taken so that each size of pipe continously cast for 2 hr or longer and each source of iron continuously used for 2 hr or longer shall be fairly represented.

6–12.1.2. *Acceptance values.* The modulus of rupture as determined by the Talbot strip test shall be 40 000 psi minimum.

The secant modulus of elasticity value shall not exceed 300 times the actual value of the modulus of rupture. (For example: when the modulus of rupture is 40 000 psi, the secant modulus of elasticity shall not exceed 12 000 000 psi.)

6–12.1.3. *Test method.* Talbot strips (Fig. 6.1) shall be machined

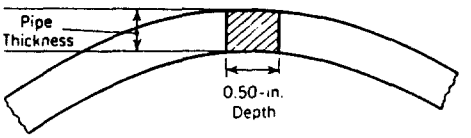

Fig. 6.1. Position From Which Talbot Strip is Cut

longitudinally from each pipe specimen selected for testing by this method. The Talbot strips may be cut from a part of the ring little stressed in the ring test—that is, near one of the elements marked *a* in the illustration of the ring test (Fig. 6.3). The strips in any case shall be in cross section as indicated in Fig. 6.1—that is, shall have for their width the thickness of the pipe and for their depth 0.50 in. Their length shall be at least $10\frac{1}{2}$ in. The strips shall be tested as beams on supports 10 in. apart with loads applied perpendicularly to the machined faces at two points $3\frac{1}{3}$ in. from the supports. The breaking load and the deflection shall be observed and recorded.

The strip shall be accurately calipered at the point of rupture and the modulus of rupture, R, shall be calculated by the usual beam formula, which for this case reduces to the expression

$$R = \frac{10W}{td^2}$$

The secant modulus of elasticity, E_s, in pounds per square inch, shall be computed by the formula

$$E_s = \frac{21.3R}{dy}$$

In the above formulas, R is the modulus of rupture (psi); E_s, the secant modulus of elasticity (psi); W, the breaking load (lb); d, the depth (in.) of the strip (intended to be 0.50 in.); t, the width (in.) of the strip (pipe thickness); and y, the deflection (in.) of the strip at the center at breaking load.

Deflection measurements shall be that of the specimen and shall not include any compression of the supports or loading blocks, or backlash or distortion of the testing machine.

6–12.2. *Hardness tests.* Hardness tests shall be made on the outside surface of pipe. A sufficient number of pipe shall be tested to assure that the hardness does not exceed Rockwell B-95, or its equivalent. Pipe may be heat-treated to meet this requirement.

For the purpose of foundry records, hardness tests shall be made on a specimen from each Talbot strip selected for testing in Sec. 6–12.11. Rockwell B hardness determinations shall be made in accordance with ASTM E18-67 on the following surfaces at their approximate centers: (a) the outside pipe surface, (b) the inside pipe surface, and (c) either of the two cut surfaces. These three determinations shall be made at three locations (1-2-3) along the length of the specimen, as shown in Fig. 6.2. The three determinations for each surface shall be averaged and no average value shall exceed Rockwell B-95. No single

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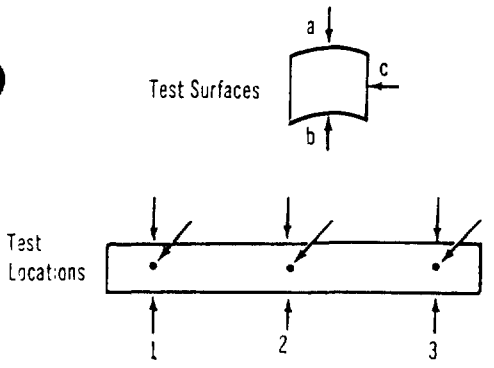

Fig. 6.2. Location of Rockwell Hardness Tests on Talbot Strip Specimen

determination on the Talbot strip shall exceed B-98.

Sec. 6–13—Ring Tests and Full-Length Bursting Tests

6–13.1. The manufacturer shall make bursting tests and ring tests in conjunction with strip tests so that he can certify the design values of the modulus of rupture (40 000 psi) and the bursting tensile strength of the iron in the pipe (18 000 psi). These tests shall be made in accordance with dimensions and methods given in Sec. 6–13.2 and Sec. 6–13.3. At least one pipe sample for the ring and bursting tests shall be selected from each of the following size groups from each calendar month's cast:

Group	Size in.
1	6, 8
2	10, 12
3	14, 16, 18
4	20, 24

When no pipe in a size group are manufactured during the calendar month, no tests on these sizes are required. Ring tests and bursting tests are not required on 3- and 4-in. pipe. At least three Talbot strips shall be tested from each pipe selected for bursting. Tests and records shall include the modulus of rupture of each strip and ring and the modulus of elasticity and hardness of each strip.

6–13.2. *Ring test method.* The maximum length of any ring shall not exceed 12 in.; for pipe 14 in. and larger, the minimum length shall be $10\frac{1}{2}$ in.; for pipe 12 in. and smaller, the minimum length shall be one half the nominal diameter of the pipe. Each ring shall be tested by the three-edge bearing method as indicated in Fig. 6.3. The lower bearing for the

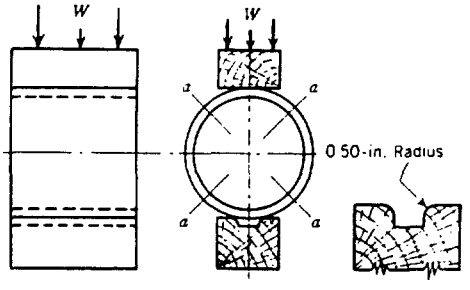

Fig. 6.3. Assembly for Ring Test

ring shall consist of two strips with vertical sides having their interior top edges rounded to a radius of approximately $\frac{1}{2}$ in. The strips shall be of hard wood or metal. If of metal, a piece of fabric or leather approximately $\frac{3}{16}$ in. thick shall be laid over them. They shall be straight and shall be securely fastened to a rigid block, with their interior vertical faces the following distances apart:

Pipe Size in.	Bearing Strip Spacing in.
6–12	$\frac{1}{2}$
14–24	1

The upper bearing shall be a hard wood block, straight and true from end to end. The upper and lower bearings shall extend the full length of the ring. The ring shall be placed symmetrically between the two bearings, and the center of application of the load shall

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be so placed that the vertical deformation at the two ends of the ring shall be approximately equal. If the ring is not uniform in thickness, it shall be so placed that the thick and thin portions are near the ends of the horizontal diameter.

For purposes of Sec. 6–15, a record of the breaking load of each ring tested shall be made. The modulus of rupture is computed from the formula

$$R = 0.954 \frac{W(d + t)}{bt^2}$$

in which R is the modulus of rupture (psi); W, the breaking load (lb); d, the average inside diameter (in.) of the ring; t, the average thickness (in.) of metal along the line of fracture; and b, the length (in.) of the ring.

6–13.3. *Burst test method.* The bursting tensile strength shall be determined by testing full-length pipe (less the amount cut off for ring and strip test specimens) to destruction by hydraulic pressure. Bells may be removed to facilitate testing. A suitable means for holding the end thrust shall be used which will not subject the pipe to endwise tension or compression, or other parasitic stresses. A calibrated pressure gage shall be used for determining the bursting pressure. The gage shall be connected to the interior of the test pipe by a separate connection from that which supplies water for the test. The unit tensile strength in bursting shall be obtained by the use of the formula

$$S = \frac{Pd}{2t}$$

in which S is the bursting tensile strength (psi) of the iron; P, the internal pressure (psi) at bursting; d, the average inside diameter (in.) of the pipe; and t, the minimum average thickness (in.) of the pipe along the principal line of break.

Measurements of thickness shall be taken along the principal line of break at 1-ft intervals.

The minimum average thickness along the principal line of break shall be obtained by averaging the measurements at the thinnest section at a weight of two and at the adjacent sections on each side at a weight of one each; or, if the thinnest section is at the end of the break, by averaging the thinnest-section measurement at a weight of two and the measurements of the adjacent section and the next section at a weight of one each.

Sec. 6–14—Chemical Analyses

Analyses of the iron shall be made at sufficiently frequent intervals to determine compliance with the following limits:

Substance	Maximum Limit *per cent*
Phosphorus	0.90
Sulfur	0.12

Control of the other chemical constituents shall be maintained to meet the physical property requirements of this standard. Samples for chemical analyses shall be representative and shall be obtained from either acceptance test specimens or specimens cast for this purpose.

Sec. 6–15—Foundry Records

The results of the following tests shall be recorded and retained for one year and shall be available to the purchaser at the foundry. Written transcripts of the results of these tests shall be furnished when specified on the purchase order:

6–15.1. Talbot strip tests (see Sec. 6–12.1)

6–15.2. Hardness tests (see Sec. 6–12.2)

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6–15.3. Ring tests and full-length bursting tests (see Sec. 6–13)

6–15.4. Chemical analyses (see Sec. 6–14).

Sec. 6–16—Additional Tests Required by Purchaser

When tests other than those provided in this standard are required by the purchaser, such tests shall be specified in the invitation for bids and on the purchase order.

Sec. 6–17—Defective Specimens and Retests

When any physical test specimen shows defective machining or lack of continuity of metal, it shall be discarded and replaced by another specimen. When any sound test specimen fails to meet the specified requirements, the pipe from which it was taken shall be rejected and a retest may be made on two additional sound specimens from pipe cast in the same sampling period as the specimen which failed. Both of the additional specimens shall meet the prescribed tests to qualify the pipe produced in that sampling period.

Sec. 6–18—Rejection of Pipe

When any routine chemical analysis fails to meet the requirements of Sec. 6–14 or when any physical acceptance test fails to meet the requirements of Sec. 6–12.1, 6–12.2, or 6–17, the pipe cast in the same sampling period shall be rejected except as subject to the provision of Sec. 6–19.

Sec. 6–19—Determining Rejection

The manufacturer may determine the amount of rejection by making similar additional tests of pipe of the same size as that rejected until the rejected lot is bracketed in order of manufacture by an acceptable test at each end of the interval in question. When pipe of one size is rejected from a sampling period, the acceptability of pipe of different sizes from that same period may be established by making the routine acceptance tests for these sizes.

CTD000413

TABLE 6.1

Selection Table for Push-On Joint Cast-Iron Pipe§

These thicknesses and weights are for pipe laid without blocks, on flat-bottom trench, with tamped backfill (laying condition B), under 5 ft of cover. For other conditions see tables 6.3 and 6.4 hereof and ANSI A21.1 (AWWA C101).

Size	Thickness	OD	Weight Based on 18-ft Laying Length		Weight Based on 20-ft Laying Length	
			Per Length†	Avg. per Foot‡	Per Length†	Avg. per Foot‡
in.			*lb*			
Working Pressure 50 psi—115 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.1	320	16.0
6	0.38	6.90	460	25.6	510	25.6
8	0.41	9.05	665	36.9	735	36.8
10	0.44	11.10	880	49.0	975	48.7
12	0.48	13.20	1,140	63.4	1,260	63.1
14	0.48	15.30	1,335	74.1	1,470	73.6
16	0.54	17.40	1,700	94.5	1,880	94.0
18	0.54	19.50	1,920	106.7	2,120	106.1
20	0.57	21.60	2,250	124.9	2,485	124.2
24	0.63	25.80	2,975	165.3	3,285	164.4
Working Pressure 100 psi—231 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.1	320	16.0
6	0.38	6.90	460	25.6	510	25.6
8	0.41	9.05	665	36.9	735	36.8
10	0.44	11.10	880	49.0	975	48.7
12	0.48	13.20	1,140	63.4	1,260	63.1
14	0.51	15.30	1,410	78.2	1,555	77.8
16	0.54	17.40	1,700	94.5	1,880	94.0
18	0.58	19.50	2,050	113.9	2,265	113.3
20	0.62	21.60	2,430	134.9	2,685	134.2
24	0.68	25.80	3,190	177.3	3,525	176.4
Working Pressure 150 psi—346 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.1	320	16.0
6	0.38	6.90	460	25.6	510	25.6
8	0.41	9.05	665	36.9	735	36.8
10	0.44	11.10	880	49.0	975	48.7
12	0.48	13.20	1,140	63.4	1,260	63.1
14	0.51	15.30	1,410	78.2	1,555	77.8
16	0.54	17.40	1,700	94.5	1,880	94.0
18	0.58	19.50	2,050	113.9	2,265	113.3
20	0.62	21.60	2,430	134.9	2,685	134.2
24	0.73	25.80	3,410	189.4	3,765	188.4
Working Pressure 200 psi—462 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.1	320	16.0
6	0.38	6.90	460	25.6	510	25.6
8	0.41	9.05	665	36.9	735	36.8
10	0.44	11.10	880	49.0	975	48.7
12	0.48	13.20	1,140	63.4	1,260	63.1
14	0.55	15.30	1,510	83.8	1,670	83.4
16	0.58	17.40	1,815	100.9	2,010	100.4
18	0.63	19.50	2,210	122.8	2,445	122.2
20	0.67	21.60	2,610	144.9	2,885	144.2
24	0.79	25.80	3,665	203.6	4,055	202.6

* Pipe of 3-in. size also available in 12-ft laying length. Weight per length† is 150 lb; average weight per foot‡ is 12.5 lb for all working pressures and heads.
† Including bell. Calculated weight of pipe rounded off to nearest 5 lb.
‡ Including bell. Average weight per foot based on calculated weight of pipe before rounding.
§ Weights shown for push-on joint pipe are also applicable to bell-and-spigot joint pipe.

CTD000414

TABLE 6.1—(*contd.*)

Selection Table for Push-On Joint Cast-Iron Pipe§

These thicknesses and weights are for pipe laid without blocks, on flat-bottom trench, with tamped backfill (Laying Condition B), under 5 ft of cover. For other conditions see Tables 6.3 and 6.4 hereof and ANSI A21.1 (AWWA C101).

Size	Thickness	OD	Weight Based on 18-ft Laying Length		Weight Based on 20-ft Laying Length	
			Per Length†	Avg. per Foot‡	Per Length†	Avg. per Foot‡
	in.		*lb*			
Working Pressure 250 psi—577 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.1	320	16.0
6	0.38	6.90	460	25.6	510	25.6
8	0.41	9.05	665	36.9	735	36.8
10	0.44	11.10	880	49.0	975	48.7
12	0.52	13.20	1,230	68.3	1,360	67.9
14	0.59	15.30	1,610	89.5	1,780	89.0
16	0.63	17.40	1,960	109.0	2,170	108.4
18	0.68	19.50	2,370	131.8	2,620	131.1
20	0.72	21.60	2,785	154.8	3,080	154.0
24	0.79	25.80	3,665	203.6	4,055	202.6
Working Pressure 300 psi—693 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.1	320	16.0
6	0.38	6.90	460	25.6	510	25.6
8	0.41	9.05	665	36.9	735	36.8
10	0.48	11.10	955	53.0	1,055	52.7
12	0.52	13.20	1,230	68.3	1,360	67.9
14	0.59	15.30	1,610	89.5	1,780	89.0
16	0.68	17.40	2,100	116.8	2,325	116.2
18	0.73	19.50	2,530	140.6	2,800	140.0
20	0.78	21.60	3,000	166.6	3,315	165.8
24	0.85	25.80	3,920	217.8	4,335	216.8
Working Pressure 350 psi—808 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.1	320	16.0
6	0.38	6.90	460	25.6	510	25.6
8	0.41	9.05	665	36.9	735	36.8
10	0.52	11.10	1,025	56.9	1,130	56.6
12	0.56	13.20	1,315	73.1	1,455	72.7
14	0.64	15.30	1,735	96.3	1,920	95.9
16	0.68	17.40	2,100	116.8	2,325	116.2
18	0.79	19.50	2,720	151.2	3,010	150.6
20	0.84	21.60	3,210	178.4	3,550	177.6
24	0.92	25.80	4,220	234.4	4,665	233.4

* Pipe of 3-in. size also available in 12-ft laying length. Weight per length† is 150 lb; average weight per foot‡ is 12.5 lb for all working pressures and heads.

† Including bell. Calculated weight of pipe rounded off to nearest 5 lb.

‡ Including bell. Average weight per foot based on calculated wieght of pipe before rounding.

§ Weights shown for push-on joint pipe are also applicable to bell-and-spigot joint pipe.

CTD000415

TABLE 6.2

Selection Table for Mechanical-Joint Cast-Iron Pipe

These thicknesses and weights are for pipe laid without blocks, on flat-bottom trench, with tamped backfill (Laying Condition B), under 5 ft of cover. For other conditions see Tables 6.3 and 6.5 hereof and ANSI A21.1 (AWWA C101).

Size	Thickness	OD	Weight Based on 18-ft Laying Length		Weight Based on 20-ft Laying Length	
			Per Length†	Avg. per Foot‡	Per Length†	Avg. per Foot‡
	in.		*lb*			
Working Pressure 50 psi—115 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.2	320	16.1
6	0.38	6.90	460	25.5	510	25.4
8	0.41	9.05	655	36.4	725	36.2
10	0.44	11.10	870	48.2	960	48.0
12	0.48	13.20	1,125	62.6	1,245	62.3
14	0.48	15.30	1,335	74.0	1,470	73.6
16	0.54	17.40	1,700	94.5	1,880	94.0
18	0.54	19.50	1,920	106.7	2,120	106.0
20	0.57	21.60	2,250	124.9	2,485	124.2
24	0.63	25.80	2,975	165.2	3,285	164.2
Working Pressure 100 psi—231 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.2	320	16.1
6	0.38	6.90	460	25.5	510	25.4
8	0.41	9.05	655	36.4	725	36.2
10	0.44	11.10	870	48.2	960	48.0
12	0.48	13.20	1,125	62.6	1,245	62.3
14	0.51	15.30	1,410	78.2	1,555	77.8
16	0.54	17.40	1,700	94.5	1,880	94.0
18	0.58	19.50	2,050	113.9	2,265	113.2
20	0.62	21.60	2,430	134.9	2,685	134.2
24	0.68	25.80	3,190	177.2	3,525	176.2
Working Pressure 150 psi—346 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.2	320	16.1
6	0.38	6.90	460	25.5	510	25.4
8	0.41	9.05	655	36.4	725	36.2
10	0.44	11.10	870	48.2	960	48.0
12	0.48	13.20	1,125	62.6	1,245	62.3
14	0.51	15.30	1,410	78.2	1,555	77.8
16	0.54	17.40	1,700	94.5	1,880	94.0
18	0.58	19.50	2,050	113.9	2,265	113.2
20	0.62	21.60	2,430	134.9	2,685	134.2
24	0.73	25.80	3,405	189.2	3,765	188.2
Working Pressure 200 psi—462 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.2	320	16.1
6	0.38	6.90	460	25.5	510	25.4
8	0.41	9.05	655	36.4	725	36.2
10	0.44	11.10	870	48.2	960	48.0
12	0.48	13.20	1,125	62.6	1,245	62.3
14	0.55	15.30	1,510	83.8	1,670	83.4
16	0.58	17.40	1,815	100.9	2,005	100.3
18	0.63	19.50	2,210	122.8	2,445	122.2
20	0.67	21.60	2,610	144.9	2,885	144.2
24	0.79	25.80	3,665	203.5	4,050	202.6

* Pipe of 3-in. size also available in 12-ft laying length. Weight per length† is 150 lb; average weight per foot‡ is 12.3 lb for all working pressures and heads.

† Including bell. Calculated weight of pipe rounded off to nearest 5 lb.

‡ Including bell. Average weight per foot based on calculated weight of pipe before rounding.

CTD000416

TABLE 6.2—(*contd.*)

Selection Table for Mechanical-Joint Cast-Iron Pipe

These thicknesses and weights are for pipe laid without blocks, on flat-bottom trench, with tamped backfill (Laying Condition B), under 5 ft of cover. For other conditions see Tables 6.3 and 6.5 hereof and ANSI A21.1 (AWWA C101).

Size	Thickness	OD	Weight Based on 18-ft Laying Length		Weight Based on 20-ft Laying Length	
			Per Length†	Avg. per Foot‡	Per Length†	Avg. per Foot‡
	in.		*lb*			
Working Pressure 250 psi—577 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.2	320	16.1
6	0.38	6.90	460	25.5	510	25.4
8	0.41	9.05	655	36.4	725	36.2
10	0.44	11.10	870	48.2	960	48.0
12	0.52	13.20	1,215	67.4	1,340	67.1
14	0.59	15.30	1,610	89.4	1,780	89.0
16	0.63	17.40	1,960	108.9	2,165	108.3
18	0.68	19.50	2,370	131.7	2,620	131.0
20	0.72	21.60	2,785	154.8	3,080	154.1
24	0.79	25.80	3,665	203.5	4,050	202.6
Working Pressure 300 psi—693 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.2	320	16.1
6	0.38	6.90	460	25.5	510	25.4
8	0.41	9.05	655	36.4	725	36.2
10	0.48	11.10	940	52.2	1,040	52.0
12	0.52	13.20	1,215	67.4	1,340	67.1
14	0.59	15.30	1,610	89.4	1,780	89.0
16	0.68	17.40	2,100	116.7	2,325	116.2
18	0.73	19.50	2,530	140.6	2,800	140.0
20	0.78	21.60	3,000	166.6	3,320	165.9
24	0.85	25.80	3,920	217.7	4,335	216.8
Working Pressure 350 psi—808 ft Head						
3*	0.32	3.96	215	12.0	240	11.9
4	0.35	4.80	290	16.2	320	16.1
6	0.38	6.90	460	25.5	510	25.4
8	0.41	9.05	655	36.4	725	36.2
10	0.52	11.10	1,010	56.1	1,120	55.9
12	0.56	13.20	1,300	72.2	1,440	71.9
14	0.64	15.30	1,735	96.3	1,920	95.9
16	0.68	17.40	2,100	116.7	2,325	116.2
18	0.79	19.50	2,720	151.2	3,010	150.6
20	0.84	21.60	3,210	178.3	3,550	177.6
24	0.92	25.80	4,215	234.2	4,665	233.2

* Pipe of 3-in. size also available in 12-ft laying length. Weight per length† is 150 lb; average weight per foot‡ is 12.3 lb for all working pressures and heads.

† Including bell. Calculated weight of pipe rounded off to nearest 5 lb.

‡ Including bell. Average weight per foot based on calculated weight of pipe before rounding.

CTD000417

TABLE 6.3

Standard Thickness Selection Table for Cast-Iron Pipe*

Laying Condition A—flat-bottom trench, without blocks, untamped backfill
Laying Condition B—flat-bottom trench, without blocks, tamped backfill
Laying Condition F—pipe laid on gravel or sand bedding, backfill tamped

Size in.	Working Pressure psi	3½-ft Cover			5-ft Cover			8-ft Cover		
		Laying Condition			Laying Condition			Laying Condition		
		A	B	F	A	B	F	A	B	F
		Thickness*—in.								
3	50	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
	100	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
	150	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
	200	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
	250	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
	300	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
	350	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
4	50	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
	100	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
	150	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
	200	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
	250	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
	300	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
	350	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
6	50	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
	100	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
	150	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
	200	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
	250	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
	300	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
	350	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
8	50	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
	100	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
	150	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
	200	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
	250	0.41	0.41	0.41	0.41	0.41	0.41	0.44	0.41	0.41
	300	0.41	0.41	0.41	0.41	0.41	0.41	0.44	0.44	0.41
	350	0.41	0.41	0.41	0.52	0.41	0.41	0.48	0.44	0.44
10	50	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
	100	0.44	0.44	0.44	0.44	0.44	0.44	0.48	0.44	0.44
	150	0.44	0.44	0.44	0.44	0.44	0.44	0.48	0.44	0.44
	200	0.44	0.44	0.44	0.44	0.44	0.44	0.48	0.48	0.44
	250	0.44	0.44	0.44	0.48	0.44	0.44	0.52	0.48	0.48
	300	0.48	0.44	0.44	0.48	0.48	0.48	0.52	0.52	0.48
	350	0.48	0.48	0.48	0.52	0.52	0.48	0.56	0.52	0.52
12	50	0.48	0.48	0.48	0.48	0.48	0.48	0.52	0.48	0.48
	100	0.48	0.48	0.48	0.48	0.48	0.48	0.52	0.48	0.48
	150	0.48	0.48	0.48	0.48	0.48	0.48	0.52	0.52	0.48
	200	0.48	0.48	0.48	0.48	0.48	0.48	0.56	0.52	0.48
	250	0.52	0.48	0.48	0.52	0.52	0.48	0.56	0.56	0.52
	300	0.52	0.52	0.52	0.56	0.52	0.52	0.60	0.56	0.56
	350	0.56	0.56	0.52	0.56	0.56	0.56	0.60	0.60	0.60
14	50	0.51	0.48	0.48	0.51	0.48	0.48	0.59	0.55	0.51
	100	0.51	0.48	0.48	0.55	0.51	0.48	0.59	0.55	0.51
	150	0.55	0.51	0.48	0.55	0.51	0.48	0.64	0.59	0.55
	200	0.55	0.51	0.51	0.55	0.55	0.51	0.64	0.59	0.59
	250	0.59	0.55	0.55	0.59	0.59	0.55	0.64	0.64	0.59
	300	0.59	0.59	0.59	0.64	0.59	0.59	0.69	0.64	0.64
	350	0.64	0.64	0.64	0.64	0.64	0.64	0.75	0.69	0.64

* Thicknesses include allowances for foundry practice, corrosion, and either water hammer or truck load.

CTD000418

TABLE 6.3—(*contd.*)

Standard Thickness Selection Table for Cast-Iron Pipe*

Laying Condition A—flat-bottom trench, without blocks, untamped backfill
Laying Condition B—flat-bottom trench, without blocks, tamped backfill
Laying Condition F—pipe laid on gravel or sand bedding, backfill tamped

Size *in.*	Working Pressure *psi*	3½-ft Cover			5-ft Cover			8-ft Cover		
		Laying Condition			Laying Condition			Laying Condition		
		A	B	F	A	B	F	A	B	F
		Thickness*—*in.*								
16	50	0.54	0.50	0.50	0.58	0.54	0.50	0.63	0.58	0.54
	100	0.54	0.54	0.50	0.58	0.54	0.50	0.63	0.58	0.54
	150	0.58	0.54	0.50	0.58	0.54	0.54	0.68	0.63	0.58
	200	0.58	0.58	0.54	0.63	0.58	0.58	0.68	0.63	0.63
	250	0.63	0.58	0.58	0.63	0.63	0.58	0.73	0.68	0.63
	300	0.63	0.63	0.63	0.68	0.68	0.63	0.73	0.73	0.68
	350	0.68	0.68	0.68	0.73	0.68	0.68	0.79	0.73	0.73
18	50	0.58	0.54	0.54	0.58	0.54	0.54	0.68	0.63	0.58
	100	0.58	0.54	0.54	0.63	0.58	0.54	0.68	0.63	0.58
	150	0.63	0.58	0.54	0.63	0.58	0.58	0.73	0.68	0.63
	200	0.63	0.58	0.58	0.68	0.63	0.58	0.73	0.68	0.63
	250	0.68	0.63	0.63	0.68	0.68	0.63	0.79	0.73	0.68
	300	0.68	0.68	0.68	0.73	0.73	0.68	0.79	0.79	0.73
	350	0.79	0.73	0.73	0.79	0.79	0.73	0.85	0.85	0.79
20	50	0.62	0.57	0.57	0.67	0.57	0.57	0.72	0.67	0.62
	100	0.62	0.57	0.57	0.67	0.62	0.57	0.72	0.67	0.62
	150	0.67	0.62	0.57	0.67	0.62	0.62	0.78	0.72	0.67
	200	0.67	0.62	0.62	0.72	0.67	0.62	0.78	0.72	0.67
	250	0.72	0.67	0.67	0.78	0.72	0.67	0.84	0.78	0.72
	300	0.78	0.72	0.72	0.78	0.78	0.72	0.84	0.84	0.78
	350	0.84	0.78	0.78	0.84	0.84	0.78	0.91	0.84	0.84
24	50	0.68	0.63	0.63	0.73	0.63	0.63	0.79	0.73	0.68
	100	0.73	0.63	0.63	0.73	0.68	0.63	0.85	0.73	0.68
	150	0.73	0.68	0.63	0.79	0.73	0.68	0.85	0.79	0.73
	200	0.79	0.73	0.68	0.79	0.79	0.73	0.92	0.85	0.79
	250	0.79	0.79	0.73	0.85	0.79	0.79	0.92	0.85	0.85
	300	0.85	0.85	0.85	0.92	0.85	0.85	0.99	0.92	0.92
	350	0.92	0.92	0.92	0.99	0.92	0.92	1.07	0.99	0.92

* Thicknesses include allowances for foundry practice, corrosion, and either water hammer or truck load.

CTD000419

TABLE 6.4

Standard Dimensions and Weights of Push-On Joint Cast-Iron Pipe‖

Size *in.*	Thickness Class	Thickness	OD†	Weight of Barrel per Foot	Weight of Bell	Weight Based on 18-ft Laying Length		Weight Based on 20-ft Laying Length	
						Per Length‡	Avg. per Foot§	Per Length‡	Avg. per Foot§
		in.		*lb*					
3*	22	0.32	3.96	11.4	11	215	12.0	240	11.9
	23	0.35	3.96	12.4	11	235	13.0	260	12.9
	24	0.38	3.96	13.3	11	250	13.9	275	13.8
4	22	0.35	4.80	15.3	14	290	16.1	320	16.0
	23	0.38	4.80	16.5	14	310	17.3	345	17.2
	24	0.41	4.80	17.6	14	330	18.4	365	18.3
	25	0.44	4.80	18.8	14	350	19.5	390	19.5
6	22	0.38	6.90	24.3	25	460	25.6	510	25.6
	23	0.41	6.90	26.1	25	495	27.5	545	27.4
	24	0.44	6.90	27.9	25	525	29.3	585	29.2
	25	0.48	6.90	30.2	25	570	31.7	630	31.4
	26	0.52	6.90	32.5	25	610	33.9	675	33.8
8	22	0.41	9.05	34.7	41	665	36.9	735	36.8
	23	0.44	9.05	37.1	41	710	39.4	785	39.2
	24	0.48	9.05	40.3	41	765	42.6	845	42.4
	25	0.52	9.05	43.5	41	825	45.8	910	45.6
	26	0.56	9.05	46.6	41	880	48.9	975	48.6
	27	0.60	9.05	49.7	41	935	52.0	1,035	51.8
10	22	0.44	11.10	46.0	54	880	49.0	975	48.7
	23	0.48	11.10	50.0	54	955	53.0	1,055	52.7
	24	0.52	11.10	53.9	54	1,025	56.9	1,130	56.6
	25	0.56	11.10	57.9	54	1,095	60.9	1,210	60.6
	26	0.60	11.10	61.8	54	1,165	64.8	1,290	64.5
	27	0.65	11.10	66.6	54	1,255	69.6	1,385	69.3
12	22	0.48	13.20	59.8	66	1,140	63.4	1,260	63.1
	23	0.52	13.20	64.6	66	1,230	68.3	1,360	67.9
	24	0.56	13.20	69.4	66	1,315	73.1	1,455	72.7
	25	0.60	13.20	74.1	66	1,400	77.8	1,550	77.4
	26	0.65	13.20	80.0	66	1,505	83.7	1,665	83.3
	27	0.70	13.20	85.8	66	1,610	89.5	1,780	89.1
	28	0.76	13.20	92.7	66	1,735	96.4	1,920	96.0

* Pipe of 3-in. size also available in 12-ft laying length. Weight (lb) per length‡ for thickness class 22 is 150; for 23, 160; for 24, 170. Average weight (lb) per foot§ for thickness class 22 is 12.5; for 23, 13.5; for 24, 14.3.
‡ Including bell. Calculated weight of pipe rounded off to nearest 5 lb.
§ Including bell. Average weight per foot based on calculated weight of pipe before rounding.
† Tolerances of OD of spigot end: 3–12 in., ±0.06 in.; 14–24 in., +0.05 in., −0.08 in.
‖ Weights shown for push-on joint pipe are also applicable to bell-and-spigot joint pipe.

CTD000420

TABLE 6.4—(*contd.*)

Standard Dimensions and Weights of Push-On Joint Cast-Iron Pipe‖

Size *in.*	Thickness Class	Thickness	OD†	Weight of Barrel per Foot	Weight of Bell	Weight Based on 18-ft Laying Length		Weight Based on 20-ft Laying Length	
						Per Length‡	Avg. per Foot§	Per Length‡	Avg. per Foot§
		in.		*lb*					
14	21	0.48	15.30	69.7	78	1,335	74.1	1,470	73.6
	22	0.51	15.30	73.9	78	1,410	78.2	1,555	77.8
	23	0.55	15.30	79.5	78	1,510	83.8	1,670	83.4
	24	0.59	15.30	85.1	78	1,610	89.5	1,780	89.0
	25	0.64	15.30	92.0	78	1,735	96.3	1,920	95.9
	26	0.69	1.530	98.8	78	1,855	103.1	2,055	102.7
	27	0.75	15.30	107.0	78	2,005	111.3	2,220	110.9
	28	0 81	15.30	115.0	78	2,150	119.3	2,380	118.9
16	21	0.50	17.40	82.8	96	1,585	88.1	1,750	87.6
	22	0.54	17.40	89.2	96	1,700	94.5	1,880	94.0
	23	0.58	17.40	95.6	96	1,815	100.9	2,010	100.4
	24	0.63	17.40	103.6	96	1,960	109.0	2,170	108.4
	25	0.68	17.40	111.4	96	2,100	116.8	2,325	116.2
	26	0.73	17.40	119.3	96	2,245	124.6	2,480	124.1
	27	0.79	17.40	128.6	96	2,410	133.9	2,670	133.4
	28	0.85	17.40	137.9	96	2,580	143.2	2,855	142.7
18	21	0.54	19.50	100.4	114	1,920	106.7	2,120	106.1
	22	0.58	19.50	107.6	114	2,050	113.9	2,265	113.3
	23	0.63	19.50	116.5	114	2,210	122.8	2,445	122.2
	24	0.68	19.50	125.4	114	2,370	131.8	2,620	131.1
	25	0.73	19.50	134.3	114	2,530	140.6	2,800	140.0
	26	0.79	19.50	144.9	114	2,720	151.2	3,010	150.6
	27	0.85	19.50	155.4	114	2,910	161.7	3,220	161.1
	28	0.92	19.50	167.5	114	3,130	173.8	3,465	173.2
20	21	0.57	21.60	117.5	133	2,250	124.9	2,485	124.2
	22	0.62	21.60	127.5	133	2,430	134.9	2,685	134.2
	23	0.67	21.60	137.5	133	2,610	144.9	2,885	144.2
	24	0.72	21.60	147.4	133	2,785	154.8	3,080	154.0
	25	0.78	21.60	159.2	133	3,000	166.6	3,315	165.8
	26	0.84	21.60	170.9	133	3,210	178.4	3,550	177.6
	27	0.91	21.60	184.5	133	3,455	191.9	3,825	191.2
	28	0.98	21.60	198.1	133	3,700	205.5	4,095	204.8
24	21	0.63	25.80	155.4	179	2,975	165.3	3,285	164.4
	22	0.68	25.80	167.4	179	3,190	177.3	3,525	176.4
	23	0.73	25.80	179.4	179	3,410	189.4	3,765	188.4
	24	0.79	25.80	193 7	179	3,665	203.6	4,055	202.6
	25	0.85	25.80	207.9	179	3,920	217.8	4,335	216.8
	26	0.92	25.80	224.4	179	4,220	234.4	4,665	233.4
	27	0.99	25 80	240.8	179	4,515	250.7	4,995	249.8
	28	1 07	25.80	259.4	179	4,850	269.3	5,365	268.4

‡ Including bell. Calculated weight of pipe rounded off to nearest 5 lb.
§ Including bell. Average weight per foot based on calculated weight of pipe before rounding.
† Tolerances of OD of spigot end: 3–12 in., ±0.06 in.; 14–24 in., +0.05 in., −0.08 in.
‖ Weights shown for push-on joint pipe are also applicable to bell-and-spigot joint pipe.

CTD000421

TABLE 6.5

Standard Dimensions and Weights of Mechanical-Joint Cast-Iron Pipe

Size in.	Thickness Class	Thickness	OD†	Weight of Barrel per Foot	Weight of Bell	Weight Based on 18-ft Laying Length		Weight Based on 20-ft Laying Length	
						Per Length‡	Avg. per Foot§	Per Length‡	Avg. per Foot§
		in.		lb					
3*	22	0.32	3.96	11.4	11	215	12.0	240	11.9
	23	0.35	3.96	12.4	11	235	13.0	260	12.9
	24	0.38	3.96	13.3	11	250	13.9	275	13.8
4	22	0.35	4.80	15.3	16	290	16.2	320	16.1
	23	0.38	4.80	16.5	16	315	17.4	345	17.3
	24	0.41	4.80	17.6	16	335	18.5	370	18.4
	25	0.44	4.80	18.8	16	355	19.7	390	19.6
6	22	0.38	6.90	24.3	22	460	25.5	510	25.4
	23	0.41	6.90	26.1	22	490	27.3	545	27.2
	24	0.44	6.90	27.9	22	525	29.1	580	29.0
	25	0.48	6.90	30.2	22	565	31.4	625	31.3
	26	0.52	6.90	32.5	22	605	33.7	670	33.6
8	22	0.41	9.05	34.7	30	655	36.4	725	36.2
	23	0.44	9.05	37.1	30	700	38.8	770	38.6
	24	0.48	9.05	40.3	30	755	42.0	835	41.8
	25	0.52	9.05	43.5	30	815	45.2	900	45.0
	26	0.56	9.05	46.6	30	870	48.3	960	48.1
	27	0.60	9.05	49.7	30	925	51.4	1,025	51.2
10	22	0.44	11.10	46.0	40	870	48.2	960	48.0
	23	0.48	11.10	50.0	40	940	52.2	1,040	52.0
	24	0.52	11.10	53.9	40	1,010	56.1	1,120	55.9
	25	0.56	11.10	57.9	40	1,080	60.1	1,200	59.9
	26	0.60	11.10	61.8	40	1,150	64.0	1,275	63.8
	27	0.65	11.10	66.6	40	1,240	68.8	1,370	68.6
12	22	0.48	13.20	59.8	50	1,125	62.6	1,245	62.3
	23	0.52	13.20	64.6	50	1,215	67.4	1,340	67.1
	24	0.56	13.20	69.4	50	1,300	72.2	1,440	71.9
	25	0.60	13.20	74.1	50	1,385	76.9	1,530	76.6
	26	0.65	13.20	80.0	50	1,490	82.8	1,650	82.5
	27	0.70	13.20	85.8	50	1,595	88.6	1,765	88.3
	28	0.76	13.20	92.7	50	1,720	95.5	1,905	95.2

* Pipe of 3-in. size also available in 12-ft laying length. Weight (lb) per length‡ for thickness class 22 is 150; for 23, 160 ; for 24, 170. Average weight (lb) per foot§ for thickness class 22 is 12.3; for 23, 13.3; for 24, 14.2.

‡ Including bell. Calculated weight of pipe rounded off to nearest 5 lb.

§ Including bell. Average weight per foot based on calculated weight of pipe before rounding.

† Tolerances of OD of spigot end: 3–12 in., ±0.06 in.; 14–24 in., +0.05 in., −0.08 in.

CTD000422

TABLE 6.5—(*contd.*)

Standard Dimensions and Weights of Mechanical-Joint Cast-Iron Pipe

Size *in.*	Thickness Class	Thickness	OD†	Weight of Barrel per Foot	Weight of Bell	Weight Based on 18-ft Laying Length		Weight Based on 20-ft Laying Length	
						Per Length‡	Avg. per Foot§	Per Length‡	Avg. per Foot§
		in.		*lb*					
14	21	0.48	15.30	69.7	78	1,335	74.0	1,470	73.6
	22	0.51	15.30	73.9	78	1,410	78.2	1,555	77.8
	23	0.55	15.30	79.5	78	1,510	83.8	1,670	83.4
	24	0.59	15.30	85.1	78	1,610	89.4	1,780	89.0
	25	0.64	15.30	92.0	78	1,735	96.3	1,920	95.9
	26	0.69	15.30	98.8	78	1,855	103.1	2,055	102.7
	27	0.75	15.30	107.0	78	2,005	111.3	2,220	110.9
	28	0.81	15.30	115.0	78	2,150	119.3	2,380	118.9
16	21	0.50	17.40	82.8	95	1,585	88.1	1,750	87.6
	22	0.54	17.40	89.2	95	1,700	94.5	1,880	94.0
	23	0.58	17.40	95.6	95	1,815	100.9	2,005	100.3
	24	0.63	17.40	103.6	95	1,960	108.9	2,165	108.3
	25	0.68	17.40	111.4	95	2,100	116.7	2,325	116.2
	26	0.73	17.40	119.3	95	2,240	124.6	2,480	124.0
	27	0.79	17.40	128.6	95	2,410	133.9	2,665	133.3
	28	0.85	17.40	137.9	95	2,575	143.2	2,855	142.7
18	21	0.54	19.50	100.4	113	1,920	106.7	2,120	106.0
	22	0.58	19.50	107.6	113	2,050	113.9	2,265	113.2
	23	0.63	19.50	116.5	113	2,210	122.8	2,445	122.2
	24	0.68	19.50	125.4	113	2,370	131.7	2,620	131.0
	25	0.73	19.50	134.3	113	2,530	140.6	2,800	140.0
	26	0.79	19.50	144.9	113	2,720	151.2	3,010	150.6
	27	0.85	19.50	155.4	113	2,910	161.7	3,220	161.0
	28	0.92	19.50	167.5	113	3,130	173.8	3,465	173.2
20	21	0.57	21.60	117.5	134	2,250	124.9	2,485	124.2
	22	0.62	21.60	127.5	134	2,430	134.9	2,685	134.2
	23	0.67	21.60	137.5	134	2,610	144.9	2,885	144.2
	24	0.72	21.60	147.4	134	2,785	154.8	3,080	154.1
	25	0.78	21.60	159.2	134	3,000	166.6	3,320	165.9
	26	0.84	21.60	170.9	134	3,210	178.3	3,550	177.6
	27	0.91	21.60	184.5	134	3,455	191.9	3,825	191.2
	28	0.98	21.60	198.1	134	3,700	205.5	4,095	204.8
24	21	0.63	25.80	155.4	177	2,975	165.2	3,285	164.2
	22	0.68	25.80	167.4	177	3,190	177.2	3,525	176.2
	23	0.73	25.80	179.4	177	3,405	189.2	3,765	188.2
	24	0.79	25.80	193.7	177	3,665	203.5	4,050	202.6
	25	0.85	25.80	207.9	177	3,920	217.7	4,335	216.8
	26	0.92	25.80	224.4	177	4,215	234.2	4,665	233.2
	27	0.99	25.80	240.8	177	4,510	250.6	4,995	249.7
	28	1.07	25.80	259.4	177	4,845	269.2	5,365	268.2

‡ Including bell. Calcaulated weight of pipe rounded off to nearest 5 lb.
§ Including bell. Average weight per foot based on calculated weight of pipe before rounding.
† Tolerances of OD of spigot end: 3–12 in., ±0.06 in.; 14–24 in., +0.05 in., −0.08 in.

CTD000423

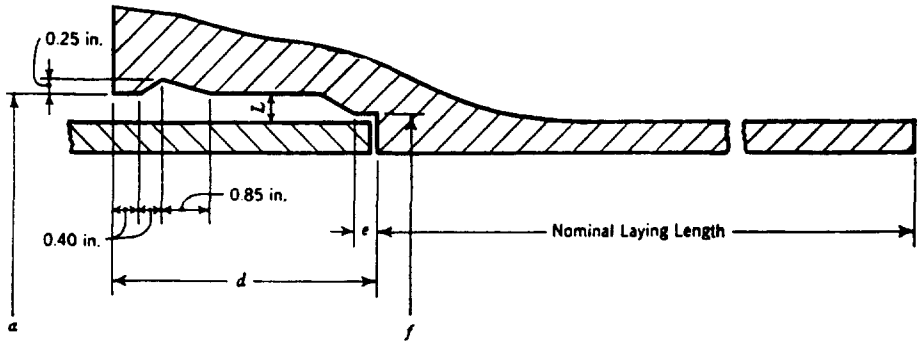

TABLE 6.6

Standard Bell-and-Spigot Joint Dimensions

For weights of bell-and-spigot joint pipe see Tables 6.1 and 6.4.

Size	Pipe OD†	Socket Diam. *a*†	Thickness of Joint *L*	Socket Depth *d*	Centering Shoulder	
					Depth *e*	ID *f*†
			in.			
3	3.96	4.76	0.40	3.30	0.30	4.10
4	4.80	5.60	0.40	3.30	0.30	4.94
6	6.90	7.70	0.40	3.88	0.38	7.06
8	9.05	9.85	0.40	4.38	0.38	9.21
10	11.10	11.90	0.40	4.38	0.38	11.28
12	13.20	14.00	0.40	4.38	0.38	13.38
14	15.30	16.10	0.40	4.50	0.50	15.52
16	17.40	18.40	0.50	4.50	0.50	17.62
18	19.50	20.50	0.50	4.50	0.50	19.72
20	21.60	22.60	0.50	4.50	0.50	21.82
24	25.80	26.80	0.50	4.50	0.50	26.02

† Tolerances for outside diameter of spigot ends, socket diameter *a*, and centering shoulder inside diameter shall be ±0.06 in. for sizes 3–12 in.; ±0.08 in. for sizes 14–24 in.

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