

**THIS STANDARD WITHDRAWN MAY 1966
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AWWA STANDARD

for

CAST-IRON PRESSURE FITTINGS

American Water Works Association

New England Water Works Association

This document presents in slightly revised form the "special castings" portion of "Standard Specifications for Cast-Iron Water Pipes and Special Castings—7C.1-1908" which was adopted by AWWA on May 12, 1908. Although it has been superseded for new installations by various American Standards for cast-iron pipe and fittings (ASA specifications A21.2, A21.6, A21.8, A21.10, and A21.11), it is still valid as a basis for replacing fittings in existing pipelines, or for ordering fittings in sizes larger than 12 in., as these large sizes are not now covered by American Standards.

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Latest Revisions to C100

The AWWA Board of Directors approved the advancement of this document to Standard on Jun. 17, 1955. The new designation is C100-55. As no changes were made in the text at that time, earlier printings of the Third Edition (designated C100-54T) remain equally valid.

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AWWA Standard for

Cast-Iron Pressure Fittings

Sec. 1—Description of Fittings

The fittings shall be made with bell and spigot joints and shall conform, within the specified tolerances, to the dimensions given in the tables forming a part of these specifications.

For pipe 4–12 in., one class of fittings shall be furnished, made from Class D patterns. Spigot ends shall have reduced outside diameters as shown by Table 1 and shall taper back for a distance of 6 in.

For pipe 14–24 in., two classes of fittings shall be furnished—Class B, and Class D, on which the letters “B” and “D”, respectively, shall be cast. For pipe 30–60 in., four classes of fittings—Classes A, B, C, and D, shall be furnished and they shall have cast on them the letter of the class to which they belong.

Classes A, B, C, and D fittings provide for the following working heads and pressures:

Class	Head <i>ft</i>	Pressure <i>psi</i>
A	100	43
B	200	86
C	300	130
D	400	173

The flanges on all manhole castings and manhole covers shall be faced and drilled as shown in Tables 8 and 9. The manufacturer shall furnish mild steel bolts with square heads, hexagon nuts and gaskets.

Sec. 2—Variation in Diameter

Sockets and spigots shall be tested with circular gages. Tolerances of fittings made from standard patterns are:

Size Range <i>in.</i>	Tolerance <i>in.</i>
4–16	± 0.12
18–24	± 0.15
30–42	± 0.20
48–60	± 0.24

Sec. 3—Variation in Thickness

The thickness tolerance for fittings with standard wall thickness of less than 1 in. shall be minus 0.12 in. The tolerance for fittings with standard wall thickness 1 in. and more shall be minus 0.15 in. An additional tolerance of 0.03 in. is permitted for spaces not exceeding 8 in. in length in any direction.

Sec. 4—Variation in Weight

The weight tolerance for 4–12 in. standard fittings is ± 10 per cent. For 14–60 in. fittings, the tolerance is ± 8 per cent. For bends and wyes, the tolerance is ± 12 per cent.

No weight shall be paid for that is in excess of the amount allowed by maximum tolerance. No fitting shall be accepted that weighs less than the amount allowed by minimum tolerance.

Sec. 5—Marking

Each fitting shall have cast, on the outside, the initials of the maker’s name

and the class. As many as four special initials and the year may also be cast when required by the customer. The weight shall be painted conspicuously on each fitting.

Sec. 6—Quality of Iron

All fittings shall be made of cast iron of good quality. The metal of the castings shall be strong, tough, of even grain, and soft enough to drill and cut satisfactorily.

Sec. 7—Test Bars

7.1. The acceptability of the iron used in the fittings shall be determined by testing bars cast from the same iron as the fittings. The observations and the computed results hereinafter required shall be recorded, and, if requested, reported to the purchaser.

7.2. *Dimensions.* Test bars shall be 2 in. wide, 1 in. thick and not less than 26 in. long. Individual test bars may vary as much as 2 per cent from the standard width or standard thickness, or both, but the patterns and molding practice shall be such that the errors shall in general not exceed 1 per cent.

7.3. *Methods of casting.* The bars shall be cast vertically in well faced, dry sand molds provided with a suitable pouring basin and mounted on a suitable refractory foundation. Metal for the bars shall be obtained by using a small, heated ladle taking its metal from the main ladle from which the fittings are to be poured and after all alloys and other additional metal, except cast iron for cooling, have been added to the main ladle and become melted. The bars shall not be removed from the mold before they have cooled to 500 F.

7.4. *When cast and to what fittings applicable.* Except as hereinafter pro-

vided for special cases, one pair of test bars of the metal used shall be cast with iron from the first ladle, another pair with iron from the approximately middle ladle and a third pair with iron from the last ladle of iron taken during a day's run or heat, from the cupola in which the iron for the fittings is melted. If the heat lasts for more than six hours, then additional pairs of bars shall be cast at approximately uniform intervals so as to give an extra pair of bars for each three hours during which the heat lasts in excess of six hours. In case the charging of the cupola is to be changed for one or more times during the day's run or heat in order to produce a different iron, the time of taking test bars shall be varied in such a way as to obtain representative tests of the iron at least at the beginning and end of each period during which the iron is intended to be constant in quality; and in case such period exceeds four hours, additional pairs of bars shall be taken at such times as will provide a pair of bars for each two hours during which this special mixture is used. At least one bar from each pair shall be broken, but the manufacturer shall have the right to break both bars, in which case the better bar shall be taken as representative. Bars showing flaws in fracture may be disregarded.

7.5. *Test bar requirements to indicate acceptable iron.* In order that the iron shall be acceptable, the average results from the single pairs of bars representing the respective pairs of bars cast during the heat or period shall comply with the requirements hereinafter specified, and, in addition, no representative bar shall be more than 5 per cent below the minimum requirements in either corrected breaking load or corrected deflection.

7.6. *Method of testing.* The bars shall be broken as beams by placing them flatwise on supports 24 in. apart and applying the load at the center of the span. The breaking load and the corresponding deflection shall be observed and recorded.

7.7. *Correcting observed breaking loads and deflections.* The bars shall be measured at the point of application of the load and the results corrected to standard 2-in. by 1-in. cross section by the conventional beam formula as follows:

Corrected breaking load

$$= \text{Observed breaking load} \times \frac{2}{bd^2}$$

Corrected deflection at breaking

$$= \text{Observed deflection at breaking} \times d$$

where b is the measured width and d is the measured depth of the bar at the point of application of the load. In the formulas above, the deflection and all dimensions are in inches.

7.8. *Requirements on strength and deflection of 2-in. by 1-in. bars.* In order to indicate acceptable metal, the corrected breaking loads and deflections of the representative 2-in. by 1-in. test bars for a given heat or period, interpreted as provided in Sec. 7.4 above, shall comply with the following requirements:

Minimum center breaking load:

2,300 lb

Minimum center deflection at breaking:

$0.30 + 0.0001$ (breaking load - 2,300) in.

7.9. *Alternate tensile bars.* As an alternate to the 2-in. by 1-in. test bars, ASTM A48 round test bars may be cast which shall meet Class 25 requirements. To be acceptable, the tensile

strength must equal or exceed 25,000 psi.

Sec. 8—Quality of Castings

The fittings shall be smooth and free from defects of every nature which would make them unfit for the use for which they are intended. No plugging or filling will be allowed.

Sec 9—Cleaning and Inspection

All fittings shall be thoroughly cleaned and subjected to a careful inspection.

Sec. 10—Linings, Exterior Coatings

Any particular lining or coating which is to be applied to the fittings shall be specified in the agreement made at the time of purchase. Separate standards for cement-mortar lining (ASA A21.4; also known as AWWA C104) have been provided as a part of standards for pipe.

No fittings for water works service shall be furnished without protective coating unless specifically ordered by the purchaser.

Sec. 11—Weighing

The fittings shall be weighed under the supervision of the engineer before the application of any lining or coating other than hot or cold bituminous dip or paint. If desired by the engineer, the fittings shall be weighed after their delivery, and the weights so ascertained shall be used in the final settlement, provided such weighing is done by a legalized weighmaster. Bids shall be submitted and a final settlement made upon the basis of a ton of 2,000 lb.

Sec. 12—Men and Material

The manufacturer shall provide all tools, testing machines, and labor neces-