

ANSI/AWWA

# C700-20

(Revision of ANSI/AWWA C700-15)

AWWA Standard

## Cold-Water Meters— Displacement Type, Metal Alloy Main Case

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American Water Works  
Association



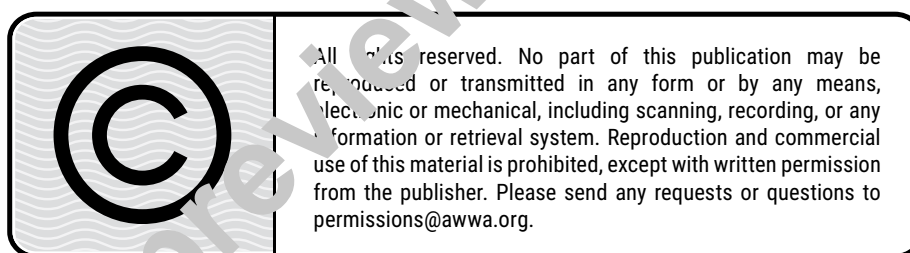
## AWWA Standard

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# Foreword

*This foreword is for information only and is not a part of ANSI/AWWA C700.*

## **I. Introduction.**

I.A. *Background.* For the past century, no tool available to water utilities has played a greater part in the conservation of water than the water meter. It has reduced waste and distributed the cost of operating a water system in the most equitable manner possible.

Although patents were issued earlier, it is thought that the first meter produced in the United States was made in 1857. It was a positive-displacement type with reciprocating pistons. This design consisted of two cylinders and pistons with inlet and outlet ports arranged so that while water in one cylinder was discharging, the other was filling. Water flowing through the meter was subject to pulsation and high friction loss. Other types of displacement meters manufactured before the turn of the 20th century were the rotary piston, oscillating piston, and nutating disc. Only the oscillating and nutating types remain in production today, as they have proved satisfactory for metering domestic water services.

I.B. *History.* Standardization of water meters was a matter of concern for many years before the first standard was adopted. An AWWA committee appointed in 1913 proposed the adoption of standards on overall meter lengths and connections in 1915 and 1916.

The standards were not adopted officially but were recorded in the proceedings for 1915<sup>†</sup> and for 1916.<sup>‡</sup>

The New England Water Works Association (NEWWA), in separate action, appointed a committee in 1916 that produced drafts of standards in 1917. Action on adoption or publication was delayed on the recommendation of manufacturers.

In 1916, the meter manufacturers, which for several years had worked informally on the matter of meter standards, formally organized a meter standards committee on which most of the meter manufacturers were represented. The records indicate that those who were not represented were kept informed of the committee's activities and given the opportunity to comment on drafts of proposed standards.

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

<sup>†</sup> AWWA Proceedings 35th Year, *Journal of the American Water Works Association*, 3:283 (1915).

<sup>‡</sup> AWWA Proceedings 36th Year, *Journal of the American Water Works Association*, 2:690 (1916).

On Mar. 9–10, 1920, the AWWA and NEWWA committees met for the first time as a joint committee to review drafts of a proposed standard that had been prepared by the manufacturers' committee. Subcommittees appointed at that meeting prepared a final draft that was approved by the joint committee and submitted to both associations for approval. AWWA adopted the standard on June 9, 1921, and NEWWA adopted it on Sept. 14, 1921. The standard, the first for any type of meter, was titled "Standard Specifications for Cold-Water Meters, Disc Type."

The first revision of the standard was approved as tentative by AWWA on Oct. 31, 1941. The effective date of the standard was delayed until Jan. 1, 1943. On Mar. 15, 1943, it was approved by NEWWA. The document was advanced from tentative to standard by AWWA on May 10, 1946.

Emergency alternative provisions were imposed by the War Production Board from Dec. 1, 1942, to Jan. 8, 1945. Emergency provisions were imposed again on Jan. 1, 1952.

The next edition of the standard was approved by AWWA as tentative on Jan. 23, 1961, and it was later advanced to standard without revision on Feb. 11, 1964, and subsequently revised on Jan. 24, 1971, May 8, 1977, Jan. 23, 1990, June 17, 1995, June 16, 2002, Jan. 25, 2009, and Jan. 24, 2015. This edition was approved on April 20, 2020.

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 Water Research Foundation (formerly 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.<sup>§</sup> 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. Specific policies of the state, provincial, or local agency.

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<sup>§</sup> Persons outside the United States should contact the appropriate authority having jurisdiction.

2. Two standards developed under the direction of NSF<sup>‡</sup>: NSF/ANSI/CAN<sup>\*\*</sup> 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.

3. Other references, including AWWA standards, *Food Chemicals Codex*, *Water Chemicals Codex*,<sup>††</sup> 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/CAN 61. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdictions. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

Annex A, “Toxicology Review and Evaluation Procedures,” to NSF/ANSI/CAN 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.

In an alternative approach to inadvertent drinking water additives, some jurisdictions (including California, Louisiana, Maryland, and Vermont, at the time of this writing) are calling for reduced lead limits for materials in contact with potable water. Various third-party certifiers have been assessing products against these lead content criteria, and a new ANSI-approved national standard, NSF/ANSI 372, Drinking Water System Components—Lead Content, was published in 2010.

On Jan. 4, 2011, legislation was signed revising the definition for “lead free” within the Safe Drinking Water Act (SDWA) as it pertains to “pipe, pipe fittings, plumbing fittings, and fixture”. The changes went into effect on Jan. 4, 2014. In brief, the new provisions to the SDWA require that these products meet a weighted average lead content of not more than 0.25 percent.

ANSI/AWWA C700 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 parties offering to certify products for contact with, or treatment of, drinking water.
3. Determine current information on product certification.

<sup>‡</sup> NSF International, 789 N. Dixboro Road, Ann Arbor, MI 48105.

<sup>\*\*</sup> Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.

<sup>††</sup> Both publications available from National Academy of Sciences, 500 Fifth Street, N.W., Washington, DC 20001.

## II. Special Issues.

II.A. *Fire Flow.* The meters described in this standard are not designed to be used in water service piping intended to extinguish fire. Requirements for meters used for residential fire sprinkler applications that meet the requirements of NFPA\* 13D in single- and two-family dwellings and manufactured homes, sizes  $\frac{3}{4}$  in. (20 mm) through 2 in. (50 mm), are found in ANSI/AWWA C714.

II.B. *Chlorine and Chloramine Degradation of Elastomers.* The selection of materials is critical for water service and distribution piping in locations where there is a possibility that elastomers will be in contact with chlorine or chloramines. Documented research has shown that elastomers such as gaskets, seals, valve seats, and encapsulations may be degraded when exposed to chlorine or chloramines. The impact of degradation is a function of the type of elastomeric material, chemical concentration, contact surface area, elastomer cross section, environmental conditions, and temperature. Careful selection of and specifications for elastomeric materials and the specifics of their application for each water system component should be considered to provide long-term usefulness and minimum degradation (cracking, loss of elasticity, or softening) of the elastomer specified.

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.* This standard provides for several options and alternatives that purchasers must designate if they wish to exercise the options or if they have a preference among the alternatives. Also, several items must be specified by purchasers to describe completely the type, size, and quantity of meters required. All such item options, and alternatives are summarized in the following itemized list. Purchasers should review each one and then make the appropriate provisions in the specifications to describe specific requirements.

1. Standard used—that is, ANSI/AWWA C700, Cold-Water Meters—Displacement Type, Metal Alloy Main Case, of latest revision.
2. Whether compliance with NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects; NSF/ANSI 372, Drinking Water System Components—Lead Content; or an alternative lead content criterion is required.
3. If meters are to be provided with nutating discs or oscillating pistons (Sec. 1.1), and if there is a preference.

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\*National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169.

4. Details of federal, state and, local requirements (Sec. 4.1).
5. If meters are to be provided with cast-iron, stainless-steel, copper alloy, or suitable engineering plastic top or bottom covers (Sec. 4.1.9), and if there is a preference.
6. If corrosion protection is required for cast-iron frost-protection covers (Sec. 4.1.9.1 and 4.2.5), and if there is a preference.
7. Size of meter (Sec. 4.2.1 and Tables 1 and 2) and quantity required.
8. Modifications of test specifications (Sec. 4.2.8) if operating water temperature will exceed 80°F (27°C).
9. If meters in sizes ½ in. (13 mm) through 1 in. (25 mm) are to be of split-case or frost-protection-type design (Sec. 4.3.1.1).
10. If ½-in. (13-mm), ½-in. × ¾-in. (13-mm × 20-mm), ⅝-in. (15-mm), ⅝-in. × ¾-in. (15-mm × 20-mm), ¾-in. (20-mm), and 1-in. (25-mm) meters are to be provided with coupling nuts and tailpieces (Sec. 4.3.2.1), and whether tailpieces are to be of a copper alloy or a suitable engineering plastic (Sec. 4.1.11).
11. If 1½-in. (40-mm) and 2-in. (50-mm) meters are to be provided with flanged ends or threaded (spud) ends (Sec. 4.3.2.2).
12. If flanged meters are to be provided with companion flanges, gaskets, bolts, and nuts (Sec. 4.3.2.2), and whether companion flanges are to be of a copper alloy, cast iron, or suitable engineering plastic (Sec. 4.1.12).
13. Details of register (Sec. 4.3.3) to be provided, where there is a preference, with regard to the following:
  - a. If the registers shall be read in US gallons, cubic feet, or cubic meters.
  - b. If the registers shall be permanently sealed against the disassembly of the gear train or have replaceable change gears.
14. If a direct-reading remote register or an encoder-type remote register is required (Sec. 4.3.3.4), specify in detail.
15. If the size of individual meters will be permanently marked on the register dial face (Sec. 4.4).
16. If warranty requirements will be specified (Sec. 5.1.1).
17. If an affidavit of compliance (Sec. 6.2) and certificate of testing for accuracy (Sec. B.3.3) are required.
18. Special materials required, if any, to resist corrosion if water is highly aggressive (Sec. B.5.3).

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

**IV. Major Revisions.** Major revisions made to the standard in this edition include the following:

1. Guidance on selection of materials in terms of chlorine and chloramine degradation of elastomers has been provided in the foreword (Sec. II.B).
2. A new copper alloy, UNS C87600, has been added to the listing of acceptable materials for pressure casings (Sec. 4.1.2).
3. The requirements for register accuracy at the minimum flow rate has been modified (Sec. 4.2.8.2).
4. Reference to ANSI/AWWA C706 on Direct Reading, Remote Registration Systems for Cold Water Meters has been removed (Sec. 4.3.3.4). (ANSI/AWWA C706 was withdrawn as an AWWA standard in 2015.)
5. Provisions for meter marking have been moved from Section 6 to Section 4. (The content of the requirements is unchanged.)

**V. Comments.** If you have any comments or questions about this standard, please call AWWA Engineering and Technical Services at 303.794.7711, FAX at 303.795.7603; write to the department at 6666 West Quincy Avenue, Denver, CO 80235-3098; or email at [standards@awwa.org](mailto:standards@awwa.org).



**American Water Works  
Association**

*Dedicated to the World's Most Important Resource®*

**ANSI/AWWA C700-20**  
(Revision of ANSI/AWWA C700-15)

**AWWA Standard**

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# Cold-Water Meters—Displacement Type, Metal Alloy Main Case

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## SECTION 1: GENERAL

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### **Sec. 1.1 Scope**

This standard describes the various types and classes of cold-water displacement meters with metal alloy main cases, in sizes ½ in. (13 mm) through 2 in. (50 mm), and the materials and workmanship employed in their fabrication. The displacement meters described, known as *nutating-disc* or *oscillating-piston meters*, are positive in action because the pistons and discs displace or carry over a fixed quantity of water for each nutation or oscillation when operated under positive pressure.

### **Sec. 1.2 Purpose**

The purpose of this standard is to provide the minimum requirements for cold-water meters—displacement type, metal alloy main case, including materials and design.

### **Sec. 1.3 Application**

This standard can be referenced in specifications for purchasing and receiving cold-water meters—displacement type, metal alloy main case. This standard can be used as a guide for manufacturing this type of meter. The stipulations of this