ANSI/AWWA **C703-24**

(Revision of ANSI/AWWA C703-19)

AWWA Standard

Cold-Water Meters—Fire-Service Type

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American Water Works Association

Approved American National Standard ANSI

STANDARD Since 1881

AWWA Standard

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C703.*

I. Introduction.

I.A. *Background*. Fire-service meters were developed in 1908 to assure water agencies that water was not being taken from fire-service lines by unauthorized persons and was not being used at unauthorized flow rates for purposes other than fire protection. The meters were designed to register the amount of water used for fires and domestic purposes at the lowest possible loss in pressure.

Some of the earlier meters were equipped with valves, referred to as *atmospheric valves*, in the mainline section. An opening from the atmosphere led to a groove in the face of the seat ring. When the rubber seat ring was in the closed position, it bore against this groove and opened a small lever-actuated needle valve located within the groove. This lowered the pressure in the groove to atmospheric, increasing the valve closing force. When the main valve opened and the rubber seat ring moved away from the groove, the small needle valve closed the groove to the atmosphere, thereby preventing the flow of water from within the meter.

Rather than measuring the water that passed through the mainline section by measuring chamber and register, as is currently the case, the first fire-service meters used a time meter to indicate how long the mainline valve was in the open position. The time was registered in hours and minutes. The displacement-type time meter had a cap with a small orifice placed over the outlet end of the meter and was connected at the inlet end of the seat-ring groove mentioned earlier. When the mainline valve opened, a small amount of water was discharged from the groove and passed through the displacement meter to the atmosphere. The small discharge of water was carefully regulated to pass a relatively definite amount of water per hour and would be registered on the meter dial as 1-h duration.

In the ensuing years, many design changes have been made to fire-service meters to improve their performance at different flow rates, from the lowest up to the torrents encountered under firefighting conditions, as well as heavy city and industrial loads.

Fire-service meters are also used as master meters to measure widely variable flow rates from reservoirs and other water services.

* American National Standards Institute, 1180 Avenue of the Americas, 10th Floor, New York, NY 10036.

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I.B. *History*. The first standard covering fire-service meters was adopted by the New England Water Works Association (NEWWA) in March 1923 and by the American Water Works Association (AWWA) on May 24, 1923. The second and third editions, with the interim designations 7M.4-T and 7M.4-1949, were approved on Oct. 24, 1946, and Jan. 18, 1949, respectively. The fourth edition, designated as C703-49, was approved on Jan. 18, 1949. Subsequent editions of ANSI/AWWA C703 were approved on Jan. 26, 1970, Feb. 3, 1979, and June 22, 1986. ANSI/AWWA C703-96 was approved by the Board of Directors on June 23, 1996, and reaffirmed without revision on Jan. 18, 2004. Subsequent editions of the standard were approved on June 12, 2011, Jan. 24, 2015, and Oct. 28, 2019. This edition of the standard was approved on Oct. 14, 2024.

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.[†] 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 or local agency.
2. Four standards developed under the direction of NSF:[‡] NSF/ANSI/CAN[§] 60, Drinking Water Treatment Chemicals—Health Effects; NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects; NSF/ANSI/CAN 372, Drinking Water System Components—Lead Content; and NSF/ANSI/CAN 600, Health Effects Evaluation and Criteria for Chemicals in Drinking Water.

[†] Persons outside the United States should contact the appropriate authority having jurisdiction.
[‡] NSF International, P.O. Box 130140, 789 North Dixboro Road, Ann Arbor, MI 48105.
[§] Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.

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3. 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 NSF/ANSI/CAN 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.

NSF/ANSI/CAN 600 (which formerly appeared in NSF/ANSI/CAN 60 and 61 as Annex A, "Toxicology Review and Evaluation Procedures") 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 NSF/ANSI/CAN 600 procedures may not always be identical, depending on the certifier.

In 1991, under the Safe Drinking Water Act (SDWA), the USEPA published a federal regulation known as the Lead and Copper Rule (LCR) to minimize lead and copper in drinking water. Numerous revisions to the LCR have taken place since 1991. On Jan. 15, 2021, the USEPA issued the Lead and Copper Rule Revisions (LCRR). On Dec. 6, 2023, the USEPA proposed additional changes in the Lead and Copper Rule Improvements (LCRI). A key provision in the LCRI proposal was to lower the lead action level from 15 ppb to 10 ppb. The LCRI was made final on Oct. 8, 2024.

The ANSI-approved national standard, NSF/ANSI/CAN 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 fixtures." The changes went into effect on Jan. 4, 2014. In brief, the revised provisions to the SDWA require that these products meet a weighted average lead content of not more than 0.25 percent. In 2020, the USEPA set a Sept. 1, 2023, deadline for products to meet the new lead content requirements outlined in the "Lead Free" Rule. This new rule outlines that manufacturers are required to be certified to NSF/ANSI/CAN 372.

A majority of US states require ANSI-accredited certification to NSF/ANSI/CAN 61, and many other states either require or recommend compliance with NSF/ANSI/CAN 61.

[¶] Both publications available from The National Academies Press, 500 Fifth Street NW, Washington, DC 20001.

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The USEPA, Health Canada, and other state and local regulatory agencies have been taking steps to limit per- and polyfluoroalkyl substances, or PFAS, in drinking water. In March 2023, for example, USEPA proposed legally enforceable levels for six different PFAS. These are PFOA, PFOS, PFNA, PFHxS, PFBS, and HFPO-DA (also known as GenX chemicals). USEPA also finalized an MCL for a combination of PFHxS, PFNA, HFPO-DA, and PFBS.

On Apr. 26, 2024, the USEPA finalized primary drinking water standards (MCLs) for these six PFAS compounds. This final National Primary Drinking Water Regulation (NPDWR) requires public water systems to take the following actions:

1. Public water systems must monitor for these PFAS and have three years to complete initial monitoring (by April 2027), followed by ongoing compliance monitoring. Water systems must also provide the public with information on the levels of these PFAS in their drinking water beginning in 2027.
2. Public water systems have five years (by April 2029) to implement solutions that reduce these PFAS if monitoring shows that drinking water levels exceed these MCLs.
3. Beginning in 2029, public water systems that have PFAS in drinking water which violates one or more of these MCLs must take action to reduce levels of these PFAS in their drinking water and must provide notification to the public of the violation.

Water meter manufacturers should avoid using materials where these PFAS compounds are intentionally added as part of the material formation of meter components that come in contact with potable water. As of the effective date of this ANSI/AWWA C703-24 standard (May 1, 2025), these final MCL criteria are expected to be directly adopted in NSF/ANSI/CAN 600 as new health effects criteria for NSF 61, and a task group under the NSF 61 Joint Committee has begun to investigate expanding the scope of PFAS testing for drinking water system components within NSF/ANSI/CAN 61.

ANSI/AWWA C703 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 all parties offering to certify products for contact with, or treatment of, drinking water.
3. Determine current information on product certification.

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II. Special Issues.

II.A. *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, and environmental conditions, including 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 (swelling, 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*. The following information should be provided by the purchaser:

1. Standard used—that is, ANSI/AWWA C703, Cold-Water Meters—Fire-Service Type, of latest revision.

2. Whether compliance with NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects; NSF/ANSI/CAN 372, Drinking Water System Components—Lead Content; or an alternative lead content criterion is required.

3. Whether specific warranty provisions are required.

4. Details of federal, state, provincial, territorial, and local requirements (Sec. 4.1).

5. Limitations on acceptable materials, if any, as referenced throughout Sec. 4.1.

6. Restrictions on corrosion resistance treatment process (Sec. 4.1.8), if any.

7. Size of meters (Sec. 4.2.1) and quantity required.

8. Length of filler piece (Sec. 4.2.3), if required.

9. Modifications of test specifications (Sec. 4.2.6), if required, if operating water temperatures are to exceed 80°F (27°C) (Sec. A.5.2).

10. Whether companion flanges, gaskets, bolts, and nuts (Sec. 4.3.4) are to be provided and if flanges are of copper alloy rather than cast iron (Sec. 4.1.9).

11. Details of register to be provided: US gallons, cubic feet, cubic meters, or other units; with or without center-sweep test hand; open, sealed, or permanently sealed (Sec. 4.3.5).

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12. Whether an encoder-type register or an adaptor (Sec. 4.3.6) is required.

13. Whether a bypass meter (Sec. 4.3.12) is required.

14. Whether the meter serial number is imprinted on the main case (Sec. 6.1).

15. Special materials required, if any, to resist corrosion if water is highly aggressive (Sec. A.5.3).

16. Whether an affidavit of compliance (Sec. 6.2), a certificate of testing accuracy (Sec. A.3.3), or both are to be provided.

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

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

1. Updated information on the USEPA Lead and Copper Rule and regulatory status of per- and polyfluoroalkyl substances, or PFAS, in drinking water has been added to foreword Sec. I.C Acceptance.

2. Material references to ASTM standards have been updated throughout the standard.

3. Information and criteria for mechanical display–type registers have been updated (Sec. 4.3.5).

4. Information on meter installation methods has been modified (Sec. A.8.1). Meter installation methods are covered in more detail in AWWA Manual M6.

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

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American Water Works Association

ANSI/AWWA C703-24
(Revision of ANSI/AWWA C703-19)

AWWA Standard

Cold-Water Meters—Fire-Service Type

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes the various types and classes of cold-water fire-service–type meters in sizes 3 in. (80 mm)* through 10 in. (250 mm), and the materials and workmanship used in their fabrication. A fire-service meter shall consist of one of the following:

A. A combination of (1) a mainline meter of the turbine type (class II), either Underwriters Laboratories† (UL) listed or FM Global Research‡ (FM) approved; (2) either a UL-listed or an FM-approved fire-service strainer; (3) a bypass meter of the appropriate size for measuring low flow rates; and (4) an automatic valve for diverting flow rates other than fire demand through the bypass meter.

B. A combination of (1) a mainline meter of the turbine type (class II), either UL listed or FM approved; and (2) either a UL-listed or an FM-approved fire-service strainer.

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

† Underwriters Laboratories, 333 Pfingsten Road, Northbrook, IL 60062.

‡ FM Global, 270 Central Avenue, Johnston, RI 02919.

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