ANSI/AWWA **C703-19**

*(Revision of ANSI/AWWA C703-15)*

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 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 above. 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.

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

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, and Jan. 24, 2015. This edition of the standard was approved on Oct. 28, 2019.

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). 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. Two standards developed under the direction of NSF,[†] NSF/ANSI/CAN[‡] 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects.

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

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* 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.

§ Both publications available from The National Academies Press, 500 Fifth Street NW, Keck 360, Washington, DC 20001.

to accept or accredit certification organizations within their jurisdiction. 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 fixtures." 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 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.

**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 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, 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).
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. Guidance on selection of materials in terms of chlorine and chloramine degradation of elastomers has been provided in the foreword (Sec. II.A).

2. The accuracy at which the changeover begins and the registration requirements at the changeover flow rates have been modified (Sec. 4.2.6.2).

3. Reference to ANSI/AWWA C706 on Direct Reading, Remote Registration Systems for Cold Water Meters has been removed (Sec. 4.3.6). (ANSI/AWWA C706 was withdrawn as an AWWA standard in 2015.)

4. Provisions for meter marking have been moved from Sec. 6.1 to Sec. 4.4. (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.

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American Water Works Association
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**ANSI/AWWA C703-19**
(Revision of ANSI/AWWA C703-15)

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.