ANSI/AWWA **C703-19**

(Revision of ANSI/AWWA C703-15)

AWWA Standard

Cold-Water Meters—Fire-Service Type

Effective date: May 1, 2020.

First edition approved by Board of Directors May 23, 1923.
This edition approved Oct. 28, 2019.
Approved by American National Standards Institute Nov. 21, 2019.

American Water Works Association

Documents
Document Sharing Hub

Full document details: ANSI AWWA C703-19

AWWA Standard

This document is an American Water Works Association (AWWA) standard. It is not a specification. AWWA standards describe minimum requirements and do not contain all of the engineering and administrative information normally contained in specifications. The AWWA standards usually contain options that must be evaluated by the user of the standard. Until each optional feature is specified by the user, the product or service is not fully defined. AWWA publication of a standard does not constitute endorsement of any product or product type, nor does AWWA test, certify, or approve any product. The use of AWWA standards is entirely voluntary. This standard does not supersede or take precedence over or displace any applicable law, regulation, or codes of any governmental authority. AWWA standards are intended to represent a consensus of the water industry that the product described will provide satisfactory service. When AWWA revises or withdraws this standard, an official notice of action will be placed in the Official Notice section of *Journal AWWA*. The action becomes effective on the first day of the month following the month of *Journal AWWA* publication of the official notice.

American National Standard

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether that person has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. American National Standards are subject to periodic review, and users are cautioned to obtain the latest editions. Producers of goods made in conformity with an American National Standard are encouraged to state on their own responsibility in advertising and promotional materials or on tags or labels that the goods are produced in conformity with particular American National Standards.

Caution Notice: The American National Standards Institute (ANSI) approval date on the front cover of this standard indicates completion of the ANSI approval process. This American National Standard may be revised or withdrawn at any time. ANSI procedures require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of ANSI approval. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036; (212) 642-4900, or e-mailing info@ansi.org.

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including scanning, recording, or any information or retrieval system. Reproduction and commercial use of this material is prohibited, except with written permission from the publisher. Please send any requests or questions to permissions@awwa.org.

ISBN-13, print: 978-1-64717-000-4

ISBN-13, electronic: 978-1-61300-543-9

DOI: 10.12999/AWWA.C703.19

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including scanning, recording, or any information or retrieval system. Reproduction and commercial use of this material is prohibited, except with written permission from the publisher.

Copyright © 2020 by American Water Works Association
Printed in USA

Documents
Document Sharing Hub

Copyright © 2020 American Water Works Association. All Rights Reserved

Full document details: ANSI AWWA C703-19

Committee Personnel

The AWWA Subcommittee on Compound and Fire-Service Meters, which developed this standard, had the following personnel at the time:

George H. De Jarlais, *Chair*

M.J. Aragon, Denver Water, Denver, Colo.
R.A. Barillas, Badger Meter, Milwaukee, Wis.
T.D. Bianchi, Neptune Technology Group Inc., Tallassee, Ala.
M.C. Bowen, City of Columbus, Division of Water, Columbus, Ohio
D. Casper, Mueller Systems, Cleveland, N.C.
J. Conover Jr., City of Sacramento, Sacramento, Calif.
G.H. De Jarlais, Badger Meter, Milwaukee, Wis.
D. Faber, Faber & Associates, Columbus, Ind.
R. Gallon, Zenner USA, Banning, Calif.
L. Gregory, RG3 Meter Company, Longview, Tex.
A. Hendey Sr., Hendey Meter, Beaumont, Calif.
D.E. Hood, M.E. Simpson Company Inc., Valparaiso, Ind.
A.M. Horbovetz, M.E. Simpson Company Inc., Valparaiso, Ind.
R.N. Koch, Master Meter Inc., Pittsburgh, Pa.
J. Pintok, RG3 Meter Company, Lake Mary, Fla.
J.A. Reiss, Elster AMCO Water LLC, Ocala, Fla.
J.R. Scarborough III, Neptune Technology Group Inc., Tallassee, Ala.
T. Smith, Sensus, Morrisville, N.C.
S.M. Swanson, Sensus, Uniontown, Pa.
M.A. Thomas, Mueller Systems, Cleveland, N.C.
W.J. Vetter, Master Meter Inc., Mansfield, Tex.
A.M. Watson, Elster AMCO Water LLC, Ocala, Fla.

The AWWA Standards Committee on Water Meters, which reviewed and approved this standard, had the following personnel at the time of approval:

Thomas A. Kelly Jr., *Chair*
Michael L. Mastic, *Secretary*

General Interest Members

J.E. Cray, Wright-Pierce, Andover, Mass.
A. Dabak, Texas Instruments, Dallas, Tex.

Copyright © 2020 American Water Works Association. All Rights Reserved

Documents
Document Sharing Hub

Full document details: ANSI AWWA C703-19

D. Faber, Faber & Associates, Columbus, Ind.
R.C. Graff, Poway, Calif.
J.G. Gunn (*alternate*), Johnson Controls Inc., Victor, N.Y.
C.C. Hannah, Johnson Controls, Inc., Lubbock, Tex.
D.E. Hood, M.E. Simpson Company Inc., Valparaiso, Ind.
A.M. Horbovetz (*alternate*), M.E. Simpson Company Inc., Valparaiso, Ind.
M.C. Johnson, Utah Water Research Laboratory, Utah State University, Logan, Utah
F.S. Kurtz (*liaison, nonvoting*), Standards Engineer Liaison, AWWA, Denver, Colo.
M.L. Mastic, MARS Company, Ocala, Fla.
R.A. Richter, National Institute of Standards and Technology, Gaithersburg, Md.
S. Thakurdesai (*alternate*), Texas Instruments, Dallas, Tex.

Producer Members

F.J. Begale (*alternate*), Badger Meter, Milwaukee, Wis.
T.D. Bianchi, Neptune Technology Group Inc., Tallassee, Ala.
C. Brunson (*alternate*), Neptune Technology Group Inc., Tallassee, Ala.
D. Casper (*alternate*), Mueller Systems, Cleveland, N.C.
M.D. Cole, Meter Technology Werks, Tampa, Fla.
G.H. De Jarlais, Badger Meter, Milwaukee, Wis.
D.J. Devane, Zenner USA, Leeds, Ala.
L. Gregory (*alternate*), RG3 Meter Company, Longview, Tex.
A. Hendey Sr., Hendey Meter, Beaumont, Calif.
R.N. Koch, Master Meter Inc., Pittsburgh, Pa.
M. Laird (*alternate*), Metron-Farnier LLC, Boulder, Colo.
J.A. McCraven, Mueller Systems, Cleveland, N.C.
J. Pintok, RG3 Meter Company, Lake Mary, Fla.
J.A. Reiss (*alternate*), Elster AMCO Water LLC, Ocala, Fla.
M. Shamley, Metron-Farnier LLC, Boulder, Colo.
T. Smith (*alternate*), Sensus, Morrisville, N.C.
S.M. Swanson, Sensus, Uniontown, Pa.
W.J. Vetter (*alternate*), Master Meter Inc., Mansfield, Tex.
A.M. Watson, Elster AMCO Water LLC, Ocala, Fla.

Documents
Document Sharing Hub
Copyright © 2020 American Water Works Association. All Rights Reserved
Full document details: ANSI AWWA C703-19

User Members

M.J. Aragon, Denver Water, Denver, Colo.

M.C. Bowen, City of Columbus, Division of Water, Columbus, Ohio

J. Conover Jr., City of Sacramento, Sacramento, Calif.

W.F. Dunnill, Consolidated Utility District of Rutherford County, Murfreesboro, Tenn.

W.M. Garfield, Arizona Water Company, Phoenix, Ariz.

G.M. Gehringer, City of Philadelphia, Philadelphia, Pa.

D. Griffin, City of Winnipeg Water and Waste Department, Winnipeg, Man.

P.A. Hayes, Mammoth Community Water District, Mammoth Lakes, Calif.

D.M. Hill, American Water, Voorhees, N.J.

N.D. Kaufman, Truckee Donner Public Utility District, Truckee, Calif.

T.A. Kelly Jr., Washington Suburban Sanitary Commission, Laurel, Md.

A. Land, Dallas Water Utilities, Dallas, Tex.

S.U. Mills-Wright (*liaison, nonvoting*), Standards Council Liaison, Dallas Water Utilities, Dallas, Tex.

R. Molhoek, Desert Water Agency, Palm Springs, Calif.

K.C. Molli, Veolia Water North America, Chicago, Ill.

J.A. Novak, Milwaukee Water Works, Milwaukee, Wis.

R. Sloan, Birmingham Water Works Board, Birmingham, Ala.

D. Strub, Austin Water Utility, Austin, Tex.

Copyright © 2020 American Water Works Association. All Rights Reserved

Documents
Document Sharing Hub

Full document details: ANSI AWWA C703-19

This page intentionally blank.

Copyright © 2020 American Water Works Association. All Rights Reserved

Documents
Document Sharing Hub

Full document details: ANSI AWWA C703-19

Contents

All AWWA standards follow the general format indicated subsequently. Some variations from this format may be found in a particular standard.

SEC. PAGE

Foreword

I Introduction ix
I.A Background ix
I.B History ix
I.C Acceptance x
II Special Issues xi
II.A Chlorine and Chloramine Degradation of Elastomers xi
III Use of This Standard xii
III.A Purchaser Options and Alternatives ... xii
III.B Modification to Standard xii
IV Major Revisions xiii
V Comments xiii

Standard

1 General
1.1 Scope 1
1.2 Purpose 2
1.3 Application 2

2 References 2

3 Definitions 3

4 Requirements
4.1 Materials 4
4.2 General Design 7
4.3 Detailed Design 10
4.4 Marking 15

5 Verification
5.1 Rejection 15

6 Delivery
6.1 Packaging and Shipping 16
6.2 Affidavit of Compliance 16

Appendix

A Supplemental Information 17
A.1 Units of Measurement 17
A.2 Register Types 17
A.3 Tests 17
A.4 Testing Equipment 19
A.5 Registration Accuracy 19
A.6 Periodic Tests 21
A.7 Meter Storage 22
A.8 Installation 22

Tables

1 Operating Characteristics (Flow-Rate Information in gpm) 8
1M Operating Characteristics (Flow-Rate Information in m^3/h) 8
2 Meter Dimensions 9
3 Physical Characteristics of Companion Flanges 10
4 Register Characteristics 11
A.1 Average Recommended Intervals Between Meter Tests 22

Copyright © 2020 American Water Works Association. All Rights Reserved

Documents
Document Sharing Hub

Full document details: ANSI AWWA C703-19

This page intentionally blank.

Copyright © 2020 American Water Works Association. All Rights Reserved

Documents
Document Sharing Hub

Full document details: ANSI AWWA C703-19

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.

Documents
Document Sharing Hub
Copyright © 2020 American Water Works Association. All Rights Reserved
Full document details: ANSI AWWA C703-19

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

* 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.

Copyright © 2020 American Water Works Association. All Rights Reserved

Documents
Document Sharing Hub

Full document details: ANSI AWWA C703-19

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

Copyright © 2020 American Water Works Association. All Rights Reserved

Documents
Document Sharing Hub

Full document details: ANSI AWWA C703-19

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.

Documents
Document Sharing Hub
Copyright © 2020 American Water Works Association. All Rights Reserved
Full document details: ANSI AWWA C703-19