ANSI/AWWA **C712-24**

(Revision of ANSI/AWWA C712-19)

AWWA Standard

Cold-Water Meters—Singlejet Type

Effective date: June 1, 2025.
First edition approved by Board of Directors Jan. 20, 2002.
This edition approved Oct. 14, 2024.
Approved by American National Standards Institute Nov. 18, 2024.

American Water Works Association

Approved American National Standard ANSI

STANDARD Since 1881

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 code 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, 1180 Avenue of the Americas, 10th 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, print: 978-1-64717-249-7

ISBN, electronic: 978-1-61300-772-3

DOI: http://doi.org/10.12999/AWWA.C712.24

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 © 2024 by American Water Works Association
Printed in USA

Copyright © 2024 by American Water Works Association. All Rights Reserved

Committee Personnel

The AWWA Subcommittee on Singlejet Meters, which developed this standard, had the following personnel at the time of approval:

Jonathan G. Gunn, *Chair*

R.A. Barillas, Badger Meter, Milwaukee, Wis.
M. Drake, Metron-Farnier LLC, Boulder, Colo.
J.G. Gunn, Johnson Controls Inc., Victor, N.Y.
A. Hendey Sr., Hendey Meter, Beaumont, Calif.
M.C. Johnson, Utah Water Research Laboratory, Utah State University, Logan, Utah
R.N. Koch, Master Meter Inc., Pittsburgh, Pa.
M.L. Mastic, MARS Company, Ocala, Fla.
J.R. Scarborough III, Neptune Technology Group Inc., Tallassee, Ala.
D. Schwartz, Badger Meter, Milwaukee, Wis.
M. Shamley, Metron-Farnier LLC, Boulder, Colo.
S.M. Swanson, Sensus, Uniontown, Pa.
J. Szewczyk, Sensus | Xylem, Uniontown, Pa.
W.J. Vetter, Master Meter Inc., Mansfield, Tex.
M.D. Westrich, Blend-Rite Industries Inc., Orange, N.J.

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

Craig C. Hannah, *Chair*
Michael L. Mastic, *Vice-Chair*
Monte R. Merkel, *Secretary*

General Interest Members

J.E. Cray, Wright-Pierce, Andover, Mass.
D. Faber, Faber & Associates, Terra Alta, W.Va.
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.

Copyright © 2024 by American Water Works Association. All Rights Reserved

M.C. Johnson, Utah Water Research Laboratory, Utah State University, Logan, Utah
T.A. Kelly Jr., Meter Consultant, Martinsburg, W.Va.
F.S. Kurtz (*liaison, nonvoting*), Standards Engineer Liaison, AWWA, Denver, Colo.
M.L. Mastic, MARS Company, Ocala, Fla.
M.R. Merkel, SL-serco Inc., Evansville, Ind.
K.C. Molli, Industry Consultant, Menomonee Falls, Wis.
R.A. Richter, National Institute of Standards and Technology, Gaithersburg, Md.

Producer Members

R.A. Barillas (*alternate*), Badger Meter, Milwaukee, Wis.
T.D. Bianchi, Neptune Technology Group Inc., Tallassee, Ala.
C. Brunson (*alternate*), Neptune Technology Group Inc., Tallassee, Ala.
M.D. Cole, Meter Technology Werks, Tampa, Fla.
D.J. Devane, Zenner USA, Leeds, Ala.
M. Drake (*alternate*), Metron-Farnier LLC, Boulder, Colo.
R. Gallon (*alternate*), Zenner USA, Banning, Calif.
L. Gregory (*alternate*), RG3 Meter Company, Longview, Tex.
A. Hendey Sr., Hendey Meter, Beaumont, Calif.
B. Kaffenberger, Itron, Liberty Lake, Wash.
R.N. Koch, Master Meter Inc., Pittsburgh, Pa.
J.A. McCraven, Mueller Systems, Cleveland, N.C.
J. Olson, Badger Meter, Milwaukee, Wis.
J. Pintok, RG3 Meter Company, Lake Mary, Fla.
M. Shamley, Metron-Farnier LLC, Boulder, Colo.
J.R. Solanes (*alternate*), Meter Technology Werks, Tampa, Fla.
S.M. Swanson, Sensus, Uniontown, Pa.
J. Szewczyk (*alternate*), Sensus | Xylem, Uniontown, Pa.
W.J. Vetter (*alternate*), Master Meter Inc., Mansfield, Tex.

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.
G.M. Gehringer (*alternate*), New Jersey American Water, Delran, N.J.
A.J. Haas, Arizona Water Company, Phoenix, Ariz.

Copyright © 2024 by American Water Works Association. All Rights Reserved

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.

P. Kostelec, Dallas Water Utilities, Dallas, Tex.

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.

G.J. Oakley, Philadelphia Water Department, Philadelphia, Pa.

C. Patterson, Washington Suburban Sanitary Commission, Laurel, Md.

B. Schade, WaterOne, Lenexa, Kans.

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

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

Copyright © 2024 by American Water Works Association. All Rights Reserved

This page intentionally blank.

Copyright © 2024 by American Water Works Association. All Rights Reserved

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	xii
II.A	Fire Flow	xii
II.B	Chlorine and Chloramine Degradation of Elastomers	xii
III	Use of This Standard	xiii
III.A	Purchaser Options and Alternatives	xiii
III.B	Modification to Standard	xiv
IV	Major Revisions	xiv
V	Comments	xiv
Standard		
1	**General**	
1.1	Scope	1
1.2	Purpose	1
1.3	Application	1
2	**References**	2
3	**Definitions**	4
4	**Requirements**	
4.1	Materials	4
4.2	General Design	7
4.3	Detailed Design	9
4.4	Marking	14
5	**Verification**	
5.1	Basis for Rejection	14
6	**Delivery**	
6.1	Packaging and Shipping	14
6.2	Affidavit of Compliance	14
Appendix		
A	Supplemental Information	15
A.1	Units of Measure	15
A.2	Tests	15
A.3	Testing Equipment	16
A.4	Registration Accuracy	17
A.5	Periodic Tests	19
A.6	Meter Storage	20
A.7	Installation	20
Tables		
1	Operating Characteristics	8
2	Meter Dimensions	8
3	Meter Connections—Companion Flange Dimensions	10
4	Maximum Indication on Initial Dial and Minimum Register Capacity	12
A.1	Most Frequently Used Interval Between Meter Tests	20

Copyright © 2024 by American Water Works Association. All Rights Reserved

This page intentionally blank.

Copyright © 2024 by American Water Works Association. All Rights Reserved

Foreword

This foreword is for information only and is not a part of ANSI/AWWA C712.*

I. Introduction

I.A. *Background.* The subcommittee that drafted this standard was formed in June 1998 from the AWWA Standards Committee on Water Meters.

Singlejet meters have been available commercially in the United States and Canada for use in potable water applications since 1991.

The singlejet type, like some class I turbine (with helical blades or flat blades) and multijet types, is an inferential meter in which the moving element is a multibladed rotor mounted on a vertical spindle within a cylindrical cavity. The operating objective is that the speed of rotation of the rotor is linearly proportional to the velocity of water flow through the meter.

The singlejet-type meter has one large opening at the inlet side that gradually reduces in diameter, resulting in the water flow becoming a jet, usually integral with the main case that directs the water flow against the rotor. The opening is sized to achieve the above-linear speed objective. Most singlejet meters do not have a separate measuring chamber to house the rotor and jet nozzle. Also, the singlejet type differs from other meters in that it does not usually employ a valved bypass to adjust the rotor speed, as is done on many multijet and turbine-type meters. In a singlejet, rotor speed adjustments are made either by gear selection in the register or by moving the upper or lower damping vane's position relative to the rotor surfaces, thereby adjusting the fluid drag effects on rotor speed.

I.B. *History.* Early European references to singlejet (originally called *Faller*) meters date back to the turn of the twentieth century. An early text reference can be found in an article by G. Daries, engineer for the Water Service in Paris, France, titled "Note on Water Meters," published in 1911, in which he questioned the early design's accuracy and longevity. These meters were used primarily in Europe and Asia, where low price was of more concern than performance.

In the 1950s and 1960s, some US water meter companies produced low-cost singlejet meters in relatively small numbers for the submetering and export markets.

With the advent of the modern singlejet meter in the 1970s, the deficiencies in performance and durability were reduced from the earlier designs of singlejet meters.

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

Copyright © 2024 by American Water Works Association. All Rights Reserved

The first edition of ANSI/AWWA C712 was approved by the AWWA Board of Directors on Jan. 20, 2002. Subsequent editions were approved Jan. 17, 2010, Jan. 24, 2015, and Oct. 28, 2019. This edition was approved 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). 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.

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 jurisdictions. 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

[†] Persons outside the United States should contact the appropriate authority having jurisdiction.

[‡] NSF International, 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 National Academies Press, 500 Fifth Street, NW, Washington, DC 20001.

Copyright © 2024 by American Water Works Association. All Rights Reserved

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 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.

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.

Copyright © 2024 by American Water Works Association. All Rights Reserved

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 C712-24 standard (June 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 C712 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.

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 ¾ 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,

[**] National Fire Protection Association, One Batterymarch Park, Quincy, MA 02169-7471.

Copyright © 2024 by American Water Works Association. All Rights Reserved

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

1. Standard used—that is, ANSI/AWWA C712, Cold-Water Meters—Singlejet 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. Details of federal, state, provincial, territorial, and local requirements (Sec. 4.1).

4. Whether main cases are to be constructed of a copper alloy, stainless steel, or a suitable engineering plastic (Sec. 4.1.2).

5. Size of meter (Sec. 4.2.1) and quantity required.

6. Modifications of test specifications (Sec. 4.2.8) if operating water temperatures will exceed 80°F (27°C) (Sec. A.4.2).

7. Type of connections for 1½-in. (40-mm) and 2-in. (50-mm) meters (Sec. 4.3.3).

8. Type of connections for ⅝-in. (15-mm), ⅝-in. × ¾-in. (15-mm × 20-mm), ¾-in. (20-mm), and 1-in. (25-mm) meters (Sec. 4.3.3.3).

9. Whether couplings (tailpieces) are to be provided (Sec. 4.3.4), and whether components are to be of a copper alloy or a suitable engineering plastic (Sec. 4.1.9).

10. Whether companion flanges, gaskets, bolts, and nuts are to be provided with flanged meters (Sec. 4.3.5), and whether companion flanges are to be made of a copper alloy, cast iron, stainless steel, or a suitable engineering plastic (Sec. 4.1.10).

Copyright © 2024 by American Water Works Association. All Rights Reserved

11. Details of the register to be provided (i.e., US gallons, cubic feet, or cubic meters; dry or wet register; mechanical or electronic display type) (Sec. 4.3.6).

12. If a remote-encoder register is required (Sec. 4.3.7), to be specified in detail.

13. If warranty requirements will be required (Sec. 5.1).

14. Whether an affidavit of compliance will be required (Sec. 6.2).

15. Special materials required, if any, to resist corrosion if water is highly aggressive (Sec. A.4.3).

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

IV. Major Revisions. The major revisions 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 registers have been updated (Sec. 4.3.6).

4. Guidance on testing singlejet meters has been modified (Sec. A.2.4 and Sec. A.3).

5. Information on meter installation methods has been modified (Sec. A.7.3 and Sec. A.7.4). 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.

Copyright © 2024 by American Water Works Association. All Rights Reserved

American Water Works Association

ANSI/AWWA C712-24
(Revision of ANSI/AWWA C712-19)

AWWA Standard

Cold-Water Meters—Singlejet Type

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes the various types and classes of cold-water singlejet meters in sizes ⅝ in. (15 mm) through 6 in. (150 mm) for water utilities' customer service and the materials and workmanship employed in their fabrication. These meters register by recording the revolutions of a rotor powered by the force of flowing water striking its blades.

Sec. 1.2 Purpose

The purpose of this standard is to provide the minimum requirements for cold-water singlejet meters, including materials and design.

Sec. 1.3 Application

This standard can be referenced in specifications for purchasing and receiving cold-water singlejet meters. This standard can be used for manufacturing this type of meter. The stipulations of this standard apply when this document has been referenced, and then only to cold-water singlejet meters.

Copyright © 2024 by American Water Works Association. All Rights Reserved