ANSI/AWWA **C704-24**

(Revision of ANSI/AWWA C704-19)

AWWA Standard

Propeller-Type Meters for Waterworks Applications

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American Water Works Association

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STANDARD Since 1881

AWWA Standard

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C704.*

I. Introduction.

I.A. *Background*. Current-type water meters were first developed for measuring flowing air and water. A booklet published in Hamburg, Germany, in 1790 by Benjamin Gottlob Hoffman described a form of current meter developed by Reinhard Woltmann, which seems to have been the first practical meter for this purpose. It was originally developed to measure stream flow and was not considered adaptable for use in a closed pipe. Since then, current meters have changed materially in design, construction, and use and have been adapted for closed pipelines.

I.B. *History*. The first effort to standardize current-type meters for customer service in the United States resulted in the formulation of AWWA Standard Specifications for Cold-Water Meters—Current Type, in 1923. These were revised on July 25, 1947, as AWWA C701-47, Standard Specifications for Cold-Water Meters—Current Type. During the period between 1923 and 1947, a different version of current-type meters was developed for use in special applications, such as pump station discharge and main line measurement. The original design for use in customer service lines contains a removable measuring cage in which a turbine operates, and the special applications meters do not. Instead, a propeller operates either directly within the pipeline itself or within the main meter body. This change in design results in differences in operating ranges, friction losses, and capacities of the two types. Because of development of this second type of propeller meter, AWWA Specification for Current-Type Meters—Propeller Drive, C704, was adopted as tentative in 1949 and was made a standard on May 25, 1950.

Confusion results from having two standards for what is essentially the same type of meter, and considerable judgment is required in the selection of one or the other. In the 1970 revisions of ANSI/AWWA C701 and ANSI/AWWA C704, the AWWA Meter Committee attempted to make the two standards more compatible in order to better assist the user in selection. Other revisions of C704 were approved by the AWWA Board of Directors on Jan. 26, 1975; Jan. 29, 1984; Jan. 26, 1992; June 16, 2002; Jan. 27, 2008; June 10, 2012; Jan. 24, 2015; and Oct. 28, 2019. This edition was approved on Oct. 14, 2024.

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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.
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 USEPA final maximum contaminant level (MCL). The MALs of an unspecified list of "unregulated contaminants" are based on toxicity testing guidelines (noncarcinogens)

[†] 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, Washington, DC 20001.

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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.

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.

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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 C704-24 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 C704 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 commercial and industrial applications in this regard are contained in ANSI/AWWA C703. 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,

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

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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 C704, Propeller-Type Meters for Waterworks Applications, 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. The modification of registration accuracy if the test water temperature exceeds 100°F (38°C).

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

5. Whether the flow tube or main casing is to be cast iron or fabricated steel (Sec. 4.1.2).

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

7. Type of end connections, including threaded, flanged, plain-end, grooved-end, welding-saddle, saddle-type, or fire hydrant connections (Sec. 4.3.2).

8. Whether companion flanges, gaskets, bolts, and nuts (Sec. 4.3.3 and Sec. 4.1.9) are to be provided with flanged meters.

9. Whether meters are to be provided with open, sealed, or permanently sealed registers; with units of measure including US gallons, cubic feet, or cubic meters (Sec. 4.3.4); with a center-sweep test hand; or with an instantaneous flow-rate indicator reading US gallons per minute, cubic feet per second, cubic meters per hour, liters per second, or other units.

10. If seal-wire holes are to be omitted (Sec. 4.3.7).

11. If an affidavit of compliance (Sec. 6.2) and certificate of testing for capacity and accuracy (Sec. A.3.1 and A.3.3) from the supplier or manufacturer are required.

12. If water is highly aggressive, whether special materials are required to resist corrosion (Sec. A.5.3).

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III.B. *Modification to Standard*. Modification to 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 register test hands have been updated (Sec. 4.3.4).
4. Information on meter installation methods has been modified (Sec. A.8). 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 C704-24
(Revision of ANSI/AWWA C704-19)

AWWA Standard

Propeller-Type Meters for Waterworks Applications

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes the various types and classes of propeller meters in sizes 2 in. (50 mm) through 72 in. (1,800 mm) for waterworks applications. These meters register by recording the revolutions of a propeller set in motion by the force of flowing water striking the blades.

Sec. 1.2 Purpose

The purpose of this standard is to provide the minimum requirements for propeller-type meters for waterworks applications.

Sec. 1.3 Application

This standard can be referenced when purchasing and receiving propeller-type meters for waterworks applications. 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 propeller-type meters for waterworks applications.

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