ANSI/AWWA **C710-24**

(Revision of ANSI/AWWA C710-20)

AWWA Standard

Cold-Water Meters—Displacement Type, Plastic Main Case

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American Water Works Association

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STANDARD Since 1881

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AWWA Standard

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C710.*

I. Introduction

I.A. *Background*. Material goods molded from plastics have been a part of everyday life for many decades, but in the early 1960s, a new group of plastics better suited to meet more demanding applications was discovered. These materials have greatly improved properties, such as strength and stiffness, and are known as *engineering plastics*. With the introduction of this new class of plastics, engineers were able to achieve design objectives that previously had seemed almost beyond reach.

The water meter industry as a whole began underwriting experiments with plastic materials as far back as the 1950s. From 1963 to 1968, two principal research programs were sponsored by the meter suppliers under the auspices of the American Water Works Association (AWWA) at the Armour Research Institute, Chicago, and later at Columbia University, New York City. These programs primarily focused on plastic meter main-case designs and materials.

Plastic material research in the water meter industry has paid great dividends and has resulted in the design of many meter components from engineering plastics. Significant improvements, such as corrosion resistance, dimensional stability, self-lubrication, low mass, and superior surface finishes, have resulted in improved meter accuracies with longer life.

When designing meter components from plastic, today's engineer has a choice of thousands of plastic compound formulations. Although many plastics appear identical, there are often vast differences in their physical properties, and it takes considerable know-how to select the one best suited for a particular application. In addition, plastics used in water meter design often contain various enhancing or reinforcing agents to give components greater rigidity, strength, and dimensional stability.

I.B. *History*. The extensive use of plastic in the design of plastic water meter parts was recognized in the Jan. 24, 1971, revision of ANSI/AWWA C700, Cold-Water Meters—Displacement Type, Bronze Main Case. The use of synthetic polymers as an alternative material for all parts except the main case was one of the major revisions.

At the 1972 AWWA annual convention, the first domestic positive-displacement water meter with a plastic main case (rather than the traditional bronze main case) was

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

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introduced. During the next 10 years, three more meter suppliers introduced plastic main-case meters.

The subject of plastic main-case materials not meeting the current standard was discussed at the 1974 meeting of the AWWA Meter Standards Committee. The committee chairman stated that the manufacturers of these meters should initiate a request for change at the next revision.

The revision of ANSI/AWWA C700 in 1977 did not include synthetic polymers as an alternative main-case material because the subcommittee could not reach agreement. The subject was tabled to be considered at the next revision in 1982. Between 1982 and 1985, revising ANSI/AWWA C700 to include synthetic polymers as a main-case alternative became an issue. To resolve this controversy, an ad hoc committee was appointed by the Standards Council. A Mar. 4, 1985, ad hoc committee report recommended that the Standards Council direct the Water Meter Committee to "appoint a new subcommittee … to develop a new standard for displacement-type water meters with plastic main cases, including consideration of appropriate allowable nutation speed for this type of meter." This recommendation was accepted by the Standards Council in June 1985.

Because of the diversity of available materials and the continual development of new and improved materials, this standard will not specify any one material but will use the term *suitable engineering plastic*. For reference purposes only, typical materials used presently for water meter designs and found in ASTM[†] specifications are cited.

The first edition of ANSI/AWWA C710 was approved by the AWWA Board of Directors on Jan. 25, 1988. Subsequent editions were approved on Jan. 28, 1990; June 17, 1995; June 16, 2002; Jan. 25, 2009; Jan. 24, 2015; and Apr. 20, 2020. This edition 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). AWWA and the Association of State Drinking Water Administrators (ASDWA) joined later.

[†] ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

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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, provincial, 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) 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.

[‡] 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.

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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.
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 C710-24 standard (May 1, 2025), these final MCL criteria are expected

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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 C710 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. *Materials*. The materials section of this standard recognizes the advances that have been made in the development of nonmetallic materials for water meter construction. Plastic materials are currently being used successfully for water meter components, and because of the continual development of new and improved materials, this standard does not require any one specific material but cites examples of materials defined by ASTM specifications typically used at this time in the construction of water meters by manufacturers.

II.B. *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.C. *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, 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.

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

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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 a preference among the 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 then make the appropriate provisions in the purchaser's specifications to describe specific requirements.

1. Standard used—that is, ANSI/AWWA C710, Cold-Water Meters—Displacement Type, Plastic Main Case, 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. Special materials required, if any, to resist corrosion if water is highly aggressive.

4. If meters are to be furnished with nutating discs or oscillating pistons (Sec. 1.1), if there is a preference.

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

6. If meters are to be furnished with cast-iron, stainless-steel, copper-alloy, or suitable engineering plastic top or bottom covers (Sec. 4.1.9), if there is a preference.

7. Size of meter (Sec. 4.2.1 and Tables 1 and 2) and quantity required.

8. Modifications of test specifications (Sec. 4.2.8), if operating water temperature will exceed 80°F (27°C) (Sec. B.4.2).

9. If ½-in. (13-mm), ½-in. × ¾-in. (13-mm × 20-mm), ⅝-in. (15-mm), ⅝-in. × ¾-in. (15-mm × 20-mm), ¾-in. (20-mm), and 1-in. (25-mm) meters are to be furnished with coupling nuts and tailpieces (Sec. 4.3.2.1).

10. Details of register (Sec. 4.3.3) to be provided, where there is a preference, with regard to the following:

    a. If the registers should read in US gallons, cubic feet, or cubic meters.
    b. If the registers should be permanently sealed against disassembly of the gear train or have replaceable change gears.

11. If a direct-reading remote register or an encoder-type remote register is required (Sec. 4.3.3), specify in detail.

12. If warranty requirements will be specified (Sec. 5.1.1).

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13. If the size of individual meters will be permanently marked on the register dial face (Sec. 4.4).

14. If an affidavit of compliance (Sec. 6.2) and certificate of testing for accuracy (Sec. B.2.3) are required.

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

IV. Major Revisions. 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. A column on "Maximum Number of Disc Nutations or Piston Oscillations per" has been added to Table 1 (Sec. 4.2).

4. Information and criteria for mechanical display–type register test hands have been updated (Sec. 4.3.3.1.3).

5. Information on meter installation methods has been modified (Sec. B.8.3). 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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AWWA Standard

Cold-Water Meters—Displacement Type, Plastic Main Case

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes the various types and classes of cold-water displacement meters with plastic main cases, in sizes ½ in. (13 mm) through 1 in. (25 mm), for water utility customer service, and the materials and workmanship employed in their fabrication. The displacement meters described, known as *nutating-disc* or *oscillating-piston* meters, are positive in action because the pistons and discs displace or carry over a fixed quantity of water for each nutation or oscillation when operated under positive pressure.

Sec. 1.2 Purpose

The purpose of this standard is to provide the minimum requirements for cold-water meters—displacement type, plastic main case, including materials and design.

Sec. 1.3 Application

This standard can be referenced in specifications for purchasing and receiving cold-water meters—displacement type, plastic main case. This standard can be used as a guide for manufacturing this type of meter. The stipulations of this standard apply when this document has been referenced and only to cold-water meters—displacement type, plastic main case.

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