ANSI/AWWA **C670-20**

*(Revision of ANSI/AWWA C670-15)*

AWWA Standard

# Online Chlorine Analyzer Operation and Maintenance



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American Water Works Association

## AWWA Standard

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# Committee Personnel

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# Contents

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

# Foreword

*This foreword is for information only and is not a part of ANSI*/AWWA C670.*

## I. Introduction.

I.A. *Background.* This standard describes online chlorine analyzer operation and maintenance (O&M) when the online chlorine analyzer is used for monitoring in the treatment of municipal water supplies or in the treatment of municipal wastewater.

I.B. *History.* The first scientific approach to the use of chlorine in water treatment was conducted between 1917 and 1920 by Wolman and Enslow. Their determination of chlorine absorption in water demonstrated the use of the orthotolidine test for chlorine residuals. The chlorination breakpoint phenomenon was discovered in 1939 and revealed the speciation of free available and combined chlorine residuals. The amperometric titration method of measuring total chlorine residuals was introduced in 1942 and was followed by an amperometric titration method of measuring free chlorine, monochloramine, and dichloramine in 1951. Colorimetric methods of determining chlorine residuals were established in 1949.

The AWWA Standards Council approved the formation of a committee to create a standard for online chlorine analyzer operation and maintenance during its March 2006 meeting. A chair for the new Online Monitoring Committee was selected in August 2006, and the committee held its first meeting at the Water Quality and Technology Conference in Denver, Colorado, in November 2006.

The first edition of ANSI/AWWA Standard C670 was approved by the AWWA Board of Directors on June 14, 2009. The second edition was approved on June 7, 2015. This edition was approved on Oct. 26, 2020.

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.

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

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/ANS[§]/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 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.

Annex A, "Toxicology Review and Evaluation Procedures," to NSF/ANSI/CAN 61 does not stipulate a maximum allowable level (MAL) or 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.

ANSI/AWWA C670 does not address additives requirements. Users of this standard should consult the appropriate state, provincial, 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.

[†] Persons outside the United States should contact the appropriate authority having jurisdiction.
[‡] NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.
[§] American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.
[¶] Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.
[**] Both publications available from National Academy of Sciences, 500 Fifth Street, NW, Washington, DC 20001.

**II. Special Issues.**

II.A. *Information on the Application of This Standard.* The online chlorine analyzer chosen for a particular application depends most on the water characteristics at the point of sampling and the reason for sampling (regulatory compliance, process control, or other). The initial selection and purchasing of an online chlorine analyzer are beyond the scope of this standard. However, as an analyzer is operated and maintained, attention should be paid to whether the water characteristics are within the range of water temperature, pH, and other parameters in which the analyzer is designed to operate.

**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 C670 Online Chlorine Analyzer Operation and Maintenance, of latest revision.

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.** Major changes made to the standard in this revision include the following:

1. A sentence was added to Sec. 1.2 Purpose addressing monochloramine formation and free ammonia.

2. In Sec. 3, definitions for amperometric method and resolution were added, the definitions for LOD and LOQ were expanded on, and revisions were made to the definitions for chlorine free residual, disinfection-by-products, electrolyte and photometric method.

3. The sections on ion-specific selective chlorine analyzers (Sec. 4.1, and previous Secs. 4.1.3 and 4.2.3) were deleted because no ion-specific or selective technology for chlorine determination exists.

4. Sec. 4.1.1 Amperometric chlorine analyzers was updated to include a sentence on sample flow rate.

5. Sec. 4.3.1 Storage was updated to address expiration of reagents.

6. Sec. 4.3.2 Contamination was expanded to include information on discoloration of reagents.

7. A new Sec. 4.3.3 was added on disposal of reagents.

8. Sec. 4.4.1 Continuous sample streams was updated to include a caution about the use of strainers.

9. Sec. 4.4.4 Sample delivery tubing was updated to provide additional details on sample tubing.

10. Sec. 4.6.1 Representative sample was revised to include information on sample quills and sample taps.

11. Sec. 4.6.2 Location of sampling port was expanded on.

12. Sec. 4.6.3 Flow requirements was revised and information on use of a sampling pump was added.

13. Sec. 4.6.4 Analyzer waste stream was slightly revised.

14. Sec. 4.6.7 Sample locations was expanded on with additional information on grab samples.

15. The first paragraph of Sec. 4.8 Calibration and Verification Techniques was revised for clarity.

16. Sec. 4.8.4 Calibration verification by comparison was revised.

17. Sec. 5.1 Instrument Verification was updated.

18. A sentence on CMMS was added to Sec. 5.2.2 Records retention, and the period of time to retain records was removed to comply with AWWA policy.

19. Four new references were added to Appendix A.

**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
*Dedicated to the World's Most Important Resource®*

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# Online Chlorine Analyzer Operation and Maintenance

## SECTION 1: GENERAL

### Sec. 1.1 Scope

This standard describes online chlorine analyzer operation and maintenance (O&M) when the online chlorine analyzer is used for monitoring in the treatment of potable water, reclaimed water, or wastewater.

### Sec. 1.2 Purpose

Continuous chlorine residual monitoring is used for two primary purposes: process control and regulatory compliance. Process control implies that the reason for testing the chlorine content of water is primarily to determine how well a process is working (e.g., how consistent the chlorine residual is downstream of the mixer or contact tank, how much chlorine is consumed after disinfection, etc.), to control chlorine feed equipment, and to ensure appropriate chlorination of the final product. The efficiency of monochloramine formation may be controlled by the total chlorine residual (for regulatory reporting purposes) and free ammonia concentration to maintain an acceptable chloramine speciation. Process control may also imply analyzing residual chlorine content in distribution or transmission systems. A sudden decrease in measured chlorine residual may be indicative of malfunctioning equipment, system failure, untreated water intrusion, or introduction of some chlorine-consuming contaminants.