



**American Water Works  
Association**

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**ANSI/AWWA C655-18**  
(Revision of ANSI/AWWA C655-09)

**AWWA Standard**

# Field Dechlorination

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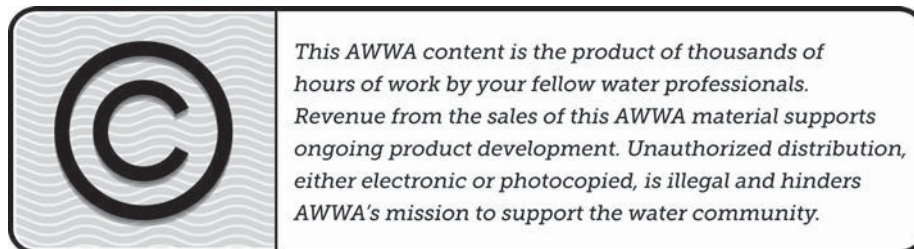
## AWWA Standard

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## Foreword

*This Foreword is for information only and is not a part of ANSI\*/AWWA C655.*

### **I. Introduction.**

I.A. *Background.* This standard describes procedures, materials, and requirements for the dechlorination of chlorinated or chloraminated water discharges. It includes current dechlorination regulations, chemical and nonchemical dechlorination, dechlorination plans and procedures, dechlorination methods, and verification.

I.B. *History.* The first version of this standard was approved by the AWWA Board of Directors on June 14, 2009. This edition was approved on Jan. 20, 2018.

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 and the Association of State Drinking Water Administrators (ASDWA) joined later.

In the United States, authority to regulate products for use in, or contact with, drinking water rests with individual states.<sup>†</sup> 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<sup>‡</sup>, NSF/ANSI<sup>§</sup> 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.
3. Other references, including AWWA standards, *Food Chemicals Codex*, *Water Chemicals Codex*,<sup>¶</sup> and other standards considered appropriate by the state or local agency.

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

† Persons outside of 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.

¶ Both publications available from National Academy of Sciences, 500 Fifth Street, NW, Washington, DC 20001.

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 jurisdiction. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

Annex A, "Toxicology Review and Evaluation Procedures," to NSF/ANSI 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 procedure may not always be identical, depending on the certifier.

ANSI/AWWA C655 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. US Regulations.**

1. USEPA has established water quality criteria (WQC) for total residual chlorine (TRC) concentrations permissible in receiving waters to protect aquatic life and water quality. These concentrations are based on acute and chronic toxicity effects for aquatic life. Under the acute toxicity criterion, the 1-hour average chlorine concentration of the stream should not exceed 0.019 mg/L (19 µg/L) more than once every 3 years, on average. Under the chronic toxicity criterion, the 4-day average concentrations should not exceed 0.011 mg/L (11 µg/L) more than once every 3 years, on average.

Most states in the United States use 0.019 mg/L (19 µg/L) as the acute criterion and 0.011 mg/L (11 µg/L) as the chronic criterion for TRC for receiving streams. Some states have adopted a toxicity-based criterion for water quality for TRC. The state regulatory agencies require water utilities to abide by the receiving water quality criterion while discharging chlorinated waters. In addition, the regulatory agencies use WQC to develop maximum allowable chlorine concentrations while issuing general or individual permits for discharge of chlorinated water into streams.

Chlorine discharge limits in water releases into receiving streams and wetlands shall not exceed 0.01 mg/L (or per state requirements).



2. In addition to residual chlorine concentrations, some other water quality parameters must be monitored during disposal of chlorinated waters. For example, dechlorination of chloramine residuals may result in the release of ammonia. USEPA has determined the maximum allowable acute and chronic concentrations of ammonia based on the pH, temperature, and the type of aquatic habitat present (warm-water versus cold-water species) in receiving waters. Under the most stringent conditions (cold-water species, pH of 9, 30°C), a 1-day average total ammonia concentration must not exceed 0.58 mg/L as NH<sub>3</sub> and a 4-day average must not exceed 0.08 mg/L as NH<sub>3</sub>.

Most states have adopted the USEPA criteria as the water quality standards for ammonia. Water utilities using combined chlorine often maintain a residual chlorine concentration of less than 1.5 mg/L in potable waters, with a chlorine-to-ammonia ratio of 4:1 to 5:1 by mass. This will result in a total ammonia concentration of approximately 0.4–0.5 mg/L, which is less than the acute criterion of 0.58 mg/L for total ammonia under the worst-case scenario. A tenfold dilution of chloraminated water in the receiving stream will result in compliance with the chronic ammonia concentration criterion (0.08 mg/L as NH<sub>3</sub>) under the most stringent conditions.

For the majority of dechlorination operations, ammonia released from chloramines is likely to be within regulatory requirements. However, some states may have regulations more stringent than the USEPA criteria for selected waters. Caution must be exercised in releasing chloraminated water into receiving streams under such conditions.

#### II.B. *Canadian Regulations.*

1. Canadian Environmental Quality Guidelines (1987) propose a water quality criterion of 0.020 mg/L of total residual chlorine for receiving streams. Many provincial regulatory agencies have adopted this chlorine concentration as the WQC. However, the criteria for chlorine and chloramine concentrations are currently being reviewed under the 1999 water quality guidelines.

Like US states, each province has set its own discharge regulations to dechlorinate before discharge into receiving streams.

2. In general, the water quality criteria for ammonia, dissolved oxygen, and pH in Canada are similar to those in the United States. In Newfoundland, the pH of the released water should be between 5.5 and 9.0. In Saskatchewan, total ammonia concentrations in the receiving water can be as high as 2.6 mg/L at pH 6.0 and 0°C to as low as 0.06 mg/L at pH 9.0 and 30°C.

Caution must be exercised in complying with ammonia, pH, and dissolved oxygen regulations during dechlorination activities.

Chlorine discharge limits in water releases into receiving streams and wetlands shall not exceed 0.01 mg/L (or per local regulations).

II.C. *Determination of Method for Dechlorination.* The method of dechlorination should be determined by the performance requirements dictated by site-specific conditions. Other issues such as the impact of dechlorination on dissolved oxygen and pH may also be of concern, depending on the quantities involved and the operational characteristics of the dechlorinating equipment. For all practical purposes, nonchemical dechlorination is limited to low chlorine discharges, and it is generally not suitable for flushing applications. Where it can be used, it is the least costly method. Chemical dechlorination methods and equipment differ in capability, and the purchaser must determine which equipment meets the discharge requirements. The dechlorination method selected by the purchaser must meet all applicable chlorine residual discharge limits at the point of releasing the water into the environment. The entire volume of discharged water must meet mixing, reaction time, and residual chlorine concentration requirements before loss of control of the volume of water.

**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 is written as though the dechlorination work will be performed by the purchaser's personnel. Where the work is to be done for a separate contract or as part of a contract for installing mains,\* appropriate provisions should be included in the purchase documents to ensure that the contractor is specifically instructed concerning the contractor's responsibilities. The following items should be provided by the purchaser:

1. Standard used—that is, ANSI/AWWA C655, Field Dechlorination, of latest revision.
2. Whether compliance with NSF/ANSI 61, Drinking Water System Components—Health Effects, is required.
3. Approval requirements before use.
4. Those procedures included in the standard, which are designated as optional, that are to be included in the purchase documents.
5. Method of dechlorination.
6. Flushing locations, rates of flushing, and locations of drainage facilities.
7. Responsibility for tapping existing mains and connections to new mains.

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\* Refer to other AWWA standards and manuals for design criteria and installation procedures for various pipe materials.

8. The number and frequency of samples for bacteriological tests.
9. Details of other federal, state or provincial, and local requirements (Sec. 4.1).
10. Method of testing for residual chlorine (Sec. 5. 2).

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 revisions made to the standard in this edition include the following:

1. To Section 3, added definition for *loss of control*.
2. Removed requirements for residual test strips specific to swimming pool test kits and orthotolidine indicator kit; retained language that apparatus or additives (if any) used for residual testing would be USEPA compliant.
3. Created Appendix A, Dechlorination Chemical Reactions (including new Table A3).
4. Moved Table 1 and Table 2 to Appendix A (now Tables A1 and A2).

**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 e-mail at [standards@awwa.org](mailto:standards@awwa.org).

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# Field Dechlorination

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## SECTION 1: GENERAL

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### **Sec. 1.1 Scope**

This standard describes procedures, materials, and requirements for the dechlorination of chlorinated or chloraminated water discharges.

### **Sec. 1.2 Purpose**

The purpose of this standard is to define the minimum procedures for the dechlorination of chlorinated or chloraminated water being discharged, including regulations, discharge site preparation, sampling and testing of discharge water, various methods of dechlorination, and dechlorination chemicals.

### **Sec. 1.3 Application**

This standard can be referenced in specifications for the dechlorination of low-chlorinated or highly chlorinated water discharges into the environment. The stipulations of this standard apply when this document has been referenced, and then only to dechlorination. The dechlorination operation shall comply with any applicable permit or local regulatory requirements, as per Sec. 5.1.1.