



**American Water Works  
Association**

**ANSI/AWWA C653-13**  
(Revision of ANSI/AWWA C653-03)

**AWWA Standard**

# Disinfection of Water Treatment Plants

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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 C653.*

## **I. Introduction.**

I.A. *Background.* This standard describes methods of disinfecting new treatment facilities before they are placed in service; existing treatment facilities before they are returned to service after construction, inspection, or other event causing potential contamination; and existing treatment facilities that, under normal operation, continue to demonstrate the presence of total coliform bacteria in the plant effluent. Because of the complexity and diversity of treatment plants, the formulation of firm rules for application of this standard is not practicable. Nevertheless, principles described in this standard do apply generally and must be followed to enable proper disinfection of treatment plant facilities. Several alternative disinfection procedures are provided for those parts of the treatment plant generally referred to as conveyance facilities (such as pipes) and storage facilities (such as basins, tanks, or clearwells).

Disinfection is required for all portions of the facility that are downstream from the filter influent or that are downstream from the first point of disinfectant application in the treatment process when the water is disinfected prior to filtration, as described in Sec. 4.2. That part of the treatment facility handling raw water need not be disinfected but should be thoroughly cleaned as described in Sec. 4.1.

I.B. *History.* The first edition of ANSI/AWWA C653 was approved by the AWWA Board of Directors on Jan. 25, 1987. The second edition of ANSI/AWWA C653 was approved on Feb. 2, 1997. The third edition was approved Jan. 19, 2003. This edition was approved on June 9, 2013.

## **II. Special Issues.**

II.A. *Alternative Disinfection Procedures.* The utility should decide which of the alternative disinfection procedures is most suitable for a given situation. Choice of the procedure used should include consideration of the availability of materials and equipment for the disinfection operation, the training of personnel to perform the disinfection, and safety considerations. For example, gas chlorination should be used only where properly designed and constructed equipment is available; makeshift equipment is not acceptable when liquid chlorine gas cylinders are used. Spray equipment should be used inside tanks or enclosures only when thorough ventilation

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is assured or when appropriate protection for personnel is provided. If a procedure is selected that requires the disposal of highly chlorinated water, thorough consideration should be given to the impact on the environment. If there is any question that the discharge of chlorinated waste may cause damage to aquatic life, wildlife, human health, physical installations, or other downstream water uses of any type, a reducing agent should be applied to water being disposed of to thoroughly neutralize the chlorine residual remaining in the water. Refer to ANSI/AWWA C655 Field Dechlorination for appropriate dechlorination requirements.

Disinfection of treatment plants requires high levels of disinfectant to be applied to ensure bacteria and other potential pathogens are inactivated. It should be noted that pH and temperature are two important factors affecting the disinfectant process. Above pH 9, chlorine is in the form of hypochlorite, which is not as effective a disinfectant as hypochlorous acid, which is more prevalent at pH less than 9. Water temperature also affects the disinfection process; disinfection at low temperatures is not as effective as at high temperatures.

Disinfectants other than chlorine may be appropriate to use. While this standard describes only the use of liquid chlorine, sodium hypochlorite solutions, and calcium hypochlorite, the applicability of other disinfectants should be evaluated. Ozone and chemical cleaners have been used, and these warrant further investigation. Whichever disinfectant or method is selected, approval from the local regulatory agency may be required.

**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 C653, Standard for Disinfection of Water Treatment Plants, of latest revision.
2. Whether compliance with NSF/ANSI 60, Drinking Water Treatment Chemicals—Health Effects, is required.
3. Details of other federal, state or provincial, and local requirements (Sec. 4.1).
4. Form of chlorine to be used (Sec. 4.3).
5. Method of chlorination of piping (Sec. 4.4.1).
6. Precautions for disposal of chlorinated water (Sec. 4.4.4.4).
7. Bacteriological testing method to be used (Sec. 5.1).



8. Redisinfection, if required (Sec. 5.1).
9. Method of dechlorination, if required.

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. The Special Issues section of the foreword has been updated to include a note to the user on the effect of pH and temperature on the disinfection process, as well as a note on consideration of alternative disinfectants (Foreword Section II).
2. Definitions for available chlorine, free chlorine, chlorine residual, contractor, liquid chlorine, and purchaser have been added (Section 3).
3. A requirement for compliance with the Safe Drinking Water Act has been added (Section 4).
4. Additional clarification and guidance on water treatment plant components requiring disinfection has been added (Sec. 4.2).
5. Reference to ANSI/AWWA B301 for Liquid Chlorine and ANSI/AWWA B300 for Hypochlorites has been added (Sec. 4.3).
6. An advisory note on using appropriate personal protective equipment when handling chlorine products has been added (Sec. 4.3).
7. An advisory note on perchlorate formation in hypochlorites has been added (Sec. 4.3.2).
8. Reference to ANSI/AWWA C655 for field dechlorination practices has been added (Sec. 4.4.4.4).
9. An advisory note on testing a disinfected facility not immediately returned to service has been added (Sec. 5.1).
10. Appendix A on Disposal of Heavily Chlorinated Water has been removed. This information is now covered in more detail in ANSI/AWWA C655, Field Dechlorination.

**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](mailto:standards@awwa.org).

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# Disinfection of Water Treatment Plants

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## SECTION 1: GENERAL

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### **Sec. 1.1 Scope**

This standard describes chlorination materials, procedures, and requirements for disinfection of new treatment facilities and existing water treatment facilities temporarily taken out of service for cleaning, inspection, maintenance, painting, repair, or any other activity or event that might lead to contamination of water. Typically, this standard applies to treatment components, including filter basins, filter media, clearwells, pump suction wells, and associated piping and appurtenances located downstream from the filter influent or from the first point of application of disinfectant in the treatment process. The disinfection method employed is surface contact with a high-strength chlorine solution for a specific time period. The absence of total coliform bacteria in addition to the use of proper disinfection practices is confirmation that the disinfection process has been accomplished in compliance with the standard.

### **Sec. 1.2 Purpose**

The purpose of this standard is to define the minimum requirements for the disinfection of water treatment plants, including facility preparation, application of chlorine to the interior surfaces of water treatment units, and sampling and testing for the presence of total coliform bacteria.