

American Water Works Association

ANSI/AWWA C652-92

(Revision of ANSI/AWWA C652-86)



AWWA STANDARD
FOR
**DISINFECTION OF WATER-STORAGE
FACILITIES**



Effective date: Feb. 1, 1993.

First edition approved by AWWA Board of Directors June 15, 1980.

This edition approved June 18, 1992.

Approved by American National Standard Institute Inc., Dec. 8, 1992.

AMERICAN WATER WORKS ASSOCIATION

6666 West Quincy Avenue, Denver, Colorado 80235

Copyright (C) 1998 American Water Works Association, All Rights Reserved.

AWWA Standard

This document is an American Water Works Association (AWWA) standard. It is not a specification. AWWA standards describe minimum requirements and do not contain all of the engineering and administrative information normally contained in specifications. The AWWA standards usually contain options that must be evaluated by the user of the standard. Until each optional feature is specified by the user, the product or service is not fully defined. AWWA publication of a standard does not constitute endorsement of any product or product type, nor does AWWA test, certify, or approve any product. The use of AWWA standards is entirely voluntary. AWWA standards are intended to represent a consensus of the water supply industry that the product described will provide satisfactory service. When AWWA revises or withdraws this standard, an official notice of action will be placed on the first page of the classified advertising section of *Journal AWWA*. The action becomes effective on the first day of the month following the month of *Journal AWWA* publication of the official notice.

American National Standard

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether that person has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. American National Standards are subject to periodic review, and users are cautioned to obtain the latest editions. Producers of goods made in conformity with an American National Standard are encouraged to state on their own responsibility in advertising and promotional materials or on tags or labels that the goods are produced in conformity with particular American National Standards.

CAUTION NOTICE: The American National Standards Institute (ANSI) approval date on the front cover of this standard indicates completion of the ANSI approval process. This American National Standard may be revised or withdrawn at any time. ANSI procedures require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of publication. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute Inc., 11 West 42nd St., New York, NY 10036 (212) 642-4900.

Copyright © 1993 by American Water Works Association
Printed in USA

Committee Personnel

The AWWA Standards Committee on Disinfection of Facilities, which reviewed and approved this standard, had the following personnel at the time of approval:

Larry A. Hensley, *Chair*

Consumer Members

P.G. Boissonneault, Portland Water District, Portland, Maine	(NEWWA)
J.C. Dice, Denver Water Department, Denver, Colo.	(AWWA)
L.A. Hensley, Gary-Hobart Water Corporation, Gary, Ind.	(AWWA)
W.E. Neuman, American Water Works Service Company Inc., Voorhees, N.J.	(AWWA)
J.P. Reames, Dallas Water Utilities Department, Dallas, Texas	(AWWA)
C.H. Smith, Consumers Illinois Water Company, Kankakee, Ill.	(AWWA)
J.L. Stapf, City of Wyoming, Wyoming, Mich.	(AWWA)

General Interest Members

K.C. Choquette,* Iowa Department of Public Health, Des Moines, Iowa	(AWWA)
B.R. Elms,† Standards Engineer Liaison, AWWA, Denver, Colo.	(AWWA)
J.V. Feuss, Cortland County Health Department, Cortland, N.Y.	(AWWA)
C.A. Froman Jr.,† Gary-Hobart Water Corporation, Gary, Ind.	(AWWA)
C.B. Hagar, Camp Dresser & McKee Inc., Phoenix, Ariz.	(AWWA)
I.M. Markwood, Alvord, Burdick and Howson, Springfield, Ill.	(AWWA)
T.W. Walker, New York State Department of Health, Victor, N.Y.	(AWWA)
M.L. Wentink, Nebraska Department of Health, North Platte, Neb.	(AWWA)

Producer Members

W.B. Huebner, Wallace & Tiernan Inc., Belleville, N.J.	(AWWA)
--	--------

*Alternate

†Liaison, nonvoting

Contents

SEC.	PAGE	SEC.	PAGE
Foreword		5 Disinfection Procedures When Conducting Underwater Inspection of Potable-Water-Storage Facilities	
I	History of Standard v	5.1	Storage-Facility Isolation..... 6
II	Advisory Information on Use of This Standard v	5.2	Storage-Facility Access 7
III	Acceptance..... vi	5.3	Initial Water Quality 7
IV	Information Required for Use of This Standard vii	5.4	Equipment and Personnel Requirements 7
V	Modification to Standard vii	5.5	Equipment Disinfection 8
VI	Major Revisions vii	5.6	Disinfectant Solution..... 8
Standard		5.7	Postinspection Chlorine Residual and Bacteriological Testing..... 8
1 General		Appendixes	
1.1	Scope 1	A Chlorine Dosages 10	
1.2	References 1	B Disposal of Heavily Chlorinated Water 11	
1.3	Record of Compliance 2	Tables	
2 Cleaning		A.1	Amounts of Chemicals Required to Give Various Chlorine Concentrations in 100,000 gal (378.5 m ³) of Water 10
2.1	Other Materials 2	A.2	Amounts of Chemicals Required to Give Chlorine Concentrations of 200 mg/L in Various Volumes of Water 10
3 Forms of Chlorine for Disinfection		B.1	Amounts of Chemicals Required to Neutralize Various Residual Chlorine Concentrations in 100,000 gal (378.5 m ³) of Water 11
3.1	Liquid Chlorine..... 2		
3.2	Sodium Hypochlorite 3		
3.3	Calcium Hypochlorite 3		
4 Alternative Methods of Chlorination			
4.1	Chlorination Method 1 3		
4.2	Chlorination Method 2 5		
4.3	Chlorination Method 3 5		
4.4	Bacteriological Sampling and Testing 5		

Foreword

This foreword is for information only and is not a part of AWWA C652.

I. History of Standard. This standard was first approved on June 15, 1980, under the designation AWWA D105, Standard for Disinfection of Water Storage Facilities. The 1980 edition was developed from information originally contained in AWWA D102-64, modified to include disinfection of water-storage facilities constructed of steel or other materials. The standard was redesignated AWWA C652 with the 1986 edition.

II. Advisory Information on Use of This Standard. This standard describes methods of disinfecting water-storage facilities that are newly constructed, have been entered for construction or inspection purposes, or that continue to show the presence of coliform bacteria during normal operation. In addition, the standard defines disinfection procedures for underwater inspections because water utilities increasingly are employing divers to conduct underwater inspections of on-line potable-water-storage facilities to minimize water loss and downtime normally associated with necessary maintenance inspections. The standard does not cover the type and technical requirements of underwater inspection, or the required skill level of the diving inspector.

A storage facility is defined as a reservoir from which water, without further treatment, is supplied directly to the distribution piping system for domestic use. From a practical standpoint, this standard applies to the disinfection of covered storage facilities constructed of steel, concrete, or materials that would provide a similar structure from a water quality standpoint. Since wood may support the growth of coliform bacteria, it is recommended that any submerged wood surface (columns, baffles, and so forth) be coated with epoxy or other durable, effectively impermeable paint or coating approved for domestic water use.

Parts of this standard may be applicable to the disinfection of large, finished-water, open storage reservoirs, such as reservoirs formed by concrete or earth dams, but such applications are incidental, and this standard is not intended to cover those kinds of storage facilities.

Three methods of chlorinating storage facilities are described in this standard. Each utility should decide which method is most suitable for a given situation. In selecting the method to be used, the utility should consider the availability of materials and equipment for disinfection, the training of personnel who will perform the disinfection, and safety. For example, gas chlorination should be used only when properly designed and constructed equipment is available; makeshift equipment is not acceptable when liquid-chlorine cylinders are used. Spray equipment should be used inside the storage facility only when thorough ventilation is assured or when appropriate protection is provided by the use of canister-type gas masks or self-contained breathing units. If a chlorination method is selected that requires the draining of a storage facility in order to dispose of highly chlorinated water, then thorough consideration should be given to the effect on the receiving environment. If there is any question as to whether a chlorinated-waste discharge may cause damage to fish life, plant life, physical installations, or other downstream water uses of any type, then an adequate amount of a reducing agent should be applied to the discharged water in order to thoroughly neutralize the chlorine residual.

III. 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 all direct and indirect drinking water additives. Other members of the consortium included the American Water Works Association Research Foundation (AWWARF), the Conference of State Health and Environmental Managers (COSHEM), the American Water Works Association (AWWA), and the Association of State Drinking Water Administrators (ASDWA). The consortium is responsible for the cooperative effort of manufacturers, regulators, product users, and other interested parties that develop and maintain the NSF standards.

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. An advisory program formerly administered by USEPA, Office of Drinking Water, discontinued on Apr. 7, 1990.
2. Specific policies of the state or local agency.
3. Two standards developed under the direction of NSF, ANSI†/NSF‡ 60, Drinking Water Treatment Chemicals—Health Effects, and ANSI/NSF 61, Drinking Water System Components—Health Effects.
4. 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 ANSI/NSF 60. 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.

Appendix A, “Toxicology Review and Evaluation Procedures,” to ANSI/NSF 60 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 Appendix A procedures may not always be identical, depending on the certifier.

AWWA C652 does not address additives requirements. Thus, 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 all parties offering to certify products for contact with, or treatment of, drinking water.

*Persons in Canada, Mexico, and non-North American countries should contact the appropriate authority having jurisdiction.

†American National Standards Institute, 11 W. 42nd St., New York, NY 10036.

‡NSF International, 3475 Plymouth Rd., Ann Arbor, MI 48106.

§Both publications available from National Academy of Sciences, 2102 Constitution Ave. N.W., Washington, DC 20418.