American Water Works Association

ANSI/AWWA C652-02

(Revision of ANSI/AWWA C652-92)

AWWA STANDARD

FOR

DISINFECTION OF WATER-STORAGE FACILITIES

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AMERICAN WATER WORKS ASSOCIATION

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Foreword

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

I. Introduction.

I.A. *Background.* This standard describes methods of disinfecting water storage tanks. The disinfecting agents discussed in this standard are chlorine solutions, and several combinations of free chlorine residual and contact time *(CT)* are provided. The chlorine solutions may be derived from liquid chlorine (Cl_2), calcium hypochlorite ($Ca(OCl)_2$), or sodium hypochlorite (NaOCl).

I.B. *History.* 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. It was revised in 1992. This edition was approved on Jan. 20, 2002.

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 all direct and indirect drinking water additives. Other members of the consortium included the American Water Works Association Research Foundation (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.

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.

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

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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.

Annex 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 Annex 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.

3. Determine current information on product certification.

II. Special Issues.

II.A. *Information on Application of This Standard.* Utilities are increasingly focusing on water storage reservoir management and maintenance as part of preserving distribution system water quality. As more frequent inspections and cleaning of reservoirs are required, utilities are turning to methods, which minimize downtime and wasted water. Utilities are utilizing inspection methods such as divers,

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

†NSF International, 789 N. Dixboro Rd., Ann Arbor, MI 48105.

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

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float down, remotely operated vehicles for both inspection and sediment removal. Sec. 4.4 of this standard describes the disinfection procedures and operational considerations for conducting in-service inspection and cleaning in potable-water-storage facilities. Originally this standard addressed inspection of storage tanks by diving but has been expanded to address all forms of inspection and cleaning that are performed while the tanks are full of water.

It should be noted that any underwater retrieval of remotely operated vehicles with divers must be performed in accordance with all aspects of this standard.

Although, Sec. 4.4 specifically addresses water quality protection, the diving subcommittee felt it was very important to communicate the critical aspects of contractor safety, which should be incorporated into any project of this type. Utilities must be aware that it is their responsibility to determine if contractors working on their property are following proper OSHA procedures. When selecting a contractor to perform this type of work, it is essential to evaluate their experience, safety procedures, and methods. Each bidder should be willing to meet the minimums set by this standard for safe performance of the work.

This standard includes references to pertinent OSHA regulations.

It should be recognized that there are specific technical skills a utility should look for when considering a firm for this type of work:

- Qualifications for conducting in-service operations in compliance with OSHA
- Qualifications for inspecting and evaluating steel/concrete/wood or membrane-covered reservoirs
- Resumes for those specific personnel who will perform underwater inspection

Sec. 4.4 does not address the following items, each of which must be specified by the purchaser:

1. The type of inspection to be performed (structural, coating, bottom sediment, cathodic protection, bacteriological, and so forth).
2. The technical requirements of the inspection.

For additional guidance:

Refer to AWWA M42 Manual of Water Supply Practices *Steel Water-Storage Tanks*.

Sec. 4.4 does not attempt to rewrite existing safety standards and relies on the existing applicable OSHA Standards, including but not limited to

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OSHA, 29 CFR, Subpart T Commercial Diving Operations 1910.401 through 1910.441

OSHA, 29 CFR, Permit Required Confined Spaces, 1910.146

III. 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 describe 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 other than booster disinfection, 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. Because 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 these 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 using canister-type gas masks or self-contained breathing units. If a chlorination method is selected that requires the draining of a

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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.A. *Purchaser Options and Alternatives.* This standard is written as though the work will be done by the purchaser's personnel. If the purchaser is contracting for the work to be done, appropriate provisions should be included in the contract agreement to ensure that the constructor is specifically instructed as to his responsibilities. At the least, the purchaser should specify the following:

1. Standard used—that is, AWWA C652, Standard for Disinfection of Water-Storage Facilities, of latest edition.
2. Method of disinfection to be used.
3. Any required disposal and precautions to be taken in disposing of chlorinated water in the storage facility.
4. Bacteriological testing and method to be used.
5. Redisinfection procedure if required.

III.B. *Modification to Standard.* Any modification of the provisions, definitions, or terminology in this standard must be provided in the purchaser's specifications.

IV. Major Revisions. Major changes made in this revision of AWWA C652 are as follows:

1. Sec. 4.4, Disinfection Procedures When Conducting Underwater Inspection of Potable-Water-Storage Facilities, was modified.

V. Comments. If you have any comments or questions about this standard, please call the AWWA Volunteer & Technical Support group, (303) 794-7711 ext. 6283, FAX (303) 795-7603, or write to the group at 6666 W. Quincy Ave., Denver, CO 80235.

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