



**American Water Works  
Association**

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**ANSI/AWWA B301-18**  
(Revision of ANSI/AWWA B301-10)

**AWWA Standard**

# Liquid Chlorine

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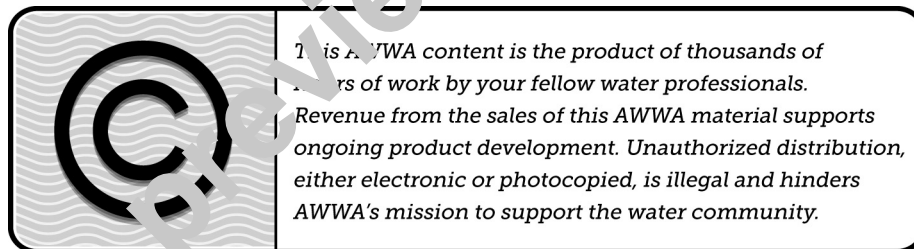
## AWWA Standard

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# Foreword

*This foreword is for information only and is not a part of ANSI/AWWA B301.*

## **I. Introduction.**

I.A. *Background.* Chlorine is an oxidizing agent commonly used for disinfection of water supplies. The first full-scale use of liquid chlorine for water disinfection was in 1912 at Niagara Falls, N.Y., where it helped to eliminate recurring typhoid outbreaks. Advocates of chlorination soon began to recognize the usefulness of prechlorination for reduction of color, tastes, and odors in water. It is also used for the oxidation of metallic substances in water to facilitate their removal during filtration. About 4.5 percent of the annual chlorine produced in the United States is used for municipal water supply treatment and wastewater treatment.

I.B. *History.* ANSI/AWWA B301 was first approved as a consensus standard on Oct. 17, 1957. It was made a standard by the AWWA Board of Directors on Jan. 26, 1959. Subsequent editions were approved June 7, 1981, Jan. 21, 1987, Jan. 26, 1992, June 20, 1999, Jan. 18, 2004, and Jan. 17, 2010. This edition of ANSI/AWWA B301 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 (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.<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 two standards developed under the direction of NSF:<sup>‡</sup> NSF/ANSI 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.

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

† Persons outside the United States should contact the appropriate authority having jurisdiction.

‡ NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI 60. 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 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.

ANSI/AWWA B301 addresses additives requirements in Sec. 4.3.2 of the standard. The transfer of contaminants from chemicals to processed water or to the residual solids is becoming a problem of great concern. The language in Sec. 4.3.2 is a recommendation only for direct additives used in the treatment of potable water to be certified by an accredited certification organization in accordance with NSF/ANSI 60, Drinking Water Treatment Chemicals—Health Effects. However, users of the standard may opt to make this certification a requirement for the product. Users of this standard should also 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. *Safety and Security Precautions.* Chlorine is a greenish-yellow gas that normally is packaged as a liquid under pressure in containers fabricated in accordance with specifications of the US Department of Transportation (DOT). Chlorine should be stored in a secure location. Chlorine-handling facilities should take appropriate precautions to minimize the possibility that an individual or group might be successful in intentionally rupturing or stealing a chlorine container.

Chlorine is fed into the water being treated using special feeders designed for that purpose. Because of the extreme corrosiveness of moist chlorine gas and the health hazards for operators handling chlorine, the feeding equipment must be fabricated of corrosion-resistant materials. Safety devices must be provided to protect plant staff and visitors in the event of chlorine leaks or exposure to chlorine during maintenance work on the feeders.

Chlorine gas is a respiratory irritant. Moderate concentrations (in the low parts-per-million range) in air cause coughing, labored breathing, and irritation of the eyes. In extreme cases, the difficulty in breathing may cause death by suffocation. Liquid chlorine will burn skin and eyes on contact. Details on safety precautions that should be followed in handling chlorine are beyond the scope of this discussion, but excellent safety guidelines are detailed in Pamphlet 1—*Chlorine Basics*\* and pamphlets referenced in appendix A. Federal safety regulations promulgated by the US Occupational Safety and Health Administration (OSHA) and the Clean Air Act (Risk Management Program) should also be implemented in both existing and new chlorination facilities.

Several chlorine emergency response kits are available, including the following (contact the Chlorine Institute for suppliers):

Kit A—for 100-lb (45-kg) and 150-lb (68-kg) cylinders

Kit B—for ton containers

Kit C—for tank cars and tank trucks

These kits are designed to stop most common leaks that may occur in the container for which they are designed. There are also cylinder containment vessels for 100-lb and 150-lb cylinders designed to encapsulate the entire cylinder.

Leak detectors and automatic shutoff and containment devices are also available from several suppliers. The OSHA permissible exposure limit (PEL) is 1.0 ppm as a “ceiling” concentration (15 min) (29 CFR<sup>†</sup> 1910.1000 [Table 21]).

Current editions of pamphlets published by the Chlorine Institute and the Compressed Gas Association, which are useful to purchasers of liquid chlorine as described in this standard, are listed in appendix A.

**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 B301, Liquid Chlorine, of latest revision.
2. Detailed information on containers to be used.
3. Whether compliance with NSF/ANSI 60, Drinking Water Treatment Chemicals—Health Effects, is required.
4. Details of other federal, state or provincial, and local requirements (Section 4).

\* Available from the Chlorine Institute Inc., 1300 Wilson Boulevard, Arlington, VA 22209.

<sup>†</sup> *Code of Federal Regulations*, Government Printing Office, 720 North Main, Pueblo, CO 81003.

5. Type and grade of material wanted or required (Sec. 4.1 and 4.2).
6. Testing procedures and criteria (Sec. 5.3), if required.
7. Whether the purchaser will reject product from containers or packaging with missing or damaged seals. The purchaser may reject product from bulk containers or packages with missing or damaged seals unless the purchaser's tests of representative samples, conducted in accordance with Sec. 5.3, demonstrate that the product meets the standard. Failure to meet the standard or the absence of, or irregularities in, seals may be sufficient cause to reject the shipment.
8. Whether alternative security measures have been adopted to replace or augment the security measures set out in Sec. 6.2.3 and 6.2.4.
9. Affidavit of compliance or certified analyses (Sec. 6.3), if required.

III.B. *Modification to Standard.* Any modification to 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. Removal of the *Chlorine Manual* and ASTM D 1412 from References (Section 2), from Sampling section (Sec. 5.2), and from Bibliography (appendix A).
2. Removal of Heavy Metals section (Sec. 4.3.4 in previous edition) under Impurities section (Sec. 4.3) and removal of Heavy Metals Test Procedures section (Sec. 5.3.3.2 in previous edition).
3. Revision of Carbon Tetrachloride and Trihalomethanes sections (Sec. 4.3.6 and 4.3.7) maximum levels under Impurities section.
4. Additional reference to the Chlorine Institute under Test Procedures section (Sec. 5.3).
5. A revision to the Notice of Nonconformance section (Sec. 5.4).
6. Revision to Marking section (Sec. 6.1).

**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 303.795.7662, write to the department at 6666 West Quincy Avenue, Denver, CO 80235-3092, or e-mail at standards@awwa.org.



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# Liquid Chlorine

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## SECTION 1: GENERAL

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### **Sec. 1.1 Scope**

This standard describes liquid chlorine for use in potable water, wastewater, and reclaimed water treatment.

### **Sec. 1.2 Purpose**

The purpose of this standard is to provide the minimum requirements for liquid chlorine, including physical, chemical, sampling, testing, packaging, and shipping requirements.

### **Sec. 1.3 Application**

This standard can be referenced in documents for purchasing and receiving liquid chlorine and can be used as a guide for testing the physical and chemical properties of liquid chlorine samples. The stipulations of this standard apply when this document has been referenced and then only to liquid chlorine used in the treatment of potable water, wastewater, or reclaimed water.

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## SECTION 2: REFERENCES

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This standard references the following documents. In their latest editions, these documents form a part of this standard to the extent specified within this standard. In any case of conflict, the requirements of this standard shall prevail.