



**American Water Works
Association**

The Authoritative Resource on Safe Water®

ANSI/AWWA B512-08
(Revision of ANSI/AWWA B512-02)

AWWA Standard

Sulfur Dioxide



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Foreword

This foreword is for information only and is not a part of ANSI/AWWA B512.

I. Introduction.

I.A. *Background.* Sulfur dioxide (SO₂), or sulfurous oxide, is a colorless, nonflammable, pungent, suffocating gas. This reducing agent is widely used to remove chlorine and other oxidants from water. Sulfur dioxide is corrosive to mild steel if moisture is present.

Sulfur dioxide is manufactured by burning sulfur in air or from the roasting and smelting of sulfide ores. Generally, sulfur dioxide is purified by using intricate scrubbing methods to remove metal impurities. The sulfur dioxide gas is compressed to form liquid sulfur dioxide, which can then be fed either as a liquid or as a gas. Sulfur dioxide liquid or gas is commercially available at nominally 100 percent strength.

Sulfur dioxide dosage for dechlorination is based on the level of residual chlorine to be removed. The required theoretical dosage for dechlorination is 0.9 mg/L of SO₂ per 1.0 mg/L of residual chlorine (not chlorine dosage). In practice, a ratio of 1:1 is generally used.

Sulfur dioxide mixed with water reacts almost instantaneously with chlorine, converting the chlorine (Cl₂) to chloride (Cl⁻) and the residual sulfur dioxide to sulfate (SO₄²⁻).

When plant capacity is expressed in million gallons per day (mgd), the sulfur dioxide feed rate in pounds per day can be calculated using the following formula:

$$\text{SO}_2\text{lb/d} = \text{Cl}_2 \text{ residual ppm} \times 8.34 \times \text{mgd of plant}$$

The following properties of sulfur dioxide (SO₂) may be useful:

Odor	pungent
Melting point	-99°F (-72.7°C)
Boiling point at atmosphere	14.0°F (-10°C)
Specific gravity of liquid at 0°C (water = 1)	1.434
Specific gravity at 80°F (27°C)	1.363
Critical temperature	314.8°F (174.9°C)
Molecular weight	64.06

For additional information on chemical and physical properties and safety information, refer to the technical information and material safety data sheet (MSDS) available from the supplier or manufacturer and the Compressed Gas Association's (CGA's) booklet CGA G-3, *Sulfur Dioxide*.*

I.B. *History*. The first edition of ANSI/AWWA B512, Standard for Sulfur Dioxide, was developed by the AWWA Standards Committee on Taste and Odor Control Chemicals and approved by the AWWA Board of Directors on Jan. 27, 1991, with an effective date of June 1, 1991. ANSI/AWWA B512-97 was approved on June 15, 1997. ANSI/AWWA B512-02 was approved on Jan. 20, 2002. This edition was approved on Jan. 27, 2008.

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 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 two standards developed under the direction of NSF, NSF‡/ANSI§ 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.

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 jurisdiction. 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

* Compressed Gas Association, 4221 Walney Road, 5th Floor, Chantilly, VA 20151.

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

‡ NSF International, 789 N. Dixboro Road, Ann Arbor, MI 48113.

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

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 B512 addresses additives requirements in Sec. 4.4 of the standard. The transfer of contaminants from chemicals to processed water or the residual solids is becoming a problem of great concern. The language in Sec. 4.4.2 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 Accidental Release Reporting.* Sulfur dioxide is a colorless, nonflammable, pungent gas or liquid with a vapor density of 2.26. Sulfur dioxide reacts with water or free moisture to form sulfurous acid, which is corrosive.

The odor threshold for sulfur dioxide is usually from 0.3 ppm to 2.5 ppm. Levels of 20 ppm usually cause coughing, while short exposures to 400 ppm to 500 ppm may be fatal. The Occupational Safety and Health Administration has set the permissible exposure level for sulfur dioxide* at 2 ppm as the 8-hr-time weighted average and 5 ppm as the short-term exposure level because sulfur dioxide is irritating to the respiratory system. Sulfur dioxide is corrosive to the eyes and skin and causes burns.

When handling sulfur dioxide, wear chemical safety glasses, rubber gloves, and rubber protective clothing. For additional information, study the supplier’s material safety data sheet (MSDS).

Emergency release of sulfur dioxide is reportable under the US Comprehensive Environmental Response Compensation and Liability Act of 1980, Sec. 302.† At present, the reportable quantity of sulfur dioxide is 1 lb.

* *Code of Federal Regulations*, Title 29, Part 1910, Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

† *Code of Federal Regulations*, Title 40, Part 300, Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

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 items should be provided by the purchaser:

1. Standard used—that is, ANSI/AWWA B512, Sulfur Dioxide, 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. The grade or purity required (see Sec. 4.2, 4.3, and 4.4).
5. If the purchaser desires to sample and analyze shipments received, agreement with the supplier as to the number of samples to be taken is necessary (Sec. 5.4).
6. If required, an affidavit of compliance or certificate of analysis (Sec. 5.4 and 6.3).
7. Size of containers (Sec. 6.2).
8. Quantity required (see Sec. 6.2.1.1).
9. Whether alternative security measures have been adopted to replace or augment the security measures set out in Sec. 6.2.2 and 6.2.3.
10. 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. 5.1, 5.2, and 5.3, demonstrate that the product meets specifications. Failure to meet specifications or the absence of, or irregularities in, seals may be sufficient cause to reject the shipment.

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. Inclusion of a requirement for compliance with the Safe Drinking Water Act and other federal regulations (Sec. 4.1).
2. Inclusion of a requirement for tamper-evident packaging (Sec. 6.2.2 and 6.2.3).

V. Comments. If you have any comments or questions about this standard, please call the AWWA Volunteer and Technical Support Group at 303.794.7711, FAX at 303.795.7603, write to the group at 6666 West Quincy Avenue, Denver, CO 80235-3098, or e-mail at standards@awwa.org.



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ANSI/AWWA B512-08
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AWWA Standard

Sulfur Dioxide

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes sulfur dioxide, a compressed, nonflammable liquified gas, for use in the treatment of municipal and industrial water supplies to remove excess residual chlorine.

Sec. 1.2 Purpose

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

Sec. 1.3 Application

This standard can be referenced in specifications for purchasing and receiving sulfur dioxide and can be used as a guide for testing the physical and chemical properties of sulfur dioxide samples. The stipulations of this standard apply when this document has been referenced and then only to sulfur dioxide used in water supply service applications.