ANSI/AWWA B404-14
(Revision of ANSI/AWWA B404-08)

American Water Works Association

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AWWA Standard

Liquid Sodium Silicate

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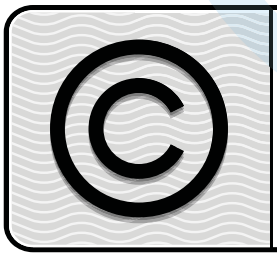

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA B404.*

I. Introduction.

I.A. *Background.* Sodium silicate solutions have application in the water treatment industry as an ingredient of activated silica coagulant aids, for the control of corrosion, and as a stabilizing agent for iron and manganese.

Sodium silicates are water-soluble glasses, manufactured by fusing soda ash (Na_2CO_3) and glass-quality, specially selected silica sands at high temperatures. These products can be identified by the formula $Na_2O{\cdot}(SiO_2)x$, where x can range from 0.5 to 4.0. Sodium silicate solutions (liquid sodium silicates) are usually identified by the weight ratio of their components, which is x in the formula, and their density is frequently reported in degrees Baumé (Bé).†

Commercial liquid sodium silicates include a variety of products ranging in ratio from 1.8 to 3.75 of SiO_2/Na_2O, and in density from 35°Bé to approximately 60°Bé (20°C). The most commonly used product for water treatment is an approximately 3.2 weight ratio liquid, usually sold at approximately 40°, which represents the least expensive source of soluble silica. A 50.5°Bé product is also used. For use in low pH waters, a lower ratio (more alkaline) silicate is sometimes more useful as it elevates pH to desired levels while not excessively feeding silicate.

I.B. *History.* The first edition of this standard for liquid sodium silicate was prepared under the direction of the AWWA Water Purification Division. The standard was approved by the Executive Committee of the Water Purification Division and by the Water Works Practice Committee and received the approval of the AWWA Board of Directors on Aug. 5, 1955. The text was approved as tentative on Aug. 5, 1955, and was made standard on Jan. 26, 1958. Subsequent editions were approved on June 15, 1980; June 14, 1987; June 18, 1992; June 21, 1998; Jan. 19, 2003; and Jan. 27, 2008. This edition was approved on June 8, 2014.

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

* American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.
† The conversion from degrees Baumé to specific gravity is outlined in Sec. 5.3.4 of the standard.

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 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 a standard developed under the direction of NSF, NSF†/ANSI‡ 60, Drinking Water Treatment Chemicals—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 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 B404 addresses additives requirements in Sec. 4.3.2 of the standard. The transfer of contaminants from chemicals to processed water or to 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.

* Persons outside the United States should contact the appropriate authority having jurisdiction.
† NSF International, 789 N. Dixboro Rd., Ann Arbor, MI 48105.
‡ American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.

II. Special Issues.

II.A. *Discussion.* Liquid sodium silicate is generally shipped in metal drums, tank trucks, or railroad tank cars. Most grades are fluid enough at room temperature and above to be purged easily. These liquids should be stored in closed, vented tanks. Storage tanks should have provisions for keeping the silicate from freezing.

Sodium silicates are normally added to water by means of a chemical feed pump. Diaphragm, peristaltic, progressive cavity, gear, and piston pumps are satisfactory, but piston or gear pumps should have lantern-ring water glands around the pistons. For some uses, such as very low concentrations for boiler feed, hot water with elevated magnesium, and some industrial uses to minimize scale formation, the silicate solutions can be diluted with freshwater before use; this is especially advisable if the silicate is fed into a brine.

Silica is found to some extent in all natural waters and is believed to be ecologically harmless. The addition of sodium silicate tends to slightly increase the pH and alkalinity of water and may increase turbidity in concentrations above 50 mg/L.

II.B. *Safety.* Sodium silicate solutions are moderately to strongly alkaline. They are not explosive or flammable, and corrosion-control silica products are not classified as hazardous. Some of the other more alkaline solutions are considered hazardous in US Department of Transportation (DOT) shipping regulations for sodium silicate.

The principal danger of silicate solutions involves contact with the eyes. Protective goggles and/or face shields should be worn when handling these products. If silicate is splashed into the eyes, flush immediately for 15 minutes and seek medical attention.

If splashed on the skin, sodium silicate solution should be washed off quickly with water—preferably warm water. If allowed to remain in contact with the skin, irritation may result. Dried deposits of the liquid should be treated with care, because they can cause skin cuts similar to those inflicted by broken glass. Such cuts should be washed with water and given appropriate medical attention to prevent infection.

For additional safety information, refer to safety data sheets (SDSs) available from the supplier or manufacturer.

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 B404, Liquid Sodium Silicate, of latest revision.

2. Quantity required.

3. Whether the recommended 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).

5. Specific gravity required (Sec. 4.1.3).

6. SiO_2:Na_2O ratio required (Sec. 4.2.2).

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. 5.2 through Sec. 5.5, 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. Form of shipment, bulk or package, type, and size (Sec. 6.2).

9. Whether alternative security measures have been adopted to replace or augment the security measures set out in Sec. 6.2.4 and 6.2.5.

10. Affidavit of compliance, or certified analysis, if required (Sec. 6.3).

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 revisions made to the standard in this edition include the following:

Inclusion of the use of this material for wastewater and reclaimed water as well as definitions of these terms (Sections 1 and 3).

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.

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Liquid Sodium Silicate

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes liquid sodium silicate used in the preparation of activated silica, which is used as a coagulant aid for the treatment of potable water, wastewater, or reclaimed water for (1) the control of corrosion and (2) stabilization of iron and manganese.

Sec. 1.2 Purpose

The purpose of this standard is to provide the minimum requirements for liquid sodium silicate, 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 sodium silicate and can be used as a guide for testing the physical and chemical properties of liquid sodium silicate samples. The stipulations of this standard apply when this document has been referenced and then only to liquid sodium silicate used in potable water, wastewater, or reclaimed water.