ANSI/AWWA B702-18
(Revision of ANSI/AWWA B702-11)

American Water Works Association

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AWWA Standard

Sodium Fluorosilicate

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AWWA Standard

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Contents

All AWWA standards follow the general format indicated subsequently. Some variations from this format may be found in a particular standard.

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA B702.*

I. Introduction.

I.A. *Background.* Community water fluoridation is an effective, safe, and relatively inexpensive way to prevent tooth decay. Sodium fluorosilicate (Na_2SiF_6) is one of several compounds presently being added to drinking water to reduce the incidence of dental cavities. Since the first fluoridation installations during 1945, studies have shown that this method of fluoride delivery benefits Americans of all ages and socioeconomic status. Dental decay can be reduced by 20–40 percent among persons who have consumed fluoridated water since birth.

Sodium fluorosilicate is a white or yellowish-white, slightly hygroscopic, crystalline powder with limited solubility in water. Although odorless, it has an acid taste. Sodium fluorosilicate has no true melting point, but decomposition begins at about 500°C (932°F) with the formation of silicon tetrafluoride. Its formula weight is 188.05, and its specific gravity is 1.36. The solubility of Na_2SiF_6 in water is 0.43 g/100 mL at 0°C (32°F) and 2.45 g/100 mL at 100°C (212°F). It hydrolyzes in water to form a solution with a pH between 3.5 and 4.0. Sodium fluorosilicate is manufactured principally from fluorosilicic acid.

Sodium fluorosilicate is fed into water using mechanical feeders designed for this purpose. The feeders are equipped with solution tanks that should completely dissolve the compound before its introduction into the water. Liquid proportioning of solutions is rarely used because of the difficulty in making constant-strength solutions. It is not recommended to feed slurries (solutions containing undissolved particles) because of the resulting variations in fluoride levels.

Refer to AWWA Manual M4, *Water Fluoridation Principles and Practices,*[†] for additional technical information concerning the application and use of sodium fluorosilicate.

I.B. *History.* This standard was first published in the August 1954 issue of *Journal AWWA* as tentative, having been approved on May 27, 1954, by the AWWA Board of Directors. Subsequent revisions to ANSI/AWWA B702 were approved on May 15, 1960, Jan. 24, 1971, Jan. 30, 1984, Jan. 29, 1989, Jan. 30, 1994, June 20, 1999, and Feb. 12, 2006. The last edition was prepared by the AWWA Standards

* American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.
† AWWA Manual M4, *Water Fluoridation Principles and Practices,* AWWA, Denver, Colo.

Committee on Fluorides and approved on June 12, 2011. This edition was approved on Jan. 20, 2018.

I.C. *Acceptance.* Products that are covered by this standard should have certification in accordance with NSF/ANSI Standard 60 and documentation on conformational testing to ANSI/AWWA B702 criteria.

Conformational testing to ANSI/AWWA B702 should be provided by the supplier to the consumer with each lot delivered. It is recommended that the consumer also conduct independent validation testing to confirm the conformational testing by the producer.

Certification of product quality in accordance with NSF/ANSI Standard 60 should be indicated for each lot delivered and provided to the consumer by the supplier in accordance with Standard 60 requirements.

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 April 1990, USEPA formally withdrew its list of acceptable drinking water additives, and regulatory oversight of direct and indirect drinking water additives passed to the process developed by the consortium under the leadership of NSF.

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. NSF, in cooperation with ASDWA, does a biennial survey of US states and Canadian provinces/territories to determine which states and provinces/territories require by legislation, regulations, or policies that products and drinking water additives be evaluated

* Water Research Foundation, 6666 West Quincy Avenue, Denver, CO 80235.

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

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

by NSF/ANSI 60 and 61. Survey results from 2009 show adoption of NSF/ANSI 60 by 47 states and nine provinces/territories, and adoption of NSF/ANSI 61 by 46 states and 11 provinces/territories.

Several organizations are accredited by national or international third-party agencies to certify products in accordance with NSF/ANSI 60. States, provinces/territories, local agencies, and water utilities can determine which certification organizations are acceptable within their individual jurisdictions.

Annex A, "Toxicology Review and Evaluation Procedures," to NSF/ANSI 60 does not stipulate a total allowable concentration (TAC) or a single product allowable concentration (SPAC) value of a contaminant for substances not regulated by a USEPA final maximum contaminant level (MCL). The TACs and SPACs 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 B702 addresses additives requirements in Sec. 4.3 of the standard. The transfer of contaminants from chemicals to processed water or to residual solids is becoming a problem of great concern. Sec. 4.3.3 recommends that material covered by this standard be certified by an accredited agency for compliance with NSF/ANSI 60. As noted above, most states and provinces/territories require that direct additives be certified to NSF/ANSI 60. A user of this standard should consult with the state, province/territory, or local agency having jurisdiction for certification requirements, but the user may require certification even in the absence of such a requirement by the agency having jurisdiction.

II. Special Issues.

II.A. *Storage, Handling, and Safety Precautions.* Sodium fluorosilicate must be stored in a clean, dry location. The storage area must be well ventilated. Sodium fluorosilicate has a tendency to compact or cake when exposed to moisture, when bags are stacked too high, or during long periods of storage. Bags of sodium fluorosilicate should be stored on pallets in stacks not more than six bags high to minimize compaction.

Sodium fluorosilicate is hazardous if swallowed or inhaled in large amounts. Ingestion of 4–5 g of fluoride ion (F^-) per 150 lb (68 kg) of body weight may be fatal. The inhalation of sodium fluorosilicate dust should be avoided. Protective safety gear should be worn when handling sodium fluorosilicate. The following list of protective clothing and equipment should be the minimum available:

1. A high-efficiency dust respirator (chemical mask) with a soft rubber face-to-mask seal and replaceable cartridges approved by the National Institute for Occupational Safety and Health/Mine Safety Health Administration (NIOSH/MSHA).*
2. Gauntlet neoprene gloves (12-in. [305-mm] minimum glove length).
3. Heavy-duty neoprene aprons.
4. Splash-proof goggles.

Feeders should be equipped with dust collectors. Spills should be cleaned up immediately. Personnel should wash thoroughly after handling sodium fluorosilicate. For additional safety precautions, refer to safety data sheets (SDSs) available from the chemical 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—The purchaser should have on record the most current AWWA standard for reference, in this case ANSI/AWWA B702 revision 2018.
2. Details of other federal, state, or provincial, and local requirements (Section 4).
3. Additional size requirements for feedability and dust suppression if desired (see the remainder of III.A and Sec. 4.1).
4. 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, 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 a shipment.
5. Form of shipment—bulk or package, package type, and package size and weight (Sec. 6.2).
6. 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.

* NIOSH/MSHA approval is given to various masks. Each brand is evaluated by NIOSH/MSHA for the proposed use and conditions. Available from the National Institute for Occupational Safety and Health, 4676 Columbia Parkway, Cincinnati, OH 45226, or Mine Safety and Health Administration, 201 12th Street South, Suite 401, Arlington, VA 22202-5450.

7. If an affidavit of compliance, a certified analysis, or both are required (Sec. 6.3).

The specific requirements for a material that is of proper screen size for the feeding equipment and that will remain "free flowing" after a definite period of time and condition of storage are matters that should be agreed on by both purchaser and supplier before shipment. At this time, widely varying methods of feeding and storing sodium fluorosilicate preclude the possibility of including a firm standard on size to satisfy all these variables. Feedability appears to depend on the uniformity of size between US Standard Sieves No. 100 (150 μm) and No. 325 (44 μm) (a narrow size distribution) and a low-moisture content.

For the suppression of dust, materials containing the least amount of particles finer than 325 mesh are preferred.

III.B. *Modification to Standard.* Any modification to the provisions, definitions, or terminology in this standard must be specified by the purchaser.

IV. Major Revisions. Major changes made in this revision of the standard include the following:

1. Inclusion of maximum allowed concentrations of impurities calculations (Sec. 4.3.3 and Table 1)
2. Revisions to Notice of Nonconformance (Sec. 5.3)

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 e-mail at standards@awwa.org.

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Sodium Fluorosilicate

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes sodium fluorosilicate (Na_2SiF_6) for use in the treatment of potable water.

Sec. 1.2 Purpose

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

Sec. 1.3 Application

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