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(Revision of ANSI/AWWA B702-18)

AWWA Standard

Sodium Fluorosilicate

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American Water Works
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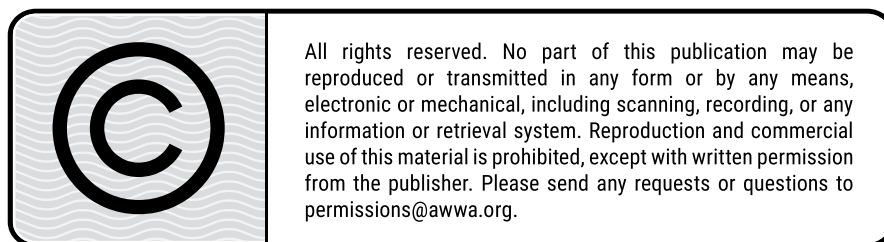
AWWA Standard

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Committee Personnel

The AWWA Standards Committee on Fluorides, which reviewed and approved this standard, had the following personnel at the time of approval:

Theresa Jean Boehmer, *Chair*

General Interest Members

T.J. Boehmer, Centers for Disease Control and Prevention, Atlanta, Ga.

K. Duchon, Consultant, Decatur, Ga.

N.J. Edman (*liaison, nonvoting*), Standards Group Liaison, AWWA, Denver, Colo.

R. Hampaul, Consultant, Nanaimo, B.C.

C. Marcos, Northeast Pump & Instrument, Lunenburg, Mass.

E.A. Moreno, Gentle Family Dentists, West Liberty, Iowa

M.S. Reed (*liaison, nonvoting*), Standards Council Liaison, City of Fort Worth, Water Department, Fort Worth, Tex.

M.L. Wentink, Nebraska Dept. of Environment and Energy, North Platte, Neb.

Producer Members

T.L. Fitzgerald, PMG Fitz LLC, Saint Peters, Mo.

J.W. Fulcher, Univar, Downers Grove, Ill.

R.L. Horne, Pennco Inc., San Felipe, Tex.

M.E. Looney, Solvay Fluorides, Houston, Tex.

M.T. Merlo, Dubois Chemicals, Nampa, Idaho

User Members

P. Devlin, PUG Services Corp., Peterborough, Ont.

M.B. Gilton, Salida Sanitary District, Turlock, Calif.

L.J. Hammes, Ames Water & Pollution Control Dept., Ames, Iowa

D.J. Huggins, City of London Water Operations, London, Ont.

J.S. Trotter, City of Bloomington, Ellettsville, Ind.

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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 to 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 acidic 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; Feb. 12, 2006; June 12, 2011; and Jan. 20, 2018. This edition was approved on March 13, 2024.

* American National Standards Institute, 1180 Avenue of the Americas, 10th Floor, New York, NY 10036.

† AWWA Manual M4, *Water Fluoridation Principles and Practices*, AWWA, Denver, Colo.

I.C. *Acceptance.* Products that are covered by this Standard should have certification in accordance with NSF[‡]/ANSI/CAN[§] 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/CAN 60 should be indicated for each lot delivered and provided to the consumer by the supplier in accordance with NSF/ANSI/CAN 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 four standards developed under the direction of NSF: NSF/ANSI/CAN 60, Drinking Water Treatment Chemicals—Health Effects; NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects; NSF/ANSI 372, Drinking Water System Components—Lead Content, and NSF/ANSI/CAN 600, Health Effects Evaluation and Criteria for Chemicals in Drinking Water. 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 by NSF/ANSI/CAN 60 and 61. Survey results from 2009 show adoption of NSF/ANSI/CAN 60 by 47 states and 9 provinces/territories and adoption of NSF/ANSI/CAN 61 by 46 states and 11 provinces/territories.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI/CAN 60. Individual states or local agencies have authority to accept or accredit

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

[§] Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.

[¶] Persons outside the United States should contact the appropriate authority having jurisdiction.

certification organizations within their jurisdiction. Accreditation of certification organizations may vary from jurisdiction to jurisdiction. NSF/ANSI/CAN 600 (which formerly appeared in NSF/ANSI/CAN 60 and NSF/ANSI/CAN 61 as Annex A, “Toxicology Review and Evaluation Procedures”) 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 NSF/ANSI/CAN 600 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 greater concern. The language in Sec. 4.3.3 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/CAN 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 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 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 to 5 g of fluoride ion (F⁻) per 150 lb (68 kg) 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).**

** 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, 1600 Clifton Road, Atlanta, GA, United States, 30333 or Mine Safety and Health Administration, 201 12th Street S, Suite 401, Arlington, VA 22202-5450.