



**American Water Works
Association**

The Authoritative Resource on Safe Water®

ANSI/AWWA B404-08
(Revision of ANSI/AWWA B404-03)

AWWA Standard

Liquid Sodium Silicate



Effective date: August 1, 2008.

First edition approved by AWWA Board of Directors Aug. 5, 1955.

This edition approved Jan. 27, 2008.

Approved by American National Standards Institute May 22, 2008.

6666 West Quincy Avenue
Denver, CO 80235-3098
T 800.926.7337
www.awwa.org

Advocacy
Communications
Conferences
Education and Training
Science and Technology
Sections

AWWA Standard

This document is an American Water Works Association (AWWA) standard. It is not a specification. AWWA standards describe minimum requirements and do not contain all of the engineering and administrative information normally contained in specifications. The AWWA standards usually contain options that must be evaluated by the user of the standard. Until each optional feature is specified by the user, the product or service is not fully defined. AWWA publication of a standard does not constitute endorsement of any product or product type, nor does AWWA test, certify, or approve any product. The use of AWWA standards is entirely voluntary. This standard does not supersede or take precedence over or displace any applicable law, regulation, or codes of any governmental authority. AWWA standards are intended to represent a consensus of the water supply industry that the product described will provide satisfactory service. When AWWA revises or withdraws this standard, an official notice of action will be placed on the first page of the classified advertising section of *Journal AWWA*. The action becomes effective on the first day of the month following the month of *Journal AWWA* publication of the official notice.

American National Standard

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether that person has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. American National Standards are subject to periodic review, and users are cautioned to obtain the latest editions. Producers of goods made in conformity with an American National Standard are encouraged to state on their own responsibility in advertising and promotional materials or on tags or labels that the goods are produced in conformity with particular American National Standards.

Caution Notice: The American National Standards Institute (ANSI) approval date on the front cover of this standard indicates completion of the ANSI approval process. This American National Standard may be revised or withdrawn at any time. ANSI procedures require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of publication. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036; (212) 642-4900.

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information or retrieval system, except in the form of brief excerpts or quotations for review purposes, without the written permission of the publisher.

Copyright © 2008 by American Water Works Association
Printed in USA

Committee Personnel

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

Robert A. Ryder, *Chair*

General Interest Members

H.T. Belcher Jr., Corrtac Systems Corporation, Currituck, N.C.	(AWWA)
W.J. Conlon, Doosan Hydro Technology, Tampa, Fla.	(AWWA)
A.A. Hazelwood, HDR One Company—Many Solutions, Oakland, Calif.	(AWWA)
N.G. Pizzi,* Standards Council Liaison, Environmental Engineering & Technology Inc., Twinsburg, Ohio	(AWWA)
S.J. Posavec,* Standards Group Liaison, AWWA, Denver, Colo.	(AWWA)
R.A. Ryder, Kennedy/Jenks Consultants, San Francisco, Calif.	(AWWA)

Producer Members

P.A. Vella, Carus Chemical, La Salle, Ill.	(AWWA)
V.J. Verdone, Pristine Water Solutions Inc., Waukegan, Ill.	(AWWA)

User Members

W.F. Maier, Lansing Board of Water & Light, Lansing, Mich.	(AWWA)
J.J. Muldowney, Philadelphia Water Department, Philadelphia, Pa.	(AWWA)
R.M. Powell, Pinellas County Utilities Lab, Largo, Fla.	(AWWA)
J.C. Thurrott, City of Daytona Beach, Daytona Beach, Fla.	(AWWA)
T.M. Tucker, Knoxville Utilities Board, Knoxville, Tenn.	(AWWA)
M.M. Vogel, Corning, N.Y.	(AWWA)

* Liaison, nonvoting

This page intentionally blank.

Contents

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

SEC.	PAGE	SEC.	PAGE
<i>Foreword</i>		4	Requirements
I	Introduction vii	4.1	Materials 2
I.A	Background vii	4.2	Physical Requirements 2
I.B	History vii	4.3	Chemical Requirements 3
I.C	Acceptance vii	4.4	Impurities 3
II	Special Issues viii	4.5	Uses 3
II.A	Discussion viii	5	Verification
II.B	Safety ix	5.1	Sampling 4
III	Use of This Standard ix	5.2	Suspended Matter 4
III.A	Purchaser Options and Alternatives ix	5.3	Test Procedure for Determining Specific Gravity 6
III.B	Modification to Standard x	5.4	Test Procedure for Determining Silica (SiO ₂) 7
IV	Major Revisions x	5.5	Test Procedure for Determining Sodium Oxide 11
V	Comments x	5.6	Calculation of Weight Ratio 11
<i>Standard</i>		5.7	Notice of Nonconformance 11
1	General	6	Delivery
1.1	Scope 1	6.1	Marking 12
1.2	Purpose 1	6.2	Packaging and Shipping 12
1.3	Application 1	6.3	Affidavit of Compliance 13
2	References 2		
3	Definitions 2		

This page intentionally blank.

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 specially selected silica sands at high temperatures. These products can be identified by the formula $\text{Na}_2\text{O} \cdot (\text{SiO}_2)_x$, 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, and in density from 35°Bé to approximately 60°Bé (20°C). The most commonly used product for water treatment is a 3.2 weight ratio liquid, usually sold at 40° to 41°Bé, which represents the least expensive source of soluble silica. For use in low pH waters, a lower ratio (more alkaline) silicate is sometimes more useful.

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 by the AWWA Board of Directors on June 15, 1980; June 14, 1987; June 18, 1992; June 21, 1998; and Jan. 19, 2003. 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

* The conversion from degrees Baumé to specific gravity is outlined in Sec. 5.3.4 of the standard.

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. 4.4 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. *Discussion.* Liquid sodium silicate is generally shipped in metal drums, tank trucks, or railroad tank cars. Most grades are fluid enough to be pumped easily. These

* 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.

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 and piston pumps are satisfactory, but piston pumps should have lantern-ring water glands around the pistons. For some uses, 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.

II.B. *Safety.* Sodium silicate solutions are moderately alkaline. They are not explosive or flammable and are not classified as hazardous in US Department of Transportation (DOT) shipping regulations.

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

If splashed on the skin, sodium silicate solution should be washed off 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, since 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 material safety data sheets (MSDS) 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 items should be covered 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 (Sec. 4.1).
5. Specific gravity required (Sec. 4.2.3).
6. $\text{SiO}_2:\text{Na}_2\text{O}$ ratio required (Sec. 4.3.2).

7. Form of shipment, bulk or package, type, and size (Sec. 6.2).

8. Affidavit of compliance if required (Sec. 6.3).

9. 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, 5.3, 5.4, and 5.5, 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.

10. 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.

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:

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. 6.2.4 and 6.2.5).

V. Comments. If you have any comments or questions about this standard, please contact 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 the group at standards@awwa.org.



**American Water Works
Association**

AWWA/ANSI B404-08
(Revision of AWWA/ANSI B404-03)

AWWA Standard

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 municipal and industrial water supplies for (1) the control of corrosion and (2) stabilization of iron and manganese in water systems.

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 specifications 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 water supply service applications.