



**American Water Works
Association**

The Authoritative Resource on Safe Water®

ANSI/AWWA B511-10
(Revision of ANSI/AWWA B511-05)

AWWA Standard

Potassium Hydroxide



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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.

SEC.	PAGE	SEC.	PAGE
<i>Foreword</i>		2	References 1
I	Introduction vii	3	Definitions 2
I.A	Background vii	4	Requirements
I.B	History vii	4.1	Materials 3
I.C	Acceptance viii	4.2	Physical Requirements 3
II	Special Issues ix	4.3	Chemical Requirements 3
II.A	Handling Precautions ix	4.4	Impurities 3
III	Use of This Standard ix	5	Verification
III.A	Purchaser Options and Alternatives ix	5.1	Sampling 4
III.B	Modification to Standard x	5.2	Test Procedures 5
IV	Major Revisions x	5.3	Notice of Nonconformance 6
V	Comments x	6	Delivery
<i>Standard</i>		6.1	Marking 7
1	General	6.2	Packaging and Shipping 7
1.1	Scope 1	6.3	Affidavit of Compliance 8
1.2	Purpose 1		
1.3	Application 1		

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA B511.*

I. Introduction.

I.A. *Background.* Technical grades of potassium hydroxide, KOH, are also known as caustic potash. Potassium hydroxide is produced electrolytically from potassium chloride. Chlorine is also formed in the process.

Potassium hydroxide is available in liquid form in two concentrations: 45 percent KOH and 50 percent KOH. The 45 percent concentration begins to crystallize at approximately -18°F (-28°C), and the 50 percent concentration begins to crystallize at approximately 50°F (10°C). Potassium hydroxide is also available in a dry form containing at least 90 percent KOH. Dry KOH is available in various forms, such as flake, ground, crystal, beaded, and prilled.

Liquid KOH is usually shipped in insulated tank cars or tank trucks and should arrive at the receiving point in liquid form. Depending on geographical location, tank cars are usually equipped with coils for steam heating. When unloading the potassium hydroxide, the manufacturer's unloading procedures should be followed. In climates where storage temperatures are below the solidification point for the concentration of potassium hydroxide received, the material may be diluted upon unloading to a concentration that will not solidify or require heated storage. Softened water should be used to dilute potassium hydroxide to prevent precipitation of calcium carbonate, which can clog feed equipment.

If the dry form of potassium hydroxide is used, it should be carefully dissolved in water to prepare the desired solution strength.

A potassium hydroxide solution may be fed by conventional liquid chemical feeding equipment. However, when purchasing chemical-feeding equipment, the purchaser should specify that it will be used to handle a caustic solution.

I.B. *History.* The first edition of the standard for potassium hydroxide was prepared under the direction of the AWWA Standards Committee on Softening and Conditioning Chemicals. It was designated ANSI/AWWA B511-90, Standard for Potassium Hydroxide, approved by the AWWA Board of Directors on June 17, 1990, and had an effective date of Feb. 1, 1991. ANSI/AWWA B511-96 was approved on

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

Feb. 9, 1996. ANSI/AWWA B511-00 was approved on Jan. 23, 2000. ANSI/AWWA B511-05 was approved on Jan. 16, 2005. This edition was approved on Jan. 17, 2010.

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 all direct and indirect drinking water additives. Other members of the original consortium included the American Water Works Association Research Foundation (AwwaRF, now Water Research Foundation) 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 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 B511 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

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

† NSF International, 789 N. Dixboro Road, Ann Arbor, MI 48105.

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

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 all 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. *Handling Precautions.* Handling of all forms of potassium hydroxide involves several extreme hazards. Considerable heat is generated in the solution or dilution process; therefore, the rate of dilution and the method of cooling should be carefully controlled to prevent boiling or splattering of the liquid.

Potassium hydroxide can cause severe burns to the skin and eyes; therefore, workers handling it must wear complete protective equipment, including chemical safety goggles. If the possibility of exposure to potassium hydroxide is high, for example, during unloading operations, a full-face shield should also be worn. Non-aluminum hard hats are recommended for protection from overhead leaks and splashes.

Boots and gloves should be made of polyvinyl chloride or neoprene. Outer clothing should be made of cotton or a suitable synthetic fabric (potassium hydroxide destroys wool and leather). A neoprene apron will provide additional protection. If the possibility of exposure is high, full suits of neoprene or polyvinyl chloride are recommended. Shirts should have long sleeves and snug-fitting cuffs. The collars should be buttoned. Trousers bottoms should extend over boot tops.

A full-face-piece respirator approved by the National Institute for Occupational Safety and Health (NIOSH) or the Mine Safety and Health Administration (MSHA) for dusts and mists should be worn when handling dry potassium hydroxide.

Emergency shower and eyewash units should be located near feeding and pumping equipment, where potassium hydroxide is sampled, and where tank cars or trucks are unloaded. Refer to the material safety data sheets (MSDSs) available from the vendor or manufacturer for additional information.

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 B511, Potassium Hydroxide, of latest revision.
2. Quantity of potassium hydroxide required.
3. Whether 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. Type of material—dry or liquid (Sec. 4.3). If dry is ordered, whether ground, flake, crystal, beaded, prilled, or other is desired.
6. For liquid potassium hydroxide, the minimum percentage of potassium hydroxide (Sec. 4.3.2).
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, 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. Whether alternative security measures have been adopted to replace or augment the security measures set out in Sec. 6.2.5 and 6.2.6.
9. Form of shipment—bulk or package and the type and size of container (Sec. 6.2).
10. If an affidavit of compliance or certified analysis or both is 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 changes made to the standard in this revision 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. 6.2.5 and 6.2.6).

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 the group at standards@awwa.org.



**American Water Works
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AWWA Standard

Potassium Hydroxide

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes the use of potassium hydroxide (KOH), dry and liquid, for use in the treatment of potable, wastewater, and reuse or reclaimed water.

Sec. 1.2 Purpose

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

Sec. 1.3 Application

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

SECTION 2: REFERENCES

This standard references the following documents. In their latest editions, they form a part of this standard to the extent specified within the standard. In any case of conflict, the requirements of this standard shall prevail.