ANSI/AWWA B202-19
(Revision of ANSI/AWWA B202-13)

American Water Works Association

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AWWA Standard

Quicklime and Hydrated Lime

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STANDARD
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Since 1881

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AWWA Standard

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

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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.

Foreword

This foreword is for information only and is not a part of ANSI/AWWA B202.*

I. Introduction.

I.A. *Background.* Quicklime results from the calcination of limestone, shell, or equivalent, and consists of calcium oxide in natural association with a lesser amount of magnesium oxide. Hydrated lime is a very finely divided powder resulting from the hydration of quicklime with enough water to satisfy its chemical affinity. Slurry lime contains additional water to create a suspension of hydrated lime. Both quicklime and hydrated lime are commonly used in the treatment and softening of municipal and industrial water supplies.

I.B. *History.* ANSI/AWWA B202 was first approved as tentative Sept. 9, 1952. It was made standard Sept. 28, 1954. Subsequent revisions to ANSI/AWWA B202 were prepared by the AWWA Standards Committee and were approved by the AWWA Board of Directors on Jan. 25, 1965; Jan. 30, 1977; Jan. 30, 1983; June 19, 1988; June 6, 1993; Jan. 20, 2002; Jan. 21, 2007; and June 9, 2013. This edition of B202 was approved on Jan. 24, 2019.

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, 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

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

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

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 B202 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. 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.

II. Special Issues

II.A. *Calcium Oxide.* The amount of available calcium oxide (CaO) varies in limes. Many methods are available for evaluating the available CaO in lime. Some give consistently low results, some are rather time-consuming, and some do not give reproducible results. The method included in this standard is reasonably rapid and reproducible and gives results that are consistent with the available CaO content obtained in use in water treatment. Other methods may be used.

The method of analysis for available CaO content presented in this standard has been found by many users to be satisfactory as a basis for the purchase of lime for water treatment. Usable results will be obtained by this method only if the acid is carefully

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

standardized according to the instructions in this standard and only if the procedure for the specified test is followed in exact detail.

Some water utility personnel still believe that a better evaluation of lime can be made and that more accurate results can be obtained by determining total CaO. In addition to available CaO, such an analysis determines CaO present as calcium carbonate—a factor of little importance in water treatment. For those who prefer the total CaO method, and for those who wish to make a complete analysis, the methods outlined in ASTM* C25, Standard Test Methods for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime, are recommended.

The amount of available CaO varies in limes from different geographic regions. Factors such as source of rock, manufacturing conditions, type of kiln, type of fuel, and even personnel have an effect on product quality.

II.B. *Lime.* A lime that slakes at a rate consistent with plant equipment is more economical to use and less difficult to handle. A slaking-rate test to determine the reactivity of lime is included in this standard. This procedure was revised to control the variables that occur in the test, thus improving the reproducibility of results. The results of the slaking-rate test on a given quicklime should be correlated with the performance of the lime in the slaker. The slaking requirement for the lime can then be specified.

Because most modern lime-slaking equipment contains devices for the removal of grit, sand, pebbles, and other coarse inert material and because overloading of the grit-removing devices is undesirable, a test for insoluble matter is provided in this standard.

II.C. *Magnesium and Insoluble Material.* This standard sets no limit on magnesium because keeping the available CaO content within the specified limit should address any excess magnesium problem adequately. No provision is made for high-magnesium lime for the specific reason that such lime is not suited for water treatment. Although insoluble matter (iron and aluminum) can cause turbidity when lime is applied to filtered water or to a water supply not to be filtered, no limit is set for these constituents because turbidity problems can be overcome by adding the lime as a saturated solution. If such a procedure is impractical, individual treatment plants may need to set up limits for total insoluble matter, iron, and aluminum when purchasing lime. This condition occurs so rarely that a provision for it in this standard is unwarranted. The test for insolubles included in this standard determines only those insolubles that are coarse enough to be retained in the slaker or grit remover. Likewise,

* ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

no mention is made of the character of insoluble matter, assuming that its composition will not affect the application of lime if done using a dry-feed machine.

II.D. *Size and Marking*. Sizes of lime are established in the standard to meet the requirements of various types of feed equipment. Alternatively, purchasers may set size requirements to meet specific conditions. A change in size requirements should be made only after consultation with the manufacturer of the feed equipment being used.

The standard also does not require the date of manufacture to be stamped on the bags in which the hydrated lime is shipped; it is assumed that the material will be delivered to the point of use in a condition to be handled readily in a dry-feed machine.

II.E. *Purchase Basis*. This standard describes only limes composed mainly of CaO or calcium hydroxide. Special limes, such as dolomitic limes for the removal of silica, are not included. Thus, for the purchase of lime of a different chemical composition, the purchaser must provide specifications describing the kind of material desired. For lime of any type, the purchaser may specify the method of manufacture to be used in making the lime.

Lime should be purchased according to the following industry-recommended guidelines:

1. Quicklime. In general, quicklime contains about 90 percent available CaO in the material provided, although greater or lower percentages of available CaO can be used. The quicklime should slake satisfactorily, based on the system's design.

Satisfactory "quick-slaking" lime will usually produce a temperature rise of 40°C (104°F) in 3 min, and the slaking reaction will be complete in 10 min or less when the lime is tested according to Sec. 5.4 of this standard.

Satisfactory quicklime for water treatment will slake without production of objectionable amounts of insoluble material.

2. Hydrated lime. In general, hydrated lime contains 68 percent available CaO (which is equivalent to 89.8 percent calcium hydroxide) in the material provided, although higher or lower percentages of available CaO can be used.

II.F. *Sampling*. Production-statistical process control testing is being used increasingly as a substitute for per-load sampling and testing and may be used as an alternative.

Current good laboratory practices require documentation of the handling of all samples from the time they are first collected until they are introduced as evidence in possible legal proceedings. Chain-of-custody procedures are followed to maintain and document control of sample possession. An in-depth discussion of chain-of-custody procedures is discussed in *Handbook for Sampling and Sample Preservation of Water and*

Wastewater (EPA-600/4-82-029). At a minimum, the chain-of-custody records should show the location, date, and time the sample was taken, along with the name of the individual who took the sample. Each time possession of the samples is transferred, the person relinquishing and the person receiving the samples should sign, date, and note the transfer of the chain-of-custody record form.

II.G. *Personal Protection.*

1. Engineering Controls: Provide ventilation adequate to maintain PELs.

2. Respiratory Protection: Use NIOSH/MSHA-approved respirators if airborne concentration exceeds PELs.

3. Skin Protection: Use appropriate gloves and footwear to prevent skin contact and the potential for burns. Clothing should fully cover arms and legs. Should lime get inside clothing or gloves, remove the clothing and the lime promptly.

4. Eye Protection: Use safety glasses with side shields or safety goggles. Contact lenses should not be worn when working with lime products.

5. Other: Eye wash fountain/stations and emergency showers should be available.

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—this is, ANSI/AWWA B202, Quicklime and Hydrated Lime, of latest revision.

2. Whether compliance with NSF/ANSI 60, Drinking Water Treatment Chemicals—Health Effects, is required.

3. Quantity and whether quicklime or hydrated lime is being purchased.

4. Details of federal, state, and local requirements (Section 4).

5. Size required (Sec. 4.1), depending on the type of feeding equipment used.

6. Limit on insoluble matter (Sec. 4.2.1) if other than 5 percent.

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. 5.1 through Sec. 5.5, demonstrate that the product meets the standard. Failure to meet the standard or absence of, or irregularities in, seals may be sufficient cause to reject a shipment.

8. Marking information (Sec. 6.1).

9. Method of packaging and shipping (Sec. 6.2).

10. Weight certificates (Sec. 6.2.4).

11. Whether alternative security measures have been adopted to replace or augment the security measures set out in Sec. 6.2.5 and Sec. 6.2.6.

12. An affidavit of compliance or certified analysis, or both, 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 changes made to the standard in this revision include the following:

1. Updates to boilerplate language in the following sections:
   - Sec. 4.3 Impurities
   - Sec. 5.6 Notice of Nonconformance
   - Sec. 6.2 Packaging and Shipping
   - Sec. 6.3 Affidavit of Compliance

V. Comments. If you have any comments or questions about this standard, please call AWWA Engineering & 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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Quicklime and Hydrated Lime

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes pebble, lump, and ground quicklime and hydrated lime for use in the treatment of potable water, wastewater, or reclaimed water supply service.

Sec. 1.2 Purpose

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

Sec. 1.3 Application

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