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AWWA Standard



Quicklime and Hydrated Lime

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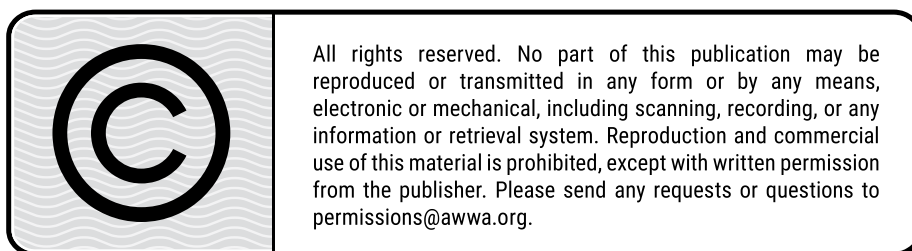
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Foreword

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; June 9, 2013; and Jan. 24, 2019. This edition was approved on Jan. 23, 2025.

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 Water Research Foundation (formerly AwwaRF) and the Conference of State Health and Environmental Managers (COSHEM). 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 four standards developed under the direction of NSF:[‡] NSF/ANSI/CAN[§] 60, Drinking Water Treatment Chemicals—

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

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

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

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

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.

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 certification organizations within their jurisdictions. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

NSF/ANSI/CAN 600 (which formerly appeared in NSF/ANSI/CAN 60 and 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 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 greater 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/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. *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 (see Sec. 5.3). 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 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 ASTM⁴ 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 (see Sec. 5.4). This procedure was devised 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 (see Sec. 5.5).

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

⁴ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

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, 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.* Statistical production-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