ANSI/AWWA B602-17
(Revision of ANSI/AWWA B602-08)

American Water Works Association

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AWWA Standard

Copper Sulfate

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AWWA Standard

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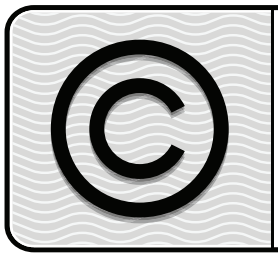

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Committee Personnel

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

Nathan K. Dunahee, *Chair*

General Interest Members

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* Liaison, nonvoting

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

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA B602.*

I. Introduction.

I.A. *Background.* Copper sulfate is used primarily as an algicide in potable water. It is available both as a commercial product and as a by-product of the printed-circuit-board industry.

The commercial product is produced by reacting a solution of sulfuric acid with copper metal, cupric oxide, or basic cupric copper salts. Copper sulfate crystals form in the concentrated solution and grow in size in a characteristic crystalline shape. A broad range of crystal sizes is produced by controlling the length of crystallization time or by fracturing the larger crystals and screening to the desired sizes.

The by-product copper sulfate is generally produced in printed-circuit-board shops, where proprietary etchant solutions are used to dissolve copper from printed circuit boards. If a sulfuric-acid-based etchant solution is used, it becomes saturated with copper ions and sulfate ions. Small crystals of copper sulfate form and are mechanically removed.

The presence of various impurities and their amounts in the copper sulfate depend on the impurities present in the starting materials or the solution in which the crystals grow.

The selection of crystal size for use in algae control depends on a number of factors, including algae type and growth habits as well as application method and equipment to be used. The application rate will depend on algae type and species as well as water characteristics, including pH, alkalinity and hardness, presence of suspended solids, density of algae growth, and water temperature. For potable water, the US Environmental Protection Agency (USEPA) has set a tolerance for the maximum residue of copper at 1 ppm, or equal to 4 ppm as copper sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$) (40 CFR† 185.1200), which also is the secondary standard under the US National Drinking Water Regulations. USEPA, Office of Drinking Water, has set the action level at 1.3 mg/L copper (Cu) as the National Primary Drinking Water Standard. Under most use conditions, the effective dose is considerably less than the established residue tolerance.

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

† Code of Federal Regulations, US Government Printing Office, Superintendent of Documents, Washington, DC 20402.

I.B. *History.* This standard was first approved as tentative on Sept. 15, 1957. It was developed by the AWWA Water Purification Division and also was submitted for review to producers and consumers whose comments were then considered by a referee. It was approved as a standard without revision on Jan. 26, 1959, and published as AWWA B602-59.

This standard was revised by the AWWA Standards Committee on Taste and Odor Control Chemicals. The dates of approval and numerical designation of past editions of ANSI/AWWA B602 are as follows:

Designation	*Date of Approval*
B602-57T	Sept. 15, 1957
B602-59	Jan. 26, 1959
B602-80	Jan. 28, 1980
B602-86	Jan. 27, 1986
B602-91	Jan. 27, 1991
B602-97	Feb. 2, 1997
B602-02	Jan. 20, 2002
B602-08	Jan. 27, 2008

This edition was approved by the AWWA Board of Directors on Jan. 14, 2017.

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). 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.

* Persons outside the United States should contact the appropriate authority having jurisdiction.
† NSF International, 789 North Dixboro Road, Ann Arbor, MI 48113.

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 jurisdictions. 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 B602 addresses additives requirements in Sec. 4.3.3 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. 4.3.3 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 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. *Storage and Handling Precautions.* Copper sulfate pentahydrate crystals are highly soluble in water but do not react with water. Store this pesticide product in a dry place in its original container until ready for use. Store this product separately to prevent cross-contamination with other chemicals.

Proper attention to safety requirements should be followed. Protective clothing should be worn while handling copper sulfate pentahydrate, especially goggles to protect against dust or splashes into the eyes.

II.B. *Disposal.* As an algicide, copper sulfate pentahydrate is covered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) as a pesticide. It must be packaged and labeled as a pesticide for algae control. Packaging material that is empty must be disposed of in compliance with FIFRA and local regulations. Any spilled solid material or waste liquid material must be disposed of in compliance with FIFRA and

local regulations. Questions on proper disposal can be answered by the state pesticide control office or regional USEPA hazardous waste representative.

II.C. *NPDES Permitting.* Point source discharges of biological pesticides and chemical pesticides that leave a residue in waters of the United States are required to comply with National Pollutant Discharge Elimination System (NPDES) requirements. Operators wanting to apply copper sulfate to waters of the United States impaired for copper or sulfate must obtain coverage under an NPDES individual permit rather than the USEPA's Pesticide General Permit.

Information about the requirements for these permits can be found at https://www.epa.gov/npdes/pesticide-applications-1.

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 B602, Copper Sulfate, of latest revision.
2. Crystal size designation.
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 (Section 4).
5. 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 5.6, 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.
6. If required, a statement of maximum impurity content limits (Sec. 4.3.2) and analytical methods to be used to determine compliance with limits (Sec. 5.4 and Sec. 5.5).
7. Requirement that the chemical registration and labeling be in accord with USEPA procedures for an algicide (Sec. 6.1.1).
8. Net weight to be supplied (Sec. 6.2.2).
9. Whether alternative security measures have been adopted to replace or augment the security measures set out in Sec. 6.2.3 and 6.2.4.
10. If required, affidavit of compliance or certified analysis (Sec. 6.3).