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American Water Works Association
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AWWA Standard

Sodium Chloride

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American Water Works Association STANDARD Since 1881

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AWWA Standard

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Committee Personnel

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

Todd M. Minten, *Chair*

General Interest Members

A. Fisher, Water Quality Association, Lisle, Ill.	(AWWA)
J.J. Gemin, AECOM, Kitchener, Ont., Canada	(AWWA)
N.E. McTigue,* Standards Council Liaison, EE&T Inc., Newport News, Va.	(AWWA)
G.L. Pierson, HDR Engineering Inc., Seattle, Wash.	(AWWA)
E.S. Ralph,* Standards Engineer Liaison, AWWA, Denver, Colo.	(AWWA)
H. Steiman, Louis Berger Group, Needham, Mass.	(AWWA)
J. Yoshimura, CDM Smith, Carlsbad, Calif.	(AWWA)

Producer Members

P. Check, Clark Corporation, Windsor, Wis.	(AWWA)
F.J. DeSilva, ResinTech Inc., Gardena, Calif.	(AWWA)
D.M. Hambley, Anthratech Western Inc., Vancouver, B.C., Canada	(AWWA)
R.R. Jones, Hungerford & Terry Inc., Clayton, N.J.	(AWWA)

User Members

J.R. Leserman, Castaic Lake Water Agency, Santa Clarita, Calif.	(AWWA)
M.A. Melton, Aqua North Carolina, Denver, N.C.	(AWWA)
T.M. Minten, Chino Basin Desalter Authority, Riverside, Calif.	(AWWA)
T. O'Neill, City of Ontario, Ontario, Calif.	(AWWA)

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* Liaison, nonvoting

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Foreword

This foreword is for information only and is not a part of ANSI[*]/AWWA B200.

I. Introduction.

I.A. *Background.* Bedded salt[†] deposits are the remains of ancient seas that have evaporated. Bedded deposits occur in horizontal layers of the mineral halite. These layers range from several feet to hundreds of feet (meters) in thickness and are between several feet and several thousand feet (meters) below the surface of the earth. Some bedded deposits between 25,000 ft and 50,000 ft (7,600 m and 15,200 m) below the surface of the earth have been subjected to pressures that have caused the salt to move upward through overlying sedimentary layers toward the Earth's surface. Presently, these deposits exist as domes of nearly pure salt that may be as large as 2 mi (3.2 km) in diameter and are sometimes found within a few feet of the Earth's surface.

Concentrated brine[†] is found in surface lakes or underground pools. Along seacoasts, the oceans provide a virtually unlimited source of salt.

Rock salt is produced by the conventional room-and-pillar mining method. After sinking a shaft to the salt level, the face, or vertical area, is drilled and may be undercut. The drill holes are loaded with explosives, and the explosives are detonated. The fragmented salt that results is crushed, screened, transported to the shaft, and hoisted to the surface.

Solar salt is produced by the natural evaporation of seawater or more concentrated brine from surface lakes or underground formations in shallow ponds.

Solution-mined brine, from which evaporated salt is produced, is obtained by drilling wells into bedded or domal rock-salt deposits and injecting water into the deposit. The water dissolves the rock salt to produce a saturated brine. Salt deposits can be solution-mined through a single set of concentric pipes or through two or more separate pipes within the same deposit. The brine can then be evaporated to produce dry salt by vacuum-pan evaporation or modifications of vacuum-pan evaporation, grainer evaporation, or the Alberger process.

In vacuum-pan evaporation, cubic "vacuum-granulated" salt crystals form in the brine during evaporation and are removed as a slurry, which is then dewatered and dried.

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

[†] The terms *salt* and *brine* are used to describe the chemical compound sodium chloride (NaCl).

In the grainer process, small hoppers of salt form on the surface of a concentrated brine solution. These drop to the bottom of the grainer pan once they become large enough to overcome forces that hold them to the surface. The resultant flake salt is removed from the grainer by rakes and dried in a rotary dryer.

The Alberger process is a part vacuum-pan, part grainer operation in which cubic crystals are formed in a flash chamber and fed to the grainer pans. The seed crystals in the grainer pan produce a product that is a mixture of grainer-type flakes and flakes grown on seed crystals. The salt is centrifuged from the brine and dried as in the grainer process. Screens are used to separate the salt into specific grades.

Any of the three salt types (rock, solar, or vacuum-granulated and their compressed forms) can be used for regeneration of ion-exchange resins. The greater quantity of insoluble matter in some rock salt may require clarification of the brine. The accumulation of insolubles in the brine tank is a disadvantage because periodic removal is necessary. Vacuum-granulated salt has the highest purity and leaves no insoluble residue.

Salt for regeneration of ion-exchange units should be selected on the basis of the brine purity required. Cation-exchange processes usually require that the saturated brine contain less than 2,000 mg/L of calcium sulfate ($CaSO_4$). Anion-exchange processes require brine with low calcium and magnesium (Mg) content to produce a consistent quality of effluent water. When caustic soda or soda ash is added to the brine makeup, saturated brine with a calcium level of 0 to 10 mg/L (as Ca) should be used. The magnesium level should be 0 to 2 mg/L (as Mg).

I.B. *History.* The first edition of the AWWA standard for sodium chloride was approved as tentative by the AWWA Board of Directors on July 6, 1949. ANSI/AWWA B200 was made a standard on May 15, 1953. Revisions approved on June 5, 1964, provided new sections on information to be supplied by the purchaser and on an affidavit of compliance. The revisions also provided for the use of the ethylenediaminetetraacetic acid (EDTA) titrimetric method for determining calcium and magnesium, the permanganate titrimetric method for calcium, and the gravimetric method for magnesium.

The 1969 revisions of the standard provided for two types of salt that were not included in earlier standards: evaporated and compressed evaporated salt. At that time, the impurity limits for certain constituents were revised, the definitions section was revised and enlarged, the physical characteristics were modified regarding fineness requirements, and minor changes were made in the test methods. The 1978 edition combined evaporated salt and compressed evaporated salt and added a specification for compressed solar salt. The 1988 edition included an acceptance clause in the foreword and revised definitions, limits, and test procedures. The 1993 edition included a revised acceptance statement and definitions. The 1998 edition of ANSI/AWWA B200 was revised to conform to AWWA standard style. The ninth edition of ANSI/AWWA B200 was approved by the AWWA Board of Directors on June 11, 2006. The last revision was approved on Jan. 22, 2012. This edition was approved 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.

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 B200 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. 4.3.4 is a recommenda-

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

† NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105