Drinking water treatment chemicals — Health effects

NSF International Standard/ American National Standard

Developed by a consortium of:

- NSF International
- The American Water Works Association Research Foundation
- The Association of State Drinking Water Administrators
- The American Water Works Association

With support from:

- The U.S. Environmental Protection Agency under cooperative agreement CR-812144

NSF/ANSI 60 – 2004

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NSF International Standard/
American National Standard
for Drinking Water Additives —

Drinking water treatment chemicals — Health effects

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Foreword[2]

In response to a competitive request for proposals from the U.S. Environmental Protection Agency (USEPA), a Consortium led by NSF International (NSF) agreed to develop voluntary third-party consensus standards and a certification program for all direct and indirect drinking water additives. Other members of the Consortium include the American Water Works Association Research Foundation, the Association of State Drinking Water Administrators, the Conference of State Health and Environmental Managers, and the American Water Works Association. (COSHEM has since become inactive as an organization.) Each organization was represented on a steering committee with oversight responsibility for the administration of the cooperative agreement. The Steering Committee provided guidance on overall administration and management, and the member organizations will remain active after the expiration of the cooperative agreement.

The standards were developed using a voluntary consensus process. All parties at interest were represented, including regulatory agencies, industry, and water suppliers; consultants; and other users of products covered by the standards.

Two standards for additives products have been adopted. NSF/ANSI 61: *Drinking water system components - Health effects* currently covers indirect additives. NSF/ANSI 60, and subsequent product certification against it, will replace the USEPA Additives Advisory Program for drinking water treatment chemicals. For more information with regard to USEPA's actions, refer to the July 7, 1988 *Federal Register* (53FR25586).

NSF/ANSI 60 has been developed to establish minimum requirements for the control of potential adverse human health effects from products added to water for its treatment. It does not attempt to include product performance requirements, which are currently addressed in standards established by such organizations as the American Water Works Association, the American Society for Testing and Materials, and the American National Standards Institute. Because this Standard complements the standards of these organizations, it is recommended that products also meet the appropriate requirements specified in the standards of such organizations.

The Standard and the accompanying text are intended for voluntary use by certifying organizations, utilities, regulatory agencies, and/or manufacturers as a basis of providing assurances that adequate health protection exists for covered products.

When this Standard was revised in 2002, it included the following revisions:

– The Single Product Acceptable Concentration (SPAC) for bromate has been raised to 0.005 mg/L from the previous value of 0.001 mg/L. The change recognizes that limited sources of bromate exist in drinking water treatment systems. The two major sources of bromate in drinking water are ozonation of water containing bromate and use of hypochlorite treatment chemicals containing bromate (sodium and calcium hypochlorites). Thus a multiple source factor of 50% was applied to the USEPA MCL of 0.01 mg/L instead of the default 10% multiple source factor used to calculate the previous SPAC.

  The revision also recognizes the need to identify products that have a low bromate residual and are thus more suitable for use by water systems employing ozonation as a primary disinfection process or other water systems wishing to minimize the introduction of bromate into the finished water. Low bromate products must have a bromate residual not exceeding 0.001 mg/L.

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Both manufacturers and users of hypochlorite solutions should take all action feasible to minimize bromate residuals in drinking water. Beginning January 2005, the Single Product Acceptable Concentration (SPAC) for bromate will be lowered to 0.003 mg/L, unless it is demonstrated to the Joint Committee on Drinking Water Additives by the manufacturers of hypochlorite treatment chemicals that the drinking water industry demand for hypochlorite chemicals cannot be adequately met unless the SPAC remains at 0.005 mg/L. The Joint Committee on Drinking Water Additives will undertake periodic reviews of the industry's efforts to lower the bromate residuals in hypochlorite treatment chemicals, as well as efforts to improve analytical capabilities for bromate detection. After January 2005, the SPAC for bromate will next be reviewed after USEPA completes its Bromate Risk Characterization as called for in the Disinfection By-Products Rule Stage II agreement. If USEPA reduces the bromate MCL in the future, the SPAC for bromate will again be reevaluated.

This version of NSF/ANSI 60 – 2004 contains additions and updates of Organics/Pesticides considered contaminants by the U.S. Environmental Protection Agency and Health Canada in the tables and language in Annex D and E. The requirements of Annex D and E in Standard 60 are used as normative evaluation for the determination of product compliance with the health effects requirements of the standard and are updated annually. This revision ensures that USEPA and Health Canada guidance concentrations for chemicals in drinking water, when available, are used as pass/fail criteria in the referenced tables. This standard also includes a change to the effective date of the lowering of the bromate SPAC, change in location of language in Annex E to Annex D, and updates to Table E2.

Other revisions to this Standard includes the following:

– Methods in sections B3.3, B3.4, B3.6, B3.7, and B3.12.1 have been updated.

– Tracer dyes have been added to B.3.13 Method Z.

– Table D1 has numerous contaminants added, changes to some drinking water regulatory levels, and SPAC. Beginning in January 2005, the Single Product Acceptable Concentration (SPAC) for bromate will be lowered to 0.003 mg/L, unless it is demonstrated to the Joint Committee on Drinking Water Additives by the manufacturers of hypochlorite treatment chemicals that the drinking water industry demand for hypochlorite chemicals cannot be adequately met unless the SPAC remains at 0.005 mg/L.

– Several chemicals have been moved within Table D2 and several chemicals additions are included.

– Additional entries to Table D3 are included as well as updates to the TAC and SPAC requirements of acetone.

– Additional chemicals have been added to the Table D4- Threshold of Evaluation Chemicals.

– Additional entries have been included in Table E2, as well as updates to the CAS#.

This Standard was developed by the NSF Joint Committee on Drinking Water Additives using the consensus process described by the American National Standards Institute.

Suggestions for improvement of this Standard are welcome. Comments should be sent to Chair, Drinking Water Additives, c/o NSF International, Standards Department, PO Box 130140, Ann Arbor, Michigan 48113-0140, USA.

Consortium Organizations

NSF International

Popularly referred to as NSF, NSF International is a non-commercial agency. It is incorporated under the laws of Michigan as a not-for-profit organization devoted to research, education, and service. It seeks to solve problems involving man and his environment. It wishes to promote health and enrich the quality of life through conserving and improving that environment. Its fundamental principle of operation is to serve as a neutral medium in which business and industry, official regulatory agencies, and the public come together to deal with problems involving products, equipment, procedures, and services related to health and the environment. It is conceived and administered as a public service organization.

NSF is perhaps best known for its role in developing Standards and Criteria for equipment, products, and services that bear upon health. NSF was the lead organization in the Consortium responsible for developing this Standard. NSF conducts research; tests and evaluates equipment, products, and services for compliance with standards and criteria; and grants and controls the use of NSF registered Marks.

NSF offers product certification (Listing Services) for all products covered by its Standards. Each program has established policies governing the associated product evaluation, Listing Services, follow-up and enforcement activities. The NSF Listing Mark is widely recognized as a sign that the product or service to which it relates complies with the applicable NSF Standard(s).

AWWA Research Foundation

The mission of the American Water Works Association Research Foundation (AWWARF) is to sponsor practical, applied research in behalf of the drinking water industry of North America. The scope of the research program embraces all aspects of water supply operation, from development and maintenance of water resources to treatment technologies and water quality issues, from storage and distribution system operations to health effects studies and utility planning and management activities. AWWARF serves as the centralized industry institution for planning, managing, and funding cooperative research and development in drinking water, including the subsequent transfer of technology and results for practical application by the water utility community.

AWWARF's purpose in this cooperative program is to provide a communication link with the water utilities throughout North America and serve as the focal point for identification of research needs of the water supply industry with respect to the additives program.

The Association of State Drinking Water Administrators

The Association of State Drinking Water Administrators (ASDWA) is a non-profit organization whose eligible membership is comprised of drinking water program administrators in each of the 50 states and seven U.S. territories. Through the organization, representatives speak with a collective voice to Congressional committees, the United States Environmental Protection Agency, professional and trade associations, water utilities, and the general public on issues related to state drinking water programs. With its mission of protecting the public health through assurance of high quality drinking water, and promoting responsible, reasonable, and feasible drinking water programs at the state and federal levels, the Association is a valued contributor to the consortium and to the program. It provides the link between the additives program and the state drinking water programs.

The Conference of State Health and Environmental Managers

The Conference of State Health and Environmental Managers (COSHEM), known formerly as the Conference of State Sanitary Engineers (CSSE), is currently inactive as an organization. It brought to the consortium expertise and involvement of state health and environmental program managers. The Conference was the focal point for health concerns of all state environmental programs, including drinking water, wastewater, air, solid and hazardous wastes, radiological, occupational, health, and food. A standing committee on water supply focused on drinking water issues and kept the membership informed. The Conference played an important role early in the program through two-way communication with state health and environmental program decision makers.

American Water Works Association

The purpose for which the American Water Works Association (AWWA) is formed is to promote public health, safety, and welfare through the improvement of the quality and quantity of water delivered to the public and the development and furtherance of understanding of the problems relating thereto by:

– advancing the knowledge of the design, construction, operation, water treatment and management of water utilities, and developing standards for procedures, equipment, and materials used by public water supply systems;

– advancing the knowledge of problems involved in the development of resources, production, and distribution of safe and adequate water supplies;

– educating the public on the problems of water supply and promoting a spirit of cooperation between consumers and suppliers in solving these problems; and

– conducting research to determine the causes of problems of providing a safe and adequate water supply and proposing solutions thereto in an effort to improve the quality and quantity of the water supply provided to the public.

AWWA brings to the Consortium its established position as the largest public drinking water association in North America, with a broad range of membership, including utilities, consultants, manufacturers/ distributors/ agents, contractors, and other organizations with a direct interest in drinking water.

NSF/ANSI Standard
for Drinking Water Additives —

Drinking water treatment chemicals — Health effects

1 Purpose, scope, and normative references

1.1 Purpose

This Standard establishes minimum health effects requirements for the chemicals, the chemical contaminants, and the impurities that are directly added to drinking water from drinking water treatment chemicals. This Standard does not establish performance or taste and odor requirements for drinking water treatment chemicals.

1.2 Scope

This Standard contains health effects requirements for drinking water treatment chemicals that are directly added to water and are intended to be present in the finished water. This Standard also contains health effects requirements for other chemical products that are directly added to water but are not intended to be present in the finished water. Chemicals covered by this Standard include, but are not limited to, coagulation and flocculation chemicals, softening, precipitation, sequestering, pH adjustment, and corrosion/scale control chemicals, disinfection and oxidation chemicals, miscellaneous treatment chemicals, and miscellaneous water supply chemicals.

Contaminants produced as by-products through reaction of the treatment chemical with a constituent of the treated water are not covered by this Standard.

1.3 Normative references

The following documents contain requirements, which by reference in this text, constitute requirements of this Standard.

APHA, *Standard Methods for the Examination of Water and Wastewater*, twentieth edition[3]

ASTM E506-98. *Standard Test Method for Mercury in Liquid Chlorine*[4]

ASTM G22-76 (1996). *Standard Practice for Determining Resistance of Plastics to Bacteria*[4]

CGA G-6.2-1994. *Commodity Specification for Carbon Dioxide*[5]

[3] American Public Health Association (APHA), 800 I Street NW, Washington, DC 20001

[4] American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428-2859

[5] Compressed Gas Association (CGA), 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102