

NSF/ANSI 61 – 2003e

# Drinking water system components — 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  
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NSF/ANSI 61 – 2003e



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NSF/ANSI 61 – 2003e

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

**Drinking water system components —  
Health effects**

Standard Developer  
NSF International

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## Foreword<sup>2</sup>

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 provides guidance on overall administration and management of the cooperative agreement. Currently, the member organizations remain active in an oversight role.

Two standards for additives products were developed. NSF/ANSI 60 – *Drinking water treatment chemicals — Health effects* covers many of the water treatment chemicals, also known as direct additives. This Standard, NSF/ANSI 61 – *Drinking water system components — Health effects*, covers all indirect additives products and materials. Testing to determine the potential of a product to impart taste and/or odor to drinking water is not included in this Standard.

NSF/ANSI 61 was developed to establish minimum requirements for the control of potential adverse human health effects from products that contact drinking water. It does not attempt to include product performance requirements that are currently addressed in other voluntary consensus 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 performance standards of these organizations, it is recommended that products also meet the appropriate performance requirements specified in the standards of such organizations.

NSF/ANSI 61, and subsequent product certification against it, has replaced the USEPA Additives Advisory Program for drinking water system components. USEPA terminated its advisory role in April 1990. For more information with regard to USEPA's actions, refer to the July 7, 1988 *Federal Register* (53FR25586).

This 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. Product certification issues, including frequency of testing and requirements for follow-up testing, evaluation, enforcement, and other policy issues, are not addressed by this Standard.

Water contact materials in Drinking Water Treatment Units listed under NSF/ANSI 42, 44, 53, 55, 58, and 62 are tested and evaluated under a separate protocol from NSF/ANSI 61 with criteria which were developed specifically for the intended end-use. NSF 61 listing should not be additionally required for acceptance of these listed units for water contact application.

This version of NSF/ANSI 61 – 2003e contains editorial corrections to a table in annex E due to inconsistencies between the table that was balloted by the Joint Committee, Technical Committee and Council of Public Health consultants and the table included in NSF/ANSI 61 – 2003.

This version of the Standard (NSF/ANSI 61-2003) includes the following revisions:

- Representatives of Health Canada and US EPA reviewed the harmonized evaluation criteria for use in NSF drinking water standards. The evaluation criteria for fluoride based on the recommendation to use the Health Canada MAC of 1.5 mg/L for non-fluoridation chemical products (non-NSF/ANSI 60 applications) has been revised in Table D1. The value of 1.5 mg/L is based on the development of dental fluoro-

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sis (an aesthetic endpoint), versus the US EPA MCL of 4 mg/L, which is protective of skeletal fluorosis. A Single Product Allowable Concentration (SPAC) of 0.15 mg/L has been established, since drinking water contact materials are not anticipated to be an intentional source of fluoride in drinking water. The EPA also recently revised the arsenic MCL to 10 ppb, and this change is reflected in this Standard to the SPAC for this analyte.

- Additional entries to Table D4 for Threshold of evaluation chemicals are included.
- The requirements of NSF/ANSI 61, Annex A, were revised in 2000 to remove the tiered approach to establishing pass/fail criteria that had been in effect since the Standard was first adopted, and to replace that approach with one based on use of uncertainty factors to account for uncertainties and deficiencies in the toxicological database. Some of the criteria in Table E1 had been based on USEPA guidance concentrations but were lowered by the tier limitations. Those tier limitations have now been removed in accordance with the revised Annex A. The revisions have updated tables D3 & E1 to the requirements of NSF/ANSI 61, Annex A, as adopted in 2000.
- Pass/fail criteria that have completed external peer review by the NSF Health Advisory Board has been incorporated into table D2.

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, Joint Committee on Drinking Water Additives, c/o NSF International, Standards Department, PO Box 130140, Ann Arbor, Michigan 48113-0140, USA.

### **Consortium organizations<sup>3</sup>**

#### **NSF International**

Popularly referred to as NSF, NSF International is a noncommercial 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 nonprofit 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 (EPA), 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.

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### 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 of the American Water Works Association (AWWA) is to promote public health, safety, and welfare by improving the quality and increasing the quantity of water delivered to the public, and to developing and furthering an understanding of the problems relating thereto by:

- advancing the knowledge of the design, construction, operation, water treatment and management of water utilities;
- 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 membership that includes 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 system components –  
Health effects

**1 Purpose, scope, and normative references**

**1.1 Purpose**

This Standard establishes minimum health effects requirements for the chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems. This Standard does not establish performance, taste and odor, or microbial growth support requirements for drinking water system products, components, or materials.

**1.2 Scope**

**1.2.1** This Standard is intended to cover specific materials or products that come into contact with: drinking water, drinking water treatment chemicals, or both. The focus of the Standard is evaluation of contaminants or impurities imparted indirectly to drinking water. The products and materials covered include, but are not limited to, process media (carbon, sand, etc.), protective materials (coatings, linings, liners, etc.), joining and sealing materials (solvent cements, welding materials, gaskets, etc.), pipes and related products (pipes, tanks, fittings, etc.), mechanical devices used in treatment/transmission/distribution systems (valves, chlorinators, separation membranes, etc.), and mechanical plumbing devices (faucets, endpoint control valves, etc.).

**1.2.2** Point-of-use and point-of-entry drinking water treatment devices are not covered by the scope of this Standard.

**1.2.3** Fire hydrants are not covered by the scope of 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<sup>4</sup>

ASTM C31/C31M-00e1. *Standard Practice for Making and Curing Concrete Test Specimens in the Field*<sup>5</sup>

ASTM C109/C109M-99. *Standard Test Method for Compressive Strength of Hydraulic Cement Mortars*<sup>5</sup>

ASTM C192/C192M-00. *Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory*<sup>5</sup>

<sup>4</sup> American Public Health Association (APHA), 800 I Street, NW, Washington, DC 20001

<sup>5</sup> ASTM, Inc., 100 Barr Harbor Drive, West Conshohocken, PA 19428-2859