MUNICIPAL WATER MATTERS

JUNE 2017 ISSUE

A PUBLICATION BY NSF INTERNATIONAL'S

GLOBAL WATER DIVISION

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About NSF

NSF International is a global independent organization that writes standards, and tests and certifies products for the water, food, health sciences and consumer goods industries to minimize adverse health effects and protect the environment (nsf.org). Founded in 1944, NSF is committed to protecting human health and safety worldwide. Operating in more than 170 countries, NSF International is a Pan American Health Organization/World Health Organization (WHO) Collaborating Center on Food Safety, Water Quality and Indoor Environment.

NSF's global water services include testing, certification and auditing for municipal water treatment components and chemicals, plastic piping systems, plumbing fixtures and fittings, point-of-use and point-of-entry water systems and filters.

FAQ SECTION

Certification vs. Compliance – What's the Difference?

By Suzan Somo

Although the terms **certification** and **compliance** sound similar, they are, in fact, quite different. When a company makes the claim that it is compliant with an NSF standard, it is stating that the product adheres to the requirements of the standard, but it does not communicate how or by whom compliance was determined. Certification means that an independent third party has physically evaluated, tested and certified the product to be in conformance with all the requirements of the standard. When a company claims compliance, it is more than likely a self-claim; it may or may not be valid, and there is no way to know for sure. A product certified by NSF International, on the other hand, provides proof of compliance and lets you know the company adheres to the strict standards and procedures imposed by NSF certification.

From extensive product testing and material analyses to plant inspections, every aspect of a product's development is thoroughly evaluated before it can earn NSF certification. Most importantly, NSF certification is not a one-time event, but involves regular on-site audits of manufacturing facilities and regular surveillance of products to ensure that they continue to meet the same high standards required to maintain certification over time. If for any reason a product fails to meet one or more certification criteria, NSF requires that the identified issue is resolved within a specified timeframe in order to maintain certification. Products that earn NSF certification may claim to be "NSF certified" or "NSF listed" and will display the applicable NSF certification mark to show that they have been tested by one of today's most respected independent product testing and evaluating organizations, NSF International.

Here's how you can tell the difference between certification and compliance language:

NSF Certification Language	Compliance Language
"NSF certified/NSF listed"	"Approved by"
"Certified by NSF"	"Verified by"
"Tested and certified by NSF"	"Seal" or "Seal of approval"
"Tested and certified by NSF International"	"NSF approved"
"[ABC's Company]'s product is certified by NSF to NSF/ANSI #"	"Meets NSF requirements"

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How Can I Get Involved in A Joint Committee for an NSF Standard?

By Kathryn Foster

Joint committees for NSF standards are comprised of equal numbers of manufacturers, public health officials and users to ensure balanced voting input between all stakeholders. For example, there are currently 33 voting members of the Drinking Water Additives Committee, including federal and state regulators and water utility and plumbing representatives, manufacturers and representatives of testing and certifying organizations. The Joint Committee on Drinking Water Additives originally developed NSF/ANSI 61 in 1988 and continues to serve as the body that revises and maintains the standard to ensure its continued relevance.

In addition to the voting members, there are many additional members of the committee who hold an “observer” status and who regularly attend committee meetings and use their expertise and experience to provide feedback to the joint committee.

Committee meetings, which are typically held annually, are open to the public and anyone may propose changes to the standard. Attendees may participate in the meetings in person or remotely.

If you would like to get involved in the Joint Committee on Drinking Water Additives or any other NSF standard committee, please contact **standards@nsf.org** or follow the links below to each of our standards portals.

NSF/ANSI 60	NSF/ANSI 61	NSF/ANSI 50	Public Drinking Water Equipment Performance

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How Do I Verify a Product Is Certified? How Do I Search the NSF Listings?

By David Nance

Looking for a product's certification mark on the packaging or product works great in the field, but if you're needing to replace chemicals or components, how can you know they are certified prior to buying them? Additionally, how can you verify if a product is certified for the specific field use even if it has a certification mark? Reviewing the online listings of certified products from a third-party certifier, such as NSF International, is the best way to get the most up-to-date information on a product's certification status. You can find the NSF official certification listings at: **http://www.nsf.org/certified-products-systems**. At NSF, we try to make it as easy as possible to find certified products using our website. Go to **www.nsf.org**, click the orange "Search Certified Products & Systems" button in the top right corner and then:

> To search by company name, enter the name into the box near the top right of the screen. The results will display that company's certification(s) across all NSF standards and protocols.

OR

> To search for a specific standard, find the standard from the list and click the link. **Note:** NSF/ANSI 60, NSF/ANSI 61 and NSF/ANSI 372 are near the bottom of the page.

> Enter information and apply search filters to narrow down your results.

> See the list of certified products.

The NSF listings for NSF/ANSI 60, NSF/ANSI 61 and NSF/ANSI 372 have a wide range of search filters. These filters include:

> Manufacturer name

> Product trade name

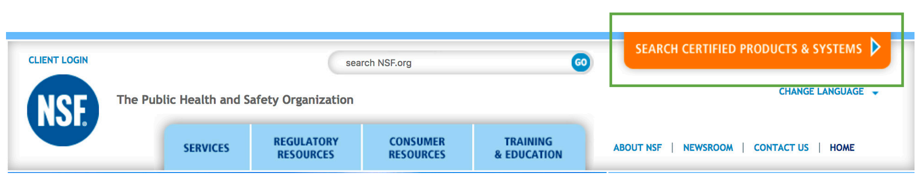
> Manufacturing facility location

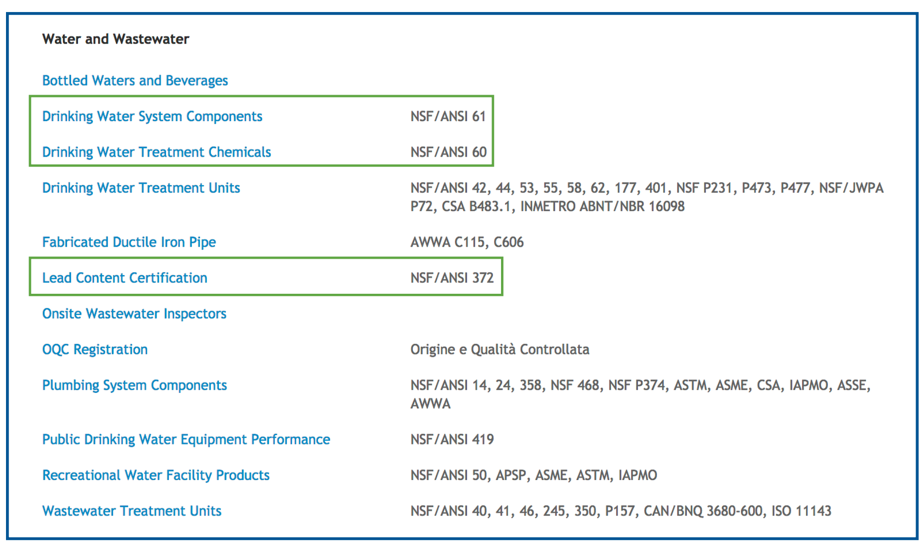
> Chemical name

> Product function or category

> Material type

If you are ever unsure of a product's certification status, or need additional assistance navigating the NSF listings, call or email the NSF Consumer Hotline directly at 1-800-673-8010 or **info@nsf.org**.





Water and Wastewater

Bottled Waters and Beverages	
Drinking Water System Components	NSF/ANSI 61
Drinking Water Treatment Chemicals	NSF/ANSI 60
Drinking Water Treatment Units	NSF/ANSI 42, 44, 53, 55, 58, 62, 177, 401, NSF P231, P473, P477, NSF/JWPA P72, CSA B483.1, INMETRO ABNT/NBR 16098
Fabricated Ductile Iron Pipe	AWWA C115, C606
Lead Content Certification	NSF/ANSI 372
Onsite Wastewater Inspectors	
OQC Registration	Origine e Qualità Controllata
Plumbing System Components	NSF/ANSI 14, 24, 358, NSF 468, NSF P374, ASTM, ASME, CSA, IAPMO, ASSE, AWWA
Public Drinking Water Equipment Performance	NSF/ANSI 419
Recreational Water Facility Products	NSF/ANSI 50, APSP, ASME, ASTM, IAPMO
Wastewater Treatment Units	NSF/ANSI 40, 41, 46, 245, 350, P157, CAN/BNQ 3680-600, ISO 11143

Product Security/Tamper-Evident Packaging Specifications for Water Treatment Chemicals

by Blake Stark

The NSF Joint Committee on Drinking Water Treatment Chemicals and the NSF Council of Public Health Consultants (CPHC) first adopted tamper-evident packaging requirements for drinking water treatment chemicals in 2012 as NSF/ANSI 60, Section 3.9 (Product Security). Similar requirements are also included in the American Water Works Association (AWWA) standards for water treatment chemicals. Under NSF/ANSI 60, Section 3.9, the packaging for chemicals certified to the standard is required to have effective measures to control access to the shipped product during the storage and distribution process, as well as to provide the chemical vendor and the purchaser/user of the product with the ability to detect tampering. Tamper-evident packaging is defined as packaging that has one or more indicators or barriers to entry which, if breached or missing, can reasonably be expected to provide visible evidence that the tampering has occurred. An informative annex (Annex F), "Examples of Tamper Evidence," was also published within NSF/ANSI 60.

In the four years of compliance experience since the product security requirements were introduced to NSF/ANSI 60, several suggestions (and requests for clarification within this section of the standard) were made, reviewed by the oversight committees and incorporated into Section 3.9 in the Fall 2016 edition of NSF/ANSI 60. The 2016 requirements for each packaging type are provided below.

Packaged Products

Properly constructed, labeled and sealed multi-wall containers such as bags and fiber drums constitute two forms of acceptable tamper-evident packaging.

Smaller containers do not require individual tamper-evident seals when shipped from the manufacturer in a larger container with acceptable seals or closures, provided the smaller containers are not intended to be sold individually as certified product (i.e. not labeled for individual sale/use for drinking water applications).

Bags and Supersacks

Packages for product shipped with visible openings must be constructed and properly sealed to make opening or substitution obvious to the purchaser. Packages must display the company's name and employ seals that are destroyed upon opening, or that make resealing unlikely (such as serialized tags), or other equivalent tamper-evident measures so that once opened, the tamper-evident feature of the packaging seal cannot be restored or readily duplicated.

Drums and Small Containers

Drums and small containers (of volume less than 1,000 liters) must be constructed and properly sealed to make opening or substitution obvious to the purchaser. Openings in the containers must be sealed with tamper-evident seals and the packages must display the company's name. Packages must employ seals that are destroyed upon opening, or that make resealing unlikely (such as ultrasonic seals), or other equivalent tamper-evident measures so that, once opened, the tamper-evident feature of the seal cannot be restored or readily duplicated.

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Bulk Shipments and Large Reusable Containers (Totes)

Bulk shipping containers, now defined as a container having a volume of more than 1,000 liters, must be secured during storage and distribution by employing one or more of the security measures below. These requirements are applicable to a single product shipment delivered to one or to multiple locations:

Tamper-Evident Seals

Containers used for bulk shipments must have tamper protection provided at all openings capable of loading or unloading chemicals. Vents must have tamper protection provided unless they are protected by construction that makes them incapable of receiving chemicals. Bulk containers may be sealed with a uniquely numbered, non-reusable, tamper-evident seal on each opening in the container. If tamper-evident seals are used, the seals shall remain in place until removed at the point of delivery. Seal numbers must be recorded and disclosed on shipping documents provided to the purchaser at the time of delivery and kept available for review by the certification body. If tamper-evident seals are used in milk run deliveries, a new seal must be applied after each partial off-loading and noted in the consignment records after each partial delivery.

Chain of Custody

An auditable continuous chain of custody protocol may be used to record secure distribution of the product. Maintaining a continuous chain of custody requires that the product is under the continuous control of bonded and designated individuals, that direct access to the product is restricted to those individuals and that the container is sealed or secured at all times during transport from the place of shipment to the place of delivery. If chain of custody is used, a completed chain of custody record showing continuous and secure custody between the certification holder to the purchaser must be provided by the transporter to the certification holder and to the purchaser at the time of delivery. The completed chain of custody record returned to the certification holder must be kept available for review by the certification body.

Where a paper-based chain of custody procedure is used for milk run deliveries, the documentation must have sufficient copies that a copy of the documentation shall be signed and provided to each consignee noting the quantity delivered at that destination and the balance remaining in the shipment. A copy of the complete series of deliveries must be provided by the transporter to the certification holder. Where an electronically-based chain of custody procedure is used for milk run deliveries, the record of the custody and deliveries must be provided by the transporter to the certification holder.

Acceptable Alternative Method(s)

An alternative method or methods, agreed upon by the certification holder and the purchaser, may be used for bulk shipments if the alternative method provides protection against tampering that is equivalent to the requirements detailed in NSF/ANSI 60. If alternative methods are used, the agreement with the purchaser and description of the alternative methods must be in written form and kept available for review by the certification body.

Tamper-Evident Integrity

The final section of the product security requirements covers tamper-evident integrity. This section specifies that tamper-evident features on all final product packaging, seals and bulk shipping containers must be designed to remain intact when handled in a reasonable manner during manufacturing, storage, shipment and delivery to the purchaser.

NSF Training and Education

By Theresa Bellish

NSF International will provide free webinars for water utilities, state drinking water agencies and public health officials interested in updates on NSF/ANSI 60, NSF/ ANSI 61 or other NSF standards. Content can be tailored to meet specific training goals including:

- **Certification of UV membranes to LT2 requirements**
- **Concrete site mix evaluation**
- **Pool chemical certification under NSF/ANSI 50**
- **Other issues of interest to specific agencies**

This complimentary service is an important resource for many state and local health departments and water utilities that need information or training on NSF standards or product certifications. If you are interested in having NSF conduct a webinar or other training platform such as on-site classroom training, please contact **watermarketing@nsf.org**.

Check out the existing recorded webinars on our website:

- **NSF/ANSI 61 and 419 Overview:** **www.nsf.org/newsroom/webinar-nsf-ansi-61-and-419-overview**
- **NSF/ANSI 50 Overview:** **www.nsf.org/newsroom/webinar-nsf-ansi-50-overview**

NSF International Evaluation for Concrete Site Mix Designs

By Theresa Bellish

While NSF/ANSI 61 covers cement and concrete products, there are often times when certified materials are not available for use and large concrete structures, such as water storage tanks, must use local sources for aggregate and cement. Concrete storage tank manufacturers usually have short lead times from when the contract is awarded to concrete pour dates, and certification is not feasible based on timelines and the fact that the on-site mix design is unique on a per-project basis. NSF has an evaluation program for concrete site mix designs for products such as water storage tanks and reservoirs that has a turnaround time of 30 days or less. The program evaluates the mix designs to the requirements of NSF/ANSI 61 to ensure that any heavy metal or other contaminants that leach into the water meet the requirements of NSF/ANSI 61. The mix design details are submitted to NSF, including the formulation with tolerances and suppliers, and include the cement, admixture, aggregate, water, fly ash, grinding aids and other applicable constituents used so that a complete technical review to the testing requirements of the standard can be conducted.

The required testing is performed on concrete cylinders of the specified mix design. The testing currently includes pH 5 and pH 10 for metals testing and pH 8 for organics testing for a five-day exposure period. Once the test results are evaluated, a letter of compliance or non-compliance to NSF/ANSI 61 is issued for the specified concrete mix design project. Examples of chemicals of concern that could impact a mix design's compliance to NSF/ANSI 61 include: aluminum, chromium, strontium, ethanolamine, diethanolamine, diethylaminoethanol, dimethylpropanediol, quinoline, thiocyanate, toluensulfonamide and methacrylic acid.

Currently 48 U.S. states have legislation, regulations or policies requiring materials and components that come in contact with potable water to have certification or compliance to NSF/ANSI 61. This evaluation program allows on-site constructed concrete tanks and reservoirs to demonstrate that compliance.

Importance of Corrosion Control

By Scott Randall

Corrosion control treatment of drinking water is necessary to prevent deterioration of pipes and fittings, which eventually leads to water loss and pressure loss. It also reduces the leaching of biologically toxic metals such as lead and cadmium. Corrosion control treatment also affects consumers' perceptions of the water quality by reducing metallic tastes, water color and odors.

Drinking water is inherently corrosive because it contains ions, salts, oxygen and residual disinfectant (chlorine disinfectants are by nature reactive compounds). Treatment chemicals that can reduce corrosion include sodium silicate and phosphates (e.g. zinc orthophosphate, sodium tripolyphosphate and sodium hexametaphosphate), as well as chemicals that impact the water characteristics and change how aggressive the water is toward a given material. These include pH adjusters such as sodium hydroxide or carbon dioxide, and compounds that increase alkalinity such as sodium bicarbonate.

Corrosion control treatment chemicals produce their beneficial effects through a variety of processes.

Silicates, phosphates and various insoluble carbonates (of iron, lead and zinc) form scale on the interior walls of pipes. The scale deposits are composed of many different compounds and are complex in structure, porosity and equilibrium with the water. Which compounds form and deposit depends on water characteristics such as pH, alkalinity and hardness. They are not uniform in their distribution, or their thickness. The scale deposits do not function as a true water barrier such as a paint or coating. Rather these porous deposits retard the electrochemical reactions between the water and the pipe surface by reducing the transport of ions between different sections of pipe surface.

Polyphosphates function less by contributing to scale deposition; rather they are more commonly used to remove undesirable scale. Pitting of the pipe surface frequently occurs in metal pipes. Corrosion compounds will sometimes deposit in and around the pit, and project out of the pipe wall. These porous deposits, called tubercules, do not prevent future corrosion and reduce the flow of water. Tuberculation can be controlled using polyphosphates, which increase the solubility of the corrosion products, moderate the pitting corrosion and can also address aesthetic affects.

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Corrosion control treatment chemicals must be selected and applied based on the water quality parameters of the treated water, as well as the pipe materials that constitute the system. The blend of corrosion control chemicals that works well in a high pH environment with mortar-lined pipe will not perform the same in low alkalinity water and ductile iron pipes. While it can be expensive in both time and money, it is prudent to test new corrosion blends under field conditions on pipe test rigs. For new pipe, or pipe without a protective scale layer, initial doses of the corrosion control chemicals will need to be high to favor scale deposition. After the scale layer has formed, which will take weeks to months, the dose should be lowered to a maintenance dose. Without the maintenance dose, the protective scale will be depleted by the water.

Because corrosion control treatment chemicals are continuously dosed into the drinking water system, it is important to purchase high quality products so that the treatment chemical itself does not contribute contaminants to the drinking water. Evaluation and contaminant testing to NSF/ANSI 60 ensures that these treatment products are safe and contain minimal contaminants. Typical test batteries for phosphates include regulated metals, radioactive isotopes and fluoride. Silicates are minimally tested for regulated metals. Products certified to NSF/ANSI 60 cannot contain regulated metals at more than one-tenth of the EPA maximum contaminant level (MCL).

Products that are certified to NSF/ANSI 60 can be found on NSF's official certification listings, which also allow searching by chemical name and by state, country or region. It is easy to verify that a specific treatment product is certified by searching by the treatment product's trade name or manufacturer name. To search for products certified by NSF International to NSF/ANSI 60, visit **info.nsf.org/Certified/PwsChemicals/**.

The Desalination Industry: Where Does Certification Fit?

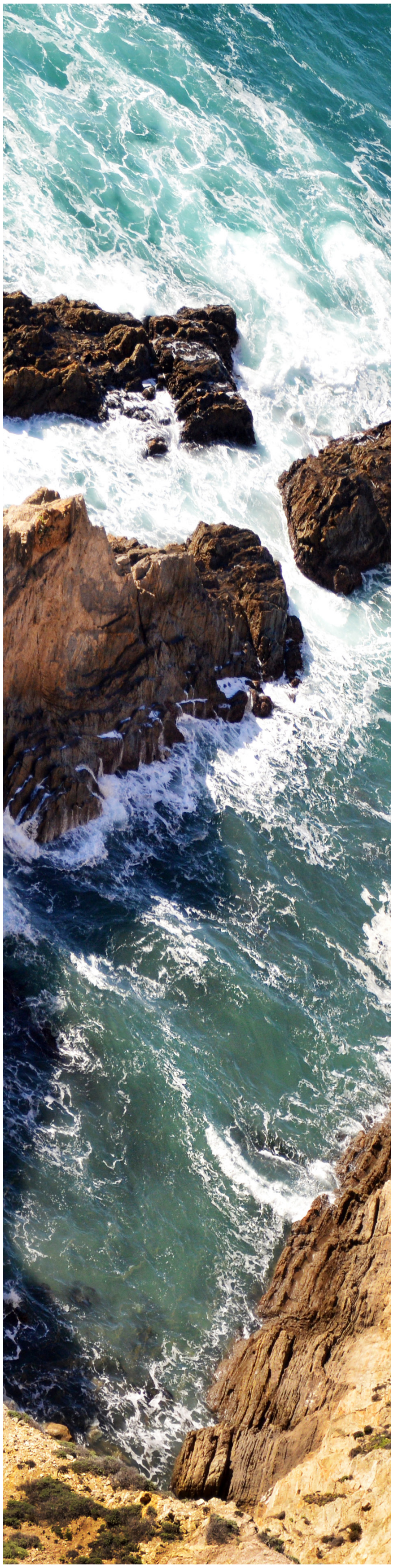
By David Nance

Droughts continue to force water conservation efforts in communities throughout the United States and across the globe. To meet water demands, even during drought conditions, communities close to seawater are considering or turning to seawater desalination. Through this process, water sources such as the Pacific Ocean have been called “drought proof.” The United States’ largest seawater desalination plant, the Claude “Bud” Lewis Carlsbad Desalination Plant in California, has been in operation for just over a year with a capacity of 50 million gallons per day (MGD). To turn ocean water into safe drinking water, water treatment facilities remove the dissolved salts prior to treatment with traditional chemicals. The two most common methods of desalination are reverse osmosis (RO) and distillation. The Carlsbad facility uses reverse osmosis for removing the high salt content of the ocean feed water. Reverse osmosis and distillation desalination plants are also being proposed in other coastal communities.

Drinking water from a desalination process is treated with typical chemicals for pH adjustment, corrosion control and disinfection downstream from the desalination process. There are several unique considerations because the desalination process removes most of the dissolved compounds. The high dissolved salt content in sea water makes it unsafe for drinking. Desalination removes the dissolved salts and minerals allowing for further treatment of the water. Reverse osmosis uses high pressure to move water through a semi-permeable membrane leaving salt and minerals behind in a more concentrated brine. Distillation heats the salt water to boiling, causing water evaporation while leaving behind the non-volatile salts. The evaporated water is condensed and collected. Both techniques remove dissolved solids, salts and minerals as well as other compounds and chemicals from the water.

The salt and other minerals left behind in the concentrate can clog RO membranes and hinder the distillation process by forming scale deposits. To combat scale deposit formation, antiscalants, often compounds with phosphate groups, are added to the feed water. Adding the scale control chemicals improves the RO membrane function over time. The antiscalant compounds may not be entirely removed during the RO or distillation process and can still persist in the final drinking water.

To ensure that any residual antiscalants in the water are at levels safe for consumers, the chemicals should be certified to NSF/ANSI 60: *Drinking Water Treatment Chemicals – Health Effects*. This certification not only verifies the safety of the chemical itself but also any possible contaminants in the chemical. Although most of the antiscalant is removed through the reverse osmosis or distillation process as it is not intended to be present in finished drinking water, NSF/ANSI 60 is conservative in its safety requirements and assumes some of the antiscalants are still present in the final, treated water. The assumptions about residual antiscalant in the drinking water depends on the type of chemical and which desalination process is used. Antiscalants are evaluated for safety based on the maximum use level in feed water, the percentage in the product and the amount to pass the RO membrane or volatize in the distillation unit. The lab test results are compared to the pass/fail criteria contained in NSF/ANSI 60 which are set by the U.S. EPA, Health Canada and third-party toxicology risk assessments. These safety evaluations cover acute and chronic exposures to chemicals.



Reverse osmosis and distillation processes remove not just the undesired salts but also any desired mineral content in the feed waters. The RO permeate and distillate waters have such low mineral content that the water needs to be softened prior to use. Softening chemicals are also covered by the scope of NSF/ANSI 60 to verify that they are not adding harmful contaminants into the water. Softening chemicals are added downstream from the RO or distillation process so they are evaluated against the maximum use level within the water with no additional assumptions.

The chemicals used as direct additives are not the only concern for drinking water safety. The treatment and transmission products and equipment used in a reverse osmosis or distillation process also need to be certified for safety. NSF/ANSI 61: *Drinking Water System Components – Health Effects* verifies that the treatment and transmission products used in any desalination process are not indirectly contributing chemicals at harmful levels into the drinking water. The products covered by NSF/ANSI 61 include the reverse osmosis membranes and pressure vessels, piping, fittings, valves, chemical generating and feeding systems, as well as any component in contact with the water. Utilizing NSF/ANSI 60 certified chemicals and NSF/ANSI 61 certified components when operating a desalination process provides the treatment facility the highest confidence that the drinking water produced is of the highest quality and safety.

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LWD-1512-0517