Contaminant Guide

& Selecting a Home Water Treatment Devices/System Guide & Tips.

The NSF Water Treatment Device Certification Program requires extensive product testing and unannounced audits of production facilities. The goal of this program is to provide assurance to consumers that the water treatment devices they are purchasing meet the design, material, and performance requirements of national standards.

Selecting and Using Water Treatment Devices

Many consumers have difficulty determining whether they actually need a water treatment system or they are not sure what type of system would be best for them. The choice regarding whether or not to install and use a water treatment system is up to you. If you have identified a specific contaminant whose presence in your water is causing you concern, you can use the drinking water treatment unit guide in this news letter, or visit www.nimbuswater.co.za to try to locate products that have been certified to reduce that specific contaminant.

Consumers are encouraged to educate themselves about the quality of their current drinking water supply. By attempting to identify the contaminants that are present in your water supply, you can then ensure that you are selecting a water treatment system that will be capable of treating those specific contaminants.

It is important to keep in mind that all home water treatment devices need regular maintenance to operate effectively. Please read the operating manual that comes with your water treatment system to ensure you are operating your system in accordance with the manufacturer's directions. Filter cartridges should be changed on a regular basis as recommended by the manufacturer.

Drinking Water Treatment Technologies

The products on the market today utilize many different technologies. NSF currently evaluates residential water treatment products that utilize one of the technologies listed below. The applicable NSF/ANSI standard that applies to each technology is shown in parentheses.

Technology	Description of Product Technology
Filtration (NSF/ANSI 42 & 53)	This is the physical process that occurs when liquids, gases, dissolved or suspended matter adhere to the surface of, or in the pores of, an adsorbent medium. Carbon filters use this technology to filter water.
Softeners (NSF/ANSI 44)	Water softening devices covered by Standard 44 use a cation exchange resin, regenerated with sodium chloride or potassium chloride, to reduce the amount of hardness (calcium, magnesium) in the water. The hardness ions in the water are replaced with sodium or potassium ions.
Ultraviolet Treatment (NSF/ANSI 55)	This treatment style uses ultraviolet light to disinfect water (Class A systems) or to reduce the amount of heterotrophic bacteria present in the water (Class B systems).
Reverse Osmosis (NSF/ANSI 58)	A process that reverses, by the application of pressure, the flow of water in a natural process of osmosis so that water passes from a more concentrated solution to a more dilute solution through a semi-permeable membrane. Most reverse osmosis systems incorporate pre- and post-filters along with the membrane itself.
Distillers (NSF/ANSI 62)	These systems heat water to the boiling point and then collect the water vapor as it condenses, leaving many of the contaminants behind, particularly the heavy metals. Some contaminants that convert readily into gases, such as volatile organic chemicals, may be carried over with the water vapor.

Styles of Water Treatment Devices

There are several styles of water treatment devices available on the market today. The most common styles are listed below, along with a brief description of each.

Point-of-Entry (POE) System
These systems typically treat most of the water entering a residence. Point-of-entry systems, or whole-house systems, are usually installed after the water meter. (Water meters are usually located in the basement of a house. In warm weather climates, the water meter may be in the garage or outside of the house.) A water softener is an example of a POE system.

Point-of-Use (POU) System
These systems typically treat water in batches and deliver water to a single tap, such as a kitchen sink faucet or an auxiliary faucet mounted next to the kitchen sink. The following information contains a brief explanation of different POU systems and points to consider when determining which style of a system will best suit your needs. The list is ordered from easiest installation/operation to more difficult or complex installation/operation and should not be construed as any type of recommendation.

Personal Water Bottle	This type of product consists of a bottle and a filter. The filter may be integrated with the push/pull cap of the filter bottle or may be integrated with a straw.
Pour Through	In pour-through products, gravity causes water to drip through a pitcher, which is usually stored in the refrigerator. They typically have a lower capacity (i.e. can filter fewer gallons) than other types of systems.
Faucet Mount	This type of filter is mounted on an existing kitchen sink faucet (usually replacing the aerator or installed immediately before the aerator). A diverter is usually used to direct water through the system when treated drinking water is desired.
Counter-Top Manual Fill	This system is usually placed on a counter and filled by pouring water into the system and activating it for a batch of water. (A manual fill distiller is usually considered to be a Counter-Top Manual Fill.)
Counter-Top Connected to Sink Faucet	This product is usually placed on a counter and connected by tubing to an existing kitchen sink faucet. The treated water dispenses out of a return tube from the kitchen faucet, or the treated water is dispensed from a spout on the system.
Plumbed-In	This type of system is usually installed under the sink and requires a permanent connection to an existing water pipe. The filter water is dispensed through the existing sink faucet.
Plumbed-In to Separate Tap	This product installs in the same manner as plumbed-in systems (above). However, the filter water is dispensed through an auxiliary faucet mounted next to the kitchen sink. People who live in apartments may not want to drill a hole in the counter top.

The Importance of Certification

In the last decade, interest in home water treatment products has grown tremendously. Unfortunately, it isn't always easy for consumers to know whether or not a particular product will actually be as safe and effective as the manufacturer claims at reducing various contaminants from your water supply.

NSF has a long history of developing and running independent product testing programs. In fact, we are the leading independent tester of home water treatment products on the market today. With our state-of-the-art laboratories and highly skilled staff, we have the knowledge and expertise to effectively evaluate water treatment products, including:

- Filtration filters (i.e. carbon, charcoal, KDF, ceramic)
- Reverse osmosis systems
- Water softeners
- Distillation systems
- Ultraviolet disinfection products.

As an added assurance for consumers, NSF requires that all products meet annual re-certification requirements. Unannounced plant inspections and periodic retesting of all certified products are required of all NSF-listed companies. This unique requirement allows us to ensure that the products we certify continue to meet all stated requirements year after year.

Drinking Water Treatment and Homeland Security

Under a grant from the U.S. Environmental Protection Agency (EPA), NSF International completed tests that verify the claims of three residential point-of-use water treatment systems. Point-of-use systems are designed to treat drinking water coming from a single dispensing point, such as a kitchen faucet, and usually treat only the cold water supply. The test results indicated that these residential drinking water treatment systems could reduce waterborne bacteria and viruses in the event of intentional contamination within a municipal or private water supply during a homeland security incident.

Testing was conducted in conjunction with the EPA National Homeland Security Research Center and Environmental Technology Verification (ETV) Program. The three water treatment devices tested reduced biological agent surrogates that represented possible biological contaminants. The surrogates were selected by experts from government agencies and academia working on water security. The units were tested using five different microorganisms, and the ability of the devices to reduce the concentration of each was measured and verified.

All three products tested are reverse osmosis systems, comprised of a membrane separation technology, that removes the biological surrogate microorganisms. Further information about these products, including test results, is available on the Nimbus WaterTec website, www.nimbuswater.co.za

Additional Information/Links

For a complete list of NSF-certified drinking water treatment products, please visit our drinking water treatment units online product database., or visit www.nimbuswater.co.za

Consumers can view our online Contaminant Guide at www.nimbuswater.co.za , which provides detailed information on many of the contaminants and treatment chemicals which are commonly found in water supplies.

You may also obtain an online copy of the Contaminant Reduction Testing Protocols used by NSF to test water treatment products for performance capabilities.

& Borehole Water vs Municipal Water

Overview

Even though many municipalities obtain their drinking water from wells, there are two main differences between municipal well water and private well water:

- Municipal water supplies are monitored for water quality by the municipality.
- Municipal water supplies are usually treated prior to distribution and consumption by consumers.

Because water supplied by a public utility is regulated be the EPA and individuals states, consumers of water supplied from a municipality can be quite confident that their water quality meets specific health guidelines. However, very few regulations exist to govern the quality of private well water supplies. Typically, well water is required to be evaluated for microbiological contamination only at the time the well is installed. Some health departments have begun requiring microbiological testing when the property changes ownership as well. During routine operation, however, it is up to the well owner to monitor and ensure the quality of their well water supply.

Basic Water Testing

There are several basic tests that private well owners may wish to consider having performed on their well water supplies to determine its quality. Many county health departments offer water testing, or you may want to consider using an accredited private testing laboratory.

- Microbiological testing for total coliform should be performed annually to determine if any bacteria are present in the water supply.
- To determine impact of nearby agricultural operations or on-site septic system, private well users should have their water analyzed each year for nitrates/nitrites.

In addition, private well water can be influenced by many local and regional factors. Some of these factors are natural, and others are the result of human activity. Although there are a wide variety of possible factors, some of the more common factors can be evaluated through the following tests:

- A hardness test can be performed to determine if a hard water condition exists. Hard water can leave skin feeling dry, cause hard water deposits on shiny surfaces, and build up over time in appliances.
- The pH level of your water should be checked to determine whether your water is acidic. Water with a low pH (less than 7.0) may have problems with leaching of copper and lead from residential plumbing. Copper leaching will be indicated with a bluish-green stain; an analysis for lead will need to be performed to determine if lead leaching is a problem.
- If the area is known to have high arsenic levels in the groundwater, a test for arsenic concentration should be performed at least annually.
- If there is a gas station nearby (within a 1/4 mile), a BTEX and MTBE analysis should be conducted. This is a volatile organic analysis to detect the presence of gasoline and/or the gasoline additive MTBE. This analysis should also be repeated annually.
- If you live in a region of the country where radon is known to be a problem, have your water analyzed for radon. If radon is detected, homeowners may also want to have their indoor air analyzed for radon as well.

- If you have a private well and live in an area where pesticide use is common, such as near a golf course, orchard, or agricultural area, you may also want to consider having your water analyzed for pesticides.

Odor and Color Problems

Well water users can sometimes experience odor or staining problems on appliances and laundry. Several of the more common complaints are described below.

- If there is a rotten egg odor associated with the well water, you may want to consider a hydrogen sulfide and methane analysis.
- If there is a musty or moldy odor with well water, an iron bacteria analysis should be conducted.
- If you are experiencing problems with red staining of fixtures, the iron level of the well water should be analyzed.
- If you are experiencing problems with brown or black staining of white laundry, have your water checked for manganese.

Once your water has been analyzed, you can compare your test results against EPA or state drinking water regulations to see if any contaminants are exceeding recommended levels. Once you have identified if any problems exist, you can begin your search for a specific treatment for your well water.

Treatment of Well Water

The treatment of well water will depend on the result of your water quality analysis. Some water quality problems are better handled through point-of-entry applications, such as color and odor problems, or conditions such as hardness. Other contaminants can be best handled through point-of-use devices.

Keep in mind that some treatment technologies may require that the homeowner pretreat the water in order for the product to be effective. For example, reverse osmosis systems designed for arsenic or nitrate reduction will last longer if hard water is softened prior to entering the unit. In addition, arsenic can be present in water in two forms - if your water contains trivalent arsenic (Arsenic 3 or Arsenite), prechlorination will be required prior to using a reverse osmosis system.

Following Up

If you decide to install a home water treatment device, it is important to ensure the system is installed and operated according to the manufacturer's instructions. In addition, it is important to conduct follow-up testing of the treated water to ensure the system is working well. The system may have to be adjusted depending upon its performance. Follow-up testing should be conducted several times throughout the first year of operation of the treatment system and after any adjustment made to the system.

You should continue to monitor the quality of your well water at least annually, even if you choose not to use a home water treatment system. This continuing analysis will help you to determine if the quality of your well water has changed during the previous year. If you installed a home water treatment product, the annual analysis

will also help you to determine how well your system is functioning and whether maintenance or replacement of components such as filter cartridges may be necessary.

Selecting a Water Treatment System

When selecting a water treatment system, it is important that you verify that the technology is safe and effective. One good way to ensure that water treatment products are both safe and effective is to use only certified water treatment devices. Certification by NSF to NSF/ANSI standards means that the manufacturer's performance claims have been validated and that the materials used in the construction of the product have been determined by toxicologists to be safe for use with potable water. In addition, NSF ensures that the product literature is correct and not misleading. Through ongoing certification audits of manufacturing facilities and periodic retesting of the system, we also ensure that the water treatment products we certify continue to meet rigorous public health standards year after year.

Additional Information

Please visit our online drinking water treatment unit product database if you wish to obtain further information on the water treatment products analyzed by NSF International. If you would like further information on the various contaminants commonly found in drinking water supplies, please checked out the Common Contaminants section of our consumer web pages.

For further questions regarding NSF or any of its product certification programs, please contact our Consumer Affairs Office.

Contaminant Guide

All sources of drinking water contain some naturally occurring contaminants. At low levels, most of these contaminants are not considered by the EPA to be harmful. Naturally occurring contaminants include radon, radium, and arsenic. In addition, people, animals, and industry can also add contaminants to our water supplies. Some of the more common contaminants that can be introduced into our water supplies include microorganisms, pesticides, and nitrates.

Below is a list of many of the common contaminants that can be found in public and private drinking water supplies. In addition, we have also included several chemicals commonly used to treat our drinking water supplies. If you would like to see further information on a specific contaminant, please select that contaminant.

2,4,5-TP
2,4-D
Alachlor
Arsenic
Asbestos
Atrazine
Bacteria
Barium
Cadmium
Carbufuran
Chloramine
Chlordane
Chlorides
Chlorine
Chlorination By-Products
Chromium
Copper
Cryptosporidium
Cysts
Dibromochloropropane
Ethylene Dibromide
Fluoride
Hardness
Heptachlor Epoxide
Hydrogen Sulfide
Lead

Lindane
Mercury
Methoxychlor
MTBE
o-dichlorobenzene
Nitrate
Nitrite
Particulate Matter
PCB
Perchlorates
Radium
Radon
Selenium
Sodium

Sulfates
Styrene
Taste and Odor
Total Dissolved Solids (TDS)
Toxaphene
Trichloroethylene (TCE)
Trihalomethanes (TTHM)
Turbidity
Volatile Organic Chemicals (VOCs)
Xylenes
Zinc