

Contaminant Reduction Testing for RO & Filters

By Emily Bolda

The process for certifying POU & POE devices to NSF standards

There are many different technologies that can be used to reduce the level of contaminants in water. The two most common that are tested in the Water Quality Assn.'s (WQA) product testing laboratory are reverse osmosis (RO) systems and filters. This testing is used to provide independent third-party certification for these types of products.

Testing for RO Systems

NSF/ANSI Standard 58 is used for RO drinking water systems. These systems incorporate the use of a membrane to remove contaminants from water. The membranes are either made of cellulose triacetate or are constructed of a thin film composite. They work by

manipulating the natural process of osmosis, in which water moves from an area of low dissolved solids to an area of high dissolved solids. Pressure is exerted on supply water, reversing this process and allowing the water itself to move through the membrane. Most of the contaminants in the form of ionic substances are rejected from passing through the membrane based on their chemical charge and are flushed away.

The most common test performed under NSF/ANSI 58 is total dissolved solids reduction. Other commonly tested claims at the WQA lab under this standard are reduction of arsenic, barium, cadmium, chromium, copper, fluoride, lead, mercury and selenium. For certification, RO systems are required to reduce the contaminant to

the levels prescribed in the standard.

For testing, the RO systems are installed in duplicate on the test bench and then are conditioned according to the manufacturer's instructions. A seven-day test protocol is performed at a dynamic (flowing) pressure of 50 psi. On the first day of the test, the daily production rate, recovery and efficiency are calculated, and influent and effluent samples are collected at prescribed points. On days two to five, influent and effluent samples are collected three times per day. After the fifth day, the systems are allowed to remain stagnant for 54 hours under pressure. After this stagnation period, influent and effluent samples are collected two more times. If the system has a storage tank, it also is drained of prescribed amounts of product water

The Gold Standard

WQA's Gold Seal Product Certification Program is dedicated to providing public health and safety services throughout the U.S. and globally. The program offers certification of all products and chemicals that make contact with drinking water, and WQA maintains an online database of all currently listed products in its Gold Seal Certified Product Listings.

WQA ensures through plant auditing and product testing that products comply with specific standards for quality and performance. Products certified to standards that require product testing are tested on a regular basis in WQA's ISO 17025-accredited laboratory located in Lisle, Ill. This testing

ensures that harmful contaminants do not come into contact with drinking water. Audits are performed at manufacturing facilities throughout the world to ensure continued compliance to the standards throughout the lifetime of the product.

WQA is fully accredited by the American National Standards Institute (ANSI) and Standards Council of Canada. The WQA Gold Seal program tests and certifies drinking water treatment units, drinking water system components, drinking water additives, pool and spa equipment, and food equipment to NSF/ANSI standards.

For more information on the Gold Seal program, contact WQA at goldseal@wqa.org or 630.505.0160.

at each sampling point. Analysis of these samples is used to calculate the percent reduction of the system for the contaminants being tested.

Testing for Filters

Filters can be manufactured using various types of media, which do the work of removing contaminants from water. There are several types of filters: faucet mount-style filters that can be attached to a kitchen or bathroom sink faucet, pour-through batch-type systems (or pitcher filters), and plumbed-in point-of-use (POU) or point-of-entry (POE) filters. Filters are tested to two standards based on whether the claim they are making is based on aesthetics or health.

NSF/ANSI Standard 42 is for filters making aesthetic claims. The commonly tested claims in the WQA lab under this standard are chlorine, chloramine, zinc, hydrogen sulfide, manganese, iron and pH neutralization. For certification, filters are required to reduce the contaminant to the level prescribed in the standard.

The most commonly tested reduction claims in the WQA lab for filters under NSF/ANSI 53, which covers health claims, are heavy metals such as arsenic, cadmium, copper, lead, mercury and selenium. Testing for metals is conducted under both high and low pH conditions. Other commonly tested contaminants are volatile organic chemicals as well as some inorganic contaminants such as nitrite/nitrate and fluoride.

All POU filters, with the exception of pitcher filters, are installed in duplicate on the test bench and conditioned according to the manufacturer's instructions. The test is run for 16 hours each day at a dynamic pressure of 60 psi, with each hour of the test operating under a certain test cycle, usually a 50/50, in which the filter runs for half of each hour, or a 10/90, in which the filter runs for six minutes of each hour.

Pitcher-type systems are tested based on the manufacturer's recommended use pattern. For aesthetic claims, this is done until the capacity of the filter claimed by the manufacturer is reached. For health claims, this is done until twice the claimed capacity is reached if the system does not have a performance indication device (PID), or 120% of the claimed capacity of the system if it does have a PID. Influent and effluent samples are collected at certain points as prescribed by the standard. Analysis of these samples is done to calculate

the percent reduction of the filter for the contaminants being tested.

POE testing is slightly different from POU testing. Only one unit is used, and the filter is tested continuously for 16 hours every day. Systems that include regeneration as part of the operating cycle are required to complete

three regeneration/operation cycles.

Contaminant reduction testing is an integral part of the work done to support WQA's Gold Seal Product Certification, and assures customers that the products they are purchasing are safe and have been tested to confirm their contaminant removal capability. *wqp*

Emily Bolda was formerly laboratory assistant for the Water Quality Assn. For more information, contact Tom Spoden at tspoden@wqa.org.

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