[An overview of standards and testing procedures for contaminant-reduction technologies]

CONTAMINANT reduction testing

By Emily Bolda

There are many different technologies that can be used to reduce the level of contaminants in water, but the two most common technologies tested are reverse osmosis (RO) systems and filters.

The NSF/ANSI Standard 58 is used for RO drinking water systems. RO systems incorporate the use of a membrane, which is what allows contaminants to be removed from the water. The membranes are either made of cellulose triacetate (CTA) or are constructed of a thin film composite (TFC).

These membranes work by manipulating the natural process of osmosis in which water will move 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; however, most of the contaminants in the form of ionic substances are rejected based on their chemical charge from passing through the membrane and are flushed away.

The most common test performed under this standard is total dissolved solids reduction. Other commonly tested claims are reduction of arsenic, barium, cadmium, chromium, copper, fluoride, lead, mercury and selenium.

RO systems are required to reduce the contaminant to the levels prescribed in the standard. The systems are installed in duplicate on the test bench and are then 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 (DPR), recovery and efficiency are calculated, and influent and effluent samples are collected at prescribed points.

On days two through five, influent and effluent samples are collected every six hours. 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 is also drained of prescribed amounts of product water at each sampling point. Analysis of these samples is used to calculate the percent reduction of the system.

Filters can be manufactured using various types of media, which is

what does the work to remove the contaminants from the water. There are several types of filters: faucet-mount 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 is an aesthetic or health claim.

Aesthetic & Health Claims

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

The most commonly tested reduction claims under NSF/ANSI Standard 53 are the heavy metals 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 16 hours of 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 cycle in which half of each hour the filter is running, or a 10/90 cycle in which six minutes of each hour the filter is running.

For pitcher-type systems, the 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 has 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.

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

Contaminant reduction testing ensures customers that the products they are purchasing are safe and have been tested to confirm their contaminant removal capability. *wqp*

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