

Information on Point of Use, Point of entry drinking water treatment units for PFAS Reduction

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What is a POU/POE water treatment system?

A Point of Use (POU) device is a treatment device installed on a single faucet or spigot used for the purpose of reducing contaminants in drinking water at that one tap. POU devices can sit on the counter, attach to the faucet, or be installed under the sink. A Point of Entry (POE) device is any unit installed to treat the water entering a house or building for the purpose of treating water distributed throughout the entire house or building.

Types of Filtration Systems for PFAS removal

Granular activated carbon (GAC), ion-exchange resin and reverse osmosis (RO) filters have been shown to be effective in removing PFAS. Both GAC and ion-exchange resin are commonly used by public water systems to remove PFOS and PFOA (the two most common PFAS compounds) from water sources. Reverse osmosis produces a concentrated waste stream from the filter back wash that needs to be disposed of so is not commonly used by public water systems. Disposal of the waste stream from a faucet-mounted RO home water treatment device is not an issue because the waste stream is so small.

One caution is that GAC and ion-exchange resin may not be as effective in removing the newer short-chain PFAS compounds, such as GenX. Based on a study from North Carolina, RO filters did the best job of removing GenX.

Certified POU/POE Filtration Systems

Several independent public health and safety organizations test and certify water treatment devices. Currently there is only one independent certification for PFAS removal.

NSF International developed standards for all materials and products that treat or come in contact with drinking water. They test and certify devices and materials to verify manufacturers' claims. In 2016, NSF developed a [test protocol \(P473\)](#) to certify the performance of products that reduce PFOA and PFOS in drinking water.

In order to be NSF certified for PFOA and PFOS reduction, a water filter must reduce the PFOA and PFOS levels of an influent challenge water of 1.0 ug/L (1,000 parts per trillion or ppt) of PFOS and 0.5 ug/L (500 ppt) of PFOA. The filter must reduce the combined PFOA and PFOS levels to below the EPA HA level of 70 ppt. Currently, 71 products from seven manufacturers are certified to meet this standard. To find NSF International certified PFOA/PFOS water filters, please see NSF International's [certification listings for PFOA/PFOS filters](#).

However, the certification requires that the filter reduce only PFOS and PFOA and only to EPA's health advisory level of 70 ppt. Drinking water can contain other PFAS chemicals, sometimes at higher levels than PFOS and PFOA.

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Non-Certified Filtration Systems

Currently, there are no independent organizations testing and certifying POU/POE filters for removal of PFOS and PFOA down to 20 ppt, nor are there organizations testing POU/POE devices for removal of all PFAS compounds. However, there has been testing done by other states and academic institutions.

Filter Testing by State Agencies

In 2016, the Minnesota Department of Health evaluated a point-of-use home water treatment device for its effectiveness in removing seven (7) PFAS chemicals. They tested a faucet-mounted carbon filter made by PUR. The filter removed six of the seven PFAS chemicals down to non-detect levels (reporting levels between 25-50 ppt). See the [evaluation](#). At that time the manufacturer was not making any claims about PFAS removal. PUR currently sells this model for \$24.99 with \$17.99 replacement filters.

Filter Testing by Academic Institutions

Professor Detlef Knappe and his research group at North Carolina State University have tested **at least 27** home-use filters.

Last year, Knappe told the Star News of Wilmington, N.C. that an under-sink reverse osmosis filter was probably the best choice for home treatment. He said it's not only effective, but its continued effectiveness can be easily verified with an electrical conductivity tester, an inexpensive tool that people can use at home.

Detailed testing results were **publicly presented in 2017** for four under-sink reverse osmosis filters and one whole-house activated carbon filter. These filters were tested for removal of a dozen PFAS chemicals, including both long-chain and short-chain compounds.

Three out of four reverse osmosis filters reduced the long-chain compounds to below 10 ppt, with the other filter reducing them to a slightly higher level. The four reverse osmosis systems also removed between 95 and 99 percent of short-chain compounds.

One whole-house activated charcoal filter from Aquasana was tested. It provided no reduction of PFAS levels. In contrast, an activated carbon filter made by Hydroviv delivered results similar to the reverse osmosis filters.

Maintenance

For any filtration system to be effective, it must be maintained. Follow the manufacturer's instructions, and change the cartridges as often as recommended. Most systems include an indicator to notify you when the cartridges or the RO membrane should be replaced.

Cartridge Disposal

The cartridges may be disposed of in household trash. They are not considered hazardous waste.

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What have been recommended in other states on POU/POE and PFAS?

Some states have issued recommendations for water filters to remove PFOA and PFOS, including:

- **Michigan;**
- **Minnesota;**
- **New Hampshire;**
- **New Jersey; and**
- **New York.**

Guidance and factsheet documents from these states recommend two types of filters for removing PFAS chemicals: activated carbon and reverse osmosis. The states provide information on the pluses and minuses of the two types, and tips on how to maintain them to ensure effective filtering. They also compare the two types of filter installations: “point of use,” which are installed under the kitchen sink or in the refrigerator, and “point of entry,” which treat the water for the whole house.

In communities with the worst contamination, such as in **Minnesota** or **Michigan**, whole-house filtration is often used. It is effective, but expensive in comparison to point-of-use filtration and may not be necessary in most cases. Further, since whole-house systems also remove chlorine, they may introduce additional risks of harmful bacterial growth in plumbing.

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Typical Cost for POU or POE units

Culligan’s NSF P473 certified product is an under-the-counter RO unit plumbed to a separate tap. Mark Baldi spoke with Everett Windover of Culligan in Vermont. Mr. Windover was referred to him by John Schmeltzer of VT DEC. Everett has been involved with mass distribution of point-of-use systems in VT, NH, and NY. According to John Schmeltzer, in VT POU installation ranges between \$800 - \$1,000 with annual maintenance around \$400/yr. The VT contract with Culligan includes installation and maintenance & monitoring. Everett did say that Culligan would work out bulk pricing if needed. The POU systems that Culligan is installing meets NSF certified performance standards The units are installed under a sink and come with a storage tank to ensure good flow. Mr. Windover also said that in the other states Culligan has attended town meetings to provide information about the systems and installation. Mr. Windover’s phone number is 802-598-4400; his email is windover@culligan4u.com.

Aquasana has an NSF P473 certified POU that attaches directly to the faucet. It is currently selling for \$57.13 (<https://www.aquasana.com/drinking-water-filter-systems/countertop-attached>). Replacement filters are \$59.99 (<https://www.aquasana.com/drinking-water-filter-systems/countertop-attached>). The service life of each filter set is 450 gallons/6 months. The performance data (http://cdn.aquasana.com/assets/AQ-4000_Performance_Data.pdf?_ga=2.99080158.1112720815.1554917590-78532145.1554917590)

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indicates that it was challenge tested with 1500 ppt of PFOA/PFOS and reduced these contaminants by 96%.

The cost estimates for Reverse Osmosis (RO) filters in the [presentation](#) by Professor Detlef Knappe at North Carolina State University are as follows:

- Purchase cost:
 - ~\$200 (do-it-yourself)
 - >\$1,000 (with installation)
- Maintenance:
 - Monitoring (~\$10)
 - Annual maintenance (~\$30 do-it-yourself, ~\$200 professional)
 - Change RO membrane every 3-5 years (~\$100 do-it yourself, ~\$300 professional)