PERFORMANCE VALIDATION TEST

PFAS removal residential Pallas RO

Pollet Water Group

PFAS (Per/Poly Fluoroalkyl substances) are anthropogenic compounds that has been used for many decades in industrial and commercial application. Their unique properties of resistance to heat and water have made them popular in products such as waterproof fabrics and firefighting forms. However, their strong chemical structure makes their breakdown very difficult and this results in their persistence in environment and human body. Consumption of drinking water contaminated with PFAS may result in adverse health effects including developmental issues, hormone disruption and increased risk of certain cancers. The European drinking water directive suggests a limit value of 100 ng/L for PFAS 20 as well as a limit of 500 ng/L for total PFAS concentration. Considering the importance of removing PFAS from drinking water, Pollet water group investigated the removal of PFAS from water using the domestic RO unit.

The investigation utilized a standard Pallas RO system comprising pre- and post-reverse osmosis (RO) activated carbon filters along with a polyamide RO unit. The removal efficiency of various types of PFAS by domestic RO were assessed. Tap water spiked with an elevated concentration of 500 ng/L was used as the feed solution, simulating a worst-case scenario. The samples were analyzed through an external laboratory using Liquid chromatography- tandem mass spectrometry method following the standards (CMA/3/D and WAC/IV/A/025) accredited by Energy and environmental information system for the Flemish Region (EMIS).

Test conditions

PFAS types	Chain length	Feed water Conc. (ng/L)
PFAS 20 sum		500
PFBA	SC-4	390
PFBS	SC-4	23
PFPeA	SC-5	57
PFHxA	SC-6	32
HFPO-DA	SC-6	34
PFBSA	SC-4	23

Table 1. Concentrations of PFAS in feed solution

RO operation	
Membrane type	Pallas 80gpd
Activated carbon operation	
AC components	CTO carbon block (5 micron)
	Coconut shell based post-carbon
Contact time	9 minutes

Table 2. Test conditions

Results

The RO system was successful in reducing the sum PFAS20 concentration below the acceptable limit of 100 ng/L (EU water directive) when tested with extreme initial concentration. The Sum PFAS20 were removed to a level lower than the detection limit (<50 ng/L), at least exceeding 90% removal. The RO system was able to remove the challenging short chain PFBA, which are difficult to remove with other treatment techniques, below the detection limit of 19 ng/L, exhibiting a removal of > 95%. The domestic RO system is anticipated to effectively remove longer chain PFAS, similar to or even better than it does with short chain PFAS. As a result, it can be affirmed that the RO system is a suitable choice for removing PFAS from drinking water, ensuring it meets safe limits.