

PERFORMANCE VALIDATION REPORT

PFAS removal using Pallas PFAS Cartridge

PFAS, which stands for Per/Poly Fluoroalkyl substances, are synthetic compounds that have seen extensive use in industrial and commercial settings for numerous decades. Nonetheless, due to their robust chemical composition, breaking them down is a challenging task, leading to their long-lasting presence in both the environment and the human body. Ingesting drinking water contaminated with PFAS can lead to detrimental health effects, including developmental problems, disruptions in hormone function, and an elevated risk of certain types of cancer. The European drinking water directive suggests a limit value of 100 ng/L for SUM of PFAS as well as a limit of 500 ng/L for Total PFAS concentration. Considering the importance of removing PFAS from drinking water, the removal of PFAS from water using the Pallas PFAS cartridge was investigated.

The investigation utilized a standard Pallas PFAS cartridge. Tap water spiked with a total PFAS concentration of 830 ng/L and a PFAS 20 concentration of 750 ng/L was used as the feed solution, simulating a worst-case scenario. After the filtration test, the feed and permeate samples were analyzed at an external laboratory using the Liquid chromatography- Tandem Mass Spectrometry method following the standards (CMA/3/D and WAC/IV/A/025) accredited by the Energy and environmental information system for the Flemish Region (EMIS), Flemish regulations on environmental recognitions (VLAREL) and Belgian accreditation body (BELAC).

Test conditions

PFAS types	Chain length	Feed water Conc. (ng/L)	Filtration operation	
Total PFAS		830	Cartridge type	Pallas PFAS
Sum PFAS 20		750		Cartridge Large
Perfluorobutanoic acid (PFBA)	SC-4	560	Tested Flowrate	1.6 lpm
Perfluorobutane sulfonic acid (PFBS)	SC-4	33		
Perfluoropentanoic acid (PFPeA)	SC-5	96	Diameter x Height	87.4 x 530
Perfluorohexanoic acid (PFHxA)	SC-6	56		
Perfluoro-2-propoxypropanoic acid (HFPO-DA)	SC-6	45	Table 2. System characteristics	
Perfluoro-n-butanessulfonamide (PFBSA)	SC-4	37		

Table 1. Concentrations of PFAS in feed solution

Results

When tested with extreme initial PFAS concentrations, the unit was successful in reducing the total PFAS and SUM PFAS20 concentrations below the acceptable limit of 500 and 100 ng/L (EU drinking water directive), respectively. It should be noted that they were removed to a level lower than the detection limit (<50 ng/L), at least exceeding 94% removal. The unit was able to remove the challenging short-chain PFBA, which is difficult to remove with other treatment techniques, below the detection limit, exhibiting a removal exceeding 96%. The Pallas unit 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 Pallas PFAS Cartridge is a suitable choice for removing PFAS from drinking water, ensuring it meets the current safe limits.

