

Cleaning PFAS-contaminated systems and surfaces

Envytech offers clean-up services for PFAS contaminated surfaces and systems. The method includes treatment of rinse water from washing of PFAS-contaminated surfaces, and generates minimal waste while reducing PFAS concentrations by more than 99%.

ABOUT THE TREATMENT

As PFAS-containing AFFF products are replaced by fluorine-free foams, rinsing and flushing out the systems, tanks, and proportioning piping is essential. However, residual PFAS compounds in the system leads to on-going and long-term recontamination of these replacement foams.

Envytech use PerflourAd®, which is an efficient and cost-effective solution to both flushing the system and treating the rinse water. PerflourAd® is a natural, plant-based product researched by Cornelsen GmbH in Germany. The product is specifically designed to clean PFAS from water and to dissolve PFAS crystals from surfaces. When PerflourAd® is dissolved in hot water, it binds the PFAS molecules and traps them in floccs. The washing liquid is then collected, and as the floccs are heavier than water, PFAS can be removed through a combination of sedimentation and filtration.

As the product is completely natural, it does not pose any chemical compatibility risk with materials and parts found in fire fighting systems and does not cause corrosion. In addition, the product is safe for operators to use/handle and does not require the circulating water to be at a high temperature. We can work effectively with unheated water and would not usually work with water above 35-40°C, which is a temperature range that stays within the temperature specifications of HDPE, rubber seals, hoses, painted/coated steel etc. found on fire fighting systems - as well as being safe for operators.

In order to provide a site specific quote we need to see the design plans for the system/systems in question and we also need to do a visit to the site.

ANALYSIS FOR VERIFICATION OF EFFECTIVENESS

In order to verify the effectiveness of the treatment, sampling of water in the system will be carried out before and after the treatment is performed. Samples will be sent for analysis of both PFAS substances and precursors which can be a significant source of PFAS when these break down over time. Precursors are analysed using so called TOP (Total oxidizable precursor) analysis, which includes breaking down of organic substances added to PFAS molecules to create unknown substances that in time will break down to known and regulated PFAS substances. This is to give a comprehensive picture of the treatment's potential. Since there are tens of thousands of PFAS substances, many that cannot be analysed, we also perform a so-called TOF - Total Fluorine analysis.

This way, we can "benchmark" our results and demonstrate the level of cleaning even more clearly. This contributes to understanding the likely toxicity and bioaccumulation effects of the PFAS substances present.

GUIDELINES

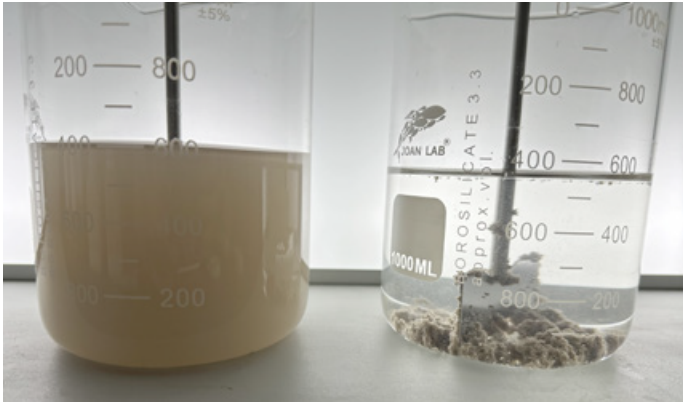
As there are currently no set guidelines for this type of work, we will present a report per subsystem containing original lab reports as well as compilations comparing levels in the system before and after treatment, with we compare with the directive from REACH regarding 25 ug/l for PFOA and its salts and 1000 ug/l for precursors. However, expected results from cleaning with PerflourAd® and method of execution include levels below 10 ng/l (0.01 ug/l) per analysed PFAS and below 250 ng/l (0.250 ug/l) for telomeres or so-called Capstones.



PFAS	Pre-rinsing		Final/postrinsing	
	Pre-rinse (ng/l)	Sample 1 (ng/l)	Final (ng/l)	Sample 2 (ng/l)
PFBA	36 000	6500	<50	<10
PFPeA	26 230	9900	<50	10
PFHxA	210 420	60 000	<50	14
PFHpA	7150	2700	<50	<10
PFOA	48 000	12 000	1.6	<10
PFNA	670	<1000	<50	<10
PFDA	3990	<1000	<50	<10
PFUnA	1080	<1000	<50	<10
PFDoA	3940	<1000	<50	<10
PFBS	9170	2200	<50	<10
PFHxS	63 690	11 000	<50	<10
PFHpS	560	<2000	<50	<10
PFOS	320 420	110 000	12	16
PFDS	630	<5000	<50	<10

Table 1: Results from treatment of fire suppression (sprinkler) systems using PerflourAd®.

Treatment of PFAS-contaminated waters by flocculation and precipitation using PerfluorAd®



ABOUT THE TREATMENT

In the past it has been difficult to remove PFAS compounds from waters with high dissolved organic content (DOC) and high chemical oxygen demand (COD). If your water has a high PFAS concentration (> 1000 ng/l) and low to medium flow rates, PerfluorAd® represents an efficient and cost-effective solution for PFAS removal. PerfluorAd® is a flocculant that can be added to water in the same way as other flocculation and precipitation products, and works similarly, but instead of removing suspended particles, PerfluorAd® removes PFAS. The PFAS is trapped in flocs and precipitate out of the water, settling at the bottom of settling tanks where it can be removed together with settled particles.

ADVANTAGES

- Removes up to 99% of PFAS
- Low cost
- Reliable
- Can be used in existing systems for flocculation / precipitation

EXECUTION

To determine expected removal rates for PerfluorAd® on specific waters, as well as to determine dosage and cost for treatment, simple bench scale flocculation test can be performed. The test is carried out at the Envytech laboratory in Stockholm. The shipping process is made easy as Envytech is cooperating with Eurofins, and together we offer a test and sampling procedure guaranteeing equal analysis using accredited PFAS analysis methods for untreated and treated waters, as well as a professional performance of a bench scale flocculation test. The results will be reported in a small report where recommended dosage, design and cost for treatment will be outlined.

PerfluorAd

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