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Case study on removing PFAS
from wastewater in a leather tannery in Italy

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Competitively testing the removal of PFOA and PFOS – Lewatit® TP 108 DW vs. granular activated carbon and competition resin

Application

PFAS is a family of highly efficient, surface-active agents used in various applications such as firefighting foams, water-repellent textiles, galvanics, and lithium-ion batteries. However, when they are not treated and disposed off thoroughly they can leach into the ground- and surface water, where they persist as a result of their high chemical stability. Due to their hazardous potential, threshold limits for drinking water have been strictly set. Standard technologies such as activated carbon cannot usually comply with the low effluent limits, especially for short-chain PFAS, which represents a major challenge in terms of remediation. On the other hand, reverse osmosis, an alternative technology for PFAS removal, generates large amounts of aqueous concentrates that need to be treated. Therefore, LANXESS has developed new types of selective ion exchange resins (IERs) that reliably reduce PFAS levels below the permissible drinking water limits and which can safely be disposed of after use.

At a glance

The competitive testing in this case study highlights the unique features of the PFAS-selective Lewatit® TP 108 DW ion exchange resin: long lifetime, saves CAPEX, OPEX, and pure water.

Location	Arzignano, Vicenza, Italy
Application	Groundwater remediation
PFAS contamination source	Industrial, from leather tanning industry
Local PFAS limits (valid since 2024)	PFAS TOT < 0.5 µg/lt ∑PFAS < 0.1 µg/lt for C4-C13
Installed product	Lewatit® TP 108 DW
Installed volume	75 liters
Purified water volume	4,500 m^3

Lewatit®

Competitive testing and performance

This case study demonstrates the competitive performance of our PFAS-selective Lewatit® TP 108 DW resin compared to granular activated carbon (GAC) and a competition ion exchange resin when removing perfluoroocatanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). Lewatit® TP 108 DW outperformed GAC and the competition resin, showing the removal of PFAS up to the detection limit over the time tested. The competition resin showed a breakthrough after 45,000 BV for PFOA. GAC broke after 23,000 BV for PFOA and after 45,000 BV for PFOS. This pilot plant treated 4,500 cubic meters of wastewater from a leather tannery plant, used 75 liters of ion exchange resin and was operated for a period of six months.

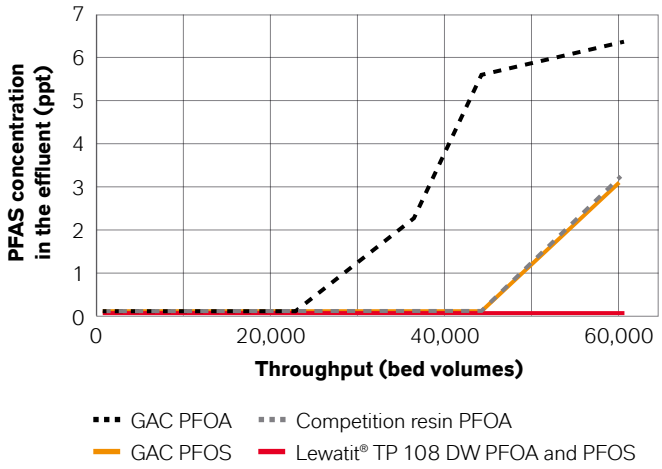
Conclusion

This case study highlights the excellent performance of PFAS-selective Lewatit® ion exchange resins, which has various benefits, including substantial cost savings. Ion exchange resins (IERs) can be operated for about five times longer than granular activated carbon (GAC). As a result, customers need to replace the Lewatit® ion exchange resin less frequently and reduce their investment costs quite substantially. Remarkably, the much shorter empty bed contact time EBCT of IERs enables a smaller footprint while treating a larger volume of wastewater.

Figure 1: Operating conditions and results of competitive testing of PFOA and PFOS removal in an Italian pilot plant; red: Lewatit® TP 108 DW, gray: competition resin, black GAC

Operating conditions

Resin in Cl form	
PFOS	61 ppt
PFOA	44 ppt
Resin volume	75 liters
Flow	1100 l/h
pH	7
Specific flow	15 BV/h
Temperature	20°C
Breakthrough	>1 ppt



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