

# QUALITY DETOXIFIES.



QUALITY WORKS.

**LANXESS**  
Energizing Chemistry

## Efficient removal of per- and polyfluorinated alkyl substances from potable water with **Lewatit® TP 108 DW**

**Lewatit® TP 108 DW** is a new gel-type strong base anion exchange resin that is highly efficient for the removal of per- and polyfluorinated alkyl substances (PFAS). The high selectivity of the resin towards PFAS facilitates production of water with PFAS contents close to detection limits from various contaminated sources.

### Applications

PFAS is a family of highly efficient surface-active agents used in various applications such as firefighting foams, water repellent textiles, cook ware, galvanics, and paints. However, when they are not handled and disposed of thoroughly they can leach into the groundwater where they persist as a result of their high chemical stability. Due to their hazardous potential, drinking water limits have been set very strictly. Recently, the US states of Michigan and New York reduced the perfluorononanoic acid (PFNA) limit in drinking water to 6 ppt. Standard technologies such as activated carbon usually cannot comply with the low effluent limits for short-chain PFAS that represent the biggest challenge in remediation. On the other hand, Reverse Osmosis, an alternative technology for PFAS removal, generates large amounts of aqueous concentrates that have to be handled. Therefore, LANXESS has developed a new type of selective ion exchange resin (IER) that reduces PFAS reliably below the drinking water limits and which can safely be disposed after use.

### Benefits

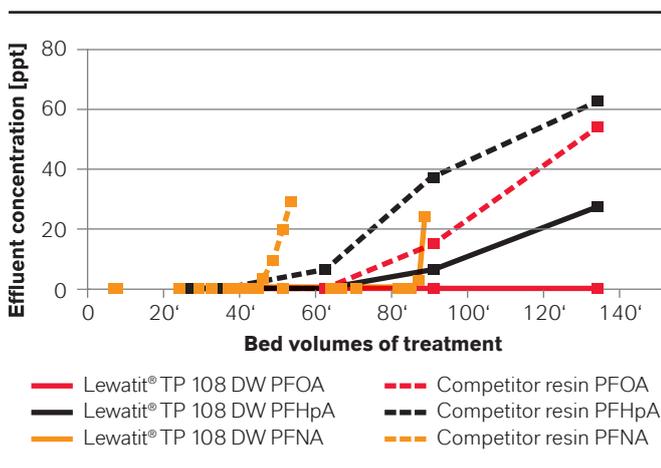
- High PFAS selectivity provides up to two-times longer cycle time than conventional ion exchange resins and up to ten-times longer than activated carbon (AC)
- Long resin lifetime provides savings on capital investment costs
- High capacity up to 100 g/l even in presence of background constituents such as chloride and sulfate
- Legal requirements regarding discharge limits are fulfilled in a reliable and cost-efficient manner
- **Lewatit® TP 108 DW** is in compliance with the "NSF/ANSI/CAN Standard 61" for health-related implications of drinking water system components and certified by the Water Quality Association (WQA). For more information please visit [www.wqa.org](http://www.wqa.org)

**X Lewatit®**

## Groundwater purification

In order to face this challenge, LANXESS has developed the novel ion exchange resin **Lewatit® TP 108 DW**, which has a very high selectivity towards different PFAS types (Figure 1). It was tested within a pilot in a column breakthrough test in which the PFAS effluent concentration was monitored until observation of the breakthrough of PFAS. **Lewatit® TP 108 DW** can be operated 45% longer than the competitive resin in case of perfluoroheptanoic acid PFHpA removal. Remarkably, **Lewatit® TP 108 DW** is still running at the detection limit in cases of PFOA removal, while the competitor's resin already broke through earlier. Even more pronounced is the cycle time difference in case of PFNA removal. In this application, **Lewatit® TP 108 DW** can be used twice as long as the resin from the competition.

**Figure 1:** Breakthrough curves depicting the concentration of perfluoroheptanoic acid (PFHpA), perfluorooctanoic acid (PFOA), and perfluorononanoic acid (PFNA) in the effluent of the ion exchange column in dependence on the treated water volume.



### Feed composition

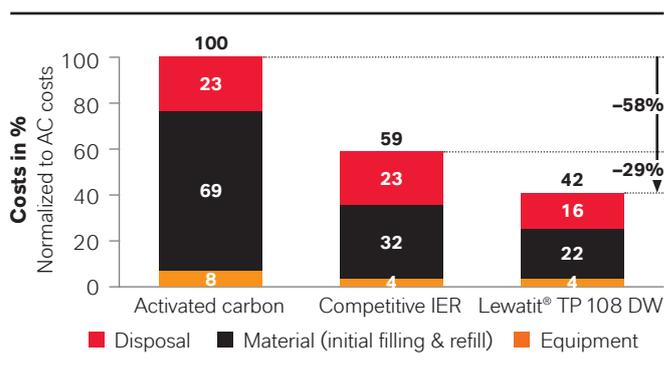
[PFHpA] = 25 ppt  
[PFOA] = 18 ppt  
[PFNA] = 40 ppt

Specific flow = 20 BV/h

## Cost comparison

The excellent performance of **Lewatit® TP 108 DW** leads to a substantial benefit when it comes to a cost comparison of different PFAS treatment technologies. Due to the lower selectivity towards PFAS, AC breaks through already five times earlier than **Lewatit® IER**. As a result, customers need to replace the **Lewatit®** ion exchange resin less frequently and achieve savings in investment costs. For the PFHpA case a cost calculation was performed for a plant operation time of 5 years. By using LANXESS technology for PFHpA removal, only 42% of the cost compared to AC needs to be spent. Competitive resin technology requires 59% of the cost, while the cost of AC was normalized to 100%. (Figure 2). In total, **Lewatit® TP 108 DW** offers 58% cost savings compared to the traditional AC technology and 29% cost savings versus other available resins from the competition.

**Figure 2:** Cost calculation for PFHpA removal using **Lewatit® TP 108 DW**, competitor ion exchange resin, and activated carbon. The case is calculated for a traditionally sized PFAS removal plant in Australia, with an operation time of 5 years. Equipment costs (orange), cost of filter medium (black), and disposal costs (red) are considered.



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