



# DOW IntegraPac™ IPD-77XP-18/DOW FILMTEC™ NF270-400

## Dow's Integrated Solutions Produce Drinking Water in Sweden

### FAST FACTS

|                              |   |
|------------------------------|---|
| Location:                    | Gävle, Sweden   |
| OEM:                         | Björks Rostfria                                       |
| Market segment, Application: | Municipal   |
| Dow products used:           | DOW IntegraPac™ IPD-77XP-18<br>DOW FILMTEC™ NF270-400 |
| Feed Water Source:           | River water   |
| Feed Water Quality:          | TDS 35,011 ppm  |
| Start-up Date:               | UF: May 2016; NF: Aug 2014/2016                       |

### Challenge

Gävle Water Treatment Plant (see Figure 1) is located at the outskirts of Gävle, Sweden. The system is fed by water from Gävle River, whose intake is only a few meters from the waterworks facilities. The river water is prefiltered through a 100 µm strainer and then it is directed to the Ultrafiltration (UF) system. The UF system has been designed with 6 trains in operation and 1 train in stand-by. Each train contains one skid with DOW IntegraPac™ IPD-77XP-18 modules, being 126 the total number of UF modules. The product water is sent to the Nanofiltration (NF) system, which contains 4 lines and uses DOW FILMTEC™ NF270-400 elements. The product water is infiltrated in an esker, and downstream it is pumped out from wells to be used as drinking water (see Figure 2). The main objective of the project is to protect the esker from organic contamination and secure a cold drinking water.

Gävle river water is particularly characterized for being challenging feed water for NF elements (see Table 1). On one hand, because of the seasonal changes expected in a river, and on the other hand, because of its high content in natural organic matter (NOM) and silt, with particulates <1-2 µm. A pretreatment that would not remove these materials would cause frequent cleanings of the NF elements and would have a negative impact on the membranes lifetime and an increase in the overall operational expenses (OPEX) of the water treatment plant.

### Additional information:

|               |                   |
|---------------|-------------------|
| Project Name: | Johanneslöt       |
| Temperature:  | 1 – 20 °C         |
| UF Capacity:  | 480 m3/h filtrate |
| NF Capacity:  | 360 m3/h permeate |

### Solution

For this reason, Ultrafiltration was considered as a powerful pretreatment for the Nanofiltration system for being robust, for providing consistent and high product water quality over time, and for its reduced footprint fitting in the available facility.

In addition, the use of chlorine in this Water Treatment plant was prohibited and the only allowed chemicals for membrane cleanings were Sodium Hydroxide (NaOH) and Citric Acid. Ultrafiltration has the additional benefit of being able to cope with these chemicals as well.

### Impact/Results

This Ultrafiltration installation is the outcome of a successful pilot trial onsite that was done using a DOW IntegraPac™ IPD-51-6 unit. DOW™ UF outside-in flow configuration of the fibers demonstrated to be the best approach to remove particulate and silt from raw water, resulting in a reduction of the Nanofiltration membrane cleanings.

The UF pilot, the UF plant and the NF plant are designed and built by the Swedish OEM Björks Rostfria AB.

### Context

Screen filters, a different technology than UF with much bigger pore size, could not cope with this challenging water to remove the small particulates.

**Table 1. Feed and filtrate water characterization**

|                            | Raw Water | After UF | After NF |
|----------------------------|-----------|----------|----------|
| Colour                     | 80        | 70       | <5       |
| Turbidity (NTU)            | 4.8       | <0.1     | <0.1     |
| COD (mg/L)                 | 14        | 12       | <1       |
| Conductivity at 25°C mS/cm | 7.1       | 7.0      | 3.6      |
| Hardness (°dH)             | 1.3       | 1.3      | 0.38     |

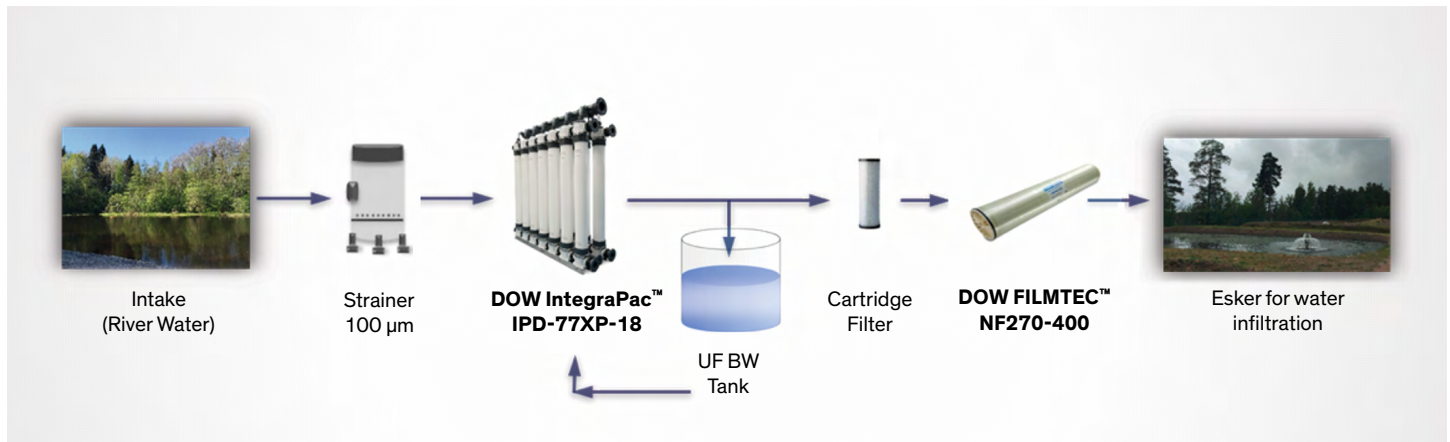


Figure 1. Schematic diagram of Johanneslöt water treatment plant

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