

# QUALITY ENABLES.

**Case study about wastewater treatment  
in a chemical plant in Nagda, India**

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**LANXESS**  
Energizing Chemistry

## Efficient wastewater treatment A zero liquid discharge operation

### Application and system design

This zero liquid discharge wastewater treatment plant is located inside the water treatment facility section of a major specialty chemicals producer. This wastewater plant processes treated sewage water via UF (ultrafiltration) pretreatment, cartridge filtration, and RO membrane desalination. The desalinated water is afterwards treated by degasification and ion exchange mixed beds installed with **Lewatit® S 108 H** and **Lewatit® M 800** to prepare the boiler feed water. The installation is a two-stage system with a capacity of 38 m<sup>3</sup>/h. The feed water to the RO has a TDS in the range of 600–1300 mg/l. The permeate has a TDS below 20 mg/l, and after the mix bed the requested quality of <0.1 mg/l TDS and 0.02 mg/l silica is achieved. The concentrate is further treated by high-pressure RO and an evaporation step to achieve the zero liquid discharge operation.

### At a glance

Industry	Chemical industry
Application	Wastewater treatment
Location	Nagda, India
Product	48 pieces Lewabrane® RO B400 HR 2000 l Lewatit® S 108 H 4000 l Lewatit® M 800
Production capacity	38 m <sup>3</sup> /hr
Water type	High content of salts and organics
Installation	November 2013

**X Lewabrane®**

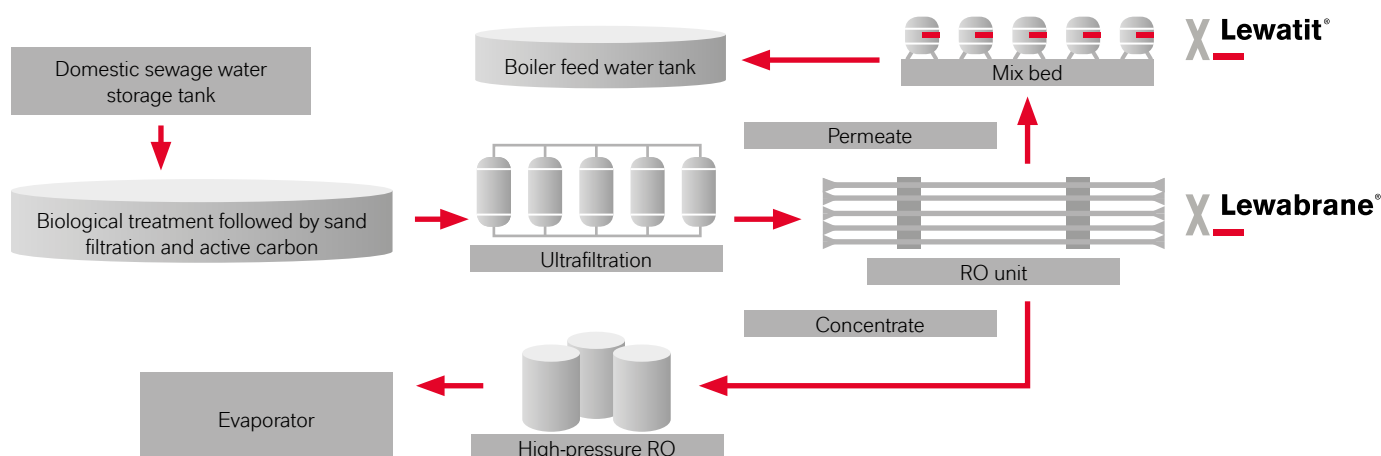
## Membrane performance

The installation was originally designed around “ultralow energy” seawater elements. However, after three years, these elements were exchanged for **Lewabrane® RO B400 HR** elements since a projection with **LewaPlus®** design software showed that the requested permeate quality could be achieved with standard test pressure brackish water (BW) elements operating at even lower feed pressure. After start-up, the predicted advantages of the **Lewabrane® BWRO** membranes were confirmed during routine daily operation. The RO feed pressure with **Lewabrane® RO B400 HR** was below 9.5 bar (with previous elements up to 12 bar), and a system salt rejection of 98.6% (better than the 97.3% rejection with the seawater RO elements). The new **Lewabrane®** elements also provided an increased silica rejection (from 94% to 96.6%), which increased the cycle time between regenerations for the ion exchange system. After three years in operation, and although monthly cleaning is required, the rejection level is still in the order of 97.5%.

## Conclusion

The results underline the advantages of a highly cross-linked membrane. The rejection is higher than low pressure seawater (SW) elements even after several years and frequent cleaning. The operational pressure could be reduced by around 30% compared to the previously installed element type. Apart from that, this process is an example of how the usage of ion exchange resins (IXR) and RO allows one to create a zero liquid discharge process.

## Zero liquid discharge process at the Nagda plant



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