LG Water Solutions

LG Chem

Basic Materials & Chemicals
Energy Solutions
IT & Electronics Materials
Advanced Materials
Life Sciences

LG Water Solutions

NanoH2O™

LG Water Solutions, part of LG Chem, Ltd., manufactures the full line of NanoH2O™ seawater, brackish water and residential reverse osmosis (RO) membranes. NanoH2O™ RO membranes are developed based on innovative Thin Film Nanocomposite (TFN) technology.

Technology

Thin Film Nanocomposite technology (TFN) improves membrane performance by embedding benign nanoparticles in the surface of the membrane. This innovative technology increases membrane flux without compromising salt rejection.

Brackish Water RO Membranes

Wastewater Reuse
Semiconductor Display
Power Generation
Petrochemical Refinery
Food & Beverage

Overview

LG Chem’s NanoH2O™ brackish water RO membranes are provided in four different types, high rejection (R), high flow (ES, UES), and anti-fouling (AFR), serving various municipal and industrial applications. NanoH2O™ brackish water RO membranes, all incorporated with innovative Thin Film Nanocomposite (TFN) technology, are offered in industry standard 2.5 inch, 4 inch, and 8 inch spiral wound configurations easily fit into existing or new RO plants. Global clients in more than 50 countries have already experienced LG Chem’s NanoH2O™ brackish water RO membranes and superior quality and performance of the membranes leads to repeat customers.

LG BW R – High Rejection Membranes
Well suited for high salinity feed water and high quality permeate requirements

LG BW ES and UES – Energy-Saving Membranes
Well suited for low salinity feed water and energy-saving

LG BW AFR – Anti-Fouling Membranes
Well suited for feed water under harsh conditions
**USA**

**Water Treatment for Indirect Potable Reuse, Scottsdale Water Campus**

LG Chem NanoH₂O™ BWRO membranes delivered lower system feed pressure to reduce energy consumption and improved permeate quality in one of the largest wastewater reuse plants in the US.

**Project Overview**

Scottsdale Water Campus commissioned in 1999. Currently it produces 20 MGD of treated water for ground water aquifer injection.

- Performance at start-up and after 21 months of operation is stable and on target.
- LG Chem BWRO membrane shows high rejection on most ions.
- Permeate quality is well within the three-year target set by the client.
- Stable permeate TOC concentration and well within California’s 0.5 mg/L target for Soil Aquifer Transfer (SAT) application.
- LG Chem BWRO membranes perform better than competitors’ products previously installed at the client’s site.

**Operation Data | Phase 1: Train 17, 18, and 19 (March 2016 – Present)**

- Feed TDS
- Feed Temperature
- Feed Pressure
- Permeate TDS

**Client**
City of Scottsdale, Arizona

**Start-Up Date**
Phase 1: 2016, Phase 2: 2017

**Feed Water**
Wastewater plant tertiary effluent

**Application**
Indirect potable reuse water

**Plant Configuration**
6 trains, 35 (Phase 1 three trains) and 39 (Phase 2 three trains) pressure vessels per train

**Recovery**
85%

**Total Project Capacity**
19,600 m³/d (5.2 MGD)

**Feed Water Temperature**
24°–33° C (75° - 94° F)

**LG Chem NanoH₂O™ Membrane Model**
LG BW 400 R

**Total Number of LG Chem NanoH₂O™ Elements**
1,332

**Feed Pressure Range**
7.4 – 8.3 bar (106 – 120 psi)
Two municipalities located in the State of Mississippi installed LG Chem NanoH2O™ BWRO membranes in the municipal RO water-treatment facilities to deliver crystal-clear water to the residents of these communities.

**Project Overview**

Commissioned in the late 2000s, the two municipal RO water treatment systems produce 5.0 MGD and 2.0 MGD of drinking water, respectively. The plants are fed from local wells. Both plants replaced old RO membranes with LG Chem NanoH2O™ BWRO membranes in 2017.

**RO Plant 1**

<table>
<thead>
<tr>
<th>Plant Configuration</th>
<th>Four two-stage trains, 24:12, 7 elements per pressure vessel</th>
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</thead>
<tbody>
<tr>
<td>Recovery</td>
<td>85%</td>
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<tr>
<td>Total Project Capacity</td>
<td>18,750 m³/d (5.0 MGD)</td>
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<tr>
<td>Feed Water Temperature</td>
<td>26°– 27 °C (79° - 81°F)</td>
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<tr>
<td>LG Chem NanoH2O™ Membrane Model</td>
<td>LG BW 400 ES</td>
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<tr>
<td>Total Number of LG Chem NanoH2O™ Elements</td>
<td>1,008</td>
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</table>
| Feed Pressure Range | 7.0 – 9.0 bar (100 – 130 psi)                   

**RO Plant 2**

<table>
<thead>
<tr>
<th>Plant Configuration</th>
<th>Two three-stage trains, 15:10:5, 6 elements per pressure vessel</th>
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<tbody>
<tr>
<td>Recovery</td>
<td>80%</td>
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<tr>
<td>Total Project Capacity</td>
<td>7,600 m³/d (2.0 MGD)</td>
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<tr>
<td>Feed Water Temperature</td>
<td>25°– 27 °C (77° - 81°F)</td>
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<tr>
<td>LG Chem NanoH2O™ Membrane Model</td>
<td>LG BW 400 ES</td>
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<tr>
<td>Total Number of LG Chem NanoH2O™ Elements</td>
<td>360</td>
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</tbody>
</table>
| Feed Pressure Range | 10.0 – 11.4 bar (145 – 165 psi)                  

**Operation Data**

- RO Plant 1, Train 1, 3, and 4 (Jun 2017 – Present)

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**USA | Municipal Drinking Water Treatment, RO Plants in the State of Mississippi**

The operation data for RO Plant 1 and RO Plant 2 is provided in the accompanying charts.
LG Chem has developed a BWRO membrane that combines the advantages of TFN (Thin-Film Nanocomposite) with anti-fouling (AF) characteristics. A unique AF formulation was added into the polyamide surface layer forming a crosslinked protective barrier permanently attached to the membrane surface.

**LG BW AFR benefits:**
- Fouling resistance
- Easy to clean and recover flux
- Less frequent cleanings

LG BW AFR surface is more hydrophilic and has the surface charge closer to neutral compared to the competitors’ anti-fouling membranes.

LG BW AFR demonstrated less biofilm formation with *E. Coli*.

LG BW AFR has been successfully installed in a number of brackish water systems across the globe, including Republic of Korea, China, Malaysia, India, USA, Saudi Arabia, and Serbia.

**Pohang Sewage Water Reuse Plant, Korea**

Comparative study: LG Chem H2O™ membrane vs Company A
**Semiconductor / Display (Ultra-Pure Water)**

| Client | LG Group (LG Electronics, LG Chem, LG Display, LG Innotek) |
| Location | Multiple |
| Total Project Capacity | 130,000 m³/d (34.3 MGD) in total |
| LG Chem NanoH₂O™ Membrane Model | LG BW 400 R, LG BW 440 R, LG BW 400 ES, LG BW 400 AFR |

**Petrochemical / Refinery**

| Client | Indian Oil Corporation Limited (Naphtha Cracker) (IOCL) |
| Location | Panipat, Haryana - India |
| Total Project Capacity | 18,000 m³/d (4.76 MGD) |
| Plant Configuration | Stage 1: 5 trains, 36 pressure vessels per train  
Stage 2: 3 trains, 16 pressure vessels per train |
| LG Chem NanoH₂O™ Membrane Model | LG BW 400 AFR |

**Pulp and Paper**

| Client | Asia Symbol Paper |
| Location | Jangmen, Guangdong - China |
| Total Project Capacity | 30,000 m³/d (7.9 MGD) |
| Plant Configuration | 5 trains, 48 pressure vessels per train |
| LG Chem NanoH₂O™ Membrane Model | LG BW 400 R |
Proven Track Record of Performance and Quality

Selected Global References

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<th>Representative Email</th>
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<tr>
<td>America</td>
<td>+1 424 218 4042</td>
<td><a href="mailto:nasales@lgchem.com">nasales@lgchem.com</a></td>
</tr>
<tr>
<td>Europe, Africa except Egypt</td>
<td>+49 162 297092</td>
<td><a href="mailto:eumansales@lgchem.com">eumansales@lgchem.com</a></td>
</tr>
<tr>
<td>Middle East, Egypt</td>
<td>+971 50 558 4168</td>
<td><a href="mailto:mesales@lgchem.com">mesales@lgchem.com</a></td>
</tr>
<tr>
<td>Korea</td>
<td>+82 2 6924 3943</td>
<td><a href="mailto:krsales@lgchem.com">krsales@lgchem.com</a></td>
</tr>
<tr>
<td>China</td>
<td>+86 21 60872900</td>
<td><a href="mailto:cnsales@lgchem.com">cnsales@lgchem.com</a></td>
</tr>
<tr>
<td>India</td>
<td>+91 9810013345</td>
<td><a href="mailto:insales@lgchem.com">insales@lgchem.com</a></td>
</tr>
<tr>
<td>South East Asia</td>
<td>+65 9749 7471</td>
<td><a href="mailto:seasales@lgchem.com">seasales@lgchem.com</a></td>
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