

LG Water Solutions

Seawater, Brackish Water RO Membranes Application Flyer





LG Water Solutions



LG Chem manufactures the full line of NanoH₂O[™] seawater and brackish water reverse osmosis (RO) membranes based on innovative Thin Film Nanocomposite (TFN) technology. We are constantly evolving and have had great success in winning large desalination projects and continue to strengthen market leadership for seawater RO. Beyond SWRO, our BWRO products have already proven their performance and quality that have led to repeat customers.

Technology

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



Seawater RO Membranes

Overview

LG Chem's NanoH₂O[™] seawater RO membranes, incorporated with innovative Thin Film Nanocomposite (TFN) technology, reduce the cost of desalination while delivering superior water quality. LG seawater RO membranes provide industry leading salt rejection and produce 20% more flow than membranes manufactured with conventional technologies. We continue to leverage the technological advantages of our seawater RO membranes to expand the market share accruing more than 1,000 Million Liter per Day (MLD) projects backlog for the last two years.



LG SW SR, GR, R | High Rejection Membranes Well suited for high feed TDS and high permeate quality requirements



LG SW ES | Energy-Saving Membranes Well suited for low feed TDS and low temperature seawater applications



LG SW GR G2, SR G2 The next generation membranes with industry-leading 99.89% rejection

Brackish Water RO Membranes

Overview

LG Chem's NanoH₂O[™] brackish water RO membranes serve various municipal and industrial applications and have been operating in the major utilities around the world. Incorporating innovative Thin Film Nanocomposite (TFN) technology, all LG BWRO membranes provide superior performance along with intrinsic anti-fouling property and are suitable for applications where consistent and reliable performance is a must.



LG BW R G2 Superior Rejection, High Flow, High Durability

LG BW R High Rejection

LG BW R Dura High Rejection, High Durability LG BW AFR Anti-Fouling, High Rejection

LG BW ES Energy Saving

LG BW ES L Energy Saving Equipped with fouling tolerant low dP spacer technology

LG BW UES Ultra Low Energy

Water Services Corporation(WSC)

Operates three water desalination plants in Pembroke, Ghar Lapsi, and Cirkewwa

Plant Info

Malta



In 2015 LG Chem won tender to retrofit all three sites

Major Challenges

Low permeate boron requirement :

≤ 0.9 ppm (5-year warranty)

Single pass

Feed pH 6.7

Pembroke Desalination Plant

LG Chem NanoH₂O[™] SWRO membranes delivered excellent water quality and demonstrated outstanding performance with respect to boron rejection at the RO desalination facilities in Malta.



Client	Water Services Corporation		
Start-Up Date	2016		
Feed Water Intake	Seawater		
Application	Potable water		
Plant Configuration	8 trains, 45 pressure vessels each, 7 elements per pressure vessel		
Recovery	42%		
Project Capacity	36,000 m ³ /d (9.5 MGD)		
Feed Temperature Range	20 - 22°C (68 - 72°F)		
LG Chem NanoH₂O™ Membrane Model	LG SW 440 GR, LG SW 440 SR		
Total Number of LG Chem NanoH ₂ O™ Elements	2,520		
Feed Pressure Range	65 – 67 bar (943 – 972 psi)		
Permeate Boron	0.45 - 0.70 ppm		

Operation Data



Spain

Israel

Carboneras Desalination Plant

LG Chem NanoH₂OTM SWRO membranes delivered high quality water for potable use in one of the largest Europe desalination plants in Spain

Client	Desaladora Carboneras UTE	
Start-Up Date	2016	
Feed Water Intake	Beach well	
Application	Potable water	
Plant Configuration	1 train, single-pass with 244 pressure vessels with 7 elements each	
Recovery	48%	
Project Capacity	20,000 m ³ /d (5.3 MGD)	
Feed Temperature Range	14 - 22°C (57 - 72°F)	
LG Chem NanoH₂O™ Membrane Model	LG SW 440 R	
Total Number of LG Chem NanoH₂O™ Elements	1,708	
Feed Pressure Range	61– 63 bar (885 – 915 psi)	



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Palmachim Desalination Plant

LG Chem NanoH₂O[™] SWRO membranes delivered lower system feed pressure to reduce energy consumption and improved permeate quality for one of the 10 largest SWRO plants in the world

Client	Via Maris Desalination Ltd.	
Start-Up Date	2012 / 2013 / 2015	
Feed Water Intake	Seawater	
Application	Potable water	
Plant Configuration	5 trains, single-pass with 352 pressure vessels each, 8 elements per pressure vessel	
Recovery	50%	
Project Capacity	180,000 m ³ /d (48 MGD)	
Feed Temperature Range	17 - 31°C (63 - 88°F)	
LG Chem NanoH₂O™ Membrane Model	LG SW 400 SR, LG SW 440 SR	
Total Number of LG Chem NanoH ₂ O™ Elements	14,080	
Feed Pressure Range	63 – 70 bar (914 – 1,015 psi)	



Oman

Santa Barbara Desalination Plant

LG Chem NanoH₂O[™] SWRO membranes supply drinking water to this Caribbean island at significant cost savings



Client	Degremont
Start-Up Date	2012
Feed Water Intake	Beach well
Application	Potable water
Plant Configuration	Single pass, 4 trains, 90 pressure vessels each, 7 elements per each pressure vessel
Recovery	44%
Project Capacity	28,400 m ³ /d (7.4 MGD)
Feed Temperature Range	25 - 26°C (77 - 79°F)
LG Chem NanoH₂O™ Membrane Model	LG SW 400 R
Total Number of LG Chem NanoH₂O™ Elements	2,520
Feed Pressure Range	54 – 55 bar (783 – 798 psi)

Barka II Desalination Plant

Largest RO desalination plant in Oman uses LG Chem NanoH₂O[™] SWRO membranes for replacement



Client	ENGIE - STOMO (SUEZ-Tractebel)
Start-Up Date	2017
Feed Water Intake	Seawater
Application	Potable water
Plant Configuration	2 trains, 125 pressure vessels each, 7 elements per pressure vessel, plus multiple PV in other trains
Recovery	43%
Project Capacity	40,000 m3/d (10.6 MGD)
Feed Temperature Range	25 - 38°C (77 - 100°F)
LG Chem NanoH₂O™ Membrane Model	LG SW 440 GR
Total Number of LG Chem NanoH₂O™ Elements	3,600
Feed Pressure Range	57 bar (825 psi)

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 over 20 MGD of treated water for ground water aquifer injection.



Client	City of Scottsdale, Arizona	
Start-Up Date	Phase 1: 2016, Phase 2: 2017	
Feed Water Intake	24 - 34°C and Wastewater plant tertiary effluent	
Application	Indirect potable reuse water	
Plant Configuration	7 three-stage trains with various configuration	
Recovery	85%	
Project Capacity	27,000 m ³ /d (7.1 MGD)	
Feed Temperature Range	24- 33°C (75 - 93°F)	
LG Chem NanoH₂O™ Membrane Model	LG BW 400 R	
Total Number of LG Chem NanoH₂O™ Elements	1,542	
Feed Pressure Range	7.4 – 8.3 bar (106 – 120 psi)	

- Performance is stable and on target after 3 years of operation.
- LG 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 BWRO membranes perform better than competitors' products previously installed at the client's site.





BWRO Selected References in Various **Industrial Applications**

Semiconductor / Display (Ultra-Pure Water) —

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Client	LG Group (LG Electronics, LG Chem, LG Display, LG Innotek)
Location	Multiple
Project Capacity	130,000 m ³ /d (34.3 MGD)
LG Chem NanoH ₂ O™ Membrane Model	LG BW 400 R, LG BW 440 R, LG BW 400 ES, LG BW 400 AFR



Petrochemical / Refinery _____



Client	PEMEX Refinery
Location	Mexico
Project Capacity	3,456 m ³ /d (0.92 MGD)
Plant Configuration	2 trains, 19 pressure vessels per train
LG Chem NanoH ₂ O™ Membrane Model	LG BW 400 AFR



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Petrochemical / Refinery

र्हाइयनअॉयल IndianOil	Client	Indian Oil Corporation Limited (Naphtha Cracker) (IOCL)
	Location	Panipat, Haryana - India
	Project Capacity	18,000 m ³ /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 NanoH ₂ O™ Membrane Model	LG BW 400 AFR

Pulp and Paper

	Client	Asia Symbol Paper
	Location	Jiangmen, Guangdong - China
ASIA SYMBOL	Project Capacity	30,000 m ³ /d (7.9 MGD)
	Plant Configuration	5 trains, 48 pressure vessels per train
	LG Chem NanoH ₂ O™ Membrane Model	LG BW 400 R



Proven Track Record of Performance and Quality

Selected Global References



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