LG Chem

LG Water Solutions

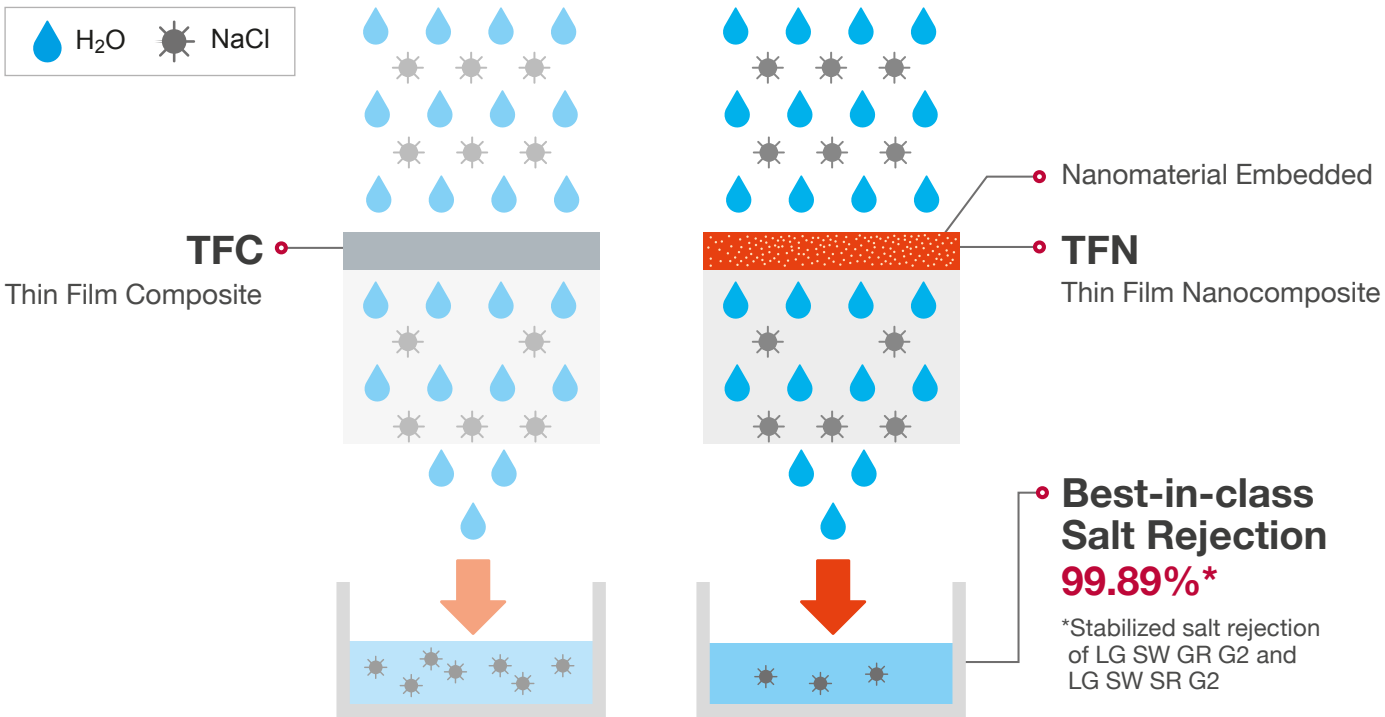
Nano H_2O™

Innovation. Proven. Trusted.

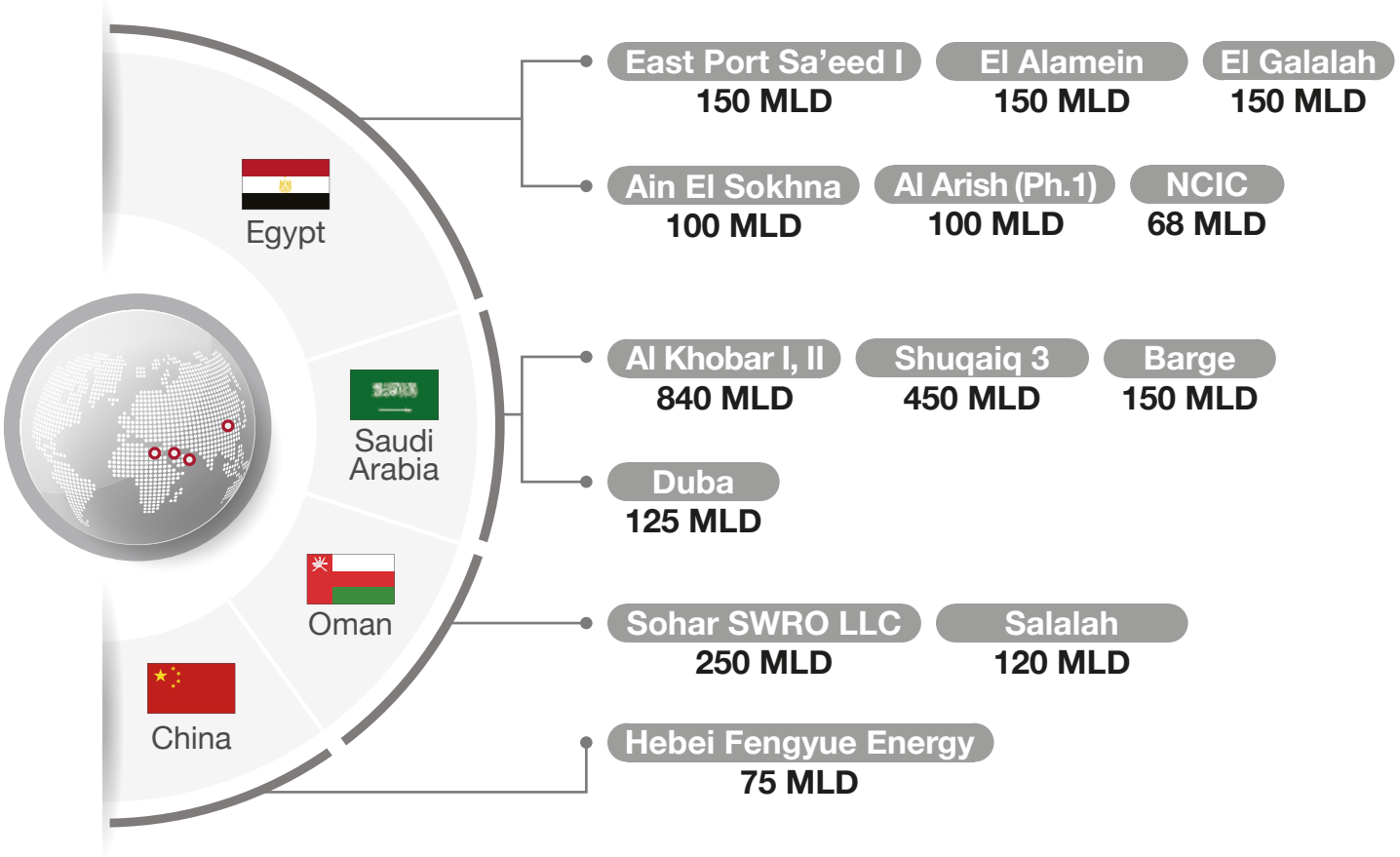
LG Chem manufactures the full line of NanoH_2O™ seawater and brackish water reverse osmosis (RO) membranes based on innovative Thin Film Nanocomposite (TFN) technology. We are constantly evolving and have had great success in winning large desalination projects and continue to strengthen market leadership 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 up to 20% without compromising salt rejection.



Global Project Wins Driven by Performance



Superior Quality Leads to Repeat Customers

Wastewater Reuse	OCWD; Scottsdale Water Campus; Paju municipal sewage reuse; Sinopec China Steel	‣ Municipal WWT and Reuse ‣ Industrial WWT and Reuse ‣ High TDS WW or ZLD/MLD
Power Generation	الشركة السعودية للكهرباء Saudi Electricity Company; KEPCO	‣ Boiler feed for steam generation ‣ Cooling tower make-up water ‣ FGD process make-up water
Petrochemical/ Refinery	IndianOil; PEMEX; PETROBRAS	‣ Regular DI water ‣ Process water ‣ Boiler water ‣ Cooling water make-up
Semiconductor/ Display	Infineon; LG Display; Panasonic	‣ Ultrapure water make-up ‣ Ultrapure water polish loop
Food & Beverage	Coca-Cola; pepsi	‣ Bottled water ‣ Process water ‣ Concentration of ingredients

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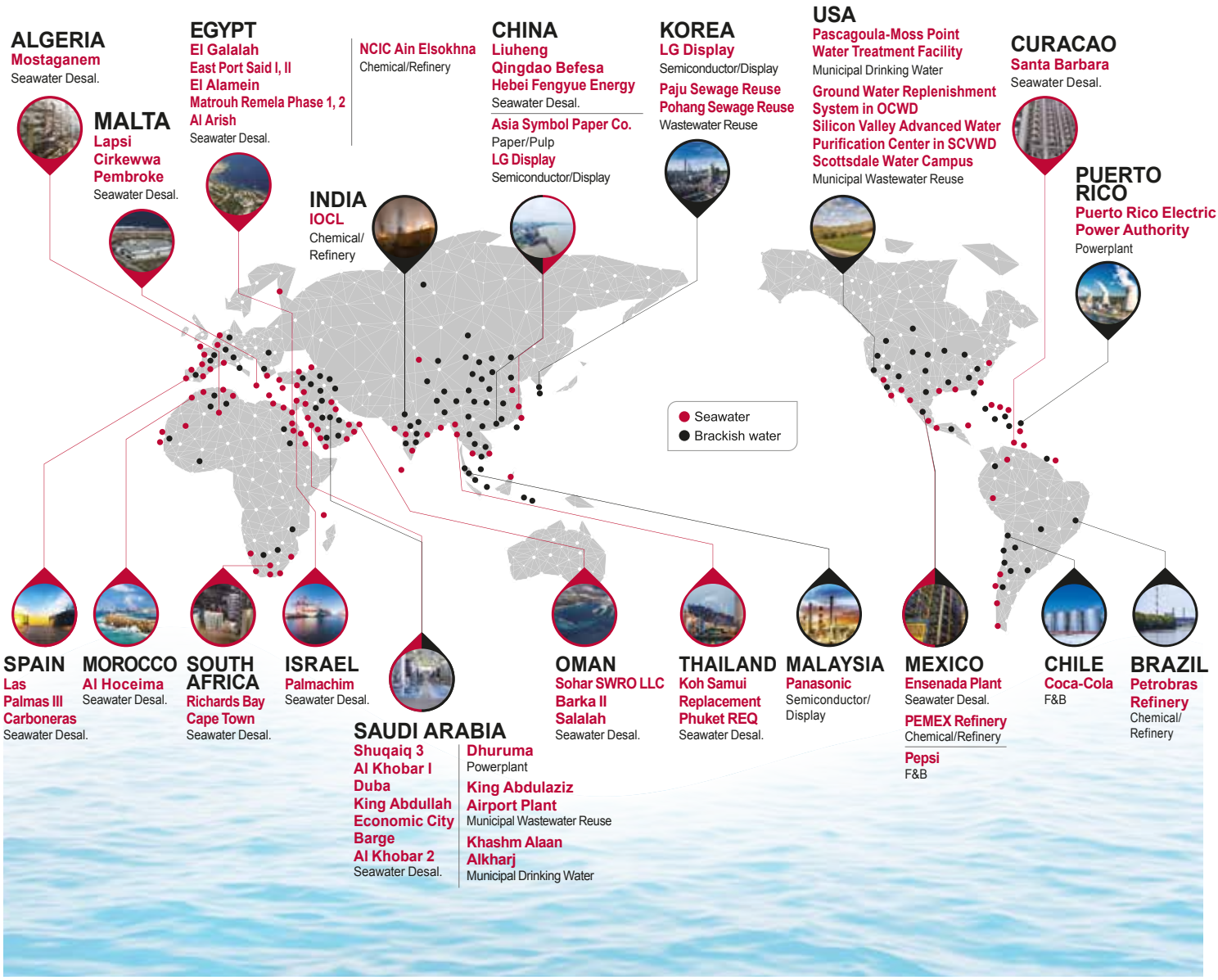
Proven Track Record



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Global Project Wins Driven by Performance

Seawater Reverse Osmosis (RO) Membranes

Overview

LG Chem's NanoH_2O™ seawater RO membranes, incorporated with innovative Thin Film Nanocomposite (TFN) technology, reduce the cost of desalination while delivering superior water quality. Our 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 our market share, accruing more than 3,000 Million Liter per Day (MLD) projects for both new and replacement market since the establishment.

LG SW SR G2 and GR G2
The next generation membranes with industry-leading salt rejection

LG SW SR, GR and 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 G2 Membranes

- With industry's **highest** salt rejection, LG SW G2 membranes can provide
  - **Improved permeate quality** without increasing operating pressure
  - **Reduced energy cost** without sacrificing the permeate quality
  - **Reduced capital and operation costs** for multi-pass SWRO systems

8-inch spiral wound membranes

Product	Active Membrane Area, ft^2 (m^2)	Permeate Flow Rate, GPD (m^3/d)	Stabilized Salt Rejection, %	Minimum Salt Rejection, %	Boron Rejection, %	Feed Spacer, mil
LG SW 400 SR G2	400 (37)	6,000 (22.7)	99.89	99.75	93	28 or 34
LG SW 440 SR G2	440 (41)	6,600 (25.0)	99.89	99.75	93	28
LG SW 400 GR G2	400 (37)	7,500 (28.4)	99.89	99.75	93	28 or 34
LG SW 440 GR G2	440 (41)	8,250 (31.2)	99.89	99.75	93	28

Test Conditions : 32,000 ppm NaCl, 5 ppm boron at 25°C (77°F), 800 psi (55 bar), pH 8, Recovery 8%.

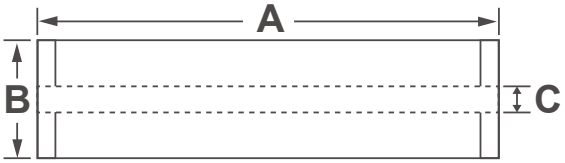
LG SWRO Membranes

8-inch spiral wound membranes

Product	Active Membrane Area, ft² (m²)	Permeate Flow Rate, GPD (m³/d)	Stabilized Salt Rejection, %	Minimum Salt Rejection, %	Boron Rejection, %	Feed Spacer, mil
LG SW 400 SR	400 (37)	6,000 (22.7)	99.85	99.7	93	28 or 34
LG SW 440 SR	440 (41)	6,600 (25.0)	99.85	99.7	93	28
LG SW 400 GR	400 (37)	7,500 (28.4)	99.85	99.7	93	28 or 34
LG SW 440 GR	440 (41)	8,250 (31.2)	99.85	99.7	93	28
LG SW 400 R	400 (37)	9,000 (34.1)	99.85	99.7	93	28 or 34
LG SW 440 R	440 (41)	9,900 (37.5)	99.85	99.7	93	28
LG SW 400 ES	400 (37)	13,700 (51.9)	99.80	99.6	89	34
LG SW 440 ES	440 (41)	15,070 (57.0)	99.80	99.6	89	28

Test Conditions : 32,000 ppm NaCl, 5 ppm boron at 25°C (77°F), 800 psi (55 bar), pH 8, Recovery 8%.

Product Dimensions



A mm (in.)	B mm (in.)	C mm (in.)	Weight kg (lbs.)
1,016 (40)	200 (7.9)	28.6 (1.125)	16 (35)

Operating Specifications

Max. Applied pressure	1,200 psi (82.7 bar)
Max. Chlorine concentration	< 0.1 ppm
Max. Operating temperature	45°C (113°F)
pH Range, Continuous (Cleaning)	2-11 (2-13)
Max. Feedwater turbidity	1.0 NTU
Max. Feedwater SDI (15 mins)	5.0
Max. Feed flow	75 gpm (17 m³/h)
Min. Ratio of concentrate to permeate flow for any element	5 : 1
Max. Pressure drop (ΔP) for each element	15 psi (1.0 bar)

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Superior Quality Leads to Repeat Customers

Brackish Water Reverse Osmosis (RO) Membranes

Overview

LG Chem's NanoH$_2$O™ 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 Nano-composite (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 AFR G2
Anti-Fouling, High Rejection, High Flow, High Durability

LG BW AFR
Anti-Fouling, High Rejection

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

LG BW ES
Energy Saving

LG BW R Dura
High Rejection, High Durability

LG BW UES
Ultra Low Energy

LG BW R
High Rejection

LG BWRO Membranes

Product		Active Membrane Area, ft^2 (m^2)	Permeate Flow Rate, GPD (m^2/d)	Stabilized Salt Rejection, %	Minimum Salt Rejection, %	Feed Spacer, mil	Test Pressure, psi (bar)
High Rejection Standard	LG BW 440 R G2	440	12,650	99.78	99.65	28	225 (15.5)
	LG BW 440 R Dura	440	11,550	99.70	99.60	28	
	LG BW 440 R	440	11,550	99.60	99.50	28	
	LG BW 400 R	400	10,500	99.60	99.50	34	
High Rejection Anti-fouling	LG BW 400 R G2	400	11,500	99.78	99.65	34, low dP	
	LG BW 400 AFR G2	400	11,500	99.70	99.60	34, low dP	
	LG BW 400 R Dura	400	10,500	99.70	99.60	34, low dP	
	LG BW 400 AFR	400	10,500	99.60	99.50	34	
Low Pressure Standard	LG BW 440 ES	440	11,550	99.60	99.50	28	150 (10.3)
	LG BW 400 ES	400	10,500	99.60	99.50	34	
Ultra Low Pressure	LG BW 440 UES	440	12,650	99.00	98.00	28	125 (8.6)
	LG BW 400 UES	400	11,500	99.00	98.00	34	

Test Conditions : 2,000 ppm NaCl at 25°C (77°F), pH 7, Recovery 15%

Light Commercial RO Membranes

Product		Active Membrane Area, ft^2 (m^2)	Permeate Flow Rate, GPD (m^2/d)	Stabilized Salt Rejection, %	Minimum Salt Rejection, %	Feed Spacer, mil	Recovery, %	Test Pressure, psi (bar)
High Rejection[1]	LG BW 4040 R	85 (7.9)	2,500 (9.5)	99.6	99.3	28	15	225 (15.5)
	LG BW 4040 AFR	75 (7.0)	2,300 (8.7)	99.6	99.3	34	15	
	LG BW 4021 R	34 (3.2)	1,000 (3.8)	99.6	99.3	28	8	
	LG BW 2521 R	9 (0.9)	345 (1.3)	99.6	99.3	28	8	
Low Pressure[1]	LG BW 4040 ES	85 (7.9)	2,500 (9.5)	99.5	99.2	28	15	150 (10.3)
	LG BW 4021 ES	34 (3.2)	1,000 (3.8)	99.5	99.2	28	8	
	LG BW 2521 ES	9 (0.9)	345 (1.3)	99.5	99.2	28	8	
Ultra Low Pressure[2]	LG CW 4040 SF*	85 (7.9)	2,900 (11.0)	99.0	98.0	28	15	100 (6.9)
	LG BW 4040 UES	85 (7.9)	2,700 (10.2)	99.0	98.0	28	15	
	LG BW 4021 UES	34 (3.2)	1,000 (3.8)	99.0	98.0	28	8	
	LG BW 2540 UES	21 (2.0)	750 (2.8)	99.0	98.0	28	15	
	LG BW 2521 UES	9 (0.9)	345 (1.3)	99.0	98.0	28	8	

Test conditions[1]: 2,000 ppm NaCl at 25°C (77°F), pH 7
Test conditions[2]: 500 ppm NaCl at 25°C (77°F), pH 7
*Dry type