

LG Water Solutions



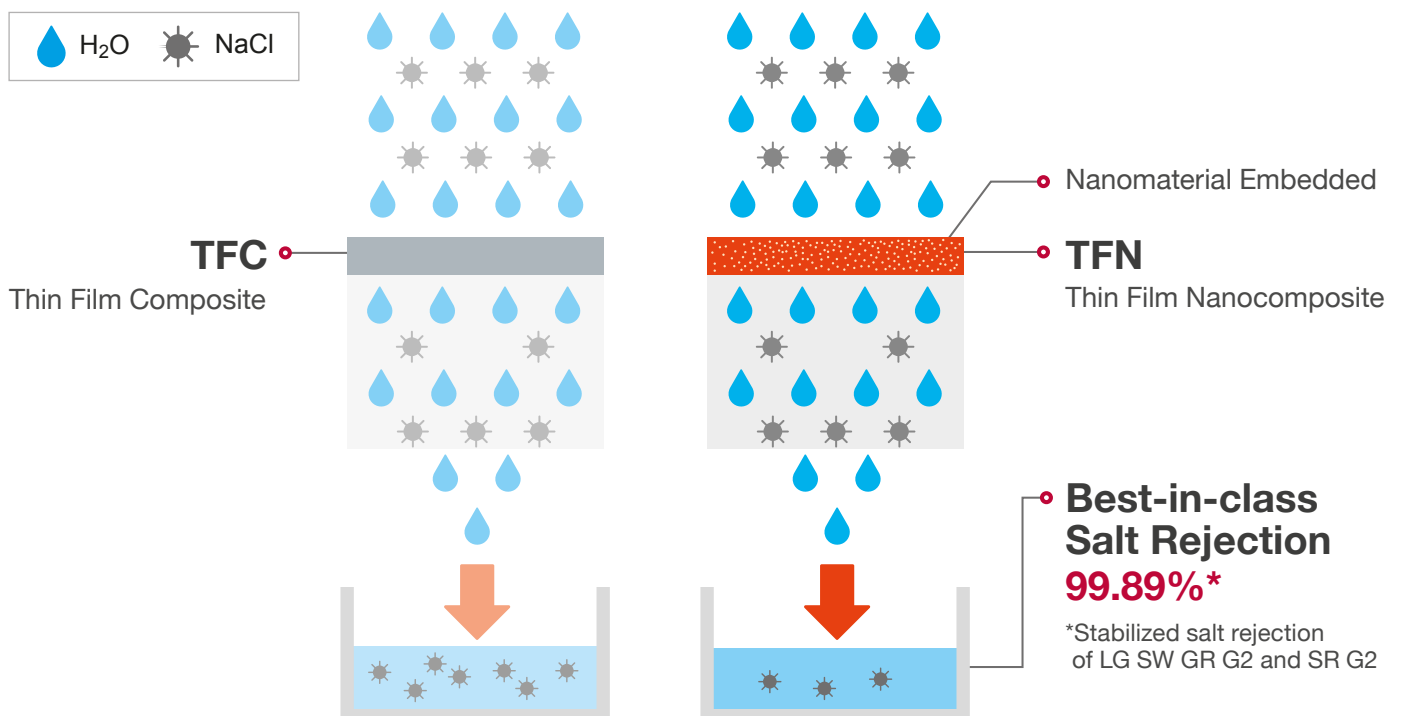
Innovation. Proven. Trusted.

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.



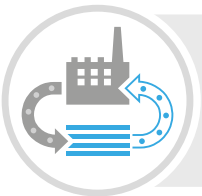
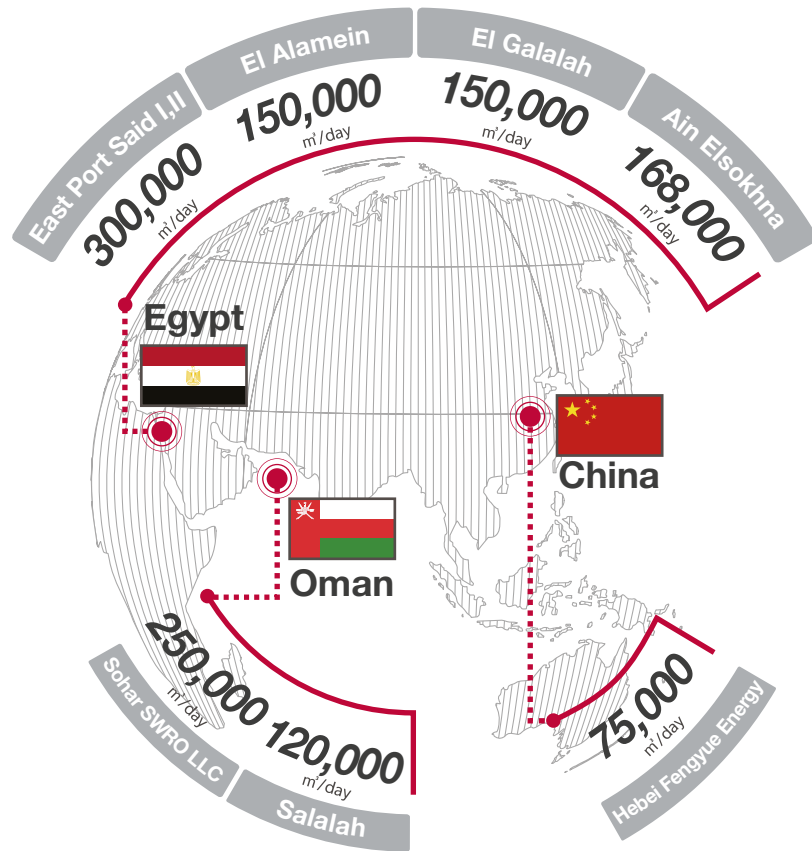
Technology

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.





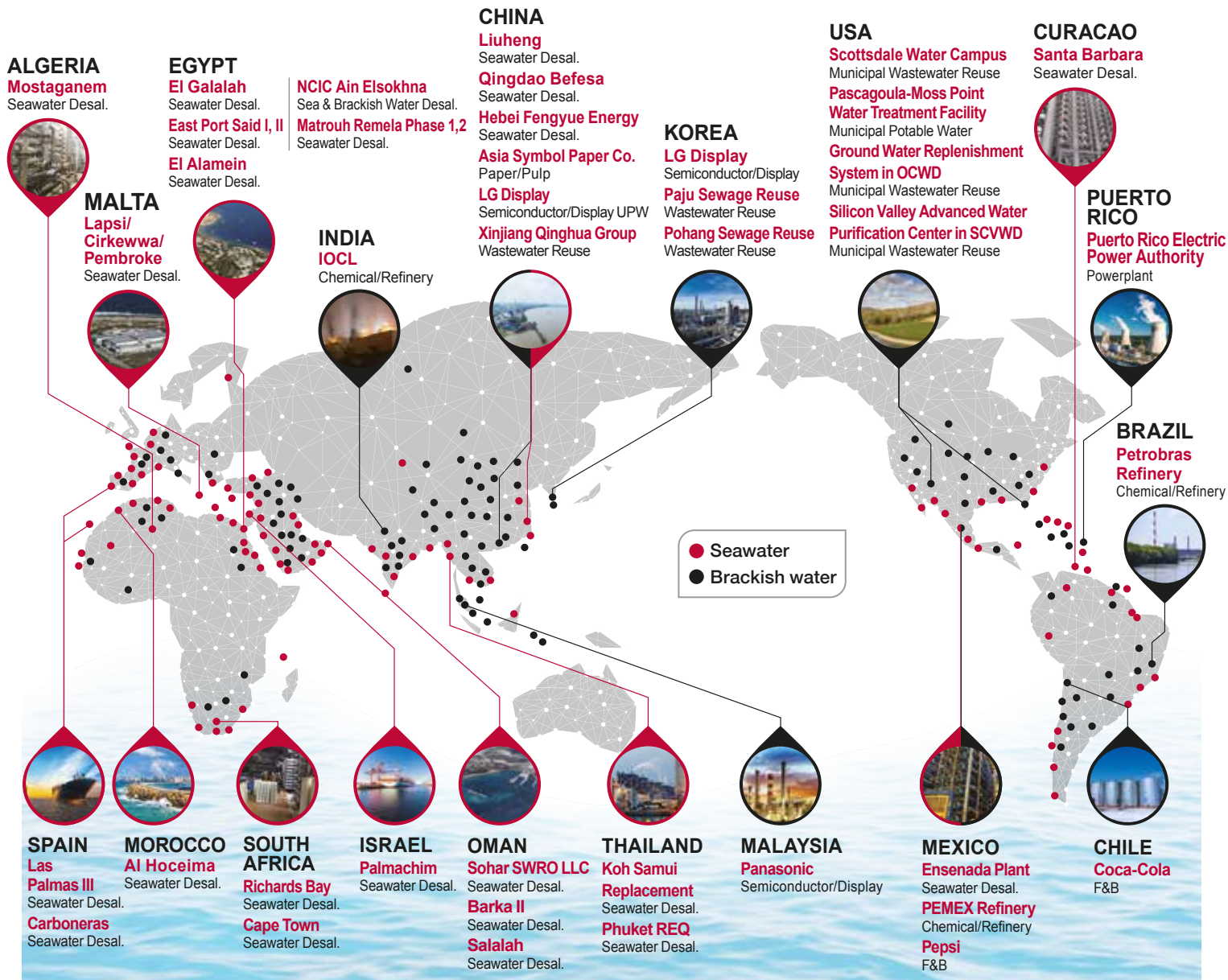
Global Project Wins Driven by Performance



Superior Quality Leads to Repeat Customers

Wastewater Reuse	Power Generation	Petrochemical / Refinery	Automotive	Semiconductor / Display	Food & Beverage
<ul style="list-style-type: none"> OCWD West Basin Santa Clara Valley Water District Scottsdale Water Campus Groundwater recharge Industrial process water Indirect potable reuse 	<ul style="list-style-type: none"> الشركة السعودية للكهرباء Saudi Electricity Company KEPCO Boiler feed for steam generation Cooling tower makeup water FGD process makeup water 	<ul style="list-style-type: none"> IndianOil PEMEX PETROBRAS Desalting water Cooling tower makeup Treatment of cooling tower blowdown 	<ul style="list-style-type: none"> CHRYSLER GM KIA Paint booths Electrocoat and phosphatizing lines Parts rinsing 	<ul style="list-style-type: none"> Infineon Panasonic LG Display Cleaning and etching agents Chip fabrication Silicon wafer dicing 	<ul style="list-style-type: none"> Coca-Cola pepsi Bottled water Syrup blending Boiler feed for steam production

Proven Track Record of Performance and Quality



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Global Project Wins Driven by Performance



Seawater Reverse Osmosis (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. 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 1,000 Million Liter per Day (MLD) projects backlog for the last two years.



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 GR G2 and SR G2

The next generation membranes with industry-leading 99.89% rejection

Product Specifications

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	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 at 25°C (77°F), 800 psi (55 bar), pH 8, Recovery 8%. Permeate flows for individual elements may vary +/-15%.

LG SW G2 Product Specifications

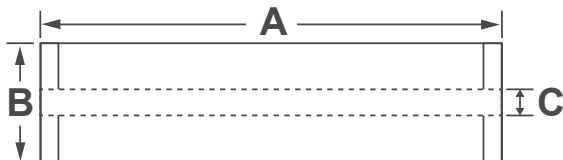
- With industry's **highest** 99.89% rejection, LG SW G2 membranes can provide
 - **Improved permeate quality** without increasing operating pressure
 - **Reduced energy cost** without sacrificing the permeate quality
 - **Reduced capital and operation costs** for multi-pass SWRO systems

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%.
 Permeate flows for individual elements may vary +/-15%.

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 m ³ /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 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 AFR

Anti-Fouling, High Rejection

LG BW R

High Rejection

LG BW ES

Energy Saving

LG BW R Dura

High Rejection, High Durability

LG BW UES

Ultra Low Energy

Product Specifications

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, %	Feed Spacer, mil	Test Conditions
LG BW 400 R G2	400 (37)	11,500 (43.7)	99.78	99.65	34	1
LG BW 440 R G2	440 (41)	12,650 (47.9)	99.78	99.65	28	1
LG BW 400 R	400 (37)	10,500 (39.7)	99.6	99.5	34	1
LG BW 440 R	440 (41)	11,550 (43.7)	99.6	99.5	28	1
LG BW 400 R Dura	400 (37)	10,500 (39.7)	99.6	99.5	34	1
LG BW 440 R Dura	440 (41)	11,550 (43.7)	99.6	99.5	28	1
LG BW 400 AFR	400 (37)	10,500 (39.7)	99.6	99.5	34	1
LG BW 400 ES	400 (37)	10,500 (39.7)	99.6	99.5	34	2
LG BW 440 ES	440 (41)	11,550 (43.7)	99.6	99.5	28	2

Test Conditions 1: 2,000 ppm NaCl at 25°C (77°F), 225 psi (15.5 bar), pH 7, Recovery 15%. Permeate flows for individual elements may vary +/-15%.

Test Conditions 2: 2,000 ppm NaCl at 25°C (77°F), 150 psi (10.3 bar), pH 7, Recovery 15%. Permeate flows for individual elements may vary +/-15%.

2.5-inch and 4-inch spiral wound membranes

LG BW R

Product	Active Membrane Area, ft ² (m ²)	Permeate Flow Rate, GPD (m ³ /d)	Stabilized Salt Rejection, %	Minimum Salt Rejection, %	Feed Spacer, mil
LG BW 4040 R	85 (7.9)	2,500 (9.5)	99.6	99.3	28
LG BW 4021 R	34 (3.2)	1,000 (3.8)	99.6	99.3	28
LG BW 2540 R*	26 (2.5)	750 (2.8)	99.6	99.3	22
LG BW 2521 R	9 (0.9)	345 (1.3)	99.6	99.3	28

Test Conditions: 2,000 ppm NaCl at 25°C (77°F), 225 psi (15.5 bar), pH 7, Recovery 15% (4040 R, 2540 R), 8% (4021 R, 2521 R)

Permeate flows for individual elements may vary +/-20%.

*The product is under development, and figures in the table are subject to change.

LG BW AFR

Product	Active Membrane Area, ft ² (m ²)	Permeate Flow Rate, GPD (m ³ /d)	Stabilized Salt Rejection, %	Minimum Salt Rejection, %	Feed Spacer, mil
LG BW 4040 AFR	75 (7.0)	2,300 (8.7)	99.6	99.3	34

Test Conditions: 2,000 ppm NaCl at 25°C (77°F), 225 psi (15.5 bar), pH 7, Recovery 15%.

Permeate flows for individual elements may vary +/-20%.

LG BW ES

Product	Active Membrane Area, ft ² (m ²)	Permeate Flow Rate, GPD (m ³ /d)	Stabilized Salt Rejection, %	Minimum Salt Rejection, %	Feed Spacer, mil
LG BW 4040 ES	85 (7.9)	2,500 (9.5)	99.5	99.2	28
LG BW 4021 ES	34 (3.2)	1,000 (3.8)	99.5	99.2	28
LG BW 2540 ES*	26 (2.5)	750 (2.8)	99.5	99.2	22
LG BW 2521 ES	9 (0.9)	345 (1.3)	99.5	99.2	28

Test Conditions: 2,000 ppm NaCl at 25°C (77°F), 150 psi (10.3 bar), pH 7, Recovery 15% (4040 ES, 2540 ES), 8% (4021 ES, 2521 ES)

Permeate flows for individual elements may vary +/-20%.

*The product is under development, and figures in the table are subject to change.

LG BW UES

Product	Active Membrane Area, ft ² (m ²)	Permeate Flow Rate, GPD (m ³ /d)	Stabilized Salt Rejection, %	Minimum Salt Rejection, %	Feed Spacer, mil
LG BW 4040 UES	85 (7.9)	2,700 (10.2)	99.0	98.0	28
LG BW 4021 UES	34 (3.2)	1,000 (3.8)	99.0	98.0	28
LG BW 2540 UES	21 (2.0)	800 (3.0)	99.0	98.0	28
LG BW 2521 UES	9 (0.9)	345 (1.3)	99.0	98.0	28

Test Conditions: 500 ppm NaCl at 25°C (77°F), 100 psi (6.9 bar), pH 7, Recovery 15% (4040 UES, 2540 UES), 8% (4021 UES, 2521 UES)

Permeate flows for individual elements will vary with no less than 85% of the specified datasheet flow.