



LG High Rejection BWRO Membranes

| 2020



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Agenda

- LG BWRO Products Overview
- High Rejection Standard LG BWRO
- High Rejection Anti-fouling LG BWRO

LG BWRO Products Overview

- High Rejection LG BWRO include Anti-fouling grades (225 psi): LG BW R G2, LG BW R Dura, LG BW R, LG BW AFR, LG BW AFR G2
- Low Pressure LG BWRO include Anti-fouling grades (150 psi): LG BW ES, LG BW ES G2 ¹⁾, LG BW AFES G2 ¹⁾
- Ultra Low Pressure LG BWRO(125 psi): LG BW UES
 = Energy Saving (ES) = Ultra Energy Saving (UES)

Product		Active Membrane Area, ft ²	Permeate Flow Rate, GPD	Stabilized Salt Rejection, %	Feed Spacer, mil
225 psi	High Rejection Standard	LG BW 440 R G2	440	12,650	99.78
		LG BW 440 R Dura	440	11,550	99.70
		LG BW 440 R	440	11,550	99.60
		LG BW 400 R	400	10,500	99.60
	High Rejection Anti-fouling	LG BW 400 R G2	400	11,500	99.78
		LG BW 400 AFR G2	400	11,500	99.70
		LG BW 400 R Dura	400	10,500	99.70
		LG BW 400 AFR	400	10,500	99.60
150 psi	Low Pressure Standard	LG BW 440 ES G2 ¹⁾	440	13,300	99.70
		LG BW 440 ES	440	11,550	99.60
		LG BW 400 ES	400	10,500	99.60
	Low Pressure Anti-fouling	LG BW 400 AFES G2 ¹⁾	400	12,100	99.70
125 psi	Ultra Low Pressure	LG BW 440 UES	440	12,650	99.0
		LG BW 400 UES	400	11,500	99.0

1) LG BW ES G2 will be launched 2021. Tentative specification

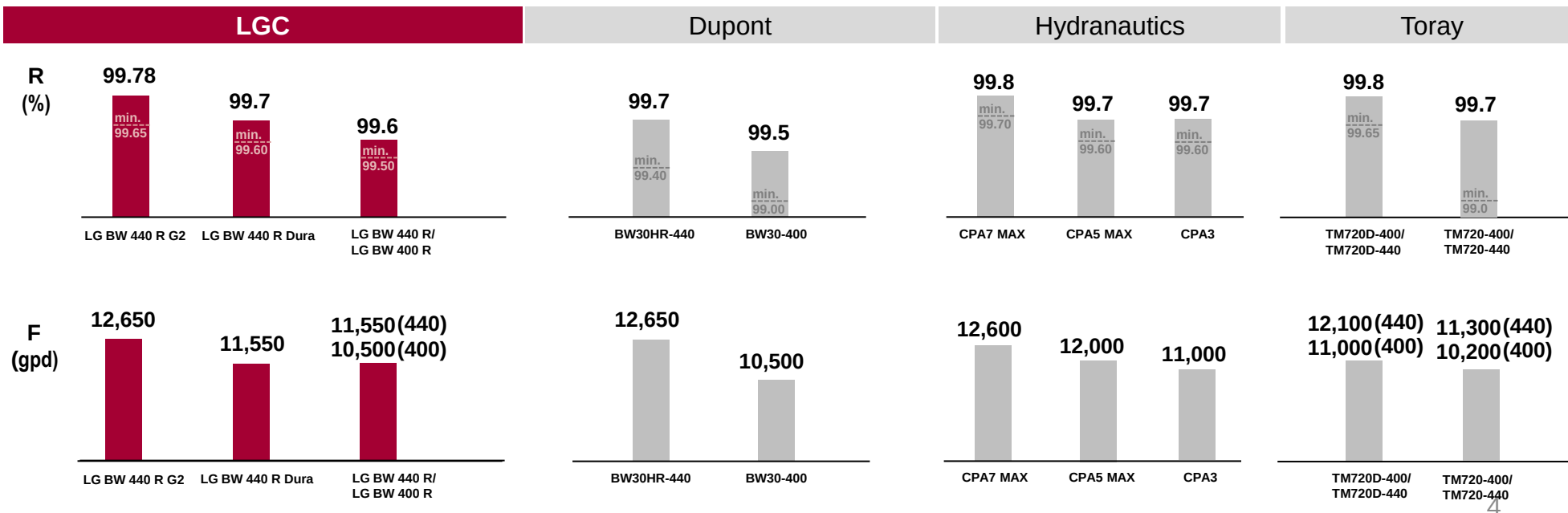
High Rejection Standard LG BWRO (225 psi)

High Rejection Standard, 225 psi	Permeate Flow Rate, GPD	Stabilized Salt Rejection, %	Feed Spacer, mil
LG BW 440 R G2	12,650	99.78	28
LG BW 440 R Dura	11,550	99.70	28
LG BW 440 R	11,550	99.60	28
LG BW 400 R	10,500	99.60	34

• Performance comparisons

- Rejection: LG BW R G2 > LG BW R Dura > LG BW R
- Flow: LG BW R G2 > LG BW R Dura ≈ LG BW R

Performance Comparison



Source: Product data sheet from each company's web

High Rejection Anti-fouling LG BWRO (225 psi)

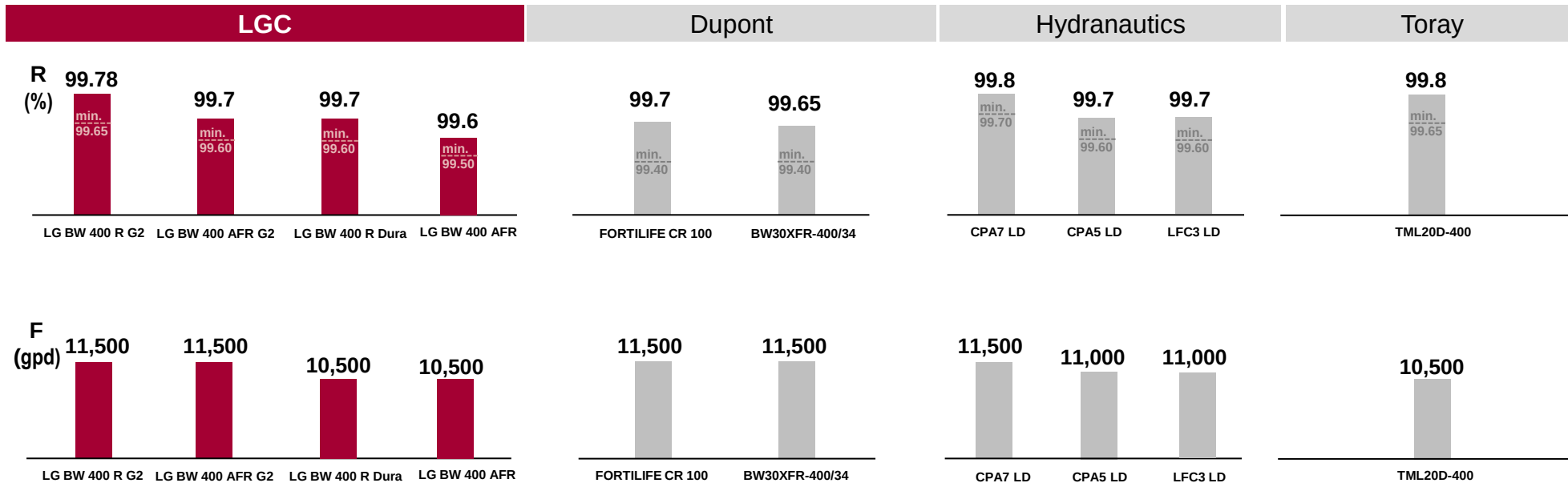
- The anti-fouling with high rejection (225 psi) products are LG BW 400 R G2, LG BW R Dura, LG BW AFR G2 and LG BW AFR

High Rejection Anti-fouling (225 psi)	LG BW 400 R G2	Anti-fouling products with 34 mil Low dP spacer
	LG BW 400 R Dura	
	LG BW 400 AFR G2	
	LG BW 400 AFR	Anti-fouling products with standard 34 mil spacer

Performance comparisons

- Rejection: LG BW R G2 > LG BW AFR G2 > LG BW R Dura > LG BW AFR
- Flow: LG BW R G2 > LG BW AFR G2 > LG BW R Dura ≈ LG BW AFR

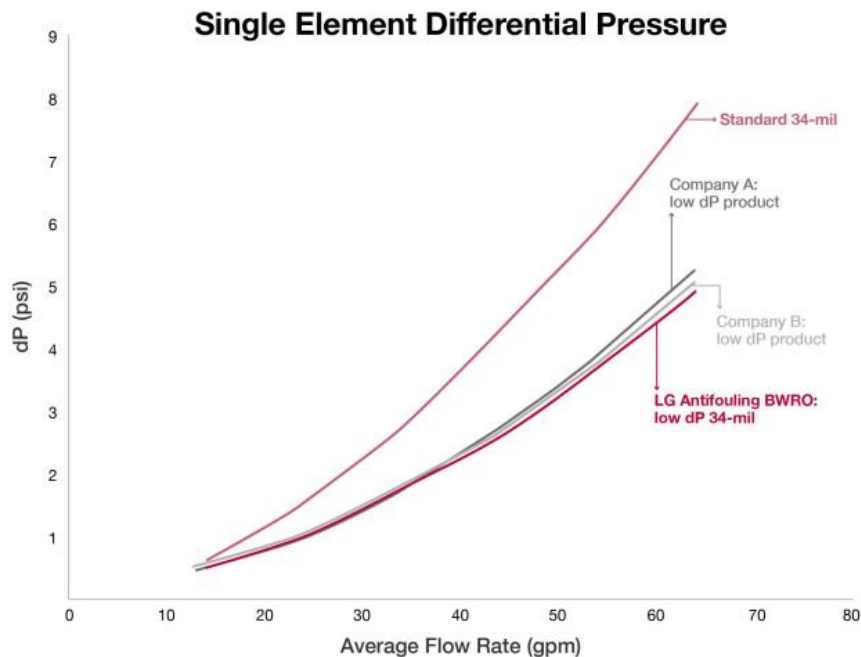
Performance Comparison



Appendix: Anti-fouling Technology Inside

Antifouling low dP Spacer technology

- LG BW 400 R G2, LG BW 400 AFR G2 and LG BW 400 R Dura
- Equipped with anti-fouling low dP spacer technology
- Reduced cleaning frequency
- Expanded membrane life span



Intrinsic Antifouling TFN membrane

- LG BW 400 R G2, LG BW 400 AFR G2, LG BW 400 R Dura, LG BW 400 AFR
- Retarded biofilm growth on membrane surface

	LGC Anti-fouling TFN membrane	Company A Anti-fouling membrane	Biofilm
2-D confocal image			100% 0%
3-D confocal image			
Biofilm Thickness (mm)	1.67	2.94	

-E.coli with green fluorescent protein(GFP), 30°C incubation
 -.Excitation: 488nm, Emission 590nm/ Image size: 6mm X 6mm

LG BWRO Antifouling Product Portfolio- from WDR

LG Chem has introduced a new anti-fouling, high-rejection BWRO membrane to its portfolio. The BW 400 AFR G2 8-inch diameter element was developed with LG Chem's thin film nanocomposite (TFN) technology with anti-fouling properties that are said to reduce microbial adhesion to reduce biofouling. The membranes are suitable for wastewater reuse applications, and are equipped with anti-fouling feed spacer technology, which is said to reduce differential pressure and cleaning frequency with challenging feedwaters.

Source: WDR, 6 April 2020

Deliver Reliable Performance in a Wide Range of Industries for the World's Largest Companies

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



- 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



LG Display

Panasonic

- Ultrapure water Make-up
- Ultrapure water polish loop

Food & Beverage



pepsi

- Bottled water
- Process water
- Concentration of ingredients

Appendix: Anti-fouling Featured Products

Company	Products	Type	Flow, GPD	Rejection, %	Spacer, mil	CIP pH	Fouling resistance features
LGC	BW 400 AFR	225 psi	10,500	99.6	34	2-12	Anti fouling property
	BW 400 AFR G2		11,500	99.7	34 low dP	1-13	Fouling tolerant low dP spacer
	BW 400 R Dura		10,500	99.7	34 low dP	1-13	Fouling tolerant low dP spacer
	BW 400 R G2		11,500	99.78	34 low dP	1-13	Fouling tolerant low dP spacer
	BW 400 AFES G2 ¹⁾	150 psi	12,100	99.7	34 low dP	1-13	Fouling tolerant low dP spacer
Dupont	BW30FR-400	225 psi	10,500	99.5	34	1-13	
	BW30XFR-400		11,500	99.65	34-LDP	1-13	Excellent fouling resistance
	FORTILIFE CR100		11,500	99.7	34, ΔP: 0.1 bar	1-13	Most advanced fouling resistant element for biofouling
	BW30XFRLE-400	150 psi	11,500	99.4	34-LDP	1-13	Improved fouling resistance with low energy
	ECO PRO-400		11,500	99.7	34-LDP	1-13	Reduction of the fouling impact
HYD	CPA5 LD	225 psi	11,000	99.7	34 LD	1-13	Low fouling spiral wound
	CPA6 LD	225 psi	8,000	99.75	34 LD	1-13	Low fouling spiral wound
	CPA7 LD	225 psi	11,500	99.8	34 LD	1-13	Low fouling spiral wound
	LFC3 LD	225 psi	11,000	99.7	34 LD	1-13	Low fouling spiral wound
	PRO-XR1	225 psi	11,500	99.7	34		Low fouling spiral wound
	PROC10	225 psi	10,500	99.75	34	1-13	Anti fouling
	PROC30	225 psi	11,500	99.8	34	1-13	Anti fouling
	ESPA2 LD	150 psi	10,000	99.6	34 LD	1-12	Low fouling spiral wound
	ESPA4 LD	100 psi	12,000	99.2	34 LD	1-12	Low fouling spiral wound
	PROC20	150 pis	10,500	99.5	34	1-13	Anti fouling, low energy

1) LG BW ES G2 will be launched 2021, Tentative performance

Source: Product data sheet from each company's web

Thank you



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