

PRODUCT SPECIFICATION SHEET

CSM[®]

Customer Satisfaction Membrane



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CSM RO MEMBRANE, The approved **Reverse Osmosis Membrane** in the world.

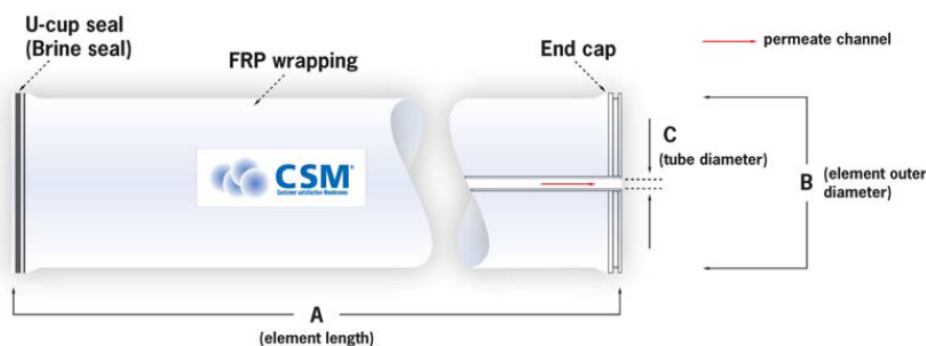
RE8040-BLN440

Normal low pressure grade RO membrane element with high extended area for brackish water

Product Specifications	Permeate Flow rate :	13,000 GPD (49.2 m ³ /day)
	Stabilized Salt Rejection :	99.2 %
	Effective Membrane Area :	440 ft ² (40.9 m ²)
<p>1. The stated performance is initial data taken after 30 minutes of operation based on the following conditions; 1,500 mg/L NaCl solution at 150 psig (1.0 MPa) applied pressure, 15 % recovery, 77 °F (25 °C) and pH 6.5~7.0.</p> <p>2. Minimum salt rejection is 99.0%</p> <p>3. Permeate Flow rate for individual elements may vary but will be no more than 10 % below the value shown.</p> <p>4. Effective membrane area may vary within 3 %.</p> <p>5. Central tube inner diameter is 1.5 inches which is larger than 1.12 inch of the regular element.</p> <p>6. All elements are vacuum sealed in a polyethylene bag containing 1.0 % SBS (Sodium bisulfite) solution and packaged individually in a cardboard box.</p>		

Product Description	Membrane Type :	Thin-film Composite
	Membrane Material :	PA (Polyamide)
	Membrane Surface Charge :	Negative
	Element Configuration :	Spiral-Wound, FRP wrapping

Product Dimensions	A =	40 inch (1,016 mm)
	B =	8.0 inch (203 mm)
	C =	1.5 inch (38 mm)



1. One interconnector (coupler) would be supplied for each membrane element.
2. All CSM membrane elements fit nominal 8.0-inch (203 mm) I.D. pressure vessel.
3. Outer feature may vary as design revisions take place.

Features

- CSM low pressure BLN440 element is made of the same high flux membrane as the regular low pressure membrane (BLN).
- CSM BLN440 produce more permeate flow than BLN because it has more membrane area. The high flux BLN440 element can save energy cost and capital costs for a high pressure pump, plumbing and pressure vessels.
- Salt rejection and specific permeate flux of BLN440 are between BLR and BLF products.

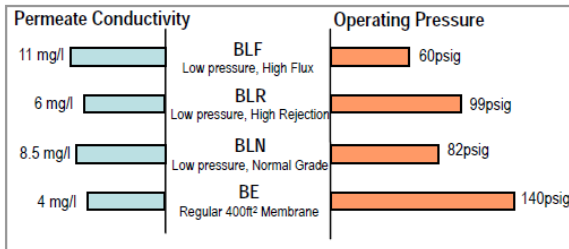
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Product Characteristics Comparison

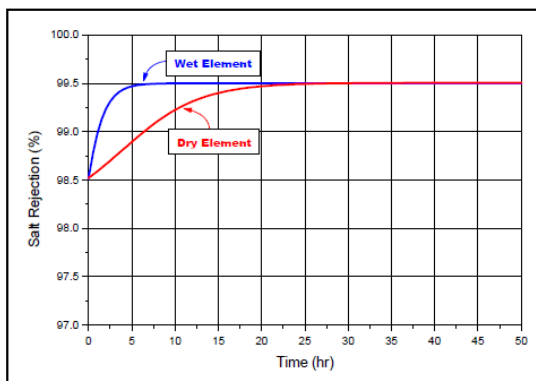
Comparison of CSM low pressure membranes with respect to permeate TDS and operating pressure under the same feed water condition (500 mg/l NaCl) and permeate flux (15 gfd) at 25°C (recovery 15 %)



Conditions for Handling CSM in general

- Customers must keep the element boxes dry at room temperature to prevent them from freezing and damages from heat. If the polyethylene bag is broken, a new protective solution has to be added to the RO membrane element and the element has to be repackaged air-tight to prevent from biological growth.
- Keep elements moist at all times after initial wetting
- Permeate water obtained from first hour of operation should be discarded in order to flush the protective solution in the elements.
- CSM elements should be immersed in a protective solution during storage, shipping or system shutdowns to prevent biological growth and freeze damage. The standard storage solution contains one (1) weight percent sodium bisulfite or sodium metabisulfite (food grade). For short term storage of one week, one (1) weight percent sodium metabisulfite solution is adequate for inhibiting biological growth.
- The customer is fully responsible for the effects of incompatible chemicals on elements. Their use will void the element limited warranty.

The Stabilization of salt rejection Characteristics



- CSM RO elements could be supplied either wet or dry.
- The stabilization of system rejection largely depends on the feed water conditions and operating parameters

Application Data

Operating Limits

- Max. Pressure drop / Element: 15 psi (0.1 MPa)
- Max. Pressure drop / 240" vessel: 60 psi (0.42 MPa)
- Max. Operating pressure: 600 psi (4.14 MPa)
- Max. Feed flow rate: 66 gpm (15.0 m³/hr)
- Min. Concentrate flow rate: 16 gpm (3.6 m³/hr)
- Max. Operating temperature: 113 °F (45 °C)
- Operating pH range: 3.0 ~ 10.0
- CIP pH range: 2.0 ~ 11.0
- Max. Turbidity: 1.0 NTU
- Max. SDI (15 min): 5.0
- Max. Free Chlorine concentration: 0.1 mg/L

Design Guideline for Various Water Source

- Waste water (SDI < 5): 8 ~ 12 gfd
- Waste water pretreated by UF (SDI < 3): 10 ~ 14 gfd
- Seawater, open intake (SDI < 5): 7 ~ 10 gfd
- High salinity well water (SDI < 3): 8 ~ 12 gfd
- Surface water (SDI < 5): 12 ~ 16 gfd
- Surface water (SDI < 3): 13 ~ 17 gfd
- Well water (SDI < 3): 13 ~ 17 gfd
- RO/UF permeate (SDI < 1): 21 ~ 30 gfd

Saturation Limits for Salts

- CaSO₄: 230 % saturation
- SrSO₄: 800 % saturation
- BaSO₄: 6,000 % saturation
- SiO₂: 100 % saturation

Above values are saturation limit at the tail end of the membrane elements for each sparingly soluble salts with proper scale inhibitor.

CaCO₃ Scaling potential limits as LSI or SDSI

- Without scale inhibitor: < -0.2
 - LSI (SDSI) with SHMP: < +0.5
 - LSI (SDSI) with special inhibitor¹: < +1.5
 - SDSI with any inhibitor: < +0.5
1. Special inhibitor means one of approved organic inhibitors. It should be approved from real plant for more than three years.



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