

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

## RE4040-FL

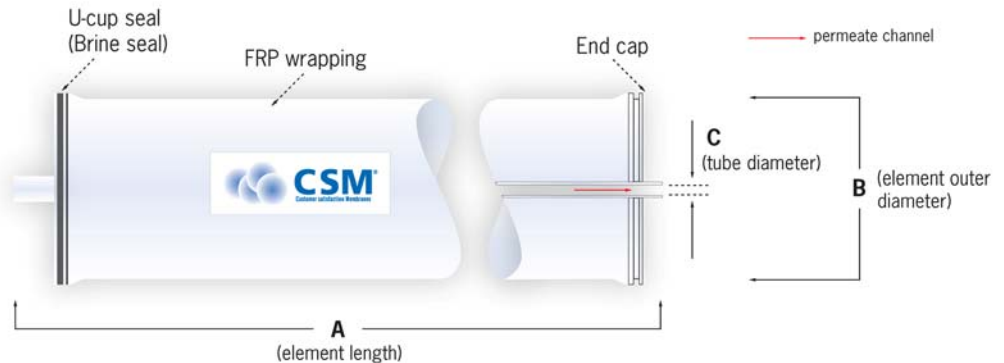
*Fouling resistant RO membrane element of low pressure grade for brackish water and waste water reuse*

<b>Product Specifications</b>	Permeate Flow rate :	1,900 GPD (7.2 m <sup>3</sup> /day)
	Stabilized Salt Rejection :	99.0 %
	Effective Membrane Area :	85 ft <sup>2</sup> (7.9 m <sup>2</sup> )

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 (1.5 MPa) applied pressure, 15 % recovery, 77 °F (25 °C) and pH 6.5-7.0.
2. All elements are vacuum sealed in a polyethylene bag containing 1.0 % SBS (Sodium bisulfite) solution and packaged individually in a cardboard box.

<b>Product Description</b>	Membrane Type :	Thin-film Composite
	Membrane Material :	PA (Polyamide)
	Membrane Surface Charge :	Close to Neutral
	Element Configuration :	Spiral-Wound, FRP wrapping

<b>Product Dimensions</b>	A =	40 inch (1,016 mm)
	B =	4.0 inch (102 mm)
	C =	0.75 inch (19.1 mm)

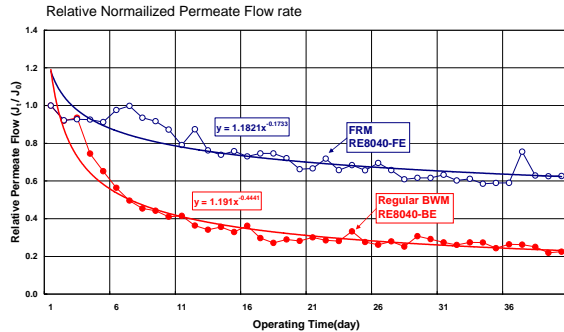


1. One interconnector (coupler) would be supplied for each membrane element.
2. All CSM membrane elements fit nominal 8.0-inch (203 mm) I.D. pressure vessel.
3. Outer feature may vary as design revisions take place.

### Features

- CSM FL element provides an excellent way to treat a feed water which might still have fouling potential fouling agents.
- CSM FL element has a high durability against CIP chemicals so the fouling resistance performance can be sustained after periodic CIP in the long term operation.
- CSM FL element has a flow rate similar to CSM BL element at low pressure.

## Fouling Resistance Characteristics



The flux decline of CSM FRM is only half of that of the general brackish water RO membrane under the condition of zero liquid discharge system.

## 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.

## 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 18 gpm (4.09 m<sup>3</sup>/hr)
- Min. Concentrate flow rate 4 gpm (0.91 m<sup>3</sup>/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
- 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

- CaSO<sub>4</sub> 230 % saturation
- SrSO<sub>4</sub> 800 % saturation
- BaSO<sub>4</sub> 6,000 % saturation
- SiO<sub>2</sub> 100 % saturation

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

### CaCO<sub>3</sub> Scaling potential limits as LSI or SDSI

- Without scale inhibitor < -0.2
- LSI (SDSI) with SHMP < +0.5
- LSI (SDSI) with special inhibitor<sup>1</sup> < +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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