CSM® Customer Satisfaction Membrane

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

RE4040-BE

High productivity RO membrane element with extended area for brackish water

Product Specifications

Permeate Flow rate :	2,400 GPD (9.1 m^3/day)
Stabilized Salt Rejection :	99.7 %
Effective Membrane Area :	85 ft^2 (7.9 m^2)

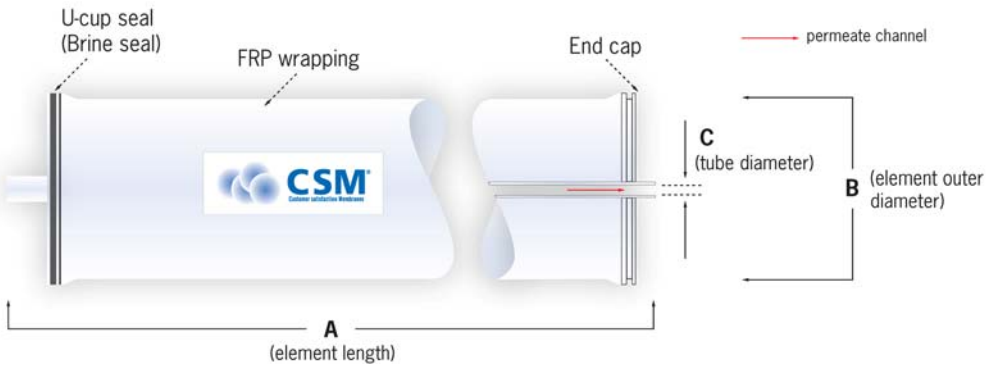
1. The stated performance is initial data taken after 30 minutes of operation based on the following conditions; 2,000 mg/L NaCl solution at 225 psig (1.5 MPa) applied pressure, 15 % recovery, 77 °F (25 °C) and pH 6.5~7.0.
2. All elements are vacuum sealed in a polyethylene bag containing 1.0 % SBS (Sodium bisulfite) solution and packaged individually in a cardboard box.

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 =	4.0 inch (102 mm)
C =	0.75 inch (19.1 mm)

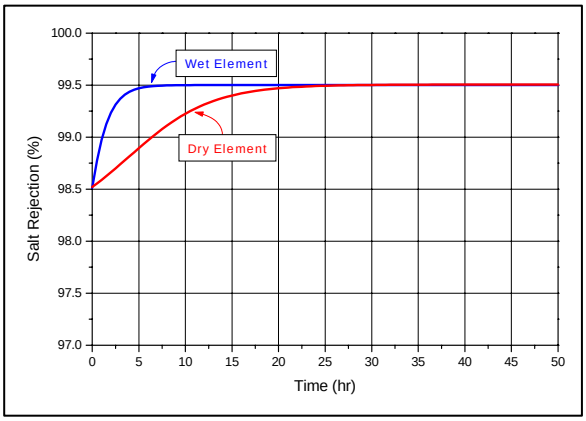


1. One interconnector (coupler) would be supplied for each membrane element.
2. All CSM membrane elements fit nominal 4.0-inch (102 mm) I.D. pressure vessel.
3. Outer feature may vary as design revisions take place.

Features

- CSM Brackish water high rejection membrane elements are used most widely because of their ability to sustain excellent performance.
- CSM membrane elements have a high chemical durability which prevents declining of their performance after CIP.

The Stabilization of salt rejection Characteristics



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

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^3/hr)
Min. Concentrate flow rate	4 gpm (0.91 m^3/hr)
Max. Operating temperature	113 ^oF (45 ^oC)
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

$CaSO_4$	230 % saturation
$SrSO_4$	800 % saturation
$BaSO_4$	6,000 % saturation
SiO_2	100 % saturation

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

$CaCO_3$ Scaling potential limits as LSI or SDSI

Without scale inhibitor	< -0.2
LSI (SDSI) with SHMP	< +0.5
LSI (SDSI) with special inhibitor[1]	< +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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