# DOW FILMTEC™ Membranes

DOW FILMTEC™ SEAMAXX™ Seawater Reverse Osmosis Element with iLEC™ Interlocking Endcaps

## Features

Dow Water & Process Solutions offers various premium seawater reverse osmosis (SWRO) elements designed to reduce capital and operation cost of desalination systems. DOW FILMTEC™ products combine premium membrane quality with automated precision fabrication resulting in outstanding performance, reliability and robustness.

DOW FILMTEC SEAMAXX is an element of choice for seawater systems operating at low to medium levels of salinity and temperature, as well as for brackish water with relatively high salinity. The element's flow rate is significantly above flow rates of any other SWRO element currently available in the market. This extraordinary high element productivity leads to substantial savings – primarily in energy consumption when compared to conventional low energy SWRO products. In addition, SEAMAXX includes the typical DOW FILMTEC product features:

- The 28 mil feed spacer combines low differential pressure with low cleaning frequency and high cleaning efficiency.
- The renown iLEC™ interlocking endcaps helps to reduce system operating costs and the risk of o-ring leaks.
- The oxidative free membrane manufacturing process results in high membrane robustness and long term stable performance.
- The widest pH range for cleanings (pH1 to pH13) allows effective cleanings even in cases of severe fouling.
- The automated, precision fabrication gives a greater number of shorter membrane leaves thus reducing fouling while maximizing element efficiency.

SEAMAXX elements are tested on flow and rejection performance using a standard test at 600 psi. Potential defects in element construction are detected and elements which do not comply with the quality protocol are discarded. A 600 psi standard test was introduced to specifically account for the high permeability of this seawater element. It is evident the expected results of standard tests performed at 600 psi and 8% recovery, are different from the nominal performance condition of 800 psi and 8% recovery. The test conditions for the Certificate of Analysis are defined in the Table below.

### Product Specifications of Standard Test, performed at 600 psi (4.1 MPa)

| Product | Part Number | Active Area ft² (m²) | Permeate Flow Rate gpd (m³/d) | Stabilized Boron Rejection % | Minimum Salt Rejection % | Stabilized Salt Rejection % |
|---|---|---|---|---|---|---|
| SEAMAXX | 11082275 | 440 (41) | 9,050 (34.2) | 81.8 | 99.25 | 99.47 |

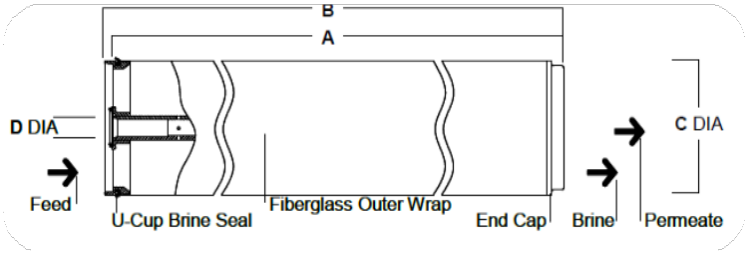
1. The above values are normalized to the following actual test conditions: 32,000 ppm NaCl, 600 psi (4.1 MPa), 77°F (25°C), pH 8 and 8% recovery.
2. Permeate flows for individual elements may vary +/-15% .
3. Product specifications may vary slightly as improvements are implemented.
4. Specific Boron stabilized rejection based on the following test conditions:32,000 ppm NaCl, 5 ppm Boron, 600 psi (4.1 MPa), 77°F (25°C), pH 8 and 8% recovery

## Product Specifications of Standard Test, performed at 800 psi (5.5 MPa)

| Product | Part Number | Active Area ft² (m²) | Permeate Flow Rate gpd (m³/d) | Stabilized Boron Rejection % | Minimum Salt Rejection % | Stabilized Salt Rejection % |
|---|---|---|---|---|---|---|
| SEAMAXX | 11082275 | 440 (41) | 17,000 (64.4) | 89 | 99.58 | 99.70 |

1. The above values are normalized from the 600 psi specification standard test to the following conditions: 32,000 ppm NaCl, 800 psi (5.5 MPa), 77°F (25°C), pH 8, 8% recovery. Due to the very high permeability of SEAMAXX elements, they are not tested at the typical feed pressure for standard test conditions of 800 psi but at a lower feed pressure of 600 psi. This allows to standard test the element within its operating guidelines.
2. Permeate flows for individual elements may vary +/-15%
3. Specific Boron stabilized rejection based on the following normalization conditions: 32,000 ppm NaCl, 5 ppm Boron, 800 psi (15.5 bar), 77°F (25°C), pH 8 and 15% recovery

## Figure 1




**Dimensions - inches (mm)**

| Product | Feed Spacer (mil) | A | B | C | D |
|---|---|---|---|---|---|
| SEAMAXX | 28 | 40 (1,016) | 40.5 (1,029) | 7.9 (201) | 1.125 (29) |

1. Refer to Dow Design Guidelines for multiple-element systems.
2. Elements fit nominal 8-inch (203 mm) I.D. pressure vessel.

## Operating Limits

| | |
|---|---|
| Membrane Type | Polyamide thin-film composite |
| Maximum Operating Temperature[a] | 1000 psig (70 bar) at T< 35ºC<br>900 psig (62 bar) at T = 35-45ºC |
| Maximum Element Pressure Drop | 13 psig (1.0 bar) |
| pH Range, Continuous Operation[a] | 2-11 |
| pH Range, Short-Term Cleaning (30 min.)[b] | 1-13 |
| Maximum Feed Silt Density Index (SDI) | SDI 5 |
| Free Chlorine Tolerance[c] | < 0.1 ppm |

a. The limits for feed pressure and temperature cover the typical operations
b. Maximum temperature for continuous operation above pH 10 is 95ºF (35C)
c. Refer to cleaning guidelines in specification sheet 609-23010
d. Under certain conditions, the presence of free chlorine and other oxidizing agents will cause premature membrane failure. Please refer to technical bulletin 609-22010 for more information.

## Important Information

Proper start-up of reverse osmosis water treatment systems is essential to prepare the membranes for operating service and to prevent membrane damage due to overfeeding or hydraulic shock. Following the proper start-up sequence also helps ensure that system operating parameters conform to design specifications so that system water quality and productivity goals can be achieved.

Before initiating system start-up procedures, membrane pretreatment, loading of the membrane elements, instrument calibration and other system checks should be completed.

Please refer to the application information literature entitled "Start-Up Sequence" (Form No. 609-02077) for more information.

## Operation Guidelines

Avoid any abrupt pressure or cross-flow variations on the spiral elements during start-up, shutdown, cleaning or other sequences to prevent possible membrane damage. During start-up, a gradual change from a standstill to operating state is recommended as follows:

- Feed pressure should be increased gradually over a 30-60 second time frame.
- Cross-flow velocity at set operating point should be achieved gradually over 15-20 seconds.
- Permeate obtained from first hour of operation should be discarded.

Please refer to the product technical manual.

## General Information

- Keep elements moist at all times after initial wetting
- If operating limits and guidelines given in this bulletin are not strictly followed, the limited warranty will be null and void. Refer to DOW FILMTEC™ Reverse Osmosis and Nanofiltration Element Three-Year Prorated Limited Warranty (Form No. 609-35010)
- To prevent biological growth during prolonged system shutdowns, it is recommended that membrane elements be immersed in a preservative solution
- The customer is fully responsible for the effects of incompatible chemicals and lubricants on elements
- Maximum pressure drop across an entire pressure vessel (housing) is 50 psi (3.4 bar)
- Avoid static permeate-side backpressure at all times

## Product Stewardship

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products - from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

## Customer Notice

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including safety data sheets, should be consulted prior to use of Dow products. Current safety data sheets are available from Dow.

**DOW FILMTEC™ Membranes**
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