



## DOW™ FILMTEC™ Membranes

DOW FILMTEC HRLE-440*i* Surface Area, Low-Energy Brackish Water RO Element with *i*LEC™ Interlocking Endcaps

### Benefits

Featuring breakthrough membrane chemistry, the DOW™ FILMTEC™ HRLE-440*i* element delivers the same 99.5% nominal NaCl rejection as traditional brackish water elements but at 33% lower pressures.

- Lower energy requirements allow new reverse osmosis systems to be designed to use one third less energy and still deliver the same permeate quality compared with other BW elements
- Existing low energy systems can be retrofitted to achieve lower permeate TDS than possible with previous low energy elements
- The combination of low energy and high rejection is ideally suited for use in the second pass of seawater and high-purity applications
- Excellent rejection of silica, boron, nitrate and ammonium; supported by Dow's modeling software
- Increased IPA rejection (IPA rejection is a common surrogate for TOC removal)
- Available dry for longer storage life and easier handling

### Product Specifications

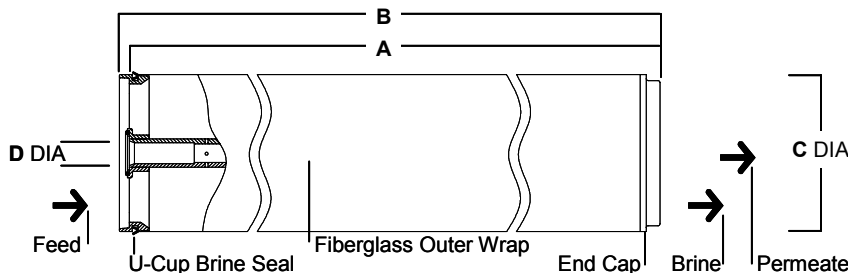
Product	Part number	Active area ft <sup>2</sup> (m <sup>2</sup> )	Feed spacer thickness (mil)	Permeate flow rate gpd (m <sup>3</sup> /d)	Stabilized salt rejection (%)	Minimum salt rejection (%)
HRLE-440 <i>i</i>	347733	440 (41)	28	12,650 (48)	99.5	99.3

#### Individual Solute Rejections

Silica rejection (%)	Boron rejection (%)	Nitrate rejection (%)	Ammonium rejection (%)	Isopropyl alcohol rejection (%)
99.8	68	97	97.5	94

1. Permeate flow and salt (NaCl) rejection based on the following standard conditions: 2,000 ppm NaCl, 150 psi (10.3 bar), 77°F (25°C), pH 8 and 15% recovery.
2. Flow rates for individual elements may vary but will be no more than 15% below the value shown.
3. Sales specifications may vary as design revisions take place.
4. Active area guaranteed +/-3%. Active area as stated by Dow Water & Process Solutions is not comparable to nominal membrane area often stated by some manufacturers. Measurement method described in Form No. 609-00434.
5. Specific solute stabilized rejections based on the following standard test conditions: 2,000 ppm NaCl, 150 psi (10.3 bar), 77°F (25°C), pH 7 and 15% recovery, 50 ppm SiO<sub>2</sub>, 5 ppm B, 100 ppm NO<sub>3</sub><sup>-</sup>, 100 ppm NH<sub>4</sub><sup>+</sup>, or 100 ppm IPA.

**Figure 1**



#### Dimensions – inches (mm)

Product	A	B	C	D
HRLE-440 <i>i</i>	40.0 (1,016)	40.5 (1,029)	7.9 (201)	1.125 ID (29)

1. Refer to DOW FilmTec Design Guidelines for multiple-element applications and recommended element recovery rates for various feed sources. 1 inch = 25.4 mm
2. Element to fit nominal 8.0-inch (203 mm) I.D. pressure vessel.
3. Individual elements with *i*LEC endcaps measure 40.5 inches (1,029 mm) in length (B). The net length (A) of the elements when connected is 40.0 inches (1,016 mm).

## Operating Limits

- |                                                        |                                        |
|--------------------------------------------------------|----------------------------------------|
| • Membrane Type                                        | Advanced Polyamide Thin-Film Composite |
| • Maximum Operating Temperature <sup>a</sup>           | 113°F (45°C)                           |
| • Maximum Operating Pressure                           | 600 psig (41 bar)                      |
| • Maximum Pressure Drop                                | 15 psig (1.0 bar)                      |
| • pH Range, Continuous Operation <sup>a</sup>          | 2 - 11                                 |
| • pH Range, Short-Term Cleaning (30 min.) <sup>b</sup> | 1 - 13                                 |
| • Maximum Feed Flow                                    | 85 gpm (19 m <sup>3</sup> /h)          |
| • Maximum Feed Silt Density Index                      | SDI 5                                  |
| • Free Chlorine Tolerance <sup>c</sup>                 | <0.1 ppm                               |

<sup>a</sup> Maximum temperature for continuous operation above pH 10 is 95°F (35°C).

<sup>b</sup> Refer to Cleaning Guidelines in specification sheet 609-23010.

<sup>c</sup> Under certain conditions, the presence of free chlorine and other oxidizing agents will cause premature membrane failure. Since oxidation damage is not covered under warranty, Dow Water & Process Solutions recommends removing residual free chlorine by pretreatment prior to membrane exposure. Please refer to technical bulletin 609-22010 for more information.

## General 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.

## Important Information

- Keep elements moist at all times after initial wetting.
- If operating limits and guidelines given in this bulletin are not strictly followed, the DOW™ FILMTEC™ Reverse Osmosis and Nanofiltration Three-Year Prorated Limited Warranty (Form No. 609-35010) will be null and void.
- 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 drops are 15 psi (1.0 bar) per element or 50 psi (3.4 bar) per multi-element pressure vessel (housing) whichever value is more limiting.
- Avoid static permeate-side backpressure at all times.

## Regulatory Note

These membranes may be subject to drinking water application restrictions in some countries: please check the application status before use and sale.

### DOW FILMTEC™ Membranes For more information about DOW FILMTEC membranes, call the Dow Water & Process Solutions business:

North America: 1-800-447-4369  
Latin America: (+55) 11-5188-9222  
Europe: (+32) 3-450-2240  
Pacific: +60 3 7958 3392  
[www.dowwaterandprocess.com](http://www.dowwaterandprocess.com)

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