# FILMTEC™ Membranes

FILMTEC **LE-400** High Productivity Low-Energy Brackish Water RO Element

## Features

The FILMTEC™ LE-400 element is a low-energy element for industrial and municipal applications that operates at low pressure to deliver energy savings in new equipment or replacement situations where energy cost is an important factor and unit price is a key driver.

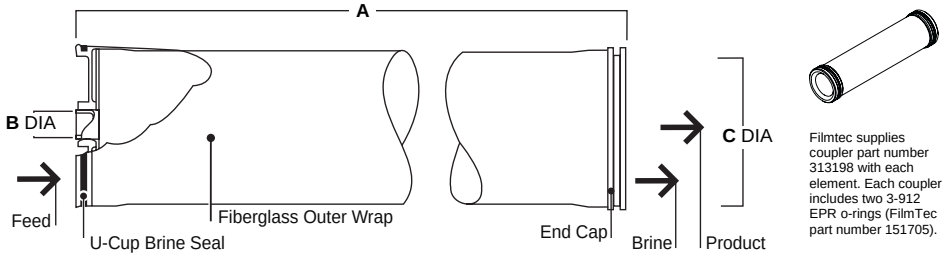
- Delivers equivalent permeate flow at 40% lower feed pressure, compared to the FILMTEC BW30-400.
- Offers the proven performance and high productivity of the FILMTEC BW30-400 element construction, with lower energy use and operating expense.
- The new FILMTEC LE-400 has an industry standard 1.125 inch ID permeate tube to facilitate element replacement.

## Product Specifications

| Product | Part number | Active area $ft^2$ ($m^2$) | Feed spacer thickness (mil) | Permeate flow rate gpd ($m^3$/d) | Stabilized salt rejection (%) | Minimum salt rejection (%) |
|---|---|---|---|---|---|---|
| **LE-400** | 249109 | 400 (37) | 28 | 11,500 (44) | 99.3% | 99.0% |

1. Permeate flow and salt 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. For comparison, the LE-400 will have a permeate flow of 12,200 gpd (46 $m^3$/d) and stabilized salt rejection of 99.3% when normalized to a feed solution of 1,500 ppm NaCl as used by some manufacturers.
3. Flow rates for individual elements may vary but will be no more than 15% below the value shown.
4. Sales specifications may vary as design revisions take place.
5. Active area guaranteed +/-3%. Active area as stated by FilmTec is not comparable to nominal membrane area often stated by some manufacturers. Measurement method described in Form No. 609-00434.

## Figure 1




| Product | Dimensions – inches (mm) A | B | C |
|---|---|---|---|
| **LE-400** | 40.0 (1,016) | 1.125 ID (29) | 7.9 (201) |

1. Refer to FilmTec Design Guidelines for multiple-element applications and recommended element recovery rates for various feed sources.
2. Element to fit nominal 8.0-inch (203 mm) I.D. pressure vessel.

1 inch = 25.4 mm


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## Operating Limits

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

[a] Maximum temperature for continuous operation above pH 10 is 95°F (35°C).

[b] Refer to Cleaning Guidelines in specification sheet 609-23010.

[c] 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, FilmTec recommends removing residual free chlorine by pretreatment prior to membrane exposure. 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.

## 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.
- 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.

## Regulatory Note

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

Notice: The use of this product in and of itself does not necessarily guarantee the removal of cysts and pathogens from water. Effective cyst and pathogen reduction is dependent on the complete system design and on the operation and maintenance of the system.

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