FilmTec™ Fortilife™ XC70 Element

FilmTec™ Fortilife™ XC70 Reverse Osmosis Elements Offer Enhanced Durability and High Water Recovery

The Challenge

With freshwater in short supply worldwide, the concentrated reject stream of a reverse osmosis (RO) wastewater reuse system can be a reliable water source for industrial plants. However, contaminants and total dissolved solids (TDS) in this water are typically high (e.g., total dissolved solids of greater than 5,000 mg/L and chemical oxygen demand (COD) of greater than 60 mg/L). Applying standard RO membranes to desalinate high-TDS/COD water results in frequent shutdowns to clean the membranes because of fouling. The difficult-to-clean foulants on the membranes often require soaking at pH 13 and elevated temperatures of 30 – 35°C, but frequent exposure of the RO membranes to these conditions has been shown to reduce their lifetime. More robust, fouling-resistant RO elements for treating contaminated, high-TDS waters are needed to achieve reliable system up-time and stable salt rejection performance over the lifetime of the element.

The Solution

FilmTec™ Fortilife™ XC70 Elements enable RO systems to achieve high water recovery rates and reach concentrate stream TDS levels of > 70,000 ppm when operating within standard RO pressure limits (< 82 bar). The durable, fouling-resistant element design makes it ideal for treating high-TDS waters with high fouling potential, while also ensuring reliable system on-stream time and long element life. This element is well-suited for challenges associated with Minimal Liquid Discharge (MLD) and brine management scenarios in textile, chemical and petrochemical, steel and metal, landfill leachate, and fossil power generation markets.

The Benefits

FilmTec™ Fortilife™ XC70 Elements offer the following advantages:

- The ability to achieve a reject TDS level of > 70,000 ppm within standard system operating limits, helping maximize RO recovery rates.
- A slower permeate flowrate decline enabled by the high fouling-resistant membrane.
- A robust membrane with reliable, long-term performance.
- The wide pH range for cleaning (1 – 13), which enables effective cleanings in severe fouling conditions.
- Consistent permeate quality to address water reuse requirements over the element's lifetime.
- Support from highly specialized and experienced technical experts.

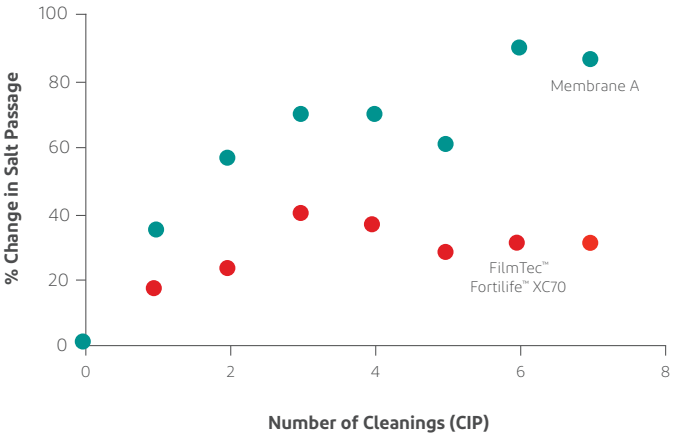
Each element is designed and manufactured to process 8,800 gallons of water per day with 99.75% stabilized salt rejection (99.6% minimum rejection) at standard test conditions of 32,000 ppm NaCl, 800 psi (55 bar), 77°F (25°C), pH 8 and 8% recovery.

The Study

FilmTec™ Fortilife™ XC70 Elements and Membrane A's conventional RO elements were exposed to multiple cycles of base (pH 13 at 35°C) and acid (pH 1 at 25°C) cleanings-in-place (CIPs) in order to compare their CIP durability. This side-by-side durability study showed Membrane A's continuous deterioration after each CIP.

FilmTec™ Fortilife™ XC70 provides enhanced CIP durability

Figure 1. Percent Change in Salt Passage



On average, wastewater RO skids need to shut down for CIP once per month. After only 7 CIPs, Membrane A had more than 85% increase in salt passage, whereas FilmTec™ Fortilife™ XC70 only increased less than 40% (see Figure 1). Consequently, in less than one year, the permeate quality resulting from Membrane A significantly decreased and may prohibit its utility in some reuse applications.

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Water Solutions
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