FILMTEC Membranes
Troubleshooting: Membrane Element Evaluation

Performance Test

The standard element performance test is used to determine the solute rejection and the permeate flow rate of a FILMTEC™ element under FILMTEC Standard Test Conditions. The test results can then be compared with the specification of the element in question. The element performance is determined before and after any cleaning trial in order to assess the efficacy of the treatment.

The apparatus for the standard test consists of a feed holding tank equipped with a thermostated heat exchanger system to maintain the feed solution at 25±1°C, a pump to provide the required pressure and feed flow rate, and a reverse osmosis device. A detailed description is given in ASTM D4194-03 /4/. A synthetic test solution is used as feed water. Permeate and concentrate are recycled back to the feed tank.

Sodium chloride is used as a test solute for reverse osmosis. For nanofiltration, magnesium sulfate and calcium chloride are used as well. The salt concentration and the feed pressure are given in the Standard Test Conditions in the product information sheet of the relevant FILMTEC element. The feed flow rate should be adjusted to obtain the element recovery as indicated in the mentioned Standard Test Conditions. The feed water pH should be adjusted to a pH of 8 by adding HCl or NaOH. For a summary of the standard test conditions, see Table 1.5 in *Element Characteristics (Section 1.8)*.

The following data are recorded one hour after start-up, and repeated 2 to 3 hours after start-up, and hourly thereafter until three successive permeate flow rates (corrected to 25°C) and salt passages agree within 5% (relative):

- Feed, concentrate, and permeate pressures
- Permeate and concentrate flows (use calibrated flow meters or a calibrated volume container and stopwatch)
- Permeate temperature
- Conductivity of feed, permeate and concentrate, or chloride content of the three streams.

The permeate flow rate should be corrected to 25°C using the formulas given in Section 6.7, Plant Performance Normalization. The salt rejection is calculated from the permeate conductivity K_p and the feed conductivity K_f:

$$\text{Rejection, \%} = \left(1 - \frac{K_p}{K_f}\right) \times 100$$

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