

TEMPERATURE & PRESSURE CORRECTION

NET PRESSURE CORRECTION

The higher the net pressure on a membrane element, the higher the permeate rate. A rough value of osmotic pressure of water can be calculated roughly by the following rule:

Osmotic pressure (PSI) = Total Dissolved Solids / 100

To estimate the effect of net pressure, follow these steps:

1. Calculate the net pressure at which the membrane element is rated (P_r)
 $P_r = \text{Rated pressure} - \text{Osmotic pressure of test solution}$
2. Calculate the net pressure under operating conditions (P_{op})
 $P_{op} = \text{Average applied pressure} - \text{Average osmotic pressure of the feed water}$
3. Expected permeate flow at operating conditions = (Rated permeate flow) x $P_{op} / (P_r)$

EXAMPLE

QUESTION:

For a thin-film membrane, 4 × 40" membrane element, using a 2000 ppm, sodium chloride solution at 225 psi and 77 degrees Fahrenheit, the permeate rate is 1800 gallons/day. What is the permeate rate at 150 psi, feed water with 1000 TDS and temperature of 59 degrees Fahrenheit?

ANSWER:

From the above example for the temperature correction, the permeate rate at 59 degrees Fahrenheit is 1224 gallons/day.

Using the steps above, the effect of net pressure is:

$$1224 \times (150 - 10) / (225 - 20) = 1224 \times (140) / (205) = 835.9 \text{ gallons/day}$$

NOTE

When designing a system additional detailed calculations are necessary to take into account the effect of pressure drop and variation in total dissolved solids (TDS) throughout the system. Please contact us if you require further information.

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