

# HOW TO CALCULATE ACTUAL PERFORMANCE FOR A REVERSE OSMOSIS MEMBRANE

Actual performance of a membrane is dependent on three factors: Osmotic Pressure, Tap Water Pressure and Tap Water Temperature.

**What is Osmotic Pressure:** The flow of water through a membrane in response to differing concentrations of solutes on either side generates a pressure across the membrane called osmotic pressure. In other words, as the hardness of the tap water increases, greater tap water pressure is required to force the water through the membrane.

**Pressure & Temperature Compensation:** In order to characterize a membrane, there must be common testing data. Industry standards to testing membrane performance is: 60 PSI tap pressure with 77 degree water temperature.

Most locations will not have exactly 60 PSI or 77 degree water. Use the calculation below to determine what the membrane will do with your water conditions.

## OSMOTIC PRESSURE CORRECTION:

$$\boxed{\text{YOUR TAP WATER T.D.S}} - 250 \text{ OEM T.D.S} / 100 = \underline{\hspace{2cm}} \text{ O.P.C.F}$$

$$\boxed{\text{YOUR HOUSE PSI P.S.I}} (-) \text{ O.P.C.F} = \underline{\hspace{2cm}} \text{ CORRECTED PRESSURE}$$

(+) \* IF THE O.P.C.F IS NEGATIVE (-), ADD THE O.P.C.F TO THE HOUSE PRESSURE

DOW FilmTec's Standard for Total Dissolved Solids in the water is 250. Your first step is to subtract what your water is from DOW's standard.

Next Step, subtract your current house pressure with the osmotic pressure. This is your corrected tap water pressure.

## PRESSURE COMPENSATION:

STEP 1:  $\boxed{\text{CORRECTED PRESSURE}} \text{ PSI} / 60 = \underline{\hspace{2cm}}$

STEP 2:  $\boxed{\text{YOUR MEMBRANE SIZE}} \text{ MEM GPD} \times \boxed{\hspace{1cm}} = \underline{\hspace{2cm}} \text{ P.C.F}$

Now, take you corrected pressure and divide it by the standard PSI set by the industry. (Which is 60 PSI)

Multiply the rated membrane size by your corrected compensation value.

## TEMPERATURE COMPENSATION:

STEP 3:  $\boxed{\hspace{1cm}} \text{ T.C.F}$   
LOOK UP YOUR TEMP ON CHART

STEP 4:  $\boxed{\hspace{1cm}} \text{ P.C.F} \times \boxed{\hspace{1cm}} \text{ T.C.F} = \underline{\hspace{2cm}} \text{ GPD}$   
ACTUAL GPD RATE WITH YOUR WATER

Look up the water temperature on the chart below to determine TCF value.

Temperature Correction Factor Table (TCF)

F / C	TCF	F / C	TCF	F / C	TCF
41.0/5	0.521	59.0/15	0.730	77.0/25	1.000
42.8/6	0.540	60.8/16	0.754	78.8/26	1.031
44.6/7	0.560	62.6/17	0.779	80.6/27	1.063
46.4/8	0.578	64.4/18	0.804	82.4/28	1.094
48.2/9	0.598	66.2/19	0.830	84.2/29	1.127
50.0/10	0.620	68.0/20	0.857	86.0/30	1.161
51.8/11	0.640	69.8/21	0.884	87.8/31	1.196
53.6/12	0.661	71.6/22	0.912	89.6/32	1.232
55.4/13	0.684	73.4/23	0.941	91.4/33	1.267
57.2/14	0.707	75.2/24	0.970	93.2/34	1.304

Finally, multiply the Pressure Compensation value by the TCF value to give you your actual gallons per day with your specific water conditions.

### PRESSURE ADJUSTMENT

#### OSMOTIC PRESSURE CORRECTION:

$$\boxed{500} \text{ T.D.S} - 250 \text{ OEM T.D.S} / 100 = \underline{2.5} \text{ O.P.C.F}$$

$$\boxed{45} \text{ P.S.I} (-) \text{ O.P.C.F} = \underline{42.5} \text{ CORRECTED PRESSURE}$$

(+) \* IF THE O.P.C.F IS NEGATIVE (-), ADD THE O.P.C.F TO THE HOUSE PRESSURE

### EXAMPLE: 42.5 PSI, 71° F, 90 GPD MEMBRANE

#### PRESSURE COMPENSATION FACTOR

STEP 1:  $\boxed{42.5} \text{ PSI} / 60 = \underline{.71}$   
CORRECTED PRESSURE

STEP 2:  $\boxed{90} \text{ MEM GPD} \times \boxed{.71} = \underline{63.9} = \text{P.C.F}$   
YOUR MEMBRANE SIZE

#### TEMPERATURE COMPENSATION FACTOR

STEP 3:  $\boxed{.912} \text{ T.C.F}$   
LOOK UP YOUR TEMP ON CHART

STEP 4:  $\boxed{63.9} \text{ P.C.F} \times \boxed{.912} \text{ T.C.F} = \underline{58.3} \text{ GPD}$   
ACTUAL GPD RATE WITH YOUR CONDITIONS

### CALCULATING EXAMPLE