RO-MAN

REVERSE OSMOSIS SYSTEM INSTALLATION GUIDE

FOR 200, 300 & 450 GPD RO SYSTEMS

200, 300, 450 GPD

Standard Installation Kit Contents:

Reverse Osmosis System

Membranes

Sediment Filter

Carbon Filter

Multi Media Filter

2 Metres Red Pipe

2 Metres Blue Pipe

Waste Saddle

Saddle Valve Mains ¼”

Roll PTFE Tape

Filter Wrench

PLEASE READ THIS ENTIRE GUIDE PRIOR TO BEGINNING INSTALLATION

IF AT ANY TIME YOU ARE USNURE HOW TO PROCEED PLEASE CONTACT THE SUPPORT TEAM BY EMAILING: **HELPDESK@RO-MAN.COM** OR CALLING: **018236 98813**.

This water system has been designed for quick and simple installation and maintenance.

By carefully reading this instruction manual and following the operational guidelines you will ensure a successful installation and reliable operation. Routine maintenance is essential to the longevity and performance f the system. Filters should be changed every two to six months depending on the quality of the feed water supply and quantity of water produced.

!!CAUTION!!

DO NOT USE THIS SYSTEM WHERE THE WATER IS MICROBIOLOGICALLY UNSAFE OR OF UNKNOWN QUALITY

Conditions for Operation

Source Water Supply - TEC

Community / Private	Non-Chlorinated – or Chlorinated as long as the carbon filter is in place and replaced every 6 months or after RECOMMENDED gallon throughput, which comes first. Membranes are damaged by chlorine.
System Pressure (Pre-Filtration)	0-75 PSI
Membrane Pressure Range	40-125 PSI
Temperature	4°-38°C (40°-100°F)
pH Range	3.0-13.0
Maximum Supply TDS Level	1500 MG/L
Turbidity	<1.0 Net Turbidity (NTU)

Chemical Parameters – TEC

Hardness (CACO.)	<350 MG/L (<20GPG)
Iron (FE)	<0.1 MG/L
Manganese (MN)	<0.05 MG/L
Hydrogen Sulfide (H2S)	0.00 MG/L
Chlorine (CL2)	0.00 MG/L

Starting Your Installation

Preparation

Determine the location for the installation of the system. Avoid locations where the system might come in contact with hot water pipes or other hazards.
Determine the location for the outlet pipe.
Determine the location for the inlet pipe.

Source & Drain Water Saddle Valve

Shut Off the Water

Locate the water shut-off valve for the cold water feed line of your mains supply. Accidentally hooking up the system to the hot supply line will permanently damage the membrane (see condition for operation). To assure you are using the cold water line, turn on both the hot and cold tap. After the water is arm to the touch, feel the pipes under the sink. It will be easy to identify the hot and cold pipes.

Close the cold water valve. Turn on the cold water tap only to assure that the line is completely shut off and the line is drained. If no shut off valve is located under the sink, turn off the main supply at the entry to the house.

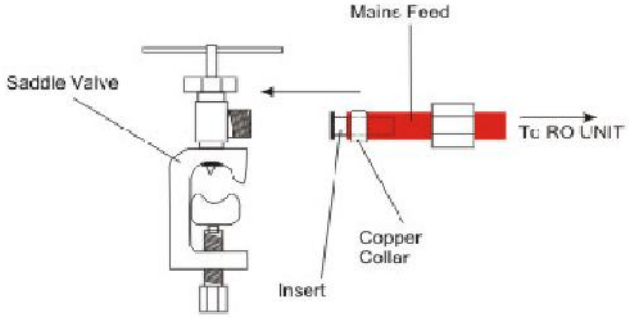
Installing the Drain Clamp

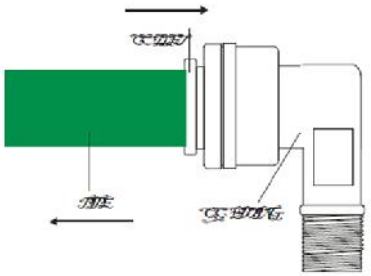
Select a location for the drain hole based on the design of the plumbing. Position the drain outlet saddle on the drainpipe. Allow adequate space for drilling. Tighten the bolts evenly on both sides. Avoid over tightening.

Using the opening in the drain outlet saddle as a guide, drill a ¼" hole in the drain pipe. Clean any debris from the saddle and threads.

Installing the Supply Feed

Connecting the red pipe to the saddle valve is not difficult, remove the nut for the valve and put it over the pipe, then push the small copper ring over the end of the pipe and push the insert into the end of the pipe. Then push the end of the pipe into the valve assembly and tighten the nut (DO NOT over tighten).
When fitting the valve make sure the saddle valve is in open position. With a spanner fit the saddle valve to a 15-9 mm pipe. Once the saddle assembly is fitted put the other end of the red pipe in water container and close the tap on the saddle valve to pierce the pipe, you may need to open and close this several times to clean the bore off.





Note on Fit Connections / Quick Connectors:

The Push Fit Connectors are opened by pushing down on the collet ring with two fingernails and pulling the hose at the same time. If your nails are not user friendly, then use a pair of pliers, a small spanner or any tool that can apply pressure on both sides of the quick connectors collet.

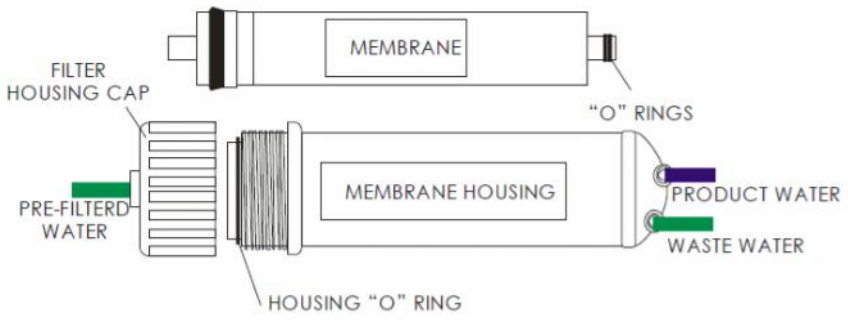
Fitting the Membrane

Please fit only one Membrane at a time. Disconnect the green tube that runs into the top membrane housing. Unpack the membrane. Do not remove the tape from around the membrane!

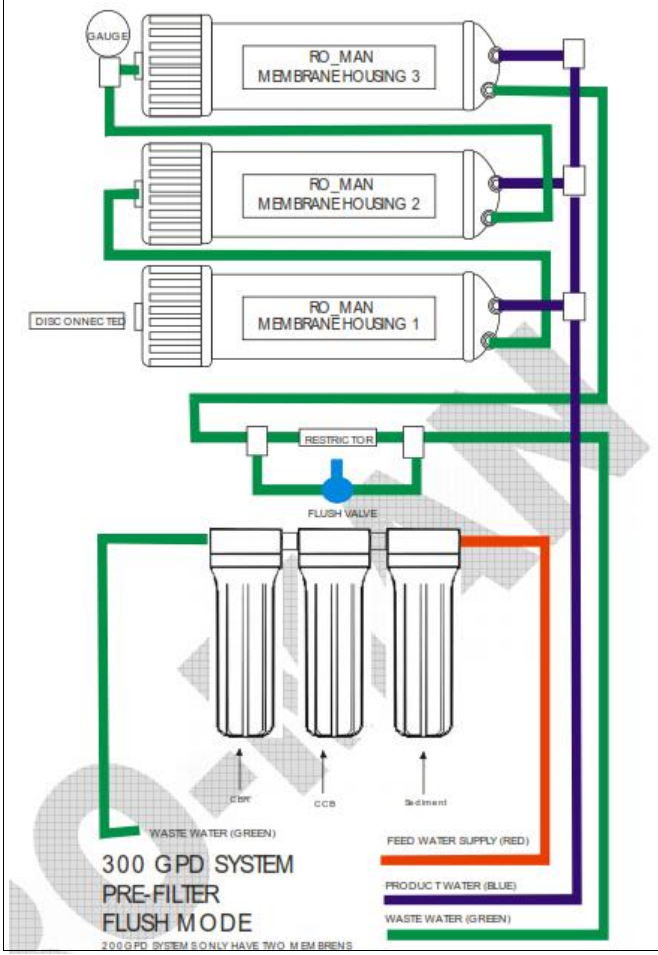
The Membrane has a plastic core in the centre of the membrane material. You will see there are two small black o rings. Holding the housing insert the membrane with the two small, black o rings first, it will stop at the large black gasket seal located on the outer edge of the membrane material. Push the membrane into the housing sometimes it can be a tight fit so push with adequate force. You will feel it 'seat' into the housing.

Once the membrane is seated properly, make sure the housing 0 ring is fitted and moist. Then screw the housing cap onto the housing and reattach the green tube/s as before.

Repeat the above if your system has a second or third membrane (200 and 300 gallon systems).



Fitting the Pipes to Flush the Carbon Filters

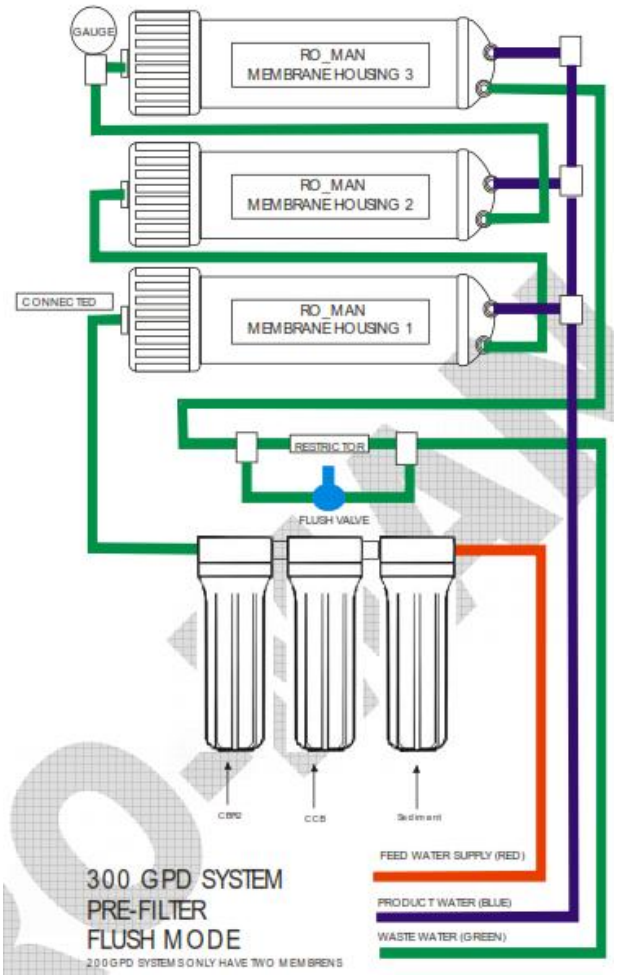


(It could damage the membrane if you do not do this)

Red: Feed Water -this goes from the metal saddle valve to the inline filter (the system has a red cap on the push fit fitting)

Green: Waste Water – waste saddle to the out on the membrane housing.

Fitting the Pipes for Production



Red: **Feed Water** – this goes to the metal saddle valve (the system has a red cap on the push fit fitting).

Green: - **Waste Water** – This goes to the plastic waste saddle from the out on the membrane housing (the system has a green cap on the push fit fitting).

Blue: - Product Water – From the system to our water container (the system has a blue cap on the push fit fitting).

Starting the System for the First Time

Make sure all water supply / drain lines re secure and free from leakage. By slowly turning the saddle valve counter clockwise until fully open. Check seal for leakage. If necessary, tighten stem nut lightly.

!!! Important Note: DO NOT USE THE FIRST 10 GALLON OF WATER !!!

Dispense this water to drain. This process removes the factory installed sanitising solution from the entire system and sends it to the drain - DO NOT DRINK THIS WATER.

Maintenance

It is imperative to follow the sequence as outlined

Flushing the System with the Flush Valve

All RO-MAN systems are fitted with a flush valve, this valve is to extend the life of the membrane, the more often you can put the system in flush mode the better. Daily flushing is best but weekly is OK. All you need to do is open the flush valve for 2-3 minutes each time, this lets the water blast away any build up in the membrane.

When to Replace the Pre-Filters

Sediment Pre-Filter should be changed when ever changing other filter or when it looks contaminated or if you get reduced pressure. Carbon filters and CCB filters should be changed every 3,500 gallons of water put through or on the 300 GPD system every 8000 gallons of product water and one the 200 GPD systems every 5000 gallons of production. All pre-filters should be changed every 6 months if water capacity is not reached.

Changing the Pre-Filters

Turn the water off by slowly turning the saddle valve clockwise. Remove the Pre-Sediment, then the carbon cartridge and then the CBR2 cartridge. Install the new filters and re-assemble system. Turn on the system and inspect for leaks

Troubleshooting

It's OK to contact your Retailer or send RO-MAN an email via helpdesk@ro-man.com. It is best to try first and remember, we cannot see it from here digital photos are great. All problems are fixable and in general they will show up in the first 24-48 hours after the system is fully charged.

1) "I have leakage from a push-in fitting"
Solution: The push-ins rarely leak but on the rare occasion that they do try pushing the line in harder. If this fails take the line out and check the end of the tube. Is it a clean square cut?? If not, take a pair of sharp scissors (or a sharp knife) and cut it then push it in again, firmly.

2) "The system is making water very slowly"
Solution Time in seconds how long it takes to produce exactly one pint of product water. Multiply the measured seconds by 8 to give time in seconds to produce 1 gallon and then divide 86,400 by the time to produce 1 gallon. You now know how many Gallons Per Day (GPD) the system is producing. Make a note of the psi on the pressure meter and take the temperature of your feed water.

Go to http://www.ro-man.com/ro-man_support.html and choose the "System Support " option using the down arrow select your RO-Man system and then input your psi , temperature and if known your input TDS. Click on "Calculate" if the answer to this calculation in UK gallons is markedly higher than what you are producing please contact helpdesk@ro-man.com. Remember that your psi needs to be 40 psi if it is not again please contact us.

3) "The system is not making water "
Solution This is almost always a psi problem. 40 psi is about as low as you can go. If the psi is low it can be a bad hole on the feed water pipe. try drilling it out. If you have good psi to the inside of the pre-filters, then check the following:

a) Check to see if the water is flowing out the Green discharge line - if so, then the membrane is getting water.
b) Disconnect the blue line from the RO membrane housing - is there any water?
c) If the Green line is flowing and the blue is not, it may be blocked, check the valve at the RO Housing. There are two outlets on the out end of the RO membrane. One goes to the discharge saddle and the other is purified water. This outlet has a built in check valve inside the chrome plated brass part, take it out - is there any water there?
d) If unit has been in service for a while, the problem is probably clogged filters. Pull the filters out, test them one at a time by putting them into the first filter position and seeing if it flows. Clogged filters are usually only associated with well water or with really turbid water.
e) The RO Membrane has silted up. Very rare unless very bad feed water. The RO Membrane is self-flushing. Try back-flushing the membrane.

4) "My filters are leaking"
Solution:
Loose O-Ring. Take housing off and make sure they are properly aligned. Housing not tight enough - tighten.

5) "I have leakage from a screw-in connector"
Solution:
a) Not tight enough - gently apply pressure - too much and you will strip the threads
b) If that does not work, remove and apply PTFE tape.

Last tip: nothing lasts forever
The system you bought will eventually wear out. The things that wear out are the RO membrane, the flow restrictor and the green line get caked with the junk that is being sent down the drain. The rubber "0" rings will get old and crack, just like gaskets on your car. If you start replacing them one by one, you are going to go crazy and will spend lots of time and money. A membrane will cost around £40.00 to replace. The bottom line is that it is cheaper and easier just to junk the system (or keep it for parts) and buy a new one every few years, or when the RO membrane dies. You will know when the RO membrane dies. The water will start tasting bad. We recommend that you invest in a TDS meter and check the TDS of the feed water and the TDS of the RO water. When there is no difference, the RO is dead. It will not happen overnight. There will be a gradual decay. Remember-change filters every 6 months. If you have fairly heavy duty use, adjust accordingly to fit in with throughput specifications.

RO-MAN Options

Pressure Gauge
There are two reasons for fitting a pressure gauge:

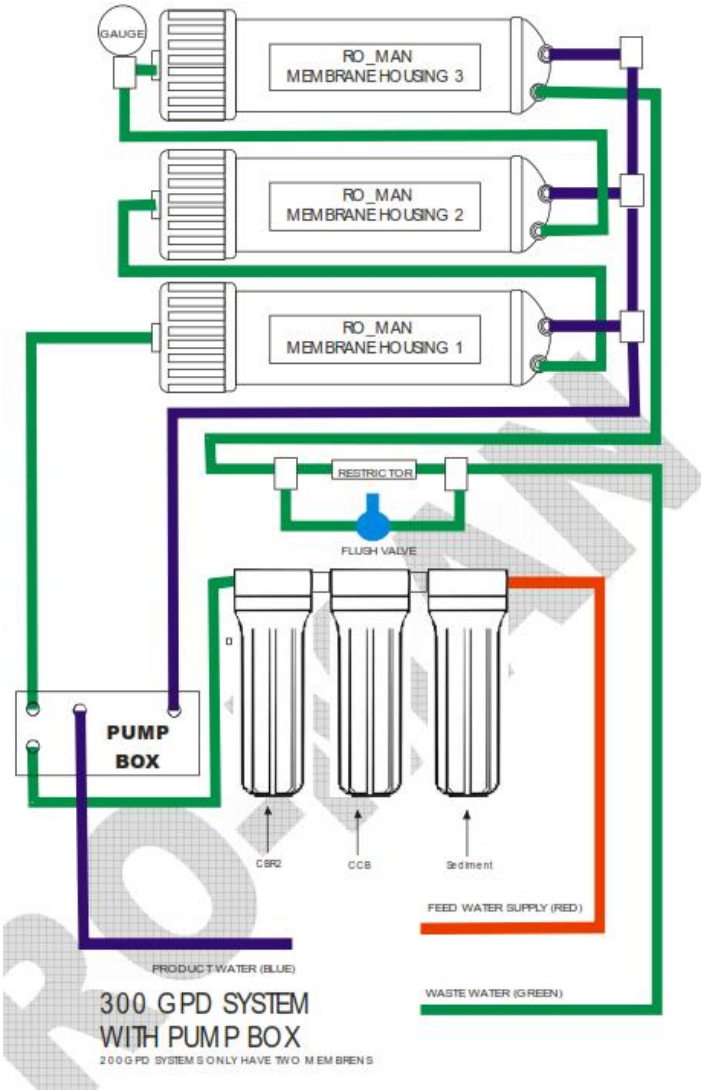
1. To read the water pressure in order to check whether it is within specification. System pressure is very important too little pressure will make the production rate very slow and too much pressure will make the seals fail. Low pressure will make the TDS higher e.g. a system running at 65 psi may have a TDS of 5 while the same system running at 40psi could have a reading as high as 15.
2. To work out when the sediment filters are blocked.

Deionisation (DI)
Deionisation is used to polish the water making it 100% pure. TDS reading should be near zero if using a DI unit.

Inline TDS Meter
TDS (Total Dissolved Solids) meters are used to work out how well the reverse osmosis system is running. By measuring the feed water TDS and then measuring the output you can work out the rejection rate.

92% Rejection is OK 95% Rejection is GOOD 98%+ Rejection is EXCELLENT.

RO-MAN Integrated Pump Box
We have developed a pump box that will increase the water pressure that drives the membrane. This pump box contains a pump, high pressure switch, to protect and help extend the life of the pump. The pump box also has a solenoid valve to stop water going through the system when the pump is not working.



How do you know how pure your water is when using a RO system?

We measure how well RO systems work with a Total Dissolved Solids (TDS) meter, with measuring how well your water filter is running you are going through the process of making pure water without knowing if it is actually pure..

Total Dissolved Solids (TDS) are the total amount of mobile charged ions, including minerals, salts or metals dissolved in a given volume of water, expressed in units of MG per unit volume of water (MG/L), also referred to as parts per million (PPM). TDS is directly related to the purity and quality of water and water purification systems and affects everything that consumes, lives in or uses water, whether organic or inorganic.

Questions and Answers about TDS in Water:

What are Total Dissolved Solids?
Dissolved solids refer to any minerals, salts, metals, cations or anions dissolved in water. This includes anything present in water other than the pure water (H2O) molecule and suspended solids. (Suspended solids are any particles / substances that are neither dissolved nor settled in the water, such as wood pulp.)

In general, the total dissolved solids concentration is the sum of the cations (positively charges) and anions (negatively charged) ions in the water.

Parts per Million (PPM) is the weight to weight ratio of any ion to water.

TDS is based on the electrical conductivity (EC) of water. Pure H2O has virtually zero conductivity. Conductivity is usually about 100 times the total cations or anions expressed as equivalents. TDS is calculated by converting the EC by a factor of 0.5 to 1.0 times the EC depending upon the levels. Typically, the higher the level of EC, the higher the conversion factor to determine the TDS.

Where do Dissolved Solids come from?

1. Some dissolved solids come from organic sources such as leaves, silt, plankton and industrial waste and sewage. Other sources come from runoff from urban areas, road salts used in winter and fertilizers and pesticides used on lawns and farms.

2. Dissolved solids also come from inorganic materials such as rock and air that may contain calcium bicarbonate, nitrogen, iron phosphorous, sulphur and other minerals. Many of these materials form salts, which are compounds that contain both a metal and a non-metal. Salts usually dissolve in water forming ions. Ions are particles that have a positive or negative charge.

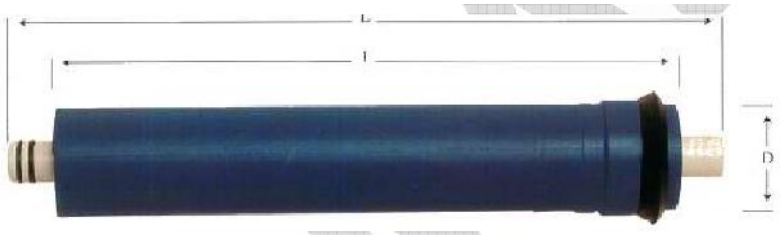
3. Water may also pick up metals such as lead or copper as they travel though pipes used to distribute water to consumers.

4. Note that the efficacy of water purification systems in removing total dissolved solids will be reduced over time, so it is highly recommended to monitor the quality of a filter or membrane and replace them when required.

Taste / Health	High TDS results in undesirable taste which could be saltly, bitter or metallic. It could also indicate the presence of toxic minerals. The recommended maximum of TDS in water in 500 mg/l (500 ppm).
Filter Performance	Test your water to make sure the reverse osmosis or other type of water filter or water purification system has a high rejection rate and know when to change your filter (or membrane) cartridges.
Hardness	High TDS indicates hard water, which cause scale build-up in pipes and valves, inhibiting performance.
Aquariums	A constant level of minerals is necessary for aquatic life. The water in an aquarium should have the same levels of TDS and pH as the fish and reef's original habitat.
Hydroponics –	TDS is the best measurement of the nutrient concentration in a hydroponics solution.
Pools and Spas	TDS levels could impede the functions of certain applications.
Colloidal Silver Water	TDS levels must be controlled prior to making colloidal silver.

RO-MAN Thin Film Membrane Information

Permeate Flow Rate		Minimum Salt	Stabilized Salts
Gals/Day US	Litres/Day	Rejection (%)	Rejection (%)
100	380	96	98
75	283	96	98
50	189	96	98
36	136	96	98



Dimensions

L		I		D	
Inches	CM	Inch	CM	Inches	CM
11.63	295	10.0	250	1.8	46

Recommended Operation Conditions

Maximum Operating Pressure	125 PSI (0.86 MPa)
Maximum Feed Flow Rate	2 GPM
Maximum Operating Temperature	113°F (45°C)
Maximum Feed Water Turbidity	1 NTU
Maximum Feed Water Silt Density Index (15min.)	5
Chlorine Tolerance	0
Feed Water pH Range	2-11
Minimum Brine Flow to permeate Flow Ratio	4:1

Temperature Correction Factor

Performance of the reverse osmosis membrane element is affected by two key factors, temperature of the feed water and the net driving pressure across the element. These two factors must be taken into account before comparing or evaluating the performance of the membrane element of a reverse osmosis system.

The higher the temperature, the more the product flow and vice versa. All reverse osmosis membrane elements and systems are rated at 77º Fahrenheit (25ºCelsius).

To find the membrane permeate rate at different temperatures follow these steps:

1) Find the Temperature Correction Factor (TFC) from the table below.
2) Divide the rated permeate flow at 77º F by the TFC.

The result is the permeate flow at the desired temperature.

Feed Water Temperature		Correction	Feed Water Temperature		Correction	Feed Water Temperature		Correction
ºC	ºF	Factor	ºC	ºF	Factor	ºC	ºF	Factor
5	41.0	2.58	15	59.0	1.47	25	77.0	1.00
6	42.8	2.38	16	60.8	1.39	26	78.8	0.97
7	44.6	2.22	17	62.6	1.34	27	80.6	0.94
8	46.4	2.11	18	64.4	1.29	28	82.4	0.91
9	48.2	2.00	19	66.2	1.24	29	84.2	0.88
10	50.0	1.89	20	68.0	1.19	30	86.0	0.85
11	51.8	1.78	21	69.8	1.15			
12	53.6	1.68	22	71.6	1.11			
13	55.4	1.61	23	73.4	1.09			
14	57.2	1.54	24	75.2	1.04			

Example Question: If a thin-film membrane permeate rate at 77 degrees Fahrenheit = 100 gallons/day. What is the permeate rate at 59 degrees Fahrenheit?

Answer: Temperature correction factor (from table above) = 1.47permeate flow at 59 degrees Fahrenheit = 100÷1.47 = 68.03 gallons (us)/day.

Net Pressure Correction

Performance of the reverse osmosis membrane element is affected by two key factor; temperature of the feed water and the net driving pressure across the element. These two factors must be taken into account before comparing or evaluating the performance of a membrane element or a reverse osmosis system.

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

OSMOTIC PRESSURE (PSI) = TOTAL DISSOLVED SOLIDS (TDS) ÷ 100

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

Calculate the Net Pressure at which the membrane is rate (Pr)
Pr = (Rate Pressure) - (Osmotic Pressure of Test Solution)

Nominal Rejection Characteristics of Thin Film Composite Reverse Osmosis Membrane

Calcium	93-99%	Bromide	90-95%
Sodium	92-98%	Phosphate	95-98%
Magnesium	93-98%	Cyanide	90-97%
Potassium	92-96%	Sulphate	96-99%
Manganese	96-98%	Thiosulfate	96-98%
Iron	96-98%	Silicate	92-95%
Aluminium	96-98%	Silica	90-98%
Copper	96-99%	Nitrate	90-95%
Nickel	96-99%	Boron	50-70%
Cadmium	93-97%	Borate	30-50%
Silver	93-96%	Fluoride	92-95%
Zinc	96-98%	Polyphosphate	96-98%
Mercury	94-97%	Orthophosphate	96-98%
Hardness Ca&Mg	93-97%	Chromate	85-95%
Radioactivity	93-97%	Bacteria	99+%
Chloride	92-98%	Lead	95-98%
Ion	92-98%	Arsenic	50-90%

Note: The above percent rejection is for reference only. Actual rejection will depend heavily on the exact chemistry, temperature, pressure and TDS content of the feed water.

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For assistance and enquiries please contact the support team:

helpdesk@ro-man.com

or telephone

018236 98813