

REVERSE OSMOSIS FRESH WATER GENERATOR SYSTEM ONBOARD M.V.SEAFDEC

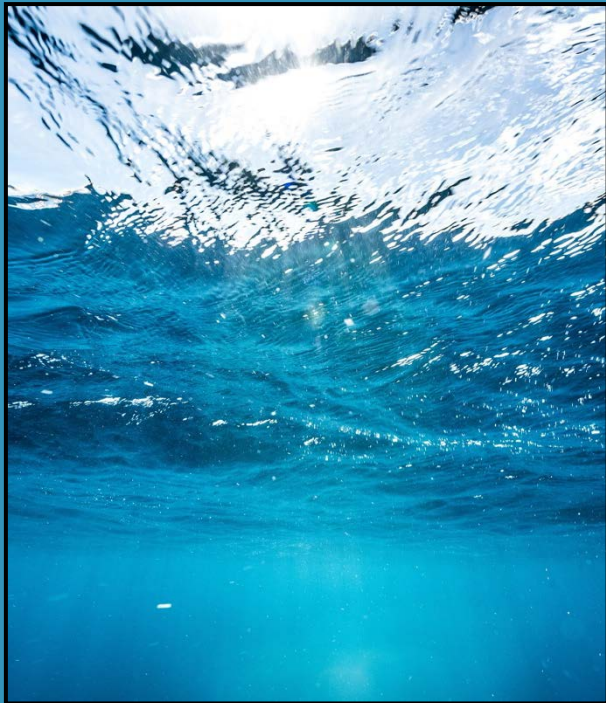


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INTRODUCTION



The quantity of water in the human body is the factor of body fluid balancing. Our body is composed of about 60% water. There are composes 75% of our brain, makes up 83% of our blood, composes 22% of our bones, makes up 75% of our muscles, helps to carry nutrients and oxygen to our cells, moistens oxygen for breathing, helps to convert food to energy, Removes waste from the body, etc.



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WATER ON THE EARTH



Water is degraded everywhere on Earth, Total volume of water available:

- The total volume of water on Earth is about 97.5% is saltwater and 2.5% is freshwater; 70% of the planet's freshwater is frozen in the icecaps of Antarctica and Greenland; 30% is mostly found underground. Freshwater use by sector: Irrigation (70%); Industry (22%); and Domestic use (8%).
- Human water needs: The daily drinking water requirement per person is 2-4 liters; it takes 2000 to 5000 liters of water to produce one person's food. Conserving water resources: 2% of freshwater will be produced via desalination by 2015.

M.V. SEAFDEC and M.V. SEAFDEC 2 are training vessels of Southeast Asian Member Countries that accept the exiting technology in the reverse osmosis system for converse seawater to freshwater for drinking, cooking, washing and even running other types of important machinery which uses freshwater as a cooling medium.

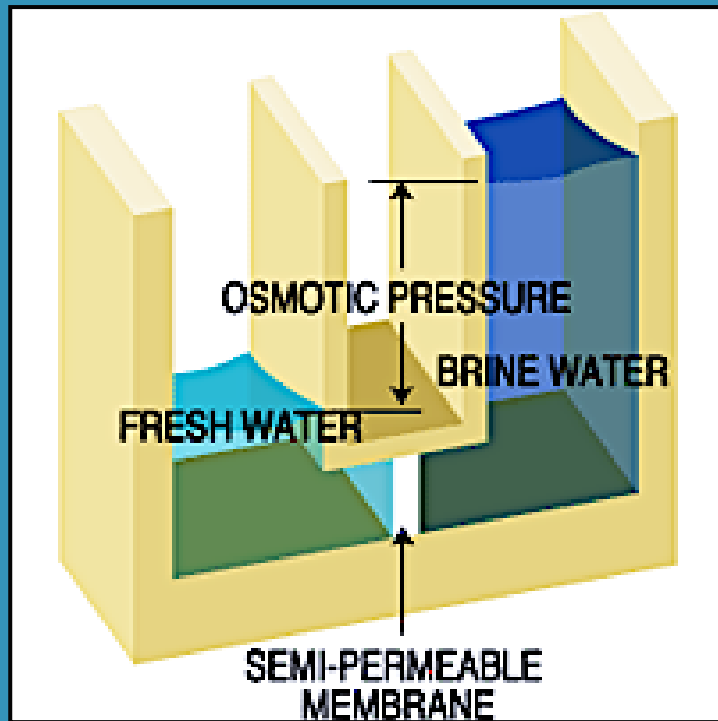


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PRINCIPLE OF REVERSE OSMOSIS PROCESS



When two kinds of solution freshwater and brine, are in contact with each other across a semipermeable membrane, the water moves through the semipermeable membrane, to the point where the concentrations of both solutions are equal to each other.

This phenomenon is due to the characteristic possessed by a membrane of allowing water to pass through it while making the passage of brine difficult. The phenomenon is referred to as osmosis. It is very commonly observed in the biological world. If the brine is contained within strict limitations, as water permeates the brine side, the pressure gradually increases until the limit is reached, above which no permeation of water is possible.

The difference in pressure between the brine and fresh water at this point is called osmotic pressure. (For seawater, the osmotic pressure thus obtained is about 25 kg/cm²)

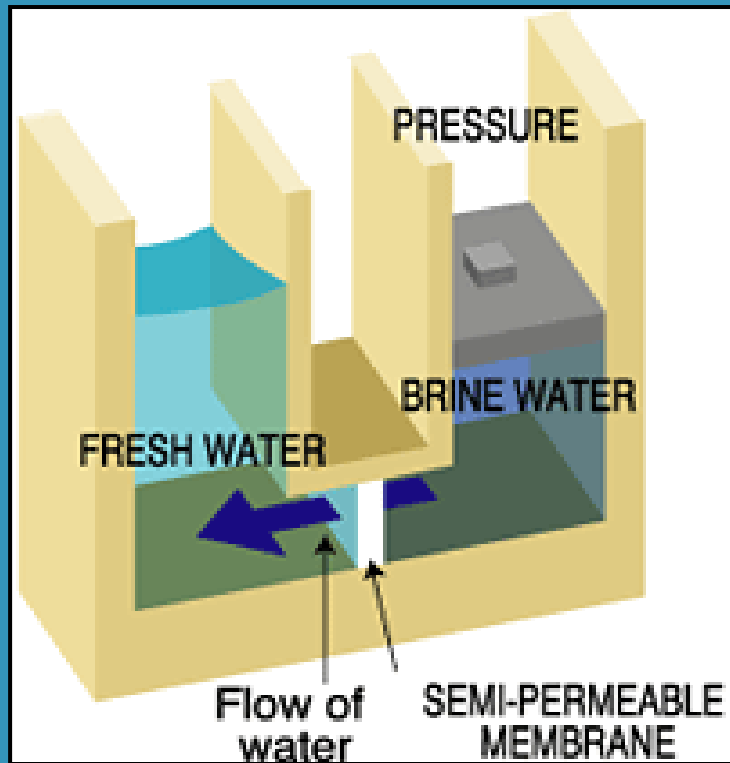


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PRINCIPLE OF REVERSE OSMOSIS PROCESS



Reverse osmosis (RO) is the technology that is used in the water purification process used to remove a large majority of contaminants such as salts contain in seawater by pushing the seawater under pressure through a semi-permeable membrane.



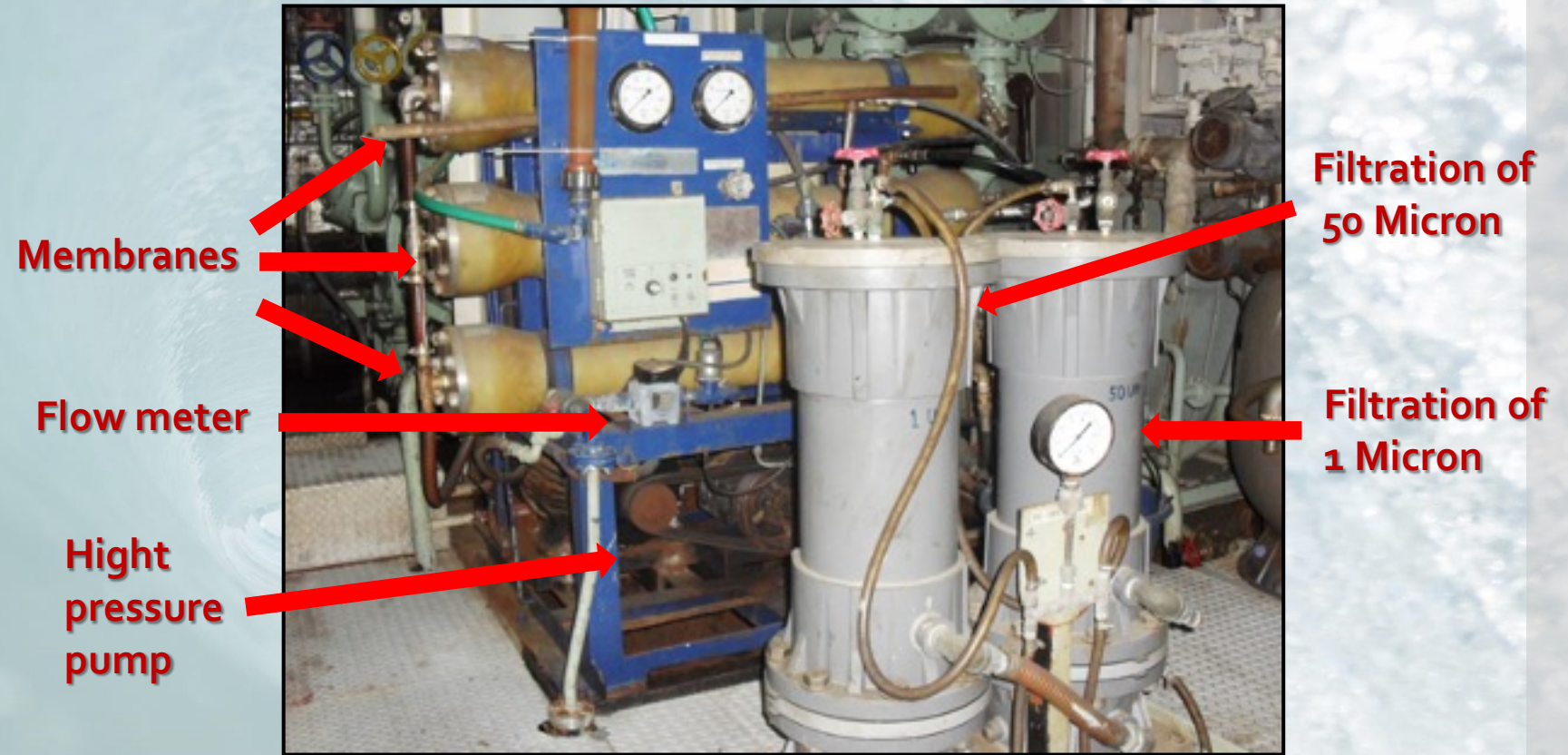
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**REVERSE
OSMOSIS
FRESH WATER
GENERATOR
SYSTEM
ONBOARD
M.V. SEAFDEC**

REVERSE OSMOSIS UNIT

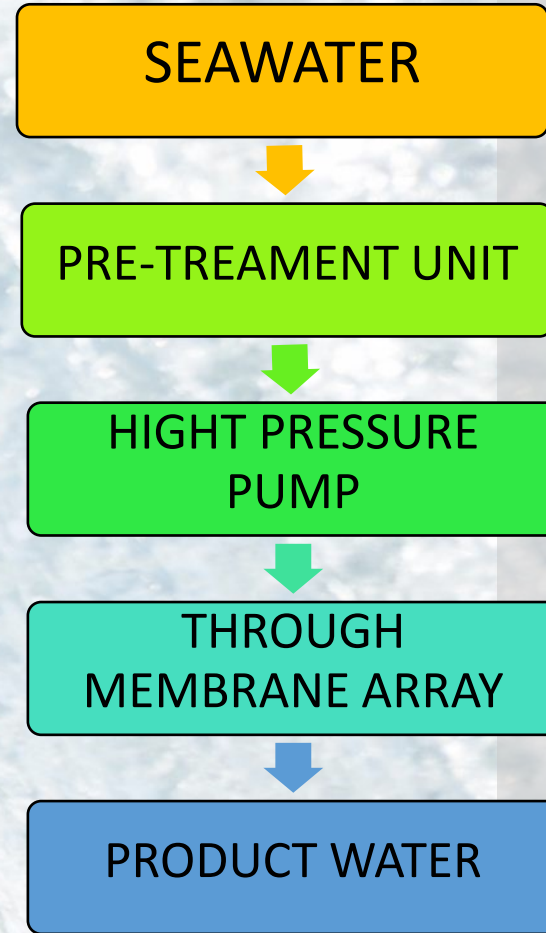
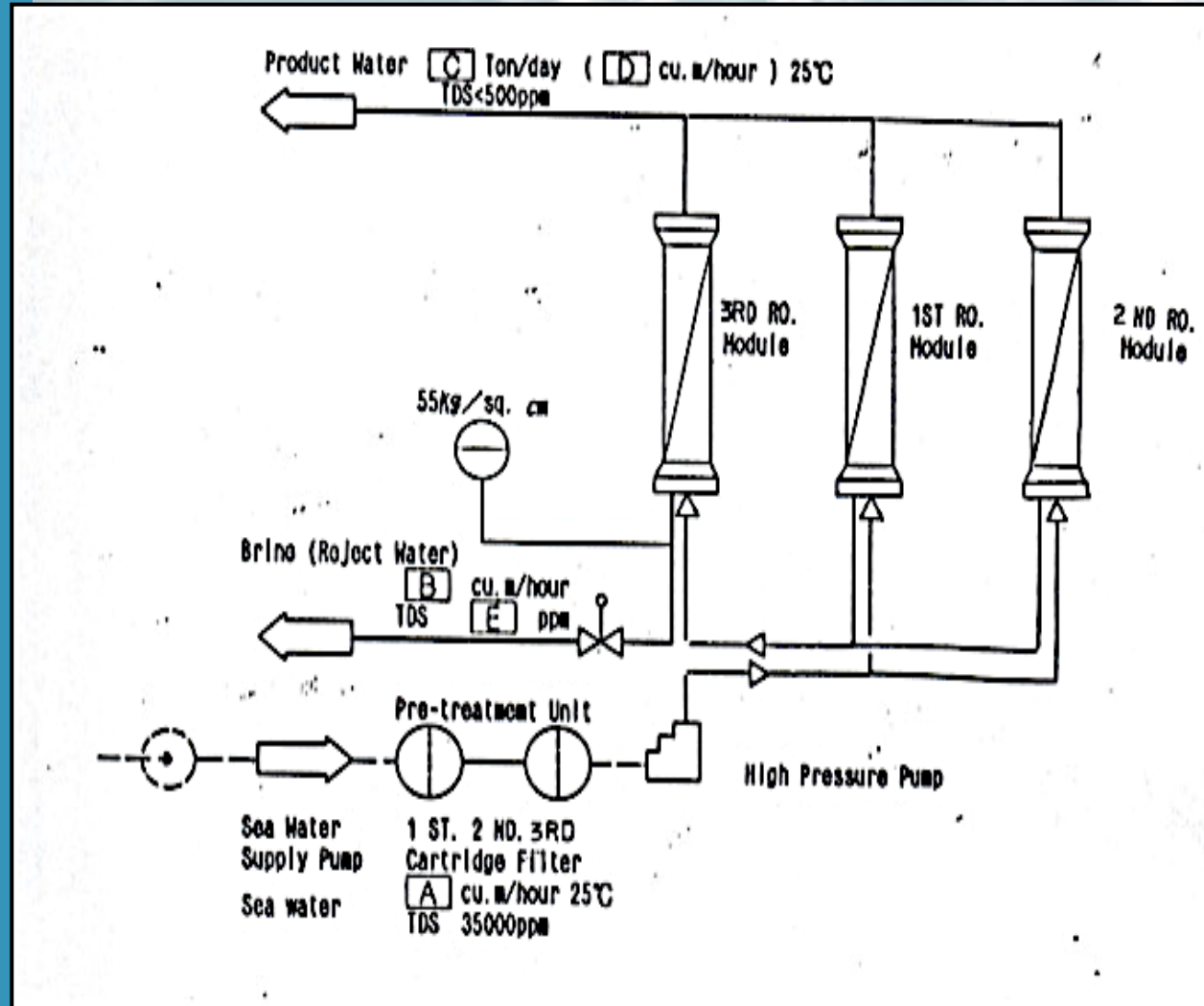


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COST OF DESALINATION WATER BY CUBIC METER UNIT

- Membrane cost is 0.10 baht/liter
- Filter size of 1 micron and 50 micron for 1 set, the cost totally is 0.02 baht/liter
- Electrical cost is 0.15 baht/liter
- Distillation cost 1 liter is 0.27 baht/liter, or 1 ton is 270 baht/m³



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ADVANTAGES

- The energy requirement is low compared to other thermal processes.
- RO systems can be installed on a very small area.
- RO water filter is great for removing commonly found Cryptosporidium in lake, river, and public supply water.
- RO water can plan cruise longer than only storage capacity.
- RO performs a separation without a phase change.
- Low maintenance.



DISADVANTAGES

- RO membrane sensitivity to plugging (particulates), fouling (organic, colloids), piercing (particle, chemical attack) and scaling (CaCO_3) in the long run if not properly protected.
- Need of right pressure (5 kg/cm^2), and right pH for proper ion rejection.
- Not kills bacteria, viruses: RO water purifier does not kill waterborne disease-causing bacteria and viruses. There is high probability that microorganisms can pass through the RO membrane (It is advisable to pass RO water through the UV water purifier to treat microorganisms)
- Membrane sensitivity to back pressure



CONCLUSION

Reverse Osmosis is an effective and proven technology to produce freshwater that is an important application on offshore vessels. This system requires less equipment for this reason the system is easy to operate.

In practices, the vessel operation, freshwater is taken an account very important for ship crew, and machinery are consuming and needs freshwater. To maintain and support the needs of freshwater consumption along with the voyage.

Most of the vessels are installed Reverse Osmosis system to convert seawater to freshwater to supply the needs of ship operation. But in some places not suitable for converse seawater to freshwater by Reverse Osmosis process because of the dept of sea surface (shallow water), seawater contains height contamination for example the coastal area such as in the Gulf of Thailand.



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