

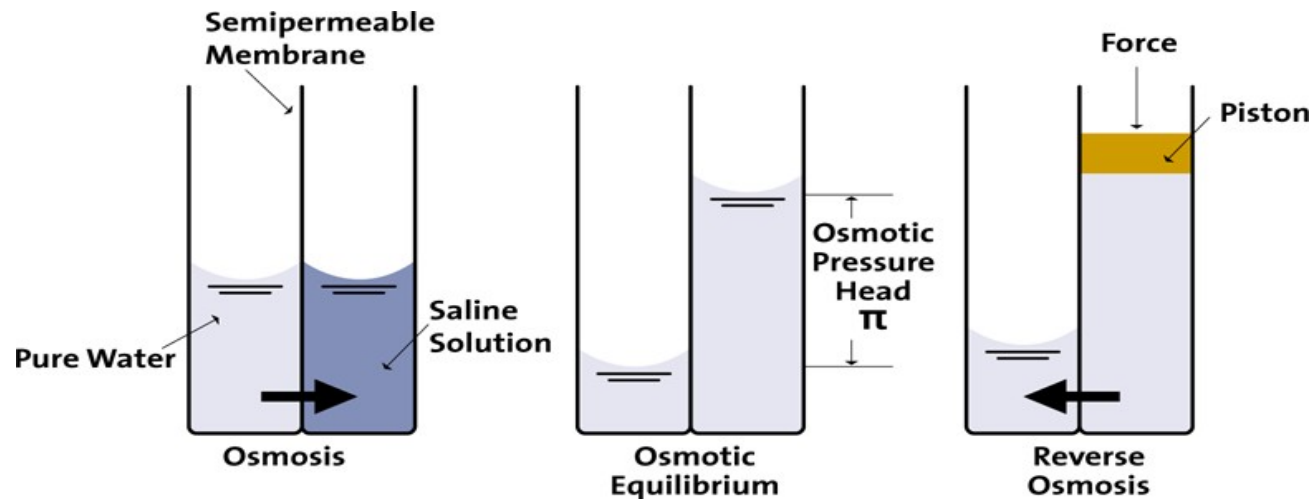
The background image shows a rocky coastline with waves crashing against the shore. The water is white and frothy, and the rocks are dark and jagged. The sky is overcast and grey.

Sea Water Desalination

Sea Water Desalination – Basic information

Sea Water Desalination means to separate the salt from water using the natural process of Osmosis. The principle of Osmosis is reverted by pump pressure to overcome the natural osmotic pressure.

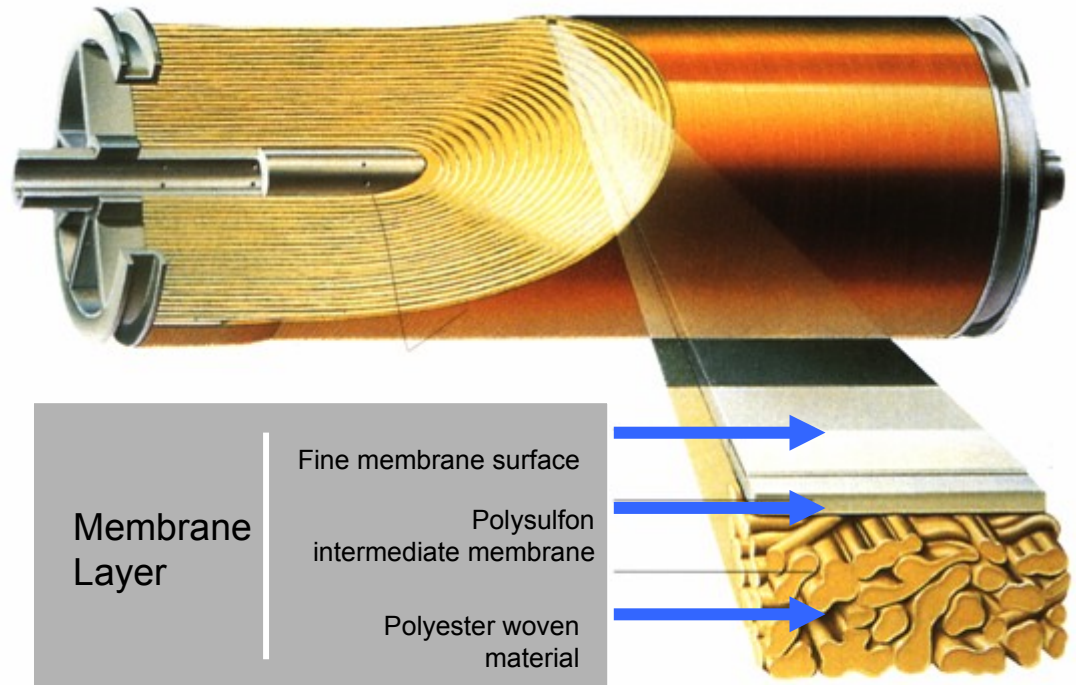
The process is called Reverse Osmosis.



Sea Water Desalination – Basic information

The separation takes place in a so called „Spiral Wound Membrane Module“.

This modules are placed in pressure vessels and driven by high pressure pumps.



Sea Water Desalination – Process

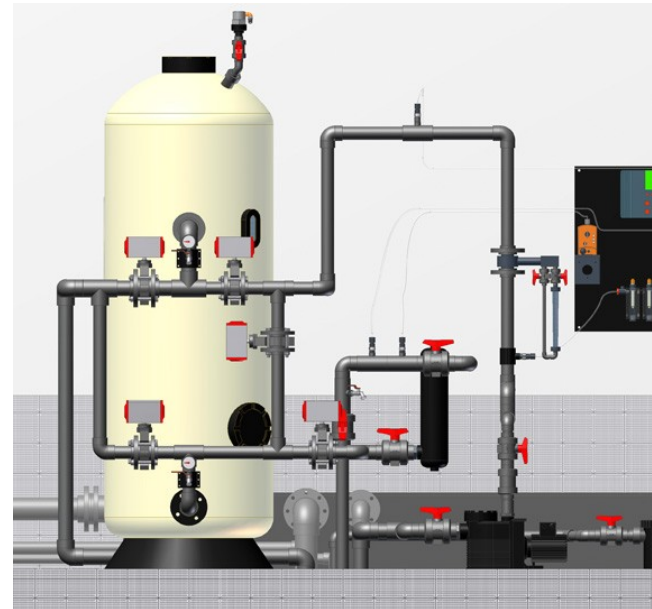
3 steps are necessary to produce potable water out of sea water:

- (1) Pre-Treatment
- (2) Desalination / RO
- (3) Post Treatment



Sea Water Desalination – Pre-treatment

- Wide Mesh Filter
- Multimedia Filter with backwash facility
- Conditioning of the Raw Water (Chlorine, Antiscaling, Acid)
- Sodiumbisulphite (removing Chlorine)
- Cartridge Filter



Sea Water Desalination – Reverse Osmosis Equipment

- Skid mounted
- Modularised arranged in trains
- Skids comprising :
 - High Pressure Pumps with / or without Energy Recovery System
 - Membrane Modules in Pressure Vessels
 - Cleaning Station (CIP)
 - Piping in PVC / PP and Stainless Steel (Duplex or 316L)
 - Measuring Instruments
 - Valves
 - Switch Board, MCC and PLC



Please note: Operation is much easier by using beach wells instead of a sea water intake!



Sea Water Desalination – Post Treatment

- Deacidification Quality Filter
- Conditioning with Chlorine
- Desinfection by Ozon or UV-Treatment



Containerised Sea Water Desalination Unit

Capacity 500 m³ / day
with Energy Recovery System (Pelton Turbine)



Sea Water Desalination – Economics

Specific Investment:

600 to 780 EURO per m³/day without Energy Recovery System

850 to 950 EURO per m³/day with Energy Recovery System

Specific Energy Demand:

6 to 8 kWh per m³ without Energy Recovery System

3 to 4 kWh per m³ with Energy Recovery System

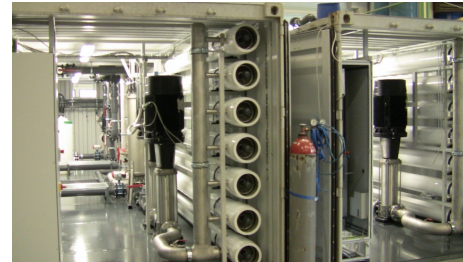
Operational cost: 0.4 to 1.0 EURO/m³

Please note: If brackish water is used instead of sea water Investment cost and Operational cost are much lower!



Selected projects

Description	Capacity [m/d]	Location	Year of erection
Brackish Water Desalination for Steel Factory	2,500	Germany	2005/2006
Seawater desalination for potable water	2 x 240; 1 x 120	Iraq	2002
Seawater desalination for off-shore oil platforms	8 x 50	Iraq	2004
Seawater desalination for Mining Field	2 x 500	Chile	2002
Seawater desalination Hotel supply	1,000	South Korea	2004
Seawater Desalination for Power Plant	3,120	Spain	2001



8 Steps to develop a Sea Water Desalination Project

- (1) Preliminary Projection of Demand, Water Source / Site Conditions,
Availability of Electricity , Financial Resources
- (2) Feasibility and Design Study
- (3) Design of RO and Financial Development
- (4) Design / Plant Review and Tendering
- (5) Decision on Tender and Ordering to an OEM
- (6) Plant Construction
- (7) Commissioning, Performance Check and Start Up
- (8) Operational Training of Staff



Selected Customers and Partners



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