

## Desalination Process:

Desalination plant: is equipment which processes sea water to produce filtered water from salt.

A desalination plant is composed of:

- Water intake from the sea (our pumping system)
- Pre-filtration system
- Reverse Osmosis (RO) process which lead to : Permeate (clean water)  
Concentrate (impurities)
- Clean in place: membrane cleaning system

The main quality characteristic of any sea source water is the TDS factor (Total dissolved solid)

Every 100mg/L of TDS in the source water creates approximately 0.07 bar (1psi) of Osmosis pressure, which will need to be overcome by the pressure applied to the saline water fed to the RO membranes.

Sea water that contains 35,000 mg/L (35g/L) of TDS will create approximately 24.5 bars (355 psi)

Pressure vessels:

Is the casing in which circulate the sea water and contains the membrane which filtrate the water from the salt using the RO process.

RO membrane elements are installed inside pressure vessel ( housings) in a series of six to eight membranes per housing.

A typical vessel containing seven membranes is about 8m length.

The length of a membrane is typically 1m.

Differential pressure recommended by the membrane manufacturer is four bars (58psi)

The minimum and maximum feed flows per individual 8" vessel are recommended to be 10-17m<sup>3</sup>/h.

## Membrane vessel Classification:

**By pressure class:** SWRO pressure vessels with operating pressure of 42 to 105 bars.

**By diameter:** they are produced in standard membrane diameter of 63 mm (2.5"), 102 mm(4"), 200 mm (8") and 400 mm (16").

**By material:** the most common vessel material is fiberglass reinforced plastic (FRP).

For specific industrial applications, where the pressure vessels have to be sanitized and or operated at high temperature stainless steel pressure vessel are more suitable.

The higher the source water salinity and brine concentration, the higher the quality stainless steel is required to prevent RO systems piping from corrosion and to maintain its longevity.