



Osmotic Solutions

Engineered Water Treatment Systems

Reverse Osmosis is one of the most popular and widely used water purification process within the current market. Allowing an extremely high level of purity with a relatively low capital cost and even less user intervention, most Reverse Osmosis Systems are entirely automatic.

Reverse Osmosis is always a multi stage process and doesn't usually consist of just one piece of equipment, it should be viewed of as a system with very specific inlet and outlet parameters, expert guidance and a site survey should always be sought before considering reverse osmosis for your application.

Reverse osmosis is a pressure driven filtration process providing high purity water (usually less than 30 microsiemens) without the need for regeneration or downtime and is often used as a replacement for ion exchange.

Another interesting fact about RO is that the water it produces is completely sterile thanks to the small pore size within the RO membrane. Obviously the wider system must be considered in order to maintain sterility, but RO may be an excellent choice for removal of bacteria and endotoxins from otherwise useable water source.

Reverse osmosis works by forcing incoming water across a semi permeable cellulose acetate membrane at very high pressures, this could be as high as 40 bar in some systems, although most commercial system operate under 18bar.

Due to the membranes construction, it allows permits pure water to pass through and a limited amount of ionic impurities, this makes the permeate, or the purified water stream.

The majority of the impurities (95-99%) remain on the "dirty" side of the membrane, where a constant flow is maintained to drain. This is the reject or concentrate flow and usually represents around 25% of an RO units overall water consumption. Although many sites are now finding uses even for this "dirty" water.

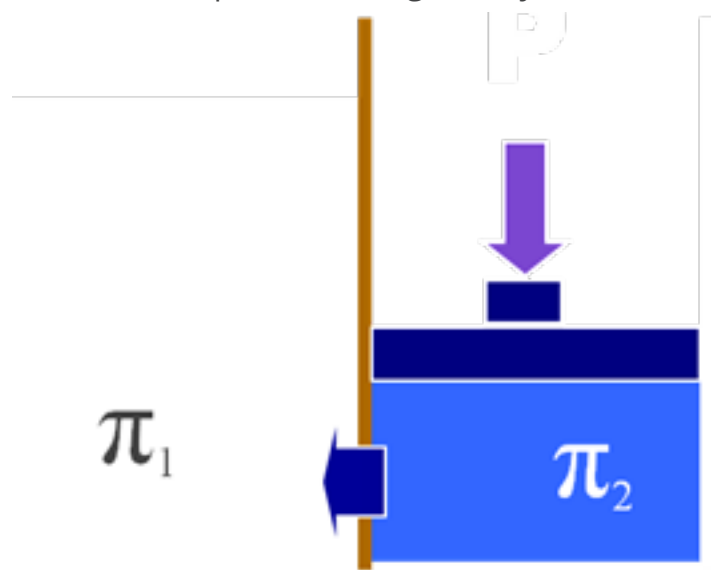
Reverse Osmosis can be represented by the diagram on the left, where;

π = Osmotic Pressure of water

P = Applied Pressure to water

By applying pressure we are rendering $\pi_2 > \pi_1$

This shows that when a pressure greater than the osmotic pressure is applied to a solution, it can be forced to pass "backwards" through a membrane, concentrating the impurities on one side of the membrane with pure water on the other.



This is a reversal of the naturally occurring osmosis where water will move from an area low in impurities across a membrane to an area high in impurities and is an essential cellular function

RO units began life in process applications where traditional ion exchange was not an option, although are now found across industry in applications ranging from boiler/cooling tower feed, to water for kidney dialysis to the purification of drinking water and rainwater harvesting.

Some of the main benefits of an RO system include:

- Continuous supply— no downtime for regenerations
- Normally no chemicals required
- Removal of up to 99% of ionic impurities
- Removal of non or little charged species such as endotoxins, bacteria and viruses
- Removal of uncharged colloidal material
- Removal of organics (MW >200 approx)
- Low maintenance requirements

All the RO units we offer are fully wet tested before delivery to site and can be provided with a range of controls to suit your exact needs.

Full systems can be offered skid mounted to avoid site work, containerised for outdoor location or as individual components for a fully integrated site build.

We offer standard systems ranging from 50litre per hour output to 30 m³/hr output, with custom designed plants for any flowrates above this

Systems can be provided with any or all of the following features

Inverter driven pumps,

Programmable outputs

Onboard CIP

Permeate flushing assemblies

Concentrate recovery stage

Twin Pass for higher purity

Antiscalant dosing

Ultra low pressure membranes reducing energy consumption by up to 49%



Please refer to the case study for a sample system including pricing