

Water Treatment



Engineering & Construction

**Reverse Osmosis
RO BWP – BWD – TWD – SW Mod.**

OVERVIEW

Reverse osmosis represents, nowadays, the most convenient and the safest technique for desalination of different kinds of water.

This treatment is replacing other technologies for water desalination, thanks to the excellent combination between quality results and low operating costs.

Advantages

Reverse osmosis also guarantees low energy consumption and reasonable expenditure of chemical products.

Furthermore, the waste water parameters fall within the sewage limits, therefore resizing more and more the problem of disposal of eluates (for example for softeners and ion exchange resin demineralization units).

HOW IT WORKS

Reverse Osmosis is the process that occurs when a saline solution comes into contact with a membrane permeable to water (and not to dissolved salts) at a pressure exceeding the osmotic pressure of the solution itself.

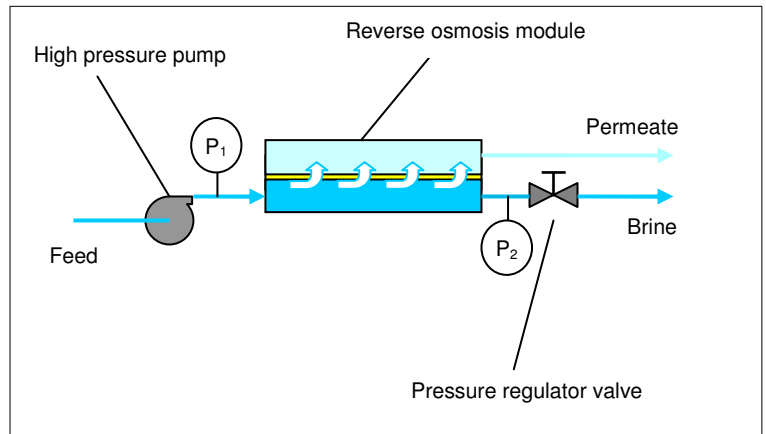
The passage from water, poor in salts (permeate), occurs through the membrane, whereas on the outside of the membrane a waste water rich in salts (brine) is obtained.

$$\text{Recovery factor} = \frac{\text{Permeate}}{\text{Feed water}} \times 100$$

P_1 = Module feed pressure

P_2 = Brine pressure

$$\Delta P_{RO} = P_1 - P_2$$



Here below is a list of the main parameters used in the planning stage of reverse osmosis and desalination processes:

- Salinity of the water to be treated
- SDI
- Temperature of the water to be treated
- Hardness
- Recovery factor
- Alkalinity
- pH

The comprehension of the water characteristics must be added to these essential factors in particular, in order to improve a possible pre-treatment, it is fundamental to verify the presence of :

- Suspended solids
- Polluting metals, such as iron and manganese
- Bacterial concentration
- Chlorine or oxidizing agents in general (except oxygen)
- Organic substances, sulphides, oils.

PRE-TREATMENT

Before the reverse osmosis section, it is important to determine the most suitable "pre-treatment" based on the characteristics of the water to be treated in order to guarantee the greater operating continuity of the system and reduce washing frequency. A correct pre-treatment prevents relatively rapid lodgement of the membrane due to grime and/or physical impurities, lodgement due to precipitation of encrusting salts and/or metals, bacterial proliferation, contact with oxidising agents.



Example of a reverse osmosis system complete with pre-treatment: bi-layer filtration, dosing of chemical agents.

USES

- Brackish water desalination to obtain drinking, irrigational or industrial water
- De-mineralization of well or network water for industrial use (thermal power stations, food, pharmaceutical, electronics industry etc.).
- Sea water desalination to obtain drinking water.

OUR STANDARD PRODUCTION

Our production of reverse osmosis units for water desalination covers a wide range of different solutions, according to:

- the type of water to be treated, tap, brackish or sea water;
- the type of use, drinking, irrigational or industrial water ;
- the productive capacity from 200 ltr/h to 25 m³/h of permeate, for brackish or tap water, and from 10 to 2000 m³/g for sea water.

The desalination units operate, efficiently, in a continuous way, so the necessary productive capacity is given from the daily need of permeate divided by the 24 hours that the unit is operating. It is advisable to have an accumulation tank of the produced permeate.



Mod. RO BWP

Used for the brackish water desalination to produce drinking water or water for irrigation. According to the complete analysis of the waters to be treated, a suitable pre-treatment is necessary. The units for drinking water production can require a mineral salt dosage unit to restore the pH, hardness and alkalinity, and a final disinfection.

The following models are available :

BWP 200 – 2200: 8 models with 4" membranes, for production from 200 l/h up to 2200 l/h;

BWP 2500 – 25000: 7 models with 8" membranes, for production from 2,5 m³/h to 25 m³/h.

Mod. RO BWD

Used for demineralized water production from brackish water for industrial use. According to the complete analysis of the waters to be treated, a suitable pre-treatment is necessary. It is possible to foresee a suitable post-treatment depending on the specific use.

The following models are available :

BWD 200 – 2200: 8 models with 4" membranes, for production from 200 l/h up to 2200 l/h;

BWD 3000 – 25000: 7 models with 8" membranes, for production from 3,0 m³/h to 25 m³/h.

Mod. RO TWD

Used for demineralized water production from tap water for industrial use.

The following models are available :

TWD 200 – 2200: 8 models with 4" membranes, for production from 200 l/h up to 2200 l/h;

TWD 3000 – 25000: 7 models with 8" membranes, for production from 3,0 m³/h to 25 m³/h.

Mod. RO SW

Used for sea water desalination – purification, with capacity up to 5000 m³/d and on specific planning to 50000 m³/d.

The following models are available:

SW 100 – 2500: TDS 35.000 mg/l , T = 20°C;

SW 100 – 2500: TDS 45.000 mg/l , T = 25°C;

NON STANDARD PRODUCTION FOR OTHER APPLICATIONS

WTEC® produces turn-key reverse osmosis plants based on specific request, with capacities greater than standard and for particular applications such as the food, pharmaceutical, electronics industry, etc.

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