

Reverse Osmosis Systems

W A T E R T R E A T M E N T S

Gemina[®]

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Reverse Osmosis Systems

HOW IT WORKS

Natural or direct osmosis consists in dissolving a solvent (usually water), and a solute. Usually solutes are composed of one or more chemical compounds (salts).

If we place pure water on one side of a membrane and on the other side water loaded with mineral salts, the water will flow from the less concentrated solution (pure water) to the more concentrated solution (water with salts) until the pressures are balanced. The difference in manometric height between both levels is what is known as the solution osmotic pressure.

Technology has allowed reversing this natural principle. If we apply a pressure higher than the natural osmotic pressure on the water with salts side (brackish water), the clean water will go through from the brackish to the pure water side.

The osmotic pressure will depend on the type of solute and its concentration, although the pressure usually ranges between 5 and 60 bars.

Following the reverse osmosis system, many concentration and/or separation processes can be performed. By applying this system to water, 95% of separation of dissolved salts can be achieved, therefore obtaining a saltiness reduction from brackish waters and from the sea.

TERMS DEFINITION

- **Filtering:** Osmosis water, with lower concentration (low saltiness) than water feeding the system.
- **Concentrate:** Water that does not go through the membrane, and remains on the higher concentration side. This concentration ends up being higher than the water feeding the system.
- **Recovery (Z):** Ratio measuring the volume of filtered water versus the volume of feeding water. For example, a system working at 80% will produce, for each 100 parts of feeding water, 80 parts of filtered water and 20 parts of concentrate.
- **Concentration Factor:** Number of times that rejected water is concentrated, or concentrate respect to feeding.

$$FC = \frac{1}{1-Z} = \frac{1}{1-0.8} = 5$$

So, for a recovery of 80%, the concentration factor is 5.

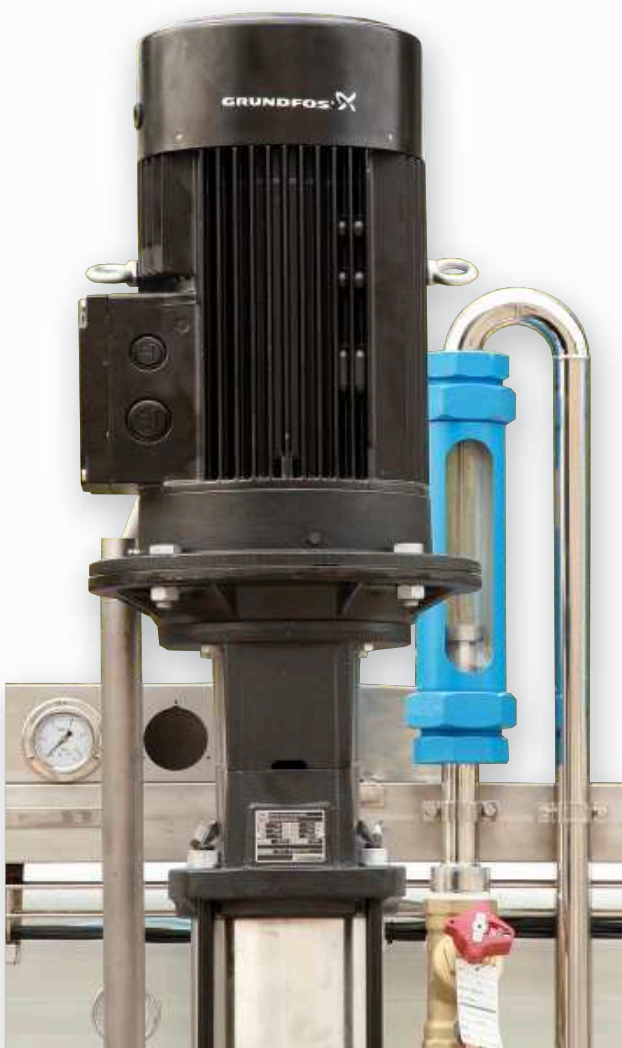
- **STC (saltiness Total Coefficient):** Total amount of salts.
- **Salt Or Ionic Escape:** Ratio between the filtering salts.

$$\% \text{ Ionic Escape} = \text{ppm} \frac{\text{Filtering}}{\text{ppm}} \text{ Feeding}$$

- **Salt Rejection:** Salt elimination percentage.

$$\% \text{ Salt Rejection} = 100 - \% \text{ Ionic Escape}$$





AVANTAGES

- Eliminates suspended matter and microorganisms.
- Eliminates solids dissolved in water.
- Performs the purifying process continuously in a single stage.
- Very simple technology.
- Less investment compared with alternatives such as evaporation.
- Modular and expandable project.
- Reduction of purges in boilers.
- Sodium-free food products.
- Increases agricultural production.

APPLICATIONS

Osmotic water has multiple applications within the food industry, among them we can highlight:

- Food manufacturing.
- Cooling towers
- Boilers.
- Heat exchangers: it avoids lime deposits.

CHARACTERISTICS

- Wide range of membrane types, adapted to each type of application.
- Fully automated systems, calculation of parameters such as conductivity, flow and temperature.
- We supply all previous treatments such as sand filtration, iron removal, activated carbon deodorization, and posterior treatment such as chlorination, ultraviolet sterilization, re-mineralization, etc.

OSMOSIS PLANTS, CONDUCTIVITY AT ENTRY <1500 mS

Model	Yield (litres/hour)	Phases	System	Thrust	Control
RO-A-1000-A	1000	1	Membranes	Multicellular	Semi-automatic
RO-A-2000-A	2000	1	Membranes	Multicellular	Semi-automatic
RO-A-4000-A	3000	1	Membranes	Multicellular	Semi-automatic
RO-A-8000-A	8000	2	Membranes	Multicellular	Semi-automatic
RO-A-12000-A	12000	2	Membranes	Multicellular	Semi-automatic
RO-A-16000-A	16000	2	Membranes	Multicellular	Semi-automatic
RO-A-22000-A	22000	2	Membranes	Multicellular	Semi-automatic

MachinePoint®

Food Technologies

MACHINEPOINT FOOD TECHNOLOGIES was created as a result of a joint-venture between **MACHINEPOINT GROUP** and **GÉMINA**.

MACHINEPOINT FOOD TECHNOLOGIES designs, manufactures and integrates lines, equipment and processes for the food industry, more specifically for the beverage processors, the dairy industry and processors of fruits and vegetables.

MACHINEPOINT FOOD TECHNOLOGIES belongs to an international group specialized in industrial equipment for plastic, packaging and food industries.

The group is headquartered in Spain (Valladolid) and has sales offices in Turkey, Mexico, France, India and North Africa. The engineering center is also located in Spain (Murcia). It is at the engineering center where we manufacture our equipment and have our R & D + I department.

GEMINA PROCESOS ALIMENTARIOS S.L. is a leading equipment manufacturer that provides innovative solutions for the food industry. It has over 25 years experience in designing, manufacturing, assembling, automating and implementing lines and processes.

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