



# Multi-Effect Plate Distiller

## MEP Series



### Application

Conversion of seawater through Multi-Effect Distillation for production of high purity water for domestic and industrial use. Applicable on Cruise Liners, Oil & Gas Industry, Power Plants, Industries and domestic water production.

### Features

- Simple design
- Enhanced performance by means of plate type evaporator/condenser
- Titanium heat transfer surfaces
- Non-coated materials resistant to seawater and brines
- Easy access for service
- Simple and reliable automation and control

### Benefits

Lowest overall water production costs:

- Based on waste heat recovery
- Simple raw water pre-treatment
- 25 years economical life
- Lowest operation and maintenance costs

Highest availability:

- > 90% of yearly hours

Simple operation & maintenance:

- Full access to evaporator heat transfer surfaces for manual cleaning
- Low educational requirement for operators

High distillate purity:

- Conductivity < 10  $\mu\text{S}/\text{cm}$
- Lowest costs for technical water treatment

### Capacity range

Our product range covers capacities from 200 up to 10,000 m<sup>3</sup>/day per unit. Based on standard components and a modular concept, each unit is custom-designed for each particular installation.

### The process

The Multiple Effect Distillation Process consists of a series of evaporation and condensation chambers called effects (1). Each effect is fitted with heat transfer surfaces based on plates - a patented proprietary design of Alfa Laval Desalt. In the plate channels, seawater is first evaporated and then condensed into pure distillate.

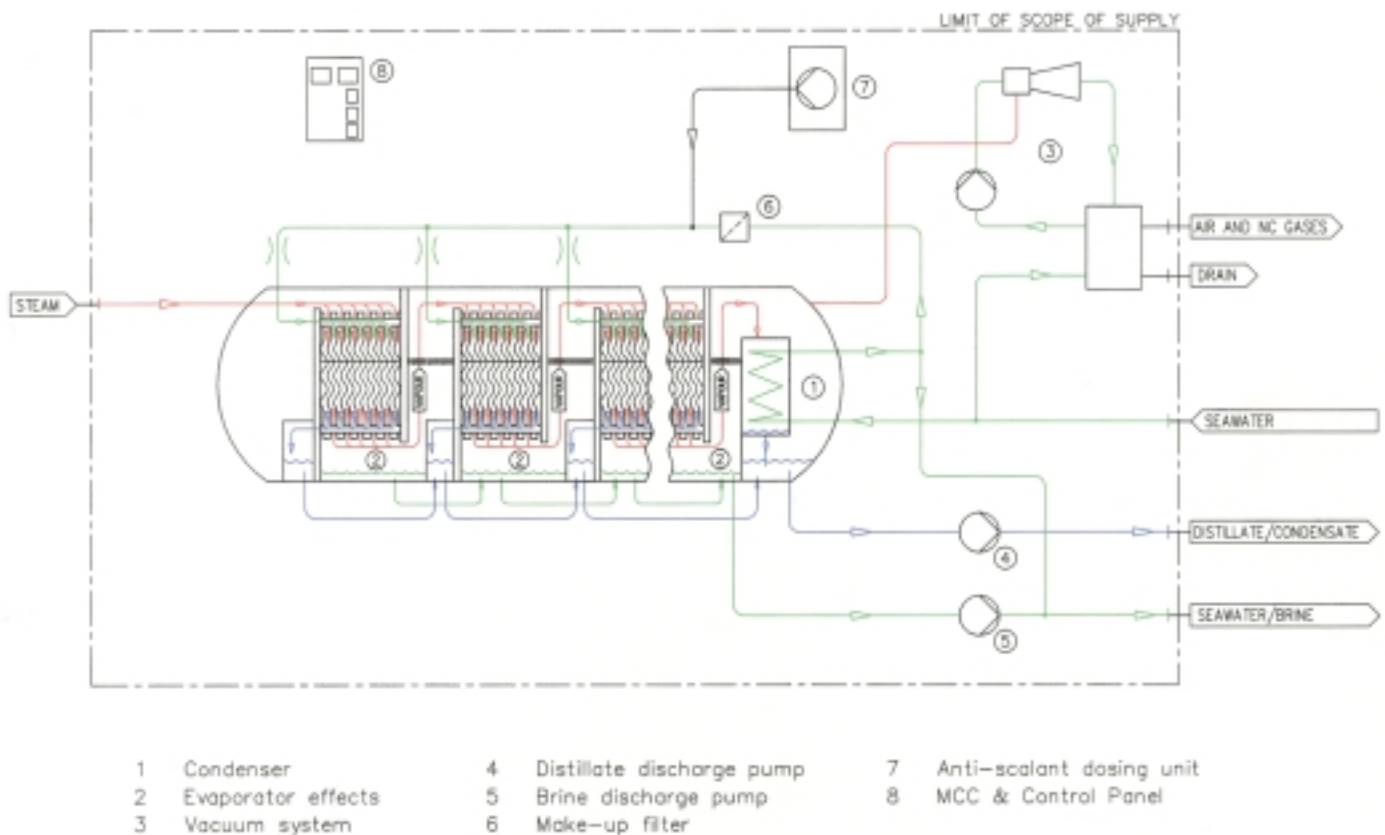
By maintaining a partial pressure difference across the effects, the process is able to yield maximum efficiency from available low-grade thermal energy sources. The economic performance and also the capital cost of the system is proportional to the number of effects contained in a unit.

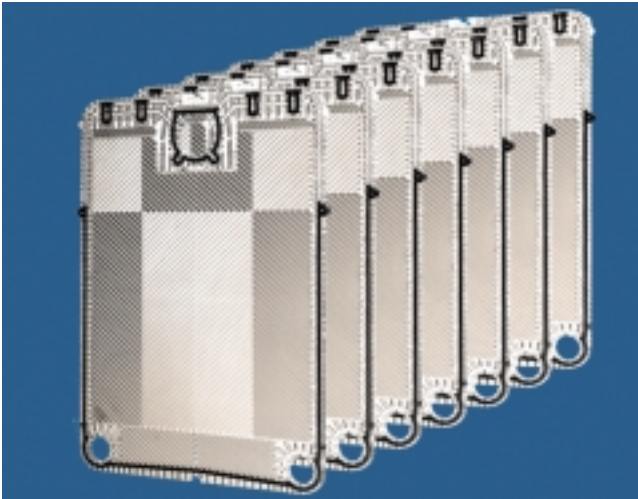
Seawater is pumped into the system via an external pump to a condenser (2). Here, the seawater acts as a coolant removing the heat supplied to the system and thereby maintaining the proper energy balance. In the condenser the vapour produced in the last effect is condensed into pure distillate.

As vapour is condensed, heat is transferred to the seawater. The preheated seawater is then delivered by the feed-water pump (3) to the various effects in the unit for evaporation. The seawater flows towards the evaporation side of the plate stack in an even and controlled falling film. The special design of the plate surfaces ensures an even flow with no dry areas in order to reduce scaling to a minimum.

On the evaporation side of the plate stack, the seawater is partially evaporated by the latent heat from the condensation side of the plate. The vapour thus obtained is passed through a demister for separation of salt droplets prior to entering the condensation side of the heat exchanger plates. Here, the vapour condenses into distilled water while yielding its latent heat through the plate to the evaporation side. The process is repeated in all effects. Finally, distillate and brine are extracted from the last effect.

The evaporation is done at subatmospheric conditions and vacuum is created and maintained by a venting system. The venting system can either be a water driven ejector (4), as shown on the flow diagram, or a steam driven ejector. The venting system evacuates the plant at start-up and extracts non-condensable gases during operation of the plant.





### The Plate Technology

Alfa Laval's distillation equipment consists of a number of titanium plate heat exchangers, which have been specifically designed for this purpose. All plates are identical; with two gasket configurations being utilised in order to form both a condensing and an evaporating plate channel.

The plates are fitted into the evaporator vessel, forming a complete plate pack.

Compared to traditional shell and tube technology, the Plate Technology gives higher thermal efficiency. The material used for the plates is Titanium grade 1, which is considered the ultimate material concerning corrosion resistance in seawater environment (especially at elevated temperatures).

### Full access to the Heating Surfaces

In the Alfa Laval plate concept, the plate pack can easily be disassembled for inspection and cleaning. In fact, the entire plate pack can easily be removed from the vessel through man-ways.

In comparison, traditional shell and tube plants have limited access for inspection. Mechanical cleaning is practically impossible. Should this be required in these systems, tubes will have to be removed and replaced, thereby incurring high costs.



### Easy Removal of Scale

If calcium carbonate scaling occurs in an Alfa Laval desalination unit, it is easily removed by chemical cleaning with a mild acid solution.

However, should calcium sulphate scaling take place, most likely through mis-operation, disassembly of the plate pack can be carried out, allowing the scale to fall to the bottom of the desalination vessel.

This means that the desalination unit can be brought back on line and up to rated capacity with minimal downtime and virtually no expense.

Should this happen with traditional shell and tube units, the downtime would be extended, expensive cleaning chemicals used and virtually no guarantee that the unit will produce rated capacity. Added to this, if the scaling is significant, tubes will have to be scrapped and replaced.



The illustrations shown above are from a plant which was deliberately scaled up with calcium sulphate in order to successfully test and prove 100% cleanability.



### **Alfa Laval in Brief**

Alfa Laval is a leading global provider of specialized products and engineered solutions.

Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuff, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.



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### **How to contact Alfa Laval**

Contact details for all countries are continually updated on our website. Please visit [www.alfalaval.com](http://www.alfalaval.com) to access the information direct.