Process water from the ocean

Coastal Aruba Refining Company N.V. **Case story**

On the Caribbean island of Aruba, off the coast of Venezuela, sea water – and the recreational opportunities it provides – plays a major role in a tourist industry that attracts more than 540,000 tourists every year and employs more than half the population.

By contrast, the island's second-largest industry is oil refining – processing crude oil from all over the world. This depends heavily on the availability of a good supply of clean, pure fresh water from which to produce the steam needed for many refining processes.

Scarce into plentiful

Salt water is, of course, a plentiful natural resource on the island, whereas fresh water is a scarce commodity. Desalination is therefore the ideal way of turning the abundant salt water from the sea into fresh water for use in industry.

The Aruba refinery was originally built by Standard Oil in the 1920s and ownership subsequently passed to what is now Exxon. Today, the refinery is owned by Valero Energy Corporation of San Antonio, Texas, and is still one of the major oil refineries in the Caribbean.

To meet its needs for large quantities of process water, the Aruba refinery installed an Alfa Laval plate-based MED (multiple effect distillation) thermal desalination plant, and can now rely on a daily supply of 6,000 m^3 of process water – with less than 5 ppm of total dissolved solids.

The Aruba refinery installed a turnkey Alfa Laval TVC-6-6000 desalination plant in which the evaporator vessel is made of stainless steel and the heat transfer area is in grade 1 titanium. These are the materials that ensure the best possible protection against sea water corrosion.

Easy to operate

The management and staff of the Aruba refinery are extremely pleased with how easy it is to operate the Alfa Laval desalination plant. Maintenance requirements are kept to a minimum, and little effort is required to start up the plant after cold conditions. It only takes two hours to reach 100% production. Operators note that the plant has an impressive ability to automatically regulate the process during operation and to respond quickly to changes in operating set points.

Alfa Laval multiple effect desalination systems
Alfa Laval multiple effect desalination systems – of both thermal vapour compression (TVC) and multiple effect plate (MEP) types – are thermally driven and employ either

- low-grade heat sources in the form of steam or hot water, where waste heat from power plants and/or refinery processes can be recovered for water desalination.

or

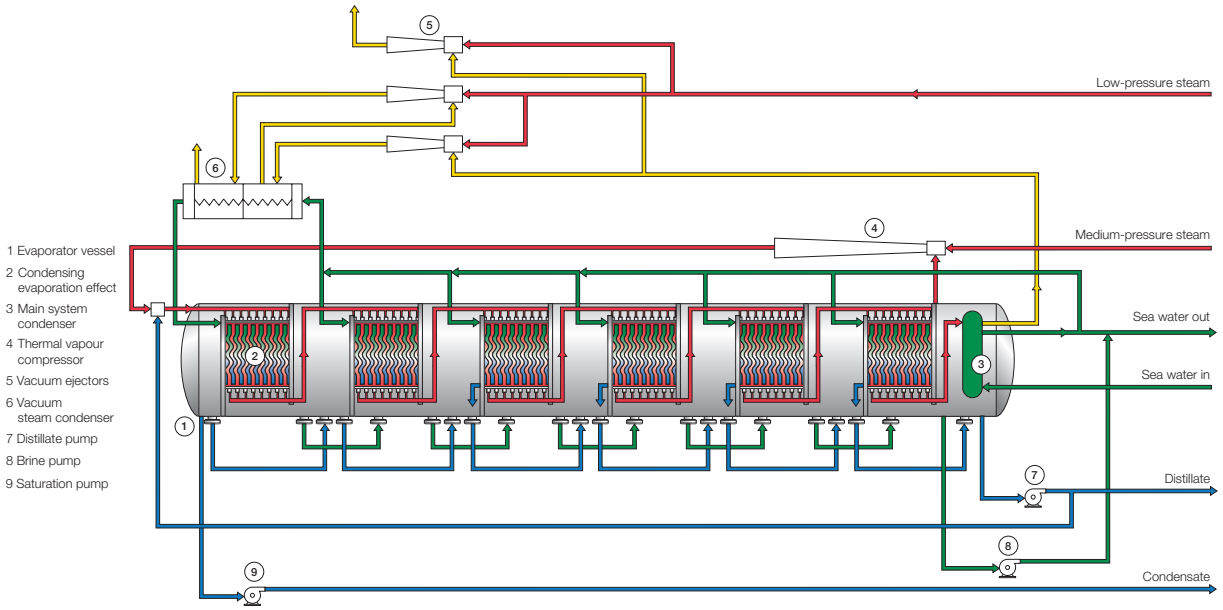
- live steam supplied under pressure from boilers or other processes to drive a thermal compressor.

Low-grade heat is extremely cost-effective, because the energy is practically free. Live steam, on the other hand, increases its overall thermal efficiency when it is integrated into a multiple effect system.

The Alfa Laval plate desalination heat transfer area in Titanium Grade 1

The advantages of this Alfa Laval plate desalination plant compared with a conventional tubular solution include

- modular design
- high thermal efficiency
- high-grade materials as standard
- more compact installation
- controlled thin falling film with no dry spots
- less tendency towards scaling
- direct manual access to the entire heat transfer surface.



The Alfa Laval plate thermal vapour compression (TVC) process

Plant Main Data:

Water desalination capacity:	6,000 m^3/day
Type of configuration:	Multi effect distillation with thermo vapour compression
Delivery Basis	Turnkey
Application:	Boiler make-up and process water
Raw water source:	Sea water
Number of effects:	6
Heat transfer surface material:	Grade 1 Titanium
Evaporator vessel material:	AISI 316L stainless steel

PPI00062EN 0409

How to contact Alfa Laval
Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com